THE INFLUENCE OF BIOSTIMULATORS CONCENTRATION UPON THE PRODUCTION OF THREE WHEAT VARIETIES GROWN UNDER EZĂRENI IAŞI ENVIROMENTAL CONDITIONS

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Abstract

In the 2008/2009 crop year at the Ezăreni Iaşi farm, we investigated the effect of the biostimulators and their concentration on production of winter wheat varieties, Boema, Crina and Flamura 85.
The extraradicular application of biostimulators determined increased grain production, the highest value of 3548.0 kg / ha being obtained in the variant treated with BCO-4DMA.
The 12.5 ppm concentration achieve a production of 3506.1 kg/ha, this variant being the control variant.
The variety which obtained the highest production (3583.5 kg / ha), with a very significant difference from the control, is Boema, created by ICCPT Fundulea.
The interaction between varieties x biostimulators x concentrations showed biostimulator BCO- 4DMA x 12.5 ppm concentration x Boema variety, with a difference from the control variant of 1787 kg / ha.

Key words: wheat, production, biostimulators, varieties

The most modern technology in agricultural science gives an important place to the procedures that accelerate or temporarily inhibit the growth, development and metabolism by means of various chemical factors (organic or inorganic compounds).

Substances that regulate growth are natural organic or synthetic compounds, which have an effect on growth rate and proportions. The biostimulating substances have gained, in the recent years, a wide applicability in crop production.

The continuing increase in the average production of wheat may be achieved through the cultivation of more productive varieties, but also through modernization of the cultivating technology based on the use of growth regulators.

With these new technological factors, we can have a better control of the growth and development of the wheat plants, eliminating losses caused by climatic stresses and fitopedogenic (Fossati, A., 1990; Gherghen, I., 1988; Maillard, 1985; Milică, 1983; Neamţu, G., 1991; Romaşcanu, 1984; Shuklina, 1975; Wang, 1991).

In our country, the first vegetal bioregulator was achieved by Oeriu (1981) and was named folcisteină. Then, Cachiţă and his collaborators (1985) obtained procaine, a growth stimulator for wheat.

MATERIAL AND METHOD

During 2008-2009, experiments were performed at the Ezăreni Farm on the effect of some growth stimulators and their concentrations on the production of three varieties of wheat.

The experience had three factors, placed after the method of subdivided parcels.

- A factor – three stimulators of the fenoxialchil sulfamoil carboxylic acids class, which have very low toxicity and are biodegradable: BCO – 4K, BCO – 4 DMA şi BCO- 4K + Zinc acetate;
- B factor –biostimulators concentrations: 12,5 ppm, 25 ppm, 50 ppm;
- C factor - three romanian varieties of wheat: Boema, Crina, Flamura 85.

The biostimulators used were obtained from Prof. Dr. Cornelius Oniscu., "Gheorghe Asachi" Technical University of Iasi.

There were applied 625 l of solution per hectare.

RESULTS AND DISCUSSIONS

The extraradicular application of biostimulators has not positively influenced the production of wheat grains (table 1). The highest production of 3548 kg / ha. was obtained in version control, treated with BCO - 4 DMA. At the two other variants of treatment, there were obtained

Table 1

The influence of biostimulators on wheat yield

Biostimulators	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
BCO -4K + Zn ac.	3335.0	93.99	-213	-
BCO – 4K	3346.0	94.30	-202	-
BCO – 4 DMA	3548.0	100.00	Control	
DL 5%	384.0 kg/ha			
DL 1%	582.4 kg/ha			
DL 0.1%	935.6 kg/ha			

negative differences over 200 kg / ha, compared to the control variant.

The decreased production can be observed when we analyze the influence of biostimulators concentrations on the production of wheat caryopsis (*table 2*).

Approximately equal yields were obtained at concentrations of 12.5 and 25 ppm (3506.1 kg/ha respectively 3505.0 kg/ha).

Table 2

The influence of concentration biostimulators on wheat yield

Concentration	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
12.5 ppm	3506.1	100.00	Control	
25.0 ppm	3505.0	99.97	-1.1	-
50 ppm	3217.7	91.77	-288.4	o
DL 5%	226.9 kg/ha			
DL 1%	311.2 kg/ha			
DL 0.1%	423.5 kg/ha			

The variety influences the production, the highest yield being obtained at the Boema variety 3583.5 kg / ha with a very signifcant difference from the control (variety Flamura 85) variant of 309.3 kg / ha (*table 3*).

Table 3

The influence of variety on wheat yield

Variety	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
Boema	3583.5	109.45	309.3	***
Crina	3371.1	102.96	96.9	-
Flamura 85	3274.2	100.00	Control	
DL 5%	162.2 kg/ha			
DL 1%	216.2 kg/ha			
DL 0.1%	281.6 kg/ha			

It is apparent in *table 4* that the highest production was obtained at the interaction between BCO-4DMA growth regulator and the concentration of 12.5 ppm of 4103.6 kg/ha, this also being the control variant.

The variants which applied the same extraroot biostimulators but in higher concentrations,of 25 and 50 ppm,have achieved lower production, with 836.3, respectively 830.3 kg/ha, than those obtained in the control version.

At the interaction between BCO-4K x 12.5 ppm and BCO- 4K + Zn ac. x 50 ppm there were obtained the smallest productions of 2995.9 kg / ha respectively 2982.3 kg/ha, differences from the control being significantly in minus.

The productions of grains were relatively low because no fertilizer was applied to wheat.

The interaction between stimulators and varieties showed that the Boema variety, which in variant treated with BCO - 4 DMA and as well in the one treated with BCO - 4K, obtained the higher yields than the control variant, of 3983.1 kg/ha respectively 3562.7 kg /ha (*table 5*).

Table 4

The influence of intercation between biostimulators and their concentrations on wheat yield

Biostimulators	Concentration	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
BCO – 4 DMA	12.5 ppm	4103.6	100.00	Control	
BCO – 4K	25 ppm	3637.9	88.65	-465.7	O
BCO - 4K + Zn ac.	25 ppm	3603.8	87.82	-499.8	O
BCO - 4K + Zn ac.	12.5 ppm	3418.7	83.31	-684.9	O O
BCO – 4K	50 ppm	3403.6	82.94	-700.0	O O
BCO – 4 DMA	25 ppm	3273.3	79.77	-830.3	O O
BCO – 4 DMA	50 ppm	3267.3	79.62	-836.3	O O
BCO – 4K	12.5 ppm	2995.9	73.01	-1107.7	O
BCO - 4K + Zn ac.	50 ppm	2982.3	72.68	-1121.3	O
DL 5%	453.8 kg/ha				
DL 1%	622.3 kg/ha				
DL 0.1%	874.1 kg/ha				

Table 5

The influence of intercation between biostimulator and varieties on wheat yield

Biostimulators	Variety	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
BCO – 4 DMA	Boema	3983.1	114.14	493.4	***
BCO – 4K	Boema	3562.7	102.09	73.0	
BCO – 4 DMA	Flamura 85	3489.7	100.00	Control	
BCO -4K + Zn ac.	Crina	3461.3	99.19	-28.4	
BCO – 4K	Crina	3298.3	94.52	-191.4	
BCO – 4 DMA	Crina	3277.8	93.93	-211.9	
BCO -4K + Zn ac.	Flamura 85	3262.8	93.50	-226.9	
BCO – 4K	Flamura 85	3252.2	93.19	-237.5	
BCO -4K + Zn ac.	Boema	3098.4	88.79	-391.3	O O
DL 5%	280.9 kg/ha				
DL 1%	374.5 kg/ha				
DL 0.1%	487.7 kg/ha				

The smallest production of 3098.4 kg / ha, was made at the same variety, Boema, at which there was pplied BCO-4K biostimulators and zinc acetate.

In *table 6* are just some of the results of the interaction between the three factors.

The highest yield was obtained at the Boema variety in the variant treated with BCO-4DMA biostimulators in concentration of 12.5 ppm, of 5018 kg / ha with a very significant difference from the control variant (BCO-4DMA x 12.5 ppm x Flamura85).The distinct differences were obtained at the interaction between BCO-4K + Ac. Zn x 25 ppm x Boema and BCO-4K x 50 ppm x Crina, with differences from the control variant of about 26%.

Diferences in minus, more than 400 kg/ha compared to the control variant were obtained to the following variants: BCO – 4K x 50 ppm x Boema; BCO – 4K x 12.5 ppm x Crina şi BCO - 4K + Zn acetate x 50 ppm x Boema.

Table 6

The influence of intercation between biostimulators, concentrations and varieties on wheat yield

Biostimulators	Concentrations	Varietyi	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
BCO – 4 DMA	12.5 ppm	Boema	5018.0	155.31	1787.0	***
BCO - 4K + Zn ac.	25 ppm	Boema	4094.5	126.73	863.5	**
BCO – 4K	50 ppm	Crina	4074.0	126.09	843.0	**
BCO – 4 DMA	12.50 ppm	Crina	4061.8	125.71	830.8	**
BCO – 4K	25 ppm	Boema	4027.5	124.65	796.5	**
BCO – 4K	25 ppm	Flamura 85	3822.3	118.30	591.3	*
BCO – 4 DMA	12.5 ppm	Flamura 85	3231.0	100.00	Control	
BCO - 4K + Zn ac.	50 ppm	Flamura 85	3016.0	93.35	-215.0	
BCO – 4K	12.5 ppm	Boema	2984.8	92.38	-246.2	
BCO – 4 DMA	25 ppm	Flamura 85	2977.5	92.15	-253.5	
BCO – 4K	50 ppm	Boema	2821.0	87.31	-410.0	
BCO – 4K	12.5 ppm	Crina	2757.0	85.33	-474.0	
BCO - 4K + Zn ac.	50 ppm	Boema	2644.8	81.86	-586.2	
DL 5%			561.7 kg/ha			
DL 1%			759.0 kg/ha			
DL 0.1%			975.4 kg/ha			

CONCLUSIONS

The extraroot application of biostimulators in different concentrations influenced the wheat production.

The highest production was obtained in the variant treated with BCO-4DMA of 3548.0 kg/ha.

At the concentration of 12.5 ppm there was obtained a yield of 3506.1 kg / ha.

The most productive variety was the Boema variety,which obtained a higher production, with 309.3 kg/ha than that obtained in the version control.

The interaction between stimulators, concentrations and varieties showed that the variant BCO-4DMA x 12.5 ppm x Boema, which produced a yield of 5018 kg/ha, with 1787 kg/ha more than the the version BCO 4DMA x 12.5 x ppm x Flamura 85.

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