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EFFECT OF MICROELEMENTS ON BIOLOGICAL PROCESSES AND THEIR ENZYMATIC ACTIVITY IN SLOPE SOILS OF SHAMAKHI-AGHSU REGION

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ABSTRACT

In 2012-2017, the activity of bacteria, ray fungi and microscopic fungi from microorganisms was studied in field experiments with the aim of studying the effect of micronutrients on the productivity of winter wheat in moderately eroded gray mountain-brown soils. The regularity of the activity of the microorganisms that play a major role during the vegetation period of wheat was studied. It was found that the micronutrients given to the soil increased the activity of groups of microorganisms in all variants of the experiment. Thus, the effect of micronutrients on the activity of bacteria was greater. Likewise, micronutrients also increased the activity of fungi and fungi. has increased. The activity of bacteria and fungi has increased. Also, does this group of microorganisms develop better, especially in conditions without humidity? From these 5-6 years of research carried out by us, we can draw the conclusion that microelements significantly revive the microbiological process in eroded soils, as a result of which decomposition and synthesis of decay in the soil is significantly improved, and the process of humus formation is accelerated.

Keywords: Hydrothermic Conditions, Fertilizers, Complex Fertilizers (Nafk-90), Bacteria, Radical Mushrooms And Fungi, Microorganisms, Light, Heat, Food, Cobalt, Zinc And Manganese.

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INTRODUCTION

As it is known, the problem of industrial production in the country is a matter of anger as an important issue, the problem of efficient use of land and food production. The lands of the mountainous area are considered a large source of source in the increase in agricultural products in Azerbaijan. In general, you need to take complex zonal combat measures against erosion to use soil lands in the mountainous areas. This explains that the erosion process is widespread in connection with the proper conduct of economic work in a complex geomorphologic environment. For many years, the soil has been washed as a result of the erosion process, productivity deteriorates and the volume of nutrients is reduced sharply and their motivation is very limited. The first turn of the bruises in the falling soils, the total number of microorganisms is a significant amount of 1G. In the variant of the ink fertilizer (NAFK-90) (NAFK-90) (NAFK-90), this increase was 750-4071 thousand. The maximum increase in the number of microorganisms was in the options provided by cobalt, zinc and manganese. Development of microorganisms (bacteria, radical and fungi) is accelerating when hydrotmite conditions are improved in June-July and expand the volume of fertilizers. The total number of microorganisms in the variants June increased by 229-4861 thousand. In the variant of the complex fertilizer, the total number of microorganisms in June was 631 to 185 thousand in June. The rapid development is to provide the population with enough food. Due to the demand of the day, as a demand for the development of grain production for the purpose of the current economic crisis, state support is in the center of this area. Reduced, its fraction composition deteriorates and decreases the moving part of agronomically valuable humin acids. Thus, the erosion process has a negative impact on the basic parameters of the humus process in the lands. The erosion process also weakens the intensity of all biochemical, fermentative processes and lands from carbon dioxide (CO2). The erosion process is also very weak in the microbiological process. The soil microfa was a solution to biochemical processes, especially in the regulating human synthesis and mineralization, which regulates these processes. Research has been found in the result of erosion process, water-physical, agrochemical characteristics and nutrients. As a result, the productivity of agricultural crops decreases. This has a negative impact on the biological productivity of our planet. Taking into account the damage caused by erosion into the blessing of the soil, the application of agro-technical measures increasing ink alarm in the fight against it is a great need. The application of a fertilizer system is very important in these events. In the last 30 years, the republic's fertilizer employees surrendered in the background of simple, complex mineral fertilizers and the republic in the erosion lands of the republic.

In other parts of the Tong Union, sufficient materials were collected. However, the physiological and biochemical bases of mineral fertilizers under the country's erosion lands were not well studied. This article, presented to the discussion of the readers, was dedicated to the "influence of micronutinals" and its settlement. Here, in the south-eastern part of research facilities, fall wheat, complex mineral fertilizers and complex fertilizers and complex fertilizers in the south-eastern part of autumn wheat are dedicated to the results of physiological research and biochemical grounds.

MATERIAL AND METHODS

The Impact of Microelements in the Micromology

Progress and analysis of materials:

As can be seen from the desktop figures, in April, the microbiological process (in early April) is not intensively. However, despite this, the microbiological process has increased a variable variant of a certain amount of fertilizer. The use of microelements was more than the activities of microorganisms with the choices of cobalt, manganese and zinc.

In this case, this study, the impact of fertilizers in this study, it was possible to see this table. In general, the complex zone management measures should be re-performed and important erosion in order to effective use land, especially land in mountainous areas. This is explained by the fact that the process of erosion is widespread due to the proper management of economic activities in complex geomorphologic environment erosion. Enough materials were also collected in other regions of the tong union. However, the physiological and biochemical bases of individual species of mineral fertilizers under cereals in the country were not well-studied. This article, which is presented to the readers' discussion, is dedicated to the nature of "the impact of micronutinals in the Micromemiological process" and its solution. Here, in the southern-eastern part of the research facilities, in the south-eastern part of the back of wheat, complex mineral fertilizers and complex fertilizers and complex fertilizers are dedicated to the study of physiological and biochemical bases.

Microelements of the impact to the microbiological process

Progress and Analysis of Materials:

As can be seen from the figures of the table, in April, the microbiological process (in early april) is not fully intensively. However, in spite of this, the microbiological process increased to a certain amount of fertilizer verse fully verangers. The total number of microeliuts in the field of practice has increased by 337-4861 thousand in 1g of the total number of microorganisms. In the variant of the complex fertilizer (nafk-90) in the fertless variant (nafk-90), this increase was 750-4071 thousand. The maximum increase in the number of microorganisms was in the options provided by cobalt, zinc and manganese. The development of microorganisms (bacteria, radical and fungi) is accelerated when hydrothermal conditions are improved in june-july and expanding the scope of fertilizers. The total number of microorganisms in the veritts relative to the research is determined in June, increased by 229-4861 thousand in the soil. In the variant of the complex fertilizer, the increase in the number of microorganisms relative to a fertile variant has changed between 631 and 185 thousand in June. The use of microelements was more than the activity of microorganisms with options applied to cobalt, manganese and zinc.

In this study, this study, the impact of fertilizers in this study in July, it was possible to see the following table. [Table: 1-5]

Table.1.The impact of microelements to the microbiological process on the ground [2012] (0-30 cm, 1g in the soil)

Variants of practice	2012											
	April				June				July			
	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number
Control (no fertilizer)	9782	998	24	10804	9883	1020	24	10927	9309	1030	8	10347
NAFK-90 (background)	13801	1046	28	14875	11229	1057	27	12303	10819	1067	11	11897
Fon+3kq/ha Ni	14346	1167	33	15546	13694	1178	29	14801	11649	1188	12	12749
Fon+3kq/ha Zn	15125	1202	36	16360	14124	1223	34	15381	12088	1234	20	13342
Fon+3kq/ha Cu	14536	1002	34	15569	11687	1023	27	12737	8565	1044	6	9615
Fon+3kq/ha B	14484	1055	30	15569	14264	1066	32	15362	11727	1140	13	12880
Fon+3kq/ha Co	15451	1362	39	16852	16437	1384	51	17879	14613	1427	41	16081
Fon+3kq/ha Mn	14500	1205	37	15742	15037	1227	42	16306	12806	1259	17	14082

Table.2: The impact of microelements to the microbiological process on the ground[2013] (0-30 cm, 1g in the soil)

Variants of practice	2013											
	April				June				July			
	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number

Control (no fertilizer)	10750	878	18	11646	10845	900	20	11765	1045	882	41	11868
NAFK-90 (background)	11440	964	23	12277	11440	986	23	12449	11531	981	44	12556
Fon+3kq/ha Ni	11450	986	24	12460	11528	997	25	12550	18036	987	49	19072
Fon+3kq/ha Zn	12100	1025	27	13152	13018	1043	29	14090	17426	1073	50	18549
Fon+3kq/ha Cu	18940	963	23	11926	10971	963	24	11958	15052	949	36	16037
Fon+3kq/ha B	11560	1048	33	12654	11654	1059	38	12751	16780	1044	62	17886
Fon+3kq/ha Co	13720	1065	37	14822	14640	1065	40	15745	18412	1062	69	19543
Fon+3kq/ha Mn	10630	1015	30	11875	11071	1026	34	12131	17044	1019	55	18063

Table.3: The impact of microelements to the microbiological process on the ground[2014] (0-30 cm, 1g in the soil)

Variants of practice	2014											
	April				June				July			
	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number
Control (no fertilizer)	6256	826	56	7138	7116	946	78	8140	6528	968	71	7567
NAFK-90 (background)	7581	882	70	8533	8061	991	116	0168	7843	1002	108	8845
Fon+3kq/ha Ni	7914	971	132	9017	8406	1001	168	9575	8034	1015	155	9204
Fon+3kq/ha Zn	8884	962	111	9957	9463	1028	140	10491	9190	1039	127	10356
Fon+3kq/ha Cu	6532	872	71	7475	7088	922	83	8163	6892	1003	81	7976
Fon+3kq/ha B	7785	829	96	8780	8223	1019	126	9363	8004	1030	115	9149
Fon+3kq/ha Co	9868	1019	142	11029	10032	1052	186	11270	9824	1063	164	11051
Fon+3kq/ha Mn	8759	944	109	9812	9429	1042	135	10588	9242	1053	128	10423

Table.4: The impact of microelements to the microbiological process on the ground[2015] (0-30 cm, 1g in the soil)

Variants of practice	2015											
	April				June				July			
	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number
Control (no fertilizer)	4369	750	35	5154	4739	760	80	5579	4478	815	51	5344
NAFK-90 (background)	5059	803	42	5904	5439	825	116	6380	5081	870	62	6013
Fon+3kq/ha Ni	6134	890	46	7070	6199	912	121	7232	6156	923	64	7143
Fon+3kq/ha Zn	7331	870	50	8251	7917	921	212	9050	7483	954	87	8524

Table.5: The impact of microelements to the microbiological process on the ground[2016] (0-30 cm, 1g in the soil)

Variants of practice	2016											
	April				June				July			
	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number	Bacteria	Shui Mushrooms	Mushrooms	Microong. total number
Control (No Fertilizer)	2457	865	68	3390	5517	752	81	6350	5056	572	35	5663
NAFK-90(background)	3190	923	125	4238	5585	816	101	6502	5513	818	69	6392
Fon+3kq/ha Ni	3620	958	144	4722	5612	927	106	6645	5152	1035	57	6244
Fon+3kq/ha Zn	3800	1006	147	4953	6457	784	140	7381	5806	871	68	6745
Fon+3kq/ha Cu	2653	891	73	3617	6291	869	128	7288	6057	798	102	9657
Fon+3kq/ha B	3412	944	129	4485	6431	957	186	7574	5981	866	86	6533
Fon+3kq/ha Co	4113	1025	160	5298	6539	985	174	7698	6053	981	75	7109
Fon+3kq/ha Mn	3304	970	142	4416	6609	920	197	7726	6355	1264	97	7716

As can be seen from the analysis of the figures in the table, in July, the total number of microorganisms in 1 g of soil increased by 1582-8675 thousand in the options with micronutrients compared to the option without fertilizer. As can be seen from the figures in the table, the total number of microorganisms in 1 g of soil increased from 666 to 1550 thousand compared to the version without fertilizer.

RESULT

Effect of trace elements on enzymatic activity in eroded soils

The great importance of the enzymatic processes in the soil is explained by their active participation in biochemical processes and humus formation. He also noted that the formation and transformation of substances in the soil takes place with the direct participation of enzymes. As is known, the activity of enzymes is related to many soil ecological factors. In addition to biotic factors, abiotic factors affect the intensity of the enzymatic process. So, in eroded soils that has lost their fertility, biological and biochemical processes stop, which leads to weakening of the enzymatic process. The effect of trace elements on the enzymatic process was studied in moderately eroded steppe brown soils developed in the territory of the research object.

The study was conducted in the experimental field planted under the wheat plant in April, May, June and July. As can be seen from the figures in table 2 below, in April, catalase activity was 7.0-13.0 cm3 in 1 minute in the non-fertilized variant, while it was 8.6-17.4 cm3 in the variants with compound fertilizer. The highest activity of catalase was observed in variants given zinc, cobalt and manganese. According to research years, the activity of catalase in June varied between 5.5-15.3 cm3 in the variant without fertilizer, 8.7-16.0 cm3 in the variant given complex fertilizer, and 9.0-25.4 cm3 in the variants given micronutrients. Thus, compared to the variant without fertilizer, the activity of catalase was 1.1-9.5 cm3 in the variant with complex fertilizer, and 3.1-13.1 cm3 in the variant with trace elements. In general, trace elements significantly increased the activity of catalase, as a result of which the biochemical processes in eroded soils were significantly improved. As it is known, enzymes are secreted by the vital activity of soil microorganisms, the root system of plants and mesofauna, and their role in nature and the biosphere is multifaceted. Enzymes, as biological catalysts, speed up chemical processes in the body a hundred thousand times. Catalase breaks down the hydrogen compounds accumulated in the soil into water and oxygen molecules. Considering all this, it can be shown that the effect of trace elements on the enzymatic process is very important.

Table 6. Effect of trace elements on the biological activity of eroded soils

Variants of practice	Depth, cm	CO_2 mg/kg/h														
		2012			2013			2014			2015			2016		
		April	June	July	April	June	July	April	June	July	April	June	July	April	June	July
ControlNo Fertilizer)	0-30	49.5	73.3	40.4	42.2	44.0	46.0	44.0	44.0	18.3	30.8	40.3	37.5	24.2	30.8	36.7
NAFK-90(background)	-“-	62.3	78.8	47.7	49.5	49.4	53.2	55.0	56.0	20.0	37.0	51.3	50.6	33.0	44.0	49.5
Fon+3kq/ha Ni	-”-	64.2	80.7	55.0	50.1	50.1	51.4	59.0	61.5	23.3	52.8	64.2	59.6	39.5	46.5	50.7
Fon+3kq/ha Zn	-”-	67.9	93.5	67.8	47.7	53.2	58.7	60.5	63.8	23.3	60.9	69.7	65.8	70.4	72.5	73.2
Fon+3kq/ha Cu	-“-	66.0	91.6	51.3	44.0	46.0	42.2	56.8	59.4	21.6	39.6	53.2	50.6	28.5	33.0	49.5
Fon+3kq/ha B	-“-	77.0	100.9	64.2	53.2	57.5	57.0	68.0	68.2	30.8	60.4	66.0	65.8	37.4	50.6	60.0
Fon+3kq/haCo	-“-	88.0	130.2	84.3	67.2	69.7	73.3	69.7	70.5	45.8	66.0	84.4	74.8	72.5	74.8	75.2
Fon+3kq/ha Mn		84.3	119.2	73.3	47.3	66.0	71.3	66.0	66.0	29.1	60.8	68.0	66.0	61.2	63.8	70.1

Table 7. Effect of trace elements on enzymatic activity in eroded soils

Variants of practice	Depth, cm	Catalase cm^3O_2 g/min														
		2012			2013			2014			2015			2016		
		April	June	July	April	June	July	April	June	July	April	June	July	April	June	July
Control (No Fertilizer)	0-30	8	15,0	5.7	9.6	11.6	15.3	7.8	7.5	5.0	13.0	13.7	13.2	8.1	15.3	19.4
NAFK-90(background)	-”-	11,2	16,0	7.0	11.5	13.4	24.8	8.0	8.7	7.0	14.1	14.7	14.3	10.0	17.5	21.5
Fon+3kq/ha Ni	-“-	12,1	17,1	10.0	15.0	16.8	22.6	8.6	9.0	7.2	15.0	15.6	15.2	10.4	19.6	22.3
Fon+3kq/ha Zn	-”-	12,3	18,6	10.7	18.5	18.8	25.8	9.1	10.0	7.0	16.4	17.6	16.9	11.2	21.5	24.8

Fon+3kq/ha Cu	-“-	12,4	16,9	8.8	17.2	13.5	20.6	7.5	7.9	6.0	14.4	14.9	14.9	9.9	16.2	21.8
Fon+3kq/ha B	-”-	12,6	20.5	9.1	16.0	17.2	21.1	8.8	9.2	7.8	15.6	16.7	16.0	10.6	20.8	23.8
Fon+3kq/ha Co	-“-	13,5	23.4	12.2	19.4	19.9	28.4	9.6	10.4	8.7	17.4	18.7	18.0	12.0	25.5	26.0
Fon+3kq/ha Mn		13,0	22.7	9.8	17.4	18.0	27.8	6.7	8.7	7.9	16.3	17.5	17.0	10.3	24.0	25.0

Table 8. Effect of trace elements on the activity of nitroreductase enzyme in eroded soils (0-30 cm layer)

Variants of practice	**Depth, cm**	**to the activity of the nitroreductase enzyme in mg/kg body weight in 24 hours (for the last 3-year research period)**								
		2014			**2015**			**2016**		
		April	**June**	**July**	**April**	**June**	**July**	**April**	**June**	**July**
Control (No Fertilizer)	0-30	39,0	43.2	45.0	35.0	46.0	43.6	42.5	41.5	37.5
NAFK-90(background)	-”-	31.1	42.9	43.2	27.5	45.5	52.5	25.0	31.5	35.0
Fon+3kq/ha Ni	-“-	31.1	41.7	46.3	27.5	41.8	47.5	35.0	40.0	35.5
Fon+3kq/ha Zn	-”-	26.0	43.0	43.3	34.5	45.5	53.0	32.5	40.0	38.0
Fon+3kq/ha Cu	-“-	32.4	42.7	42.5	27.5	47.5	53.0	22.5	47.5	40.0
Fon+3kq/ha B	-”-	28.5	43.1	43.6	34.5	47.5	53.5	25.0	47.5	42.5
Fon+3kq/ha Co	-“-	23.3	42.5	43.6	32.5	47.5	57.5	25.0	40.5	40.0
Fon+3kq/ha Mn		23.3	42.1	43.6	32.5	46.8	52.5	30.0	45.5	42.0

Table 6-8 shows the activity of the nitroreductase enzyme. As can be seen from this figure, the activity of nitrate reductase in all variants after fertilization in early spring was lower than the non-fertilization variant. Thus, in the variant without fertilizer, the activity of nitrate reductase was 35.0-39 mg/kg in April, while in the variant with compound fertilizer it was 27.5-31.1 mg/kg. Nitrate reductase activity decreased by 7.5-7.9 mg in the variant with complex fertilizer compared to the variant without fertilizer. In April, the activity of nitrate reductase was 23.3-32.4 mg/kg in 24 hours in the variants applied microelements, which decreased by 2.6-15.7 mg/kg compared to the variant without fertilizers. Nitrate reductase activity was significantly reduced in variants where zinc, cobalt and manganese were applied. In July, the activity of nitrate reductase increased sharply. Thus, its activity (in 24 hours) is 43.2-42.5 mg/kg in the variant without fertilizer, 43.2-52.5 mg/kg in the variant with complex fertilizer, and 42.5-57.5 mg in the variant with micronutrients. /kg has been. Among microelements zinc, cobalt and copper significantly increased the activity intensity of nitrate reductase.

As can be seen from the figures in the table, the effect of micronutrients on the activity of nitrate reductase was not observed in April, and its activity was lower in the experimental variants than in the variant without fertilizer.

In this regard, it should be noted that the nitrate reductase enzyme ensures the conversion of nitrates into nitrites in the soil.The effect of trace elements on the activity of urease enzyme was also studied in the last 3-year research period in Arizia.

It was determined that trace elements significantly increase the activity of urease. June-July) is higher than in spring (April).

Thus, in April, the amount of urease in the version without fertilizer was 0.33-0.69 mg (NH3 in 24 hours) in 1 g of soil, while it was 0.84-1.02 mg in the version with compound fertilizer. Nickel, zinc and urease activity was higher in variants given cobalt. In July, the activity of urease was 0.68-1.14 mg in the variant without fertilizer, 1.02-1.33 mg in the variant with complex fertilizer, and 0.74-1.98 mg in the variant with micronutrients. The activity of urease was high in June (1.40-2.09 mg) and July (0.80-2.09 mg). In general, the options providing nickel, zinc and cobalt were effective regardless of hydrothermal conditions.

Table 9. The impact of microelemenes to the activity of the ureasa enzyme in the ingredient land (in 0-30 cm)

Variants of practice	Depth, cm	to the activity of nitroreductase enzyme mg/kg body weight in 24 hours (for the last 3-year research period								
		2014			2015			2016		
		April	June	July	April	June	July	April	June	July
Control (No Fertilizer)	0-30	0.33	0.80	0.68	0.69	1.40	1.14	1.15	1.44	1.68
NAFK-90(background)	-”-	0.84	1.24	1.02	1.02	1.47	1.33	1.39	1.88	1.99
Fon+3kq/ha Ni	-“-	1.18	1.65	1.36	1.15	1.85	1.55	1.44	2.26	2.35
Fon+3kq/ha Zn	-”-	1.50	1.78	1.49	1.24	1.88	1.57	1.61	2.33	2.39
Fon+3kq/ha Cu	-“-	0.38	0.87	0.74	0.90	1.58	1.27	1.32	1.74	1.78
Fon+3kq/ha B	-”-	0.46	0.93	0.88	1.10	1.51	1.31	1.52	2.02	2.12
Fon+3kq/ha Co	-“-	1.57	2.09	1.73	1.37	2.09	1.98	1.74	2.46	2.66
Fon+3kq/ha Mn	“-	0.87	1.27	1.15	1.10	1.75	1.72	1.54	2.19	2.26

Currently, as a result of the widespread use of nitrate-containing fertilizers in agriculture, nitrates accumulate in the soil, which has a great role in environmental pollution. [Table-9]

Nitrates accumulated in the soil are also collected in agricultural plants and transferred to human and animal bodies and cause various pathological conditions. In such conditions, the nitrate reductase enzyme is of great importance. Nitrate reductase serves human health and nature protection by breaking down nitrates accumulated in the soil

As can be seen from the analysis of the figures in the table, in

July, the total number of microorganisms in 1 g of soil increased by 1582-8675 thousand in the options with micronutrients compared to the option without fertilizer.
As can be seen from the figures in the table, the total number of microorganisms in 1 g of soil increased from 666 to 1550 thousand compared to the version without fertilizer.

CONCLUSION

Microelements increased the activity of groups of microorganisms in all variants. The effect of microelements on the activity of bacteria was greater. Microelements also increased the activity of ray fungi and fungi. The activity of bacteria and fungi increased. This group of microorganisms develops especially well in conditions without humidity. From the conducted 5-year research, it can be concluded that microelements significantly revive the microbiological process in eroded soils, as a result of which decomposition and synthesis of decay in the soil is significantly improved, and the process of humus formation is accelerated.

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