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ACTIVITY OF ANTIOXIDANT ENZYMES IN PLANTS OF BUCKWHEAT BY THE ACTION OF BIOLOGICAL PREPARATIONS

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The results of researches are presented from the study of action of different norms of microbiological preparation of Diazobakterin (150, 175, 200 mls) and methods of application of regulator of plants' growth Radostim (treatment of seeds before sowing is 250 mls/t, sprinkling of sowing is 50 mls/he) on activity of antioxidant enzymes of class of oxidoreductase, catalase, peroxidase, polifenoloxidase.

Key words: regulator of plants' growth, microbiological preparation, buckwheat, catalase, peroxidase, polifenoloxidase.

The basic processes of vital activity of plants' organism, namely photosynthesis, breathing, synthesis of organic substances, depend directly on activity of enzymes of class of oxydoreductase [1]. A change of enzymes' activity in the plants depends greatly on increasing of concentrations in photosynthesis' tissues of active forms of oxygen(AFO), they are produced in reply to biotic and abiotic stress factors, among them: a water deficit, salting, low or high temperature, action of herbicides, heavy metals, radiation, infection of pathogen [2,3]. So, in chloroplasts the formation of singlet oxygen, superoxyradical and the hydrogen peroxide, in mitochondrion - superoxyradical and other [4]. AFO reacts to proteins, lipids, nucleic acids, damaging the structures of membranes and macromolecules, that negatively influences on passing of physiological processes in plants and forming of their productivity [5]. A prominent role in neutralization of AFO is played by the antioxidant system that is presented by a complex of low molecular antioxidant connections and enzymes, including such as catalase, peroxidase, polifenoloxidase, askorbatoksidase. Catalase neutralizes the negative action of hydrogen peroxide on the way of decomposition to hydrogen and oxygen, peroxidase revives in peroxide to water [6]. The state of the antioxidant system of plants and change of her activity, as a reaction on actors, was studied on different agricultural crops [7,8], however changes of activity of antioxidant enzymes in the plants of buckwheat for the actions of biological preparations are practically not studied. At the same time single literary sources [9 11] certify their high efficiency in forming of antioxidant status and productivity of different growing.

Methodology of researches. Researches were held in conditions of an experience field of the Uman national university of gardening on a chart that included variants with treatment of seeds before sowing by bacterial preparation of Diazobakterin (stamms of bacteria of Azospirillum of brasilense 18 - 21410) in norms 175 and 200 mls separately and consonant with the regulator of height of

plants of Radostim (EmistimC 0,3 gs/1, potassic salt of alpha-naphtylvinegar at 1,0 mg/1 and microelements) in a norm 250 ml/t. On a background of application of before-named preparations sowings of buckwheat in the phase of the first pair of the real leaves sprinkled Radostim in a norm 50 mls/he. Experiments were laid in a triple reiteration a systematic method in sowing of buckwheat of sort of Yelena.
Analyses were executed in laboratory terms in the selected standards of plants of the field experiments in the phase of branching of stem. Activity of enzymes of catalase, peroxidase, polifenoloxidase were determined on methodology expounded by H.Pochinok.

Results of researches. As a result of undertaken studies it is set that through the using for preseed treatment of buckwheat' seeds of microbiological preparation of Diazobakterin both separately and in mixtures with Radostim, enzymes' activity rose in plants (table 1). At preseed treatment of buckwheat' seeds by bacterial preparation of Diazobakterin in norms 150, 175, 200 mls activity of catalase with the increasing of norm of preparation grew on 1,0; 1,8 and 1,5 mkMol of decomposed H_2O_2 against control, activity of peroxidase on 3,7; 6,5; 4,3 mkMol of oxyguaiacol and polifenoloxidase on 1,8; 1,9; 2,2mkMol oxyascorbic acid against control according to the norms of preparations. Obviously, that the use of microbiological preparation of Diazobakterin for treatment of buckwheat' seed before sowing provided intensification of plants microbal mutual relations whose result is an improvement of terms of mineral feed and as a result, exchange processes in plants, where an inalienable constituent enzymes are. At the compatible action of microbiological preparation of Diazobakterin in norms 150, 175, 200 mls with the plants' growth' regulator of Radostim are 250 mls/t, applied for treatment of buckwheat' seed before sowing, activity of catalase in the variants of experience as compared to control grew on 50; 52 and 54%, peroxidase on 17; 20 and 19%, polifenoloxidase on 21; 31; 32%. Using of Diazobakterin in norms 150; 175; 200 mls for treatment of seed before sowing and bringing on abackground of this preparation on the shoots of growing by the growth' regulator of Radostim 50 mls/he provided the increasing of activity of antioxidant enzymes of catalase, peroxidase and polifenoloxidase against variants with the independent bringing of Diazobakterin on 15 -22; 10-13 and 7-16. At the combined application of Radostim (treatment of seeds before sowing in a norm of 250 mls/t and bringing on vegetans plants 50 mls/he) the increasing of activity of catalase was traced on 2,2 mkMol of decomposed H_2O_2, peroxidase - on 13,2 mkMol of oxyguaiacol, polifenoloxidase - on 6,7 mkMol oxyascorbic acid against control. At the same time the greatest activity of antioxidant enzymes in the buckwheat' leaves was marked for the using for preseed treatment of seeds by mixture of Diazobakterin (150, 175, 200 mls) with Radostim (250 mls/t) and sprinkling of sowing with Radostim (50 mls/he), where in comparison to the variants of Diazobakterin - Radostim (treatment of seeds is before sowing) the increasing of activity of catalase was marked on 3,5; 8,2; 8,1 mkMol of decomposed H_2O_2, peroxidase - 4,8; 9,1 and 8.1 mkMol of oxyguaiacol, polifenoloxidase on - 4,6; 7,8 and 6,4 mkMol of oxyascorbic acid.

1. The activity of antioxidant enzymes in the buckwheat' leaves through the using of bacterial preparation of Diazobakterin and growth' regulator of plants of Radostim, in 2010

Expirience' variant	Catalase, mkMol of decomposed H2O2/g raw mass for 1 min.	Peroxidase mkMol of oxyguaiacol /g raw mass for 1 min.	Polifenoloxidase, mkMol of oxyascorbic acid / g raw mass for 1 min.
Without using preparations (control)	10,5	98,7	21,1
Diazobakterin 150 ml	11,5	102,4	22,9
Diazobakterin 175 ml	12,3	105,2	23,0
Diazobakterin,200 ml	12,0	103,0	23,3
Radostim 250 ml /t	10,7	105,3	22,1
Diazobakterin 150 ml + Radostim 250 ml /t	15,8	115,3	25,5
Diazobakterin 175 ml + Radostim 250 ml /t	16,0	118,2	27,7
Diazobakterin 200 ml + Radostim 250 ml /t	16,2	117,1	27,8
Radostim 50 ml /he	12,0	110,4	27,7
Diazobakterin 150 ml + Radostim 50 ml /he	13,3	113,1	24,4
Diazobakterin 175 ml + Radostim 50 ml /he	14,1	115,2	25,5
Diazobakterin 200 ml + Radostim 50 ml /he	14,6	116,8	26,0
Radostim 250 мл/т + Radostim 50 ml /he	12,7	111,9	27,8
Diazobakterin 150 ml + Radostim 250 ml /t + Radostim 50 ml /he	19,3	120,1	30,1
Diazobakterin 175 ml + Radostim 250 ml /t + Радостим 50 ml /he	24,2	127,3	35,5
Diazobakterin 200 ml + Radostim 250 ml /t + Radostim 50 ml /he	24,3	125,1	34,2
HIP_{05}	*1,1*	*3,2*	*1,8*

The same variants of experience in comparison to control provided the increasing of activity of catalase on 84-131 peroxidase - 22 - 29 polifenoloxidase - 43 - 68.

The obtained experimental facts testify that there is a substantial increasing of antioxidant status of plants by a complex application of biological preparations (treatment of seeds before sowing by microbiological preparation and growth' regulator of plants + bringing of growth' regulator of plants on a shoot). From one side it can be connected with forming of powerful buckwheat' rootage, that serves as an environment for development of nitrogen fixing microorganisms and provides improvement of water exchange and mineral feed, and on the other hand with activity of physical - biochemical processes (photosynthesis, breathing and other) in plants under influence of growth' regulator (both for treatments of seed and bringing on shoots) [4,10].

For determination of activity of antioxidant enzymes it was set 2011, that in the variants of experience analogical dependence was traced as well as in 2010 (table 2).

So by the using of Diazobakterin in norms 150, 175, 200 mls and Radostim in a norm 250 mls/t, as separately so compatible, activity of antioxidant enzymes grew in the variants of experience, at the same time the highest she was in a variant by treatments of seeds by mixture of preparations of Diazobakterin (175 mls) and Radostim (250 mls/t) and sprinkling of sowing of Radostim (50 mls/he), that exceeded control for catalase on 101 % peroxidase - on 28% and for polifenoloxidase -on 65%. That testifies about the improvement of terms of growth and development of buckwheat' plants being brought in preparations, increasing activity in them exchange processes that plays an important role in the adaptation reactions of plants and forming of harvest.

Conclusions. Through the compatible use of different norms of microbiological preparation of Diazobakterin with the growth' regulator of plants Radostim activity of antioxidant enzymes grows in the buckwheat' plants, at the same time activity of catalase, peroxidase and polifenoloxidase depends on norms and methods of bringing of these biological preparations. The greatest level of activity of enzymes in the plants of buckwheat is traced at compatible application for treatment of seeds before sowing of microbiological preparation of Diazobakterin in a norm l75 mls with the growth' regulator of plants Radostim in a norm 250 mls/t and sprinkling on this background of sowing of Radostim in a norm 50 mls/he, where activity of catalase grew in average to control on 16%, peroxidase - 30%, polifenoloxidase - 67%.

2. The activity of antioxidant enzymes in the buckwheat' leaves through the using of bacterial preparation of Diazobakterin and growth' regulator of plants of Radostim, in 2011

Expirience' variant	Catalase, mkMol of decomposed H2O2/g raw mass for 1 min	Peroxidase mkMol of oxyguaiacol /g raw mass for 1 min.	Polifenoloxidase, mkMol of oxyascorbic acid / g raw mass for 1 min.
Without using of preparations (control)	11,7	97,9	20,2
Diazobakterin 150 ml	12,9	102,8	22,1
Diazobakterin 175 ml	13,6	104,1	22,4
Diazobakterin,200 ml	13,8	103,9	22,9
Radostim 250 ml /t	12,0	104,5	21,9
Diazobakterin 150 ml + Radostim 250 ml /t	15,0	115,7	26,5
Diazobakterin 175 ml + Radostim 250 ml /t	15,8	116,4	27,1
Diazobakterin,200 ml + Radostim 250 ml /t	16,1	117,2	27,8
Radostim 50 ml /he	13,2	110,9	26,6
Diazobakterin 150 ml + Radostim 50 ml /he	14,7	113,5	24,1
Diazobakterin 175 ml + Radostim 50 ml /he	14,5	114,1	24,8
Diazobakterin,200 ml + Radostim 50 ml /he	15,1	114,7	25,3
Радостим 250 мл/т + Radostim 50 ml /he	13,9	112,2	26,7
Diazobakterin 150 ml Radostim 250 ml /t + Radostim 50 ml /he	18,9	120,8	28,9
Diazobakterin 175 ml + Radostim 250 ml /t + Radostim 50 ml /he	23,5	125,3	33,4
Diazobakterin,200 ml + Radostim 250 ml /t + Radostim 50 ml /he	22,9	123,4	32,7
HIP_{05}	*1,2*	*3,9*	*1,7*

That testifies about the improvement of terms of growth and development of buckwheat' plants being brought in preparations, increasing activity in them exchange processes that plays an important role in the adaptation reactions of plants and forming of harvest.

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