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THE INFLUENCE OF THE BEET CYST NEMATODES ON THE DEVELOPMENT OF A ROOT ROT AT SPRING RAPE

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Interaction between the quantity of beet-cyst nematodes and a root rot of a spring rape is determined. The coefficient of correlation between the quantity of juvenile nematodes in the roots of plants in the phase of the second pair of the true leaves and in the same phase evened spreading disease - 0,65; in the phase of stooling - 0,69; during the development of the disease in the phase of the second pair of the real leaves - 0,57. Strengthening the influence of phytopathogenic mycromycetes from the genera of Fusarium at the presence of Heterodera schachtii Schmidt in the soil is proved.

Keywords: *a root rot of a spring rape, Fusarium, Heterodera schachtii, beet-cyst nematodes*

A root rot of spring rape is caused with the soilborn fungi from genera of *Fusarium* Link, *Rhizoctonia* DC and *Pythium* Pringsh. At the same time the beet-cyst nematodes are wide-spread in sowing of a spring rape, as a cruciferous culture. Many researchers report that the destruction of the cells of the root by the nematodes creates conditions for penetration and development of saprophyte fungy and bacteria, that stimulates reproduction of population of mykophagous nematodes and saprophagous, which feeds on fungy, rotten vegetable fabric and bacteria, supporting thus development of diseases [1, 2, 5, 6, 7, 8]. So for example, it is set that the amount of plants of sugar beets of staggered is increased the damping-off seedlings on 12,3-20%, and development of disease on 5,5% at the presence of *Heterodera schachtii* [4]. The plants of sugar beet that ere infected by *H. schachtii*, are more colonized by mycelium of *Rhizoctonia solani*, than without nematodes [2]. In laboratory conditions at the compatible action of beet-cyst nematodes and fungy *Fusarium* necrosises were

observed at 25 % seedligs of sugar beet, fungy, from *Phoma* – in 5 %, and at their compatible action 40 % of plants had expressed symptoms of diseases [9]. For this reason it is important to learn the influence of *H. schachtii* on development root rot of spring rape.

Materials and methods of researches. The researches with the artificial infectious backgrounds are made in the conditions of VP NUBiP Ukraine the "Agronomical experimental station" of Pshenichne v. The artificial infectious background of eelworms was created by bringing the soil with cysts of nematodes, used calculation is about 360 cyst / 100 g of soil. For the infection of the soil with root rot was used grain which became overgrown with mycelium of fungy [12]. Cross-correlation regressive interaction was studying on the model areas of the production sowing in the conditions of sugar beet production of Kagarlick of Kyiv region. Spring rape of "Kalinivskiy" sort was used for researches.

Statistical treatment of results is executed by MS Excel 2010.

Results of researches and its discussion In our studies, bringing cysts *H.schahtii* to the soil (in natural infectious background) resulted increasing of disease spread to 45.5% (Table 1), which is 1.6 times higher, and disease development in 2.1 times (40, 9%) compared to the control. In stooling phase root rot also had more intensive development: the spread of disease was higher in 2.8 times, and development was in 1.7 times higher compared to the version without nematodes. Separate influence of pathogenic fungi *F.avenaceum*, *F. gibbosum* and *F. sambucinum* was less effective and root rot was developed at the level of the control variant or below it. The simultaneous influence of fungi and nematodes caused to the increase in the spread of the disease in phase first pair of true leaves at least 5%, and the disease has increased by 2-12%. At *H.schahtii* + *F. gibbosum* root rot appeared more intensive in several times, so spreading of disease increased from 12.5 to 46.8%, disease progression increased from 5.6 to 24.3%. Similar intensive progress of the disease was observed for this option at stooling phase also, meanwhile for other embodiments plants were less affected: the spreading and development of root rot decreased for 3-9%. It is known that nematodes can be suppressed by such fungi

as: *Fusarium oxysporum*, *Gliociadium* spp., *Scopulariopsis* spp., *Fusarium* spp. and *Verticillium* spp., parasitizing their eggs [3].

1. Influence of fungi and nematodes on the development of root rot of spring rape

Infectious background	Field germination, %	First pair of true leaves		Stooling	
		P*,%	R*,%	P,%	R,%
Control (natural infectious background)	92,4	27,6	18,9	23,5	13,0
H.schahtii + natural infectious background	82,8	45,5	40,9	65,3	22,0
F.avenaceum	86,0	28,9	16,1	45,3	12,5
H.schahtii + F. avenaceum	92,0	34,2	13,5	36,9	24,6
F. gibbosum	92,9	12,5	5,6	14,5	8,6
H.schahtii + F. gibbosum	77,5	46,8	24,3	78,9	27,6
F. sambucinum	85,7	14,6	8,9	28,9	25,6
H.schahtii + F. sambucinum	70,0	19,3	11,3	28,1	15,7

** P - The spread of the disease; R-Development of disease*

It should be noted that influence of *H.schahtii F. avenaceum* and *F. sambucinum* were less pathogenic than the natural background infectious enriched with *H.schahtii*. Overall natural infectious background contains dozens pathogens, it is labile and tolerant to soil and climatic conditions during the growing season and much higher than infectious backgrounds that were artificially created and enriched by one pathogen-micromycetes [10].

We applied correlation regression analysis (Table. 2) to examine interaction between the contamination of the soil and plants rape beet with cyst nematode and the development of root rot. In the field conditions between the initial level of nematode infestation of the soil beet and the sugar beet development damping-off of seedlings Hryhoryev V.M. (2006) set average positive correlation r = 0,6 [4]. In our

studies density of such connection was low (R^2 = $(0,0635)^2$= 0,25. According to Syharova D.D. (2010) reliable communication begins only at quantity 1000 *H.schahtii* /100 g of soil [9]. A higher level of correlation (100%) was indicated between microbiota presented by fungi genera *Fusarium*, *Rhizoctonia* and *Pythium* and spreading of parasitic nematode fauna genera *Pratylenchus* [10,11], which in its

2. Dependence and spread of the disease in different phases of vegetation on the intensity of settling rape plantparasitic nematodes

Indicators settlement plantparasitic nematodes		Intensity ratio determination in different phases of rape			
		The second pair of true leaves		Stooling	
		The spread of disease	Development of the disease	The spread of disease	Development of the disease
Number of nematodes before sowing, unit/100 g of soil		R^2 = 0,0635	R² = 0,0496	R² = 0,0182	R² = 0,0022
The second pair of true leaves	Number of juvenile nematodes on the roots, unit/g	R^2 = 0,4193	R² = 0,3161	R² = 0,4686	R² = 0,122
	Number of cysts on the roots, unit/g	R^2 = 0,2532	R² = 0,1759	R² = 0,4221	R² = 0,0697
Stooling	Number of juvenile nematodes on the roots, unit/g	-	-	R² = 0,1722	R² = 0,0001
	Number of cysts on the roots, unit/g	-	-	R² = 0,2623	R² = 0,0474

development cycle has only moving shapes. Therefore, we studied influence of invasion plants by plantparasitic nematodes, which determined the largest mobile phase that the juvenile nematodes of roots. However, *H.schahtii* can form several generations during the growing season and during plant vegetation cysts on the roots can appear, so we have also added it to the calculations. We also found out the close

interaction between the number of juvenile nematodes per 1 gram of roots during the formation of the second pair of true leaves and spreading of the disease in both phases of rape which is rather high ($R^2 = (0.42)^2 = 0.65$ and $R^2 = (0.47)^2 = 0.69$). In the later phases of vegetation rape (Stooling), when the first generation beet nematode is formed, average positive correlation is at the number of cysts in the roots of 1 gram and the spreading of the diseases: $R^2=(0,26)^2=0,51$.

The interaction between the quantity of nematodes and the development of the disease was only identified at the phase of the second pair of the real leaves $R^2=(0,32)^2=0,57$. At other phases it is much weaker, as nematodes first of all destroy and damage fabrics, allow penetrating of fungy, and help to defeat the plants, in the result of it disease spreading increases. The intensity of disease progress depends on the other factors, such as: firmness of plants, meteorological terms, biological features of exciters, and others.

Conclusions

It is identified that the presence of *H.schahtii* in the soil considerably strengthens the potential of natural infectious background and increases spreading of root rot in 1,6-2,8 times. The pathogenic properties of the fungi of genera *Fusarium* (*F.avenaceum, F. gibbosum* and *F. sambucinum*) are also increasing under the action of *H.schahtii* from 1,3 to 3,7 times.

Spreading and development of root rot is influenced with degree of settling plants with the juvenile nematodes. Quantity of juvenile nematodes in the roots of plants in the phase of the second pair of the real leaves influences spreading of a root rot during all vegetation: r=0,65 and r=0,69, and influences spreading the disease only at the beginning – in the phase of the second pair of the true leaves (r =0,57). Spreading the disease during stooling phase depends on quantity of cyst on roots both at the beginning of vegetation (r=0,65) and during stooling stage, though in a less measure (r=0,51).

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ВПЛИВ ЦИСТОУТВОРЮЮЧОЇ БУРЯКОВОЇ НЕМАТОДИ НА РОЗВИТОК КОРЕНЕВИХ ГНИЛЕЙ ЯРОГО РІПАКУ

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Встановлено зв'язок між чисельністю цистоутворюючої бурякової нематоди та кореневими гнилями ярого ріпаку. Коефіцієнт кореляції між чисельністю личинок в коренях рослин у фазу другої пари справжніх листочків та поширенням хвороби у цю ж фазу дорівнює - 0,65; у фазу стеблування - 0,69; із розвитком хвороби у фазу другої пари справжніх листочків - 0,57.

Підтверджено підсилення дії фітопатогенних грибів з роду Fusarium за наявності у ґрунті Heterodera schachtii Schmidt.

Ключові слова: *кореневі гнилі ярого ріпаку, Fusarium, Heterodera schachtii, цистоутворююча бурякова нематода*

ВЛИЯНИЕ ЦИСТООБРАЗУЮЩЕЙ СВЕКЛОВИЧНОЙ НЕМАТОДЫ НА РАЗВИТИЕ КОРНЕВЫХ ГНИЛЕЙ ЯРОГО РАПСА

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Установлена связь между численностью цистообразующей свекловичной нематодой и корневыми гнилями ярого рапса. Коэффициент корреляции между численностью личинок в корнях растений в фазу второй пары настоящих листочков и распространением болезни в эту же фазу равен - 0,65;в фазу стеблевания - 0,69; развитием болезни в фазу второй пары настоящих листочков - 0,57. Подтверждено усиление воздействия фитопатогенных грибов из рода Fusarium в присутствии в почве Heterodera schachtii Schmidt.

Ключевые слова: *корневые гнили ярого рапса, Fusarium, Heterodera schachtii, цистообразующая свекловичная нематода*