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THE EFFECT OF FERTILIZATION ON ACCUMULATION OF MACROELEMENTS BY WINTER WHEAT OF DIFFERENT SORTS IN RIGHT BANCK OF FOREST-STEEPE

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Temper of accumulation of nitrogen and phosphorus and potassium by winter wheat was researched under different fertilization. The Myronivska 61 sort and Hationalna sort were grown. Plants of Nationalna soprt accumulated more intensive nitrogen but less intensive phosphorus and potassium in comparative to plants of Myronivska 61 sort. It caused grain yield of Myronivska 61 sort was 6.43 t per ha and grain yield of Hationalna sort was 7.40 t per ha.

Winter wheat, fertilizers, sort, accumulation of macroelements, grain yield

The yield formation of winter wheat depends from sort an denvironmental conditions. The effective using of physiologic energetic radiation increases productivity of winter wheat. The area of leave surface and time of itfunctioning describe plant growth. These indexes depend from supply plants by nutrients [2].

Nitrogen influences on chlorophyll content in green leave and on photosynthesis [6]. It deficiency causes chlorosisof leave. The effect of phosphate efficiency on plant activity is not simple. C.C. De Groot [4] i T.H. Nielsen [7] say it inhibited carbon assimilation. S.J. Grafts-Brandner [5] think sit did not influence on photosynthesis. The time of fertilizer application influences on effect of phosphate. It deficiency inearly growth stages of plants decreases leave number and leave surface [1, 3]. In these conditions the growth processes are slowed down and can been stopped photosynthesis [7]. Nitrogen deficiency and potassium deficiency causes tarch filling of chloroplasts [4]. The processes of yield formation are damaged. Therefore, fertilizers application influence on yield formation of winter wheat. They can optimize or inhibit this process. And every sort has it

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response on fertilization. Then, diagnostic of plant nutrition has important role in yield formation of winter wheat.

The goal of investigation is determination of response of Myronivcka 61 sort and of response of Nationala sort on fertilization.

The methods of investigation. The field trials were located in long-time experiment of department of agrochemistry and quality of plant products in Right-Bank of Forest-steppe of Ukraine in 2007-2008. The experiment was arranged in tree replication. The area of seed plot (variant) was 100 m^2. In field trials the next fertilizers ware applied: ammonium nitrate (34 %) (ГОСТ 2 – 85); OSP (19,5 %) (ГОСТ 5956 – 78); potassium chloride (60 %) (ГОСТ 4568 – 95). The soil of research plot was medow-chernozem calcareous. The content of humus was 4.09 %. The content of available phosphate was 27.0 mg per ha. The content of exchangeable potassium was 89.0 mg per ha.

Winter wheat was seed edinoptimal time. The grain yield was harvested in stage of biological ripeness. Every variant was harvested individually. The plant samples were burned with acid. After, nitrogen was determined in them according to method with nesller reagent. Phosphate in plant samples was determined according to Denije method and potassium was determined with the help of photometer. The results of field trials were considered with MacrosoftofficeExcel, Agrostat.

The results of investigation. The macroelement content was decreased in winter wheat plants in vegetation. It was caused by ‘the effect dilute”. In these conditions 100 plants accumulated more nitrogen and phosphate and potassium from the stem elongation stage to preheading stage.

Plants of Nationalna sort accumulated more intensive nitrogen then plants of Myronivska 61 sort because this sort needs more this element for building of plant body. But, they accumulated less phosphate and potassium (table 1. 2).

These sorts of winter wheat give positive response to manure aftereffect in rotation with saturation in 12 t per ha. Nitrogen content was increased to 1.05-1.98 % in plants of Myronivska 61 sortand to 1.19-2.11 % in plants of Nationalna.

1. The fertilizer effect on macroelements content in plants of winter wheat, % per dry matter, 2006-2008.

Variants of investigation	Stages of plant growth											
	Spring tiller dencity			Stem elongation			Preheading			Grain ripeness		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Myronivska 61												
Without fertilizers – control	1.91	0.88	2.67	1.62	0.69	2.36	1.27	0.64	1.98	0.98	0.39	1.74
Manure (aftereffect in rotation with saturation in 12 t per ha) – background	1.98	0.92	2.97	1.69	0.74	2.43	1.36	0.71	2.11	1.05	0.45	1.85
Background + $N_{30}P_{80}K_{80}$+ N_{30}	3.22	1.26	3.33	2.89	1.03	2.92	2.39	0.98	2.89	2.07	0.75	2.51
Background + $N_{45}P_{120}K_{120}$+ N_{30}	3.76	1.33	3.39	3.43	1.15	3.01	2.91	1.11	3.15	2.58	0.86	2.87
$N_{30}P_{80}K_{80}$+ N_{30}	2.99	1.14	3.27	2.67	0.91	2.81	2.39	0.86	2.95	1.97	0.62	2.64
LSD_{05}, %	0.25	0.08	0.29	0.26	0.06	0.24	0.23	0.10	0.23	0.27	0.12	0.22
Nationalna												
Without fertilizers – control	2.01	0.59	2.39	1.81	0.40	2.18	1.49	0.38	1.65	1.15	0.28	1.48
Manure (aftereffect in rotation with saturation in 12 t per ha) – background	2.11	0.61	2.65	1.93	0.49	2.31	1.58	0.43	1.79	1.19	0.31	1.55
Background + $N_{30}P_{80}K_{80}$+ N_{30}	3.41	0.99	3.01	3.05	0.75	2.67	2.61	0.67	2.61	2.32	0.65	2.25
Background + $N_{45}P_{120}K_{120}$+ N_{30}	3.76	1.07	3.31	3.69	0.87	2.81	3.11	0.84	2.90	2.78	0.78	2.61
$N_{30}P_{80}K_{80}$+ N_{30}	3.22	0.89	2.86	2.91	0.62	2.59	2.58	0.58	2.67	2.15	0.59	2.34
LSD_{05}, %	0.27	0.08	0.33	0.28	0.11	0.16	0.28	0.05	0.18	0.33	0.12	0.19

Phosphate and potassium were accumulated in the same way. Fertilizers application in rate $N_{30}P_{80}K_{80}+N_{30}$ on the background optimized accumulative processes in plant bodies. The nitrogen content was increased to 2.07-3.22 % into plants of Myronivska 61 sort and to 2.32-3.41 % into plants of Nationalna. The phosphate content was increased to 0.75 – 1.26 % into plants of Myronivska 61 sort and to 0.65 – 0.99 % into plants of Nationalna. The potassium content was increased to 2.51 – 3.33 % into plants of Myronivska 61 sort and to 2.25 – 3.01 % into plants of Nationalna sort (table 2). The fertilizers application in rate $N_{45}P_{120}K_{120}+N_{30}$ increased macroelements content in plants of both sorts in addition. These compounds have they maximal sense in this variant.

These tendencies of macroelements accumulation in plants of winter wheat caused same tendencies of yield formation (table 3). On background grain yield of Myronivska 61 sort was increased on 1.14 t per ha in comparative to control and grain yield of Nationalna sort was increased on 1.38 t per ha. Optimization of mineral nutrition of winter wheat in the variant with fertilizers application in rate $N_{30}P_{80}K_{80}+N_{30}$grain yield of these sorts were increased on 1.67 t per ha and 2.51 t per ha. When this fertilizer rate was applied on background the grain additional yield was got 3.08 t per ha and 3.58 t per ha. Fertilizer application in rate $N_{45}P_{120}K_{120}+N_{30}$ increased grain yield in addition on 0.75 t per ha and 0.78 t per ha.

Conclutions. Winter wheat of Myronivska 61 sort and of Nationalna sort got positive response on fertilizers application in rate $N_{45}P_{120}K_{120}+N_{30}$ on background of manure aftereffect with 12 t per ha saturation in rotation. In these conditions plants accumulated maximal macroelements content during vegetation. The nitrogen content was 2.58-3.76 % per dry matter in plants of Myronivska 61 sort and 2.78-3.76 % in plants of Nationalna sort. The phosphate content was 0.86-1.33 % per dry matter in plants of Myronivska 61 sort and 0.78-1.07 % in plants of Nationalna sort. The potassium content was 2.87-3.39 % per dry matter in plants of Myronivska 61 sort and 2.61-3.31 % in plants of Nationalna sort. In these conditions grain yield of Myronivska 61 sort was 6.43 t per ha and grainyield of Nationalna sort was 7.40 t per ha. Point out, plants of nationalna sort accumulated

2. The fertilizer effect on macroelements content in plants of winter wheat, gper 100 dry matter, 2006–2008.

Variants of investigation	Stages of plant growth											
	Spring tiller dencity			Stem elongation			Preheading			Grain ripeness		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Myronivska 61												
Without fertilizers – control	0.78	0.36	1.09	3.40	1.45	4.96	5.82	2.93	9.07	7.40	2.94	13.1
Manure (aftereffect in rotation with saturation in 12 t per ha) – background	1.09	0.51	1.63	4.36	1.91	6.27	7.85	4.10	12.2	9.57	4.10	16.9
Background + $N_{30}P_{80}K_{80}$+ N_{30}	2.38	0.93	2.46	9.88	3.52	9.99	18.3	7.49	22.1	23.2	8.42	28.2
Background + $N_{45}P_{120}K_{120}$+ N_{30}	3.99	1.41	3.59	13.9	4.65	12.2	25.3	9.65	27.4	33.2	11.1	36.9
$N_{30}P_{80}K_{80}$+ N_{30}	1.94	0.74	2.13	7.32	2.49	7.70	14.7	5.29	18.1	19.3	6.08	25.9
Nationalna												
Without fertilizers – control	1.03	0.30	1.22	4.07	0.90	4.91	7.14	1.82	7.90	9.26	2.25	11.9
Manure (aftereffect in rotation with saturation in 12 t per ha) – background	1.37	0.40	1.72	5.27	1.34	6.31	9.45	2.57	10.7	11.4	2.98	14.9
Background + $N_{30}P_{80}K_{80}$+ N_{30}	2.86	0.83	2.53	10.9	2.68	9.53	20.5	5.26	20.5	27.2	7.62	26.4
Background + $N_{45}P_{120}K_{120}$+ N_{30}	4.36	1.24	3.84	15.5	3.65	11.8	27.7	7.48	25.8	37.2	10.4	34.9
$N_{30}P_{80}K_{80}$+ N_{30}	2.42	0.67	2.15	8.41	1.79	7.49	16.4	3.69	17.0	22.1	6.08	24.1

3. The fertilizer effect on grain yield of winter wheat, 2006 – 2008.

Variants of investigation	Yield, t/ha	Additional yield, t/ha		Payback 1 kgNPKby grain, kg	Yield, t/ha To control	Additional yield, t/ha		Payback 1 kgNPKby grain, kg
		to control	to background			to control	to background	
	Myronivska 61				Nationalna			
Without fertilizers – control	3.35	-	-	-	3.82	-	-	-
Manure (aftereffect in rotation with saturation in 12 t per ha) – background	4.48	1.14	-	-	5.20	1.38	-	-
Background + $N_{30}P_{80}K_{80}$+ N_{30}	5.68	2.34	1.20	5.45	6.62	2.8	1.42	6.45
Background + $N_{45}P_{120}K_{120}$+ N_{30}	6.43	3.08	1.95	6.17	7.40	3.58	2.2	6.98
$N_{30}P_{80}K_{80}$ + N_{30}	5.02	1.67	-	7.59	6.33	2.51	-	11.4
LSD_{05}, t/ha	*0.23*				*0.27*			

nitrogen more intensively and phosphate and potassium less intensively then plants of Myronivska 61 sort.

Досліджено характер накопичення азоту, фосфору й калію рослинами пшениці озимої за різних варіантів удобрення. Вирощували пластичний сорт Миронівська 61 та інтенсивний – Національна. Встановлено, що рослини другого сорту інтенсивніше акумулювали азот порівняно із першим, але повільніше – фосфор і калій. Це зумовило формування їхньої урожайності відповідно 6,43 і 7,40 т/га.

Пшениця озима, добрива, сорт, акумуляція макроелементів, урожай