THE EFFECT OF CONCENTRATION OF SOME BIOSTIMULATORS UPON THE CARYOPSES OF THREE WHEAT CULTIVARS – A RESEARCH STUDY CARRIED OUT AT EZARENI STATION, IAŞI

EFECTUL CONCENTRAȚIEI UNOR BIOSTIMULATORI ASUPRA PRODUCȚIEI DE CARIOPSE LA TREI SOIURI DE GRÂU, ÎN CONDIȚIILE FERMEI EZĂRENI – IAŞI

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Abstract. *In climatic conditions of the agricultural year 2010-2011 at Ezareni station, Iaşi, on a cambic chernozem soil was followed the effect of BCO – 4DMA, BCO 4 K and BCO 4K + Zn acetate biostimulators in concentration of 12,5 ppm, 25 ppm and 50 ppm upon the cariops production of three wheat cultivars - Arieşan, Crina and Boema. BCO 4K + Zn acetate biostimulator determined the highest production of 8213 kg/ha with 15,77% higer than the control variant – BCO – 4DMA; compared with control variant which was trated with water, increase production was 31,57%; between concentrations of biostimulators wasn't significant differences; Boema variety has ranked on the first place with a production of 7997,8 kg/ha. Interaction between factors highlighted variant BCO 4K +Zn acetate x 50 ppm x Boema with 9007 kg/ha, increase production being very significant.*
Key words: biostimulators, concentration, wheat, production.

Rezumat. *În condițiile climatice din anul agricol 2010-2011, la ferma Ezăreni – Iaşi, pe un sol cernoziom cambic s-a urmărit efectul biostimulatorilor BCO – 4DMA, BCO 4 K şi BCO 4K + acetat de Zn, în concentrații de 12,5 ppm, 25 ppm şi 50 ppm asupra producției de cariopse la trei soiuri de grâu – Arieşan, Crina şi Boema. Biostimulatorul BCO 4K + acetat de Zn a determinat producția maximă de 8213 kg/ha, cu 15,77% mai mare decât în varianta martor - BCO – 4DMA; față de varianta martor tratată cu apă, sporul de producție a fost de 31,57%; între concentrațiile de biostimulatori nu s-au constatat diferențe semnificative; soiul Boema s-a situat pe locul întâi cu o producție de 7997,8 kg/ha; interacțiunea dintre factori a evidențiat varianta BCO 4K + acetat de Zn x 50 ppm x soiul Boema, sporul de producție fiind foarte semnificativ.*
Cuvinte cheie: biostimulatori, concentrație, grâu, producție.

INTRODUCTION

The research made in the last years showed that in plants life an important role plays some organic compounds that regulate various physiological processes.

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Called today growth stimulators, plant hormones or phytohormones act on stimulating or inhibiting the processes of their action (Ghițău, 2011).

Growth stimulators at low concentration accelerates the processes of growth and the high concentration can stop this process making herbicides (Iovu, 1964).

Corneliu Oniscu and his collaborators (1972, 1975, 1978 and 1979) have synthesized a series of derivates from class of fenoxialchil sulfamoil carboxylic acids which represents a new class of stimulators generally called BCO.

In sugar beet, carrots, vines and roses crops were tested two substances (BCO 2 and BCO 4) from the class of BCO biostimulators with auxinic action outstanding. It was obtained good results, allowing the product to be aproved as BCO 4 biostimulator sugar beet crops.

Ghițău Carmen and collaborators (2010) have investigated in laboratory conditions the effect of some biostimulators applications in different concentration on the germination process (energy and germination capacity), rot length and coleoptil of winter wheat variety Boema. The highest percentage of germination was recorded in the following biostimulators: BCO 4K with 91,12% germination, BCO 2K + Zinc acetate with 94,50% germination BCO 4 DMA with 95,5% germination, BCO 2 DMA + Zinc acetate with 93,87% germination.

On wheat growth, stimulators acting on the root system, brotherhood, plant height, photosynthetic capacity, duration synthesis, renescence and also can influences the density, resistance to stress and MMB (Ghițău, 2011).

MATERIAL AND METHODS

The experience has been established at the Ezareni station, Iasi in subdivided plots with three repetitions.

The experimental factors are:

A factor – The biostimulators:

a_1 → BCO – 4DMA;

a_2 → BCO 4K;

a_3 → BCO 4K + acetat de Zn.

B factor – Biostimulator concentrations:

b_1 → 50 ppm;

b_2 → 25 ppm;

b_3 → 12,5 ppm.

C factor – Varieties of wheat:

c_1 → Arieşan;

c_2 → Crina;

c_3 → Boema.

The biostimulators applied were obtained from prof. dr. Corneliu Oniscu, „Gheorghe Asachi" Tehnical University of Iasi.

These biostimulators are from the class of fenoxialchil sulfamoil carboxylic acids, wich has a low toxicity and can be also biodegradable.

The climate conditions of the agricultural year 2010 – 2011 have been favorable for wheat plant growth. The multiannual average of rainfall at the weather station AgroExpert – Miroslava was 517,8 mm. The average annual of rainfall is

providing 80% more than 380 – 480 mm and 50% of the annual amount of precipitation exceeds 500 mm .

RESULTS AND DISCUSSIONS

The biostimulators applied has positively influenced wheat productions. Therefore, the highest productions of 8213 kg/ha was recorded at BCO 4K + Zinc acetate biostimulator, with a difference of 1119 kg/ha, very significant compared to control BCO – 4DMA biostimulator (tab. 1).

Table1

The influence of biostimulators on wheat yield in crop year 2010-2011

Biostimulators	Production Kg/ha	% of variant control	Differences Kg/ha	Significance	Observati-ons
BCO – 4DMA	7094	100,0	Mt.	-	PLACE III
BCO 4K	7978	112,46	884	**	PLACE II
BCO 4K + Zinc acetate	8213	115,77	1119	***	PLACE I

DL 5% 340,4 kg/ha
DL 1 % 564,4 kg/ha
DL 0,1% 905,2 kg/ha

When the biostimulators variant were compared with wather trated extraroot production increases were 31,57% in BCO 4K + Zinc acetate, 27,81% in BCO 4K and 13,64% in BCO 4 DMA (tab. 2).

Table 2

Production caused by the biostimulators compared with the variant trated with water in crop year 2010-2011

Biostimulators	Production Kg/ha	% of variant control	Differences Kg/ha	Significnce	Observati-ons
BCO – 4DMA	7094	113,64	852	***	PLACE III
BCO 4K	7978	127,81	1736	***	PLACE II
BCO 4K + acetat de Zn	8213	131,57	1971	***	PLACE I
Treated with water	6242	100,0	Mt.	-	PLACE IV

DL 5% 340,4 kg/ha
DL 1% 464,4 kg/ha
DL 0,1% 590,2 kg/ha

The concentrations of growth regulators has not significantly differentiated the productions (tab. 3), with a difference of 245,1 kg/ha, but uninsured statistic was obtained at a concentration of 50 ppm.

On table 4, where wheat yields are influenced by variety, we observed that Crina and Ariesan varieties were not different between them, with similar production. The highest production of 7997,8 kg/ha was obtained by Boema variety. Crina variety made production less than Boema, with 326,3 kg/ha

being distinctly less significant and Ariesan variety achieved a lower production with 380,4 kg/ha from Boema, being very significant in less.

From the interaction of three factors studied, has observed the highest production of 9007 kg/ha obtained by the variant BCO – 4K + Zinc acetate x 50 ppm x Boema variety with a difference of 1461 kg/ha, being very significant to the control variant BCO – 4DMA x 12,5 ppm x Boema variety (tab. 5).

Table 3

The influence of biostimulator concentrations on wheat yield in crop year 2010-2011

Concentration ppm	Production Kg/ha	% of variant control	Differences Kg/ha	Significance	Observations
50	7949,6	103,18	245,10	-	PLACE I
25	7631,7	99,05	- 72,80	-	PLACE III
12,5	7704,5	100,0	Mt.	-	PLACE II

DL 5% 185,0 kg/ha
DL 1% 259,7 kg/ha
DL 0,1% 366,6 kg/ha

Table 4

The influence of variety on wheat yield in crop year 2010-2011

Variety	Production Kg/ha	% of variant control	Differences Kg/ha	Significance	Observations
Boema	7997,8	100,0	Mt.	-	PLACE I
Crina	7671,5	95,92	-326,3	00	PLACE II
Arieşan	7617,4	95,24	-380,4	000	PLACE III

DL 5% 196,3 kg/ha
DL 1% 263,1 kg/ha
DL 0,1% 347,1 kg/ha

Analyzing the biostimulator interactions it has observed these:

The highest yield of 7546 kg/ha was obtained by Boema variety in the variant treated with BCO - 4 DMA biostimulator in concentration of 12,5 ppm and the lowest production of 6580 kg/ha at Crina variety with a concentration of 12,5 ppm;

BCO – 4K biostimulator determined the highest production of 8536 kg/ha in interaction with 12,5 ppm and Crina variety, while the lower production of 6946 kg/ha was obtained in interaction with 25 ppm and Crina variety;

BCO – 4K + Zinc acetate realized the highest production of 9007 kg/ha at 50 ppm at Boema variety interaction and the lower production of 7253 kg/ha at 12,5 ppm and Ariesan variety interaction.

Table 5

The influence of interaction between biostimulators x concentration x varieties on wheat yield in crop year 2010-2011

Biostimu-lators	Concentra-tions ppm	Variety	Produc-tion Kg/ha	% of variant control	Differences Kg/ha	Signifi-cance
BCO – 4 DMA	50	Boema	7347	97,36	-199	
		Crina	7417	98,28	-129	
		Arieşan	6943	92,00	-603	0
	25	Boema	7133	94,52	-413	0
		Crina	7030	93,16	-516	0
		Arieşan	7130	94,48	-416	0
	12,5	Boema	7546	100,0	Mt.	
		Crina	6580	87,19	-966	00
		Arieşan	6720	89,05	-826	00
BCO 4 K	50	Boema	8447	111,94	901	**
		Crina	8110	107,47	564	*
		Arieşan	7282	96,50	-264	
	25	Boema	7895	104,62	349	
		Crina	6946	92,04	-600	0
		Arieşan	8377	111,02	931	**
	12,5	Boema	7996	105,96	450	*
		Crina	8536	113,11	990	**
		Arieşan	8220	108,93	674	*
BCO 4 K + Zinc acetate	50	Boema	9007	119,36	1461	***
		Crina	8371	110,93	825	**
		Arieşan	8623	114,27	1077	**
	25	Boema	8380	111,05	834	**
		Crina	7794	103,28	248	
		Arieşan	8000	106,01	454	*
	12,5	Boema	8230	109,06	684	*
		Crina	8260	109,46	714	**
		Arieşan	7253	96.11	293	
DL 5%			412,9 kg/ha			
DL 1%			703,5 kg/ha			
DL 0,1%			1155,5 kg/ha			

CONCLUSIONS

1. When the factors were analyzed individually the biostimulators and wheat varieties positively influenced the caryopses production, and concentrations of 12,5 ppm, 25 ppm and 50 ppm did not lead significant production differences.

2. Compared with version control the biostimulators BCO – 4 DMA, BCO – 4 K and BCO – 4 K + Zinc acetate realized increases of 12,46% and 15,77%, and when the biostimulators were compared with variant treated with water extraroot there were high increase in all biostimulators production of 31,57% at BCO – 4 K + Zinc acetate, of 27,81% at BCO – 4 K and 13,63% at BCO – 4 DMA .

3. Biostimulators concentration realized production of 7949,6 kg/ha at 50 ppm, of 7631,7 kg/ha at 25 ppm and 7704,5 kg/ha at 12,5 ppm.

4. The highest carryopse production of 7997,8 kg/ha was obtained by Boema variety and the other two variety Crina and Ariesan determined production of 7671,5 kg/ha and respectively 7617,4 kg/ha.

5. Interaction between the factors analyzed showed the variant BCO – 4 K + Zinc acetate x 50 ppm x Boema with a production of 9007 kg/ha, with 19,36% higher than version control (BCO – 4K x 12,5 ppm x Boema).

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