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INFLUENCE PLANTING DATES AND GROWING AND PROCESSING OF MICROBIOLOGICAL PREPARATIONS ON THE QUALITY OF POTATO (SOLANUM TUBEROSUM L.) IN CARPATHIAN

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Application in the Carpathians Fitotsyd, Planriz, Diazofit, Fosfoenterin and fungicide Ridomil Gold MZ 68 WG as a whole contributed to increasing productivity and marketability of potatoes, increase the standard part compared to the control without treatment. In the application of microbiological preparations , on average we observed the formation of more marketable tubers in 1.1-1.3 times, smaller number of small tubers in the 1.1-1.6 and infected plants in 1,5-3,9 times. Treatment with a mixture of Planriz and Ridomil Gold was more effective than using a single fungicide. The 1st planting time in the third decade of April was the best landing due to the formation of more standard parts.

Solanum tuberosum L., marketability, quality, planting time, microbiological agents

Problem statement. Due to changes in the forms of management in the process of reorganization of agricultural production in the Carpathian region, the bulk of arable land (80%) is concentrated in private farms [1], significantly reduced the area under potatoes in the use ofsusceptible to diseases varieties are more Polish breeding. Preservation of quality planting material is remained current. Establishment of deposit defective products fall leads to significant losses in spring [4,5]. The use of modern technologies microbiological preparations for plant protection and bacterial fertilizers can increase their resistance to pathogens, productivity and quality of

products and promotes recovery agrocenosis from harmful chemicals [3-5,7]. Research in this area in Ukraine zoned with new and promising varieties are insufficient. Therefore the question of the influence of soil and climatic conditions of cultivation and application of microbiological agents on the quality of potatoes is relevant.

The aim of the research was to identify the conditions under which cultivation techniques and technology in the Carpathians formed a minimum of standard marketable potato tubers. The task was to study the influence of the planting time and processing of chemical and microbiological agents on potato yield and its structure in the Carpathians Lviv region. In addition, similar studies were conducted in different soil and climatic conditions of Lviv , which has Polissia area, Western steppes and foothills of the Carpathians, where potatoes are grown, and in Polessye Kiev.

Materials and methods research. Methods of field research - common [2,6]. Used biologics Planryz (based on bacteria *Pseudomonas fluorescence* AR -33, titer - 2.5 $\times 10^9$ cells / ml, consumption rate - 1,5-2,0 l/ha), Diazofit - bacterial preparation based on nitrogen fixing bacteria *Agrobacterium radiobacter*, consumption rate - 0,2-0,4 l/t). Fosforoenteryn - biological product based on phosphorus bacteria *Enterobacter nimipressuralis* 32-3 (FMB - fosforomobilizator, consumption rate - 0,2-0,4 l/t), which was produced in biolaboratoriyi State Phytosanitary Inspection of Lviv region. As biological control using Fitotsyd - biological product based on Bacillus subtilis titer of 1 × 109-1 × 1010 cells / mL (BTU cente , Vinnitsa region., M.Ladyzhyn). Potatoes (Early-maturing varieties Skarbnutsya and middle- grade Lileya) , given the unfavorable rainy weather in Lviv, spring planted in the third week of April, the second and third of May. Crops harvested in the third week of August and the second week of September.

Results and analysis. Application in the Carpathian of Fitotsyd, Planryz, Diazofit, Fosfoenteryn and fungicide Rydomil Gold contributed to a higher overall yield and marketability of potatoes , increase the standard of tubers compared with the control without cultivation. In the application of microbiological agents in the average observed the formation of more product tubers (73,1-84,3%against 59,8-

69,9% in the control variant), fewer small bubbles (11,1-19,1% compared with 16,1-22,8%) and infected plants (respectively 2,3-9,3% vs. 8,3-20,4%) (table 1-4).

The most effective measure was the combined using of Planryz and Rydomil Gold as compared withcontrol (commodity tuber yield averaged 73,1-84,3% compared to 52,2-78,8% of other options). The application of Planryz +Diazofit +FMB in concentrations 2.5+0.2+0.2 l/ha and Planryzu separately was mostly insignificantly inferior. Concomitant using of Planryz and Rydomil Gold increased efficiency products separately. The 1st time planting in the third decade of April in terms of planting was the best due to the formation of more standard parts (yield averaged 18,6-27,7 % compared with 15 ,7 -19, 8% , and the number of infected plants 3.9 -4.9 % vs. 8,7-10,7 %). Within three years of research in all four soil-climatic zones of Lviv region - the highest total and marketable tuber yield was obtained from the first planting period, in the third decade of April [5].The third term (the third decade of May) was uneconomical.

Preparation of polyvalent based compositions of several microorganisms that underlie Planryz, Diazofit and Fosfoenteryn provided environmental and physiological compatibility of different bacterial stability and efficiency in different agro-climatic conditions.

Table 1 - Structure of thepotato cropprocessingdepending onpreparations (2009 - 2011,cultivarLileya, the Carpathians, the first termplanting)

№	Optionexperiment	yield capacity			Non-standard part of the crop						
		overall, t / ha	standard, t / ha	marketability, %	in all		including, %				
					t / ha	%	small	withappendages, greenish	mechanicallydamaged	damagedby pests	damaged bydisease
1	Notreatment (control)	12,6	5,9	46,9	6,7	53,1	35,8	0,4	2,1	2,5	15,3
2	Fitotsyd, 1л/га	16,4	10,9	66,4	5,5	33,6	17,6	0,3	1,4	4,1	10,9
3	Rydomil GoldMC68WG	18,5	12,3	66,2	6,3	33,8	15,0	0	3,2	5,6	9,8
4	Planryz(1,0 l/ha)	15,9	11,0	69,5	4,8	30,5	16,1	0	0,8	6,1	8,8
5	Planryz (1,5 l/ha)	16,1	10,9	67,8	5,2	32,2	22,6	0,3	1,7	3,5	5,9
6	Planryz (2,0 l/ha)	16,9	12,8	15,5	4,1	24,5	18,8	0,4	0,8	1,1	4,0
7	Planryz (2,5 l/ha)	19,5	14,3	73,2	5,2	26,8	10,7	0	4,3	3,7	8,2
8	Planryz+Diazofit+FMB (1,0 + 0,2 + 0, l/ha)	16,8	12,2	72,9	4,6	27,1	19,3	0	6,5	2,0	1,7
9	Planryz+Diazofit+FMB (1,5 + 0,2 + 0,2 l/ha)	17,7	13,1	74,2	4,6	25,8	19,2	0,2	1,6	4,0	2,2
10	Planryz+Diazofit+FMB (2,0 + 0,2 + 0,2 l/ha)	19,8	15,7	79,1	4,2	20,9	11,0	0,2	2,5	5,3	2,1
11	Planryz+Diazofit+FMB (2,5 + 0,2 + 0,2 l/ha)	17,7	13,0	73,5	4,7	26,5	14,6	0,2	4,7	5,3	5,0
12	Planryz+Rydomil GoldMC68WG (2,0 +2,5 l/ha)	19,8	19,4	75,5	4,9	24,5	17,6	0,5	1,2	2,9	2,6
	unimportantdifference$_{05}$	1,8-2,2									
	Mean	17,3	12,3	70,0	5,1	30,0	18,2	0,2	2,6	3,8	6,4

Table 2 - Structure of thepotato cropprocessingdepending onpreparations (2009 - 2011,cultivarLileya, the Carpathians, the second termplanting)

№	Optionexperiment	Yield capacity			Non-standard part of the crop						
					in all		including, %				
		overall, t / ha	standard, t / ha	marketability, %	t / ha	%	small	withappendages, greenish	mechanicallydamaged	damagedby pests	damaged bydisease
1	Notreatment (control)	11,3	4,8	48,6	6,5	57,4	19,9	0	5,0	3,8	32,2
2	Fitotsyd, 1л/га	16,7	8,7	52,2	8,0	47,8	15,8	0,4	3,8	6,7	19,4
3	Rydomil GoldMC68WG	15,3	10,9	71,3	4,4	28,7	13,0	0,4	1,7	3,3	9,7
4	Planryz(1,0 l/ha)	14,5	9,2	63,7	5,3	36,3	14,4	0,3	4,7	2,7	16,0
5	Planryz (1,5 l/ha)	14,4	9,7	67,3	4,7	32,7	14,8	0	2,5	2,2	15,6
6	Planryz (2,0 l/ha)	14,6	10,0	68,4	4,6	31,6	17,2	0	4,7	2,2	8,7
7	Planryz (2,5 l/ha)	15,5	10,1	65,3	5,4	34,7	25,4	0	4,4	2,6	3,5
8	Planryz+Diazofit+FMB (1,0 + 0,2 + 0, l/ha)	14,8	10,4	70,2	4,4	29,8	16,0	0,6	1,4	4,0	8,3
9	Planryz+Diazofit+FMB (1,5 + 0,2 + 0,2 l/ha)	16,6	11,5	69,4	5,1	30,6	14,4	0,3	2,6	2,9	10,6
10	Planryz+Diazofit+FMB (2,0 + 0,2 + 0,2 l/ha)	15,9	10,2	63,8	5,8	36,2	23,5	0,2	3,7	7,2	4,3
11	Planryz+Diazofit+FMB (2,5 + 0,2 + 0,2 l/ha)	17,1	11,1	65,0	6,0	35,0	15,9	0,2	2,9	8,6	7,9
12	Planryz+Rydomil GoldMC68WG (2,0 +2,5 l/ha)	17,0	12,1	73,1	4,6	26,9	14,9	0,5	3,2	2,7	5,5
	unimportantdifference$_{05}$	1,7-2,1									
	Mean	15,3	9,9	64,4	5,4	35,6	17,1	0,2	3,4	4,1	11,8

Table 3 - Structure of thepotato cropprocessingdepending onpreparations (2009 - 2011,cultivarSkarbnutsya, the Carpathians, the first termplanting)

№	Optionexperiment	Yield capacity			Non-standard part of the crop						
					in all		including, %				
		overall, t / ha	standard, t / ha	marketability, %	t / ha	%	small	withappendages, greenish	mechanicallydamaged	damagedby pests	damaged bydisease
1	Notreatment (control)	16,8	9,8	58,5	7,0	41,5	23,2	0,3	3,9	2,8	11,7
2	Fitotsyd, 1л/га	25,2	18,8	74,8	6,4	25,2	16,4	0	1,7	1,0	7,4
3	Rydomil GoldMC68WG	26,1	19,8	75,6	6,4	24,4	14,6	0,3	1,3	2,7	5,7
4	Planryz(1,0 l/ha)	31,2	23,1	74,0	8,4	26,0	12,5	0,7	5,2	2,0	4,8
5	Planryz (1,5 l/ha)	30,4	25,8	84,8	4,6	15,2	7,2	0,5	1,8	1,9	4,1
6	Planryz (2,0 l/ha)	29,2	22,6	77,5	6,6	22,5	11,4	0,3	3,0	2,6	5,0
7	Planryz (2,5 l/ha)	27,2	21,5	78,9	5,7	21,1	13,2	0	1,9	0,6	6,2
8	Planryz+Diazofit+FMB (1,0 + 0,2 + 0, l/ha)	29,0	22,2	76,6	6,8	23,4	15,4	0	2,2	2,0	3,6
9	Planryz+Diazofit+FMB (1,5 + 0,2 + 0,2 l/ha)	28,8	23,1	80,2	5,7	19,8	10,4	0	3,8	3,0	2,6
10	Planryz+Diazofit+FMB (2,0 + 0,2 + 0,2 l/ha)	31,5	24,6	71,9	7,0	22,1	9,8	0,4	3,0	3,9	4,6
11	Planryz+Diazofit+FMB (2,5 + 0,2 + 0,2 l/ha)	30,0	23,3	77,6	6,7	22,4	10,3	0	3,5	3,9	4,9
12	Planryz+Rydomil GoldMC68WG (2,0 +2,5 l/ha)	28,6	23,3	84,3	5,3	18,7	11,5	0	3,0	1,8	2,3
	unimportantdifference$_{05}$	2,1-2,2									
	Mean	27,8	21,5	76,5	6,4	23,5	13,0	0,2	2,9	2,3	5,2

Table 4 - Structure of thepotato cropprocessingdepending onpreparations (2009 - 2011,cultivarSkarbnutsya, the Carpathians, the secondtermplanting)

№	Optionexperiment	Yield capacity			Non-standard part of the crop						
					in all		including, %				
		overall, t / ha	standard, t / ha	marketability, %	t / ha	%	small	withappendages, greenish	mechanicallydamaged	damagedby pests	damaged bydisease
1	Notreatment (control)	15,1	8,5	56,5	6,6	43,5	19,9	0,3	1,4	4,7	17,4
2	Fitotsyd, 1л/га	18,5	13,2	71,1	5,4	28,9	12,8	0,4	2,9	3,2	10,1
3	Rydomil GoldMC68WG	19,8	14,2	71,9	5,6	28,1	15,5	0,3	2,8	2,1	7,9
4	Planryz(1,0 l/ha)	23,4	16,7	71,6	6,7	28,4	13,5	0	2,7	3,4	8,7
5	Planryz (1,5 l/ha)	23,1	16,2	70,4	6,8	29,6	13,1	0	1,2	3,6	11,7
6	Planryz (2,0 l/ha)	2,0	14,7	72,2	5,7	27,8	14,0	0	3,8	2,3	8,3
7	Planryz (2,5 l/ha)	21,0	14,4	68,5	6,6	31,5	23,0	0	2,0	1,0	8,6
8	Planryz+Diazofit+FMB (1,0 + 0,2 + 0, l/ha)	20,6	14,2	68,8	6,4	31,2	14,3	0	3,5	4,5	10,3
9	Planryz+Diazofit+FMB (1,5 + 0,2 + 0,2 l/ha)	21,1	15,2	71,7	6,0	28,3	20,5	0	2,6	1,2	4,5
10	Planryz+Diazofit+FMB (2,0 + 0,2 + 0,2 l/ha)	23,3	18,0	77,4	5,3	22,6	12,5	0	2,0	2,4	5,7
11	Planryz+Diazofit+FMB (2,5 + 0,2 + 0,2 l/ha)	22,1	15,4	69,6	6,7	30,4	15,1	0,4	3,5	1,8	10,6
12	Planryz+Rydomil GoldMC68WG (2,0 +2,5 l/ha)	22,1	16,4	74,4	5,6	25,6	15,5	0	1,9	2,3	5,7
	unimportantdifference$_{05}$	1,4-1,8									
	Mean	20,9	14,8	70,3	6,1	29,7	15,8	0,1	2,5	2,7	9,1

Conclusions. The application in the Carpathian of Fitotsyd, Planryz, Diazofit, Fosfoenteryn and fungicide Rydomil Gold MC 68 WG as a whole contributed to a higher yield and marketability of potatoes, increase the standard of tubers compared with the control without cultivation. In the case of microbiological agents in the average observed the formation of more marketable tubers 1.1-1.3 times, fewer small tubers in 1,2-1,8 and damaged plants bydisease in 1,5-4,6 times. The 1st planting time in the third decade of April was the best landing due to the formation of more standard parts.