STUDY ON INFLUENCE OF THE GROWTH REGULATOR FLORAMIL ON THE PRODUCTIVITY AND QUALITY OF LINSEED FLAX

ПРОУЧВАНЕ ВЛИЯНИЕТО НА РАСТЕЖНИЯ РЕГУЛАТОР ФЛОРАМИЛ ВЪРХУ ПРОДУКТИВНОСТТА И КАЧЕСТВОТО НА МАСЛОДАЕН ЛЕН

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ABSTRACT

The study was carried out in 2004 - 2006 in the experimental field of the Agriculture University- Plovdiv after the block method in four replications with size of the yield plots 20 m^2 - variety Liflora. The preparation was tested in the different rates and phases. The biostimulator FLORAMIL introduced in phase beginning of flowering in rate 0.1 L ha^{-1} increased the yield of flax seeds with 8.61 %. The increase of the yield was in result of the formation of a larger number of capsules and seeds and the higher weight of the seeds per plant in this variant. In view of the chemical composition the strongest positive effect was observed in variant C_1 and C_2. The statistic processing of the data was made according to ANOVA, DUNKAN - multiple-range test.

Key words: Floramil, flax, development, productivity, quality

РЕЗЮМЕ

Опитът беше изведен през 2004-2006 година в експерименталната база на Аграрния Университет – Пловдив по блоков метод в четири повторения с размер на опитната парцелка 20m^2 – сорт Лифлора. Биостимулаторът ФЛОРАМИЛ беше изпитван в различни дози и фази на развитие. Този препарат използван във фаза начало на цъфтеж в доза 0.1 L ha^{-1} повишава добива на семена с 8.61 %. Увеличаването на добива е резултат от формирането на по-голям брой кутийки и семена и по-високото тегло на семената на едно растение при този вариант. По отношение на химическия състав най-силен положителен ефект се наблюдава при вариант C_1 и C_2. Статистическата обработка на данните беше направена по ANOVA, DUNKAN - multiple-range test.

Ключови думи: Флорамил, лен, развитие, продуктивност, качество

INTRODUCTION

Many scientists in the last few years concentrated their efforts on developing substances that influence the plants growth and development, increase the plants productivity and improve the yield quality.

These are the so called biologically active substances. They are used in small quantities, they are harmless and ecologically clean. The application of the biologically active substances is easy and their use is economically profitable.

A special Base for development and implementation of biologically active substances was established recently in the Agricultural Academy in Bulgaria, giving the Bulgarian scientist the opportunity to contribute with their studies to the further development of this matter.

According to some authors' researches, the treatment of the plants of peanuts, hard wheat, etc. with different doses and in different phases of the vegetation contributes to increasing the productivity and the values of the productivity elements. [1, 2, 3, 4, 5, 6]

Such researches concerning flax were not carried out. That is why our purpose was to ascertain the influence of the biostimulator FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/, used in different doses and phases, on the productivity and quality of linseed flax.

MATERIAL AND METHODS

The study was carried out in 2004-2006 in the experimental field of the Agriculture University after the block method in four replications with size of the yield plots 20 m^2. Linseed flax cultivar Liflora was grown in accordance with the standard technology. FLORAMIL is the trade name of /20%, 3 - methyl phenyl phtalamine acid/. The preparation was tested in the following doses and phases:

Control St - treated only with water

A_1- treated with 0.06 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning of flowering; B_1 - treated with 0.08 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning of flowering; C_1 - treated with 0.1 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning of flowering; A_2 - treated with 0.6 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase full flowering; B_2 - treated with 0.8 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase full flowering; C_2 - treated with 0.1 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase full flowering; A_3- treated with 0.12 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning and full flowering; B_3- treated with 0.16 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning and full flowering; C_3- treated with 0.2 L ha^{-1} 20%, 3 - methyl phenyl phtalamine acid in phase beginning and full flowering. The structural elements of the yield were determined after analysing 50 plants from one square meter. The statistic processing of the data was made according to ANOVA, DUNKAN - multiple-range test [7, 8].

RESULTS AND DISCUSSION

The chart on Fig.1 showed that the temperatures during the vegetation of the linseed flax cultivation were higher compared to the long-term period in all the years of the research. According to the data for the meteorological conditions, the three years of the study could be considered suitable for the linseed flax cultivation.

The highest temperatures during the period of ripening were registered in 2006 – 24.7°C. The amount of the rainfalls during the period sowing - harvesting was as follows: 2004 – 173.1 mm, 2005 – 289.9 mm, 2006 - 225,0 mm at 242 mm for the long-term period.

On analysing the data ANOVA it was ascertained that the years with their climatic conditions had a very strong statistic influence on the yield - η 96 /Table 1/.

The results of the phenological observations /Table 2/ showed that the optimum temperatures and the one and the same quantity of rainfalls during the time of sawing and of germination in all three years of the study made the germination possible for 10 - 12 days.

The intermediate period between the phases alder – bud stage in 2004 lasted for 23 days, and the higher temperatures and the smaller quantity of rainfalls in 2006 shortened this period to 19 days.

The highest quantity of rainfalls fell in 2005 during the period bud stage – flowering, thus making this period longer - it lasted 25 days and full ripening – 44 days.

The post-action of the preparation FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ with regard to plants height could be expressed with plants growth stimulation compared to the control /Table 3/.

The plants, treated with the lowest dose of the biostimulator FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ in phase bud-stage, exceeded the height of the control with 1-2 cm, while the variants with the highest concentration exceeded it with 10-17 cm.

The index number of branches per plant had the highest values in the control, compared to all other variants.

The number of capsules in the variants A_2, C_1 and C_2 exceeded that of the control. The treatment of the plants in phase beginning of flowering with concentration 0.1 L ha^{-1} FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ had the strongest effect on the number of capsules.

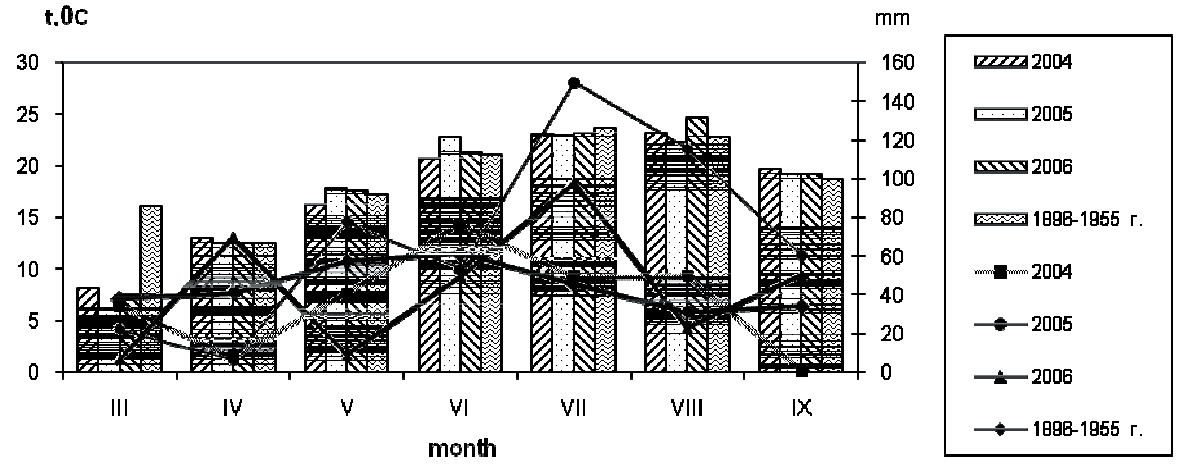

Figure 1. Temperature and rainfall distribution during the period 2004-2006, compared to the long-term period

Table 1. ANOVA of yield

Source of variation	Sum of Squares	DF	MS	F	Sign of F	η^2
VAR	46669.467	9	5185.496	163.766	000	94
GOD	67200.267	2	33600.133	1061.146	000	96
Interaction VAR x GOD	4303.733	18	239.096	7.551	000	60
Resudual	2849.760	90	31.664	-	-	-

Table 2. Phenological observation of linseed flax, treated with Floramil in different doses and phenophases

Years of study	Sowing	Spout	Alder	Bud Stage	Full flowering	Full ripening
2004	31.III	10.IV	30.IV	23.V	10.VI	15.VII
2005	25.III	5.IV	26.IV	18.V	12.VI	26.VII
2006	30.III	11.IV	3.V	22.V	13.VI	20.VII

The treatment of the plants in the two phases of their development and with the highest doses of FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ reduced the number of capsules in all variants.

The same tendency was exhibited for the other two indices /number of seeds and weight of the seeds per plant/.

The results, given in Table 4, showed that the peculiarities in the meteorological conditions in the separate years of the study led to obtaining different yield of seeds.

The highest yield of seeds was obtained in 2004 and the lowest in 2005.

In all the three years of the research the highest yield of seeds was obtained at treatment of the linseed flax with 0.1 L ha^{-1} FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ in phase beginning of flowering. The differences, compared to the control, were mathematically significant. The same tendency was observed also average for the period of the study. The strongest positive effect in this variant was due to the higher values of the elements of the yield /number of capsules, seeds and weight of seeds per plant/.

The yield in the variants A_2 and C_2 at treatment of the plants in phase full flowering exceeded the control, but according to mathematical significance they become equal to it.

The treatment of the plants with the highest doses of the biostimulator FLORAMIL /20%, 3 - methyl phenyl

Table 3. Structural analysis of the yield elements /average for the period 2004 - 2006/

Variants	Height of the plants, cm	Branches/ plant	Number of capsules/ plant	Number of seeds/ plant	Weight of the seeds/ plant, g
St.	68	2.5	16	128	0.88
A_1	69	1.3	12	96	0.66
B_1	70	1.1	11	88	0.60
C_1	69	1.8	25	200	1.38
St	68	2.5	16	128	0.88
A_2	76	2.0	24	192	1.32
B_2	72	2.0	11	110	0.76
C_2	78	2.1	23	161	1.11
St	68	2.5	16	128	0.88
A_3	73	1.5	8	64	0.44
B_3	81	0.75	7	63	0.43
C_3	85	0.85	10	90	0.62

Tàble 4.Yield of seeds kg /ha for the period 2004-2006

V	Years							
	2004		2005		2006		Average	
	kg /ha	%	kg /ha	%	kg /ha	%	kg /ha	%
St	1560e	100.00	1130d	100.00	1250de	100.00	1313	100.00
A_1	1290d	82.69	910bc	80.53	1190d	95.20	1130	86.14
B_1	1270d	81.41	930c	82.30	1020c	81.60	1073	81.77
C_1	1700j	108.97	1230e	108.85	1350j	108.85	1427	108.61
St	1560e	100.00	1130d	100.00	1250de	100.00	1313	100.00
A_2	1600e	102.56	1170de	103.53	1300ej	104.00	1357	103.42
B_2	1280d	82.05	890bc	78.76	1000bc	80.8	1057	80.54
C_2	1620ej	103.89	1170de	103.53	1290ej	103.20	1360	103.54
St	1560e	100.00	1130d	100.00	1250de	100.00	1313	100.00
A_3	870a	55.76	720a	63.72	930b	74.40	840	64.63
B_3	1180c	75.64	700a	61.95	840a	67.20	907	68.26
C_3	1070b	68.58	840b	74.34	1030c	82.40	980	75.11
LSD 5%	110.6		100.6		120.2			

phtalamine acid/ in both phases of their development reduced the yield compared to the control, the differences were mathematically significant.

FLORAMIL /20%, 3 - methyl phenyl phtalamine acid/ had positive influence on the dry matter, the crude protein and the crude fat in the variants C_1 and C_2. There were almost no changes in the contents of cellulose in all tested variants.

Regarding the physical indices hectolitre weight and weight of 1000 seeds average for the period of the research, the differences were poorly exhibited. /Table 5/

CONCLUSION

1.The treatment of the plants with FLORAMIL did not have influence on the running of the phenophases.

2. The biostimulator FLORAMIL introduced in phase beginning of flowering in dose 0.1 L ha^{-1} increased the yield of flax seeds with 8.61 %.

3. The increase of the yield was in result of the formation of a larger number of capsules and seeds and the higher weight of the seeds per plant in this variant.

4. In view of the chemical composition the strongest positive effect was observed in variant C_1 and C_2.

Table 5. Chemical characteristics and physical indices of the flax seeds from the different variants average for the period 2004-2006

Variants	Dry Matter %	Crude protein Content %	Crude Fat content %	Cellulose Content %	Weight of 1000 seeds g	Hectolitre seed weight kg
St	93.25	25.13	41.12	14.17	6.33	75.70
A_1	93.20	25.15	41.10	14.16	6.33	75.30
B_1	93.03	25.13	41.05	14.15	6.38	75.90
C_1	94.01	25.94	42.27	14.23	6.14	75.60
St	93.25	25.13	41.12	14.17	6.33	75.70
A_2	93.87	25.23	41.00	14.75	6.24	75.30
B_2	93.10	25.04	41.11	14.10	6.12	75.20
C_2	93.96	25.67	42.00	14.14	6.00	75.80
St	93.25	25.13	41.12	14.17	6.33	75.70
A_3	93.15	25.09	41.99	14.15	6.08	75.10
B_3	93.90	25.02	41.10	14.13	6.00	75.00
C_3	93.00	25.01	41.03	14.12	6.04	75.30

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