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THE FEATURES OF POTATO TUBERS EPIPHYTIC MICROFLORA DURING STORAGE BY THE APPLICATION OF BIOLOGICAL PREPARATIONS

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The using of biologiccal preparations Planryz, Diazofit and Fosfoenteryn reduce the tuber contamination by pathogens Fusarium and Alternaria sp. in 2,1-2,8 times compared to the control. It was established to reduce the number of pathogens in the composition of epiphytic microflora tubers of relatively resistant potato varieties Skarbnuza compared with relatively receptive Lileya. It was proved that using of Planriz + Ridomil Gold was more effective than one fungicide.

Problem. Yield and marketability of potatoes, and the intensity of the disease tubers during storage are directly dependent on the degree of manifestation of diseases of plants during the growing season. Measures, that reduce disease development during the growing season, allow to get the greater number of healthy tubers with minimal susceptibility to pathogens and development of their retention period [1,2,3]. In recent years, more attention is paid to developing methods of environmental protection products being considered as an alternative to chemical methods of protection, affecting the ecology agrophytocenoses [3,5,7]. The impact of biological preparations on pathogens contamination during storage of tubers of potatoes (*Solanum tuberosum* L.) remain poorly understood. The aim of research was to study the characteristics of microbial groupings of potato tubers during storage under the influence of biological products Planryz and mixtures Planryz + Diazofit +Fosfoenteryn.

Methods of research. The study was conducted during 2009-2012 in Radehiv area (zone of Polissya Lviv region). The biological products Planryz was studied - from bacteria *Pseudomonas fluorescence strain* AR-33, 2,0 l/ha, Diazofit (active ingredient - bacteria *Agrobacterium radiobacter*, 0,2 l/ha), Fosforoenteryn - biological products based on phosphorus bacteria *Enterobacter nimipressuralis* 32-3

(PMB- fosforomobilizator 0,2 l/ha). As biological control using Fitotsyd (based on *Bacillus subtilis*, 1 l / ha), chemical - Rydomil Gold MTS68 WG, 2,5 l/ha. The tubers before planting and during budding and after flowering - plants were treated by preparations. Experiments conducted on the 1 st (27-30 April), 2nd (12-15 May) planting dates. The method of successive dilutions of suspensions (washings from the surface of bubbles) were used to study the microflora of tubers at the beginning and end of storage, ranked last in elective nutrient medium further records of colonies that grew on them, the study of morphological and cultural properties of selected isolates [1,6]. Statistical analysis of the data was performed by a computer program Excel.

Results and analysis. Analysis of potato tubers at the beginning and end of storage showed that compared with the control and use Planryz+Planryz+ Diazofit (FMB) reduced the tuber contamination by pathogens Fusarium and Alternaria sp. These figures at the beginning of storage in the first grade planting period in Lileya were in control - 4,7-5,5, biological products - 1,7-2,6, chemical fungicide Rydomil Gold - 3,2-4,8 th.KFU/ cm^2. At the end of storage - according 7,7-14,2, 2,7-3,8 and 5,9-6,1 th. KFU/ cm^2. A similar trend was observed for tubers of varieties Scarbnyza. The second term of tubers planting increased the infectious load and processing biological products to some extent contributed to the reduction of disease during storage compared with the control.

Number of pathogens Fusarium and Alternaria sp. in epiphytic microflora tubers in relatively resistant varieties Scarbnyza at the beginning and end of storage was less in 2,2-3,8 times in comparison with the relatively receptive Lileya. This can be explained by the fact that plant secondary metabolites (phenolic compounds, alkaloids, terpenes and others), as protective again stress components can modify the metabolism of plant varieties induce plasticity changes and their level of resistance to defeat pathogens [1,3,4,7]. Compatible using of Rydomil Gold and Planryz contributed to increasing the efficiency of fungicide (average number of pathogens in the composition of epiphytic microflora on tubers decreased in 1,8-2,1 times).

Bacteria, which are the basis of biological products, produce plant hormones, have the ability to nitrogen fixation, improved water and mineral nutrition of plants inhibit the development of pathogens by bactericidal or fungicidal allocation

substances [1,7], and their immune-stimulating activity has a prolonged effect, helping to preserve the protective potential in potato tubers during storage.

Conclusions. The seed tuber treatment before landing, further spraying during the growing season and before laying the deposit by biological products Planryzom, Diazofitom, Fosfoenterynom reduces the population density of pathogens Fusarium and Alternaria genera consisting of epiphytic microflora tubers 2,1-2,8 times compared to the control. It was established the reduce of the number of pathogens in the composition of epiphytic microflora tubers relatively resistant varieties Scarbnyza at the beginning and end of storage in 2,2-3,8 times in comparison with the relatively receptive Lileya. It was proved that using of Planriz + Ridomil Gold was more effective than one fungicide.

Table 1

The microflora of potato tubers at the beginning and end of storage (variety Lily, Radekhiv district, zone of Polissya, Lviv region, 2009-2013)

Variant of experiment	Number of microorganisms x 10^3 CFU/sm^2															
	1 term of planting								2 term of planting							
	Total	Bacteria	Micromycetes						Total	Bacteria	Micromycetes					
			Total	*Alternaria spp.*	*Fusarium spp.*	*Aspergillus spp.*	*Penicillium spp.*	*Rhizopus spp.*			Total	*Alternaria spp.*	*Fusarium spp.*	*Aspergillus spp.*	*Penicillium spp.*	*Rhizopus spp.*
	At the beginning of storage															
The control (no treatment)	194,6	178,8	15,8	4,7	5,5	3,4	2,2	0,0	162,6	130,1	32,5	7,0	5,6	6,1	6,6	7,2
Biological control, Fitotsyd	167,2	157,9	9,3	1,4	0,9	2,1	3,9	1,0	133,9	114,3	19,6	2,1	2,8	4,5	7,9	2,3
Chemical control, Rydomil Gold MC MC 68 WG	192,8	170,8	22,0	4,8	3,2	5,3	5,7	3,0	140,7	118,5	22,2	3,4	4,1	5,5	6,3	2,9
Planryz	157,7	147,2	10,5	2,0	2,6	1,0	3,8	1,1	138,1	120,7	17,4	2,2	2,8	4,4	6,8	1,2
Planryz +Diazofit + PMB	147,9	142,0	5,9	1,7	0,0	2,5	1,3	0,4	127,6	112,0	15,6	1,9	2,2	3,3	7,2	1,0
Planryz + Rydomil Gold MC MC 68 WG	171,6	156,9	14,7	3,2	2,3	4,3	3,4	1,5	138,5	121,1	17,4	2,6	2,5	5,1	4,8	2,4
	At the end of storage															
The control (no treatment)	107,2	51,8	55,4	7,7	14,2	3,8	23,2	6,5	87,6	37,6	50,0	12,5	10,1	5,2	9,0	13,2
Biological control, Fitotsyd	71,8	43,2	28,6	3,7	4,4	1,3	14,0	5,2	64,9	32,4	32,5	4,2	7,6	2,8	8,3	9,6
Chemical control, Rydomil Gold MC MC 68 WG	107,7	69,6	38,1	5,9	6,1	4,2	17,5	4,4	52,0	36,8	15,2	8,3	9,0	3,7	1,2	2,0
Planryz	65,3	32,8	32,5	2,9	3,8	8,2	15,3	2,3	32,0	17,2	14,8	3,9	4,3	1,7	4,1	0,8
Planryz +Diazofit + PMB	57,4	30,4	27,0	2,7	3,1	7,2	12,0	2,0	34,5	25,2	9,3	2,8	3,1	0,9	2,2	0,3
Planryz + Rydomil Gold MC MC 68 WG	53,0	34,3	18,7	3,2	4,8	2,9	5,7	2,1	47,0	29,0	18,0	4,5	6,9	2,1	3,2	1,3

Table 2

The microflora of potato tubers at the beginning and end of storage (variety Lileya, Radekhiv district, zone of Polissya, Lviv region, 2009-2013)

Variant of experiment	Number of microorganisms x 10^3 CFU/sm^2															
	1 term of planting								2 term of planting							
	Total	Bacteria	Micromycetes						Total	Bacteria	Micromycetes					
			Total	*Alternaria spp.*	*Fusarium spp.*	*Aspergillus spp.*	*Penicillium spp.*	*Rhizopus spp.*			Total	*Alternaria spp.*	*Fusarium spp.*	*Aspergillus spp.*	*Penicillium spp.*	*Rhizopus spp.*
	At the beginning of storage															
The control (no treatment)	192,5	163,6	28,9	2,0	2,1	3,1	14,3	7,4	169,2	137,2	32,0	2,5	2,0	2,2	3,3	6,8
Biological control, Fitotsyd	157,0	143,9	13,1	0,0	0, 3	4,2	6,8	2,1	118,9	113,0	5,9	0,3	0,5	4,1	5,1	7,2
Chemical control, Rydomil Gold MC MC 68 WG	171,0	156,3	14,7	1,4	2,0	2,3	5,5	3,5	147,5	135,5	12,0	2,3	2,0	0,2	3,1	5,4
Planryz	125,9	119,4	6,5	1,1	0,5	1,3	3,1	0,5	128,4	122,6	5,8	1,1	0,8	3,7	4,9	5,0
Planryz +Diazofit + PMB	119,4	115,4	4,0	0,7	0,0	1,2	2,1	0,0	123,3	116,1	7,2	0,5	1,0	1,2	4,4	3,0
Planryz + Rydomil Gold MC MC 68 WG	141,9	132,7	9,2	1,3	1,0	2,1	3,5	1,3	135,3	127,2	8,1	1,8	1,4	3,1	4,5	1,2
	At the end of storage															
The control (no treatment)	65,9	34,9	31,0	2,4	3,3	2,7	4,5	18,1	49,8	37,6	12,2	2,7	4,5	1,3	1,0	4,2
Biological control, Fitotsyd	33,9	28,0	5,9	0,4	2,3	0,1	0,3	2,8	31,7	20,4	11,3	1,2	3,2	1,6	1,2	4,1
Chemical control, Rydomil Gold MC MC 68 WG	36,2	24,2	12,0	1,5	3,8	0,0	2,4	4,3	42,9	32,4	10,5	0,9	3,3	0,5	2,0	3,8
Planryz	34,0	28,2	5,8	1,1	1,7	0,9	2,1	0,0	39,0	26,8	12,2	1,3	2,5	3,2	4,7	0,5
Planryz +Diazofit + PMB	28,0	20,8	7,2	0,3	1,3	1,8	3,3	0,5	33,6	23,6	10,0	1,2	1,6	2,3	2,9	2,0
Planryz + Rydomil Gold MC MC 68 WG	34,8	26,7	8,1	1,3	2,6	0,5	1,6	2,1	45,8	30,4	15,4	1,0	2,8	3,9	4,2	3,5

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