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THE EFFECT OF STIMULATORS ON GRAIN QUALITY OF THE SOYBEAN VARIETIES

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ABSTRACT

This article presents data on the effect of stimulators on grain quality of the soybean varieties. According to the data, it was observed that the amount of protein in Nafis variety increased by 0.1-1.7% due to Uzgumi stimulator, 0.6-0.9% due to Fulvogummat stimulator, 1.2-1.6% due to Rival stimulator. The amount of protein in Vilana variety increased by 1.6-2.3% due to Uzgumi stimulator, 2.0-3.3% due to Fulvogummat stimulator, 2.1-3.5% due to Rival stimulator; In Nafis variety, the amount of oil decreased due to the increase in protein, and in the Vilana variety, an increase in the amount of oil was observed due to a slight decrease in the protein content.

Keywords: grain quality, protein, oil, soybean varieties, stimulators, background of mineral fertilizers.

INTRODUCTION

Soybean plant is a very important plant in the world today. It is grown in more than 60 areas of the world. Soy is the leading crop among legumes. Today, when there is a protein shortage all over the world, the protein content of soybeans, the presence of all the amino acids useful for humans in the protein content, increases the nutritional value of soybeans even more. It is important to note that the advantage of soybeans is that they can be compared with a number of food products in terms of the richness of lysine, methionine, arginine, leucine and other essential amino acids. In many countries where soybeans are grown, this crop is the only source of protein, and it also provides livestock with nutritious food and increases its productivity. Soybean accounts for 40% of the world's gross vegetable oil production [2].

LITERATURE REVIEWS

In addition to the adopted cultivation technology, the application and study of stimulants that activate the plant's more active growth, development and crop formation remains a very relevant issue today.

this indicator can be increased under the influence of various stimulants and growth regulators, fertilizers, substances with various active effects. (Agabackgroundov O.M. and Others) [1].

Currently, various complexes are being created at the industrial level, including mineral, micro-fertilizers, growth regulators, stimulants, and seed adhesives. This set of complex substances is used in seed treatment. Seeds are saved when treated in this way. The use of a complex of growth regulators should ensure not only the productivity of the plant, but also its safety (Shapoval, 2015), [7].

The use of plant growth regulators in agriculture began in the 30s of the last century in the United States. The first widely used synthetic hormone was ethylene. Since then, synthetic substances imitating natural growth hormones have become an integral part of modern agriculture (Lovtsova), [4].

The development of the technology of using biostimulants for leguminous crops, which regulate growth and increase immunity, is of the most urgent importance. [6]

Achievements achieved in the experiments of "Aksayskaya Niva" LLC, Rostov Region, Aksay District. Treatment of soybean seeds with Gumimax drug had a positive effect on the reduction of wilting in soybeans, plant grains and grain yield. The results of the experiment show that the drug "Gumimax" increases the plant's resistance to existing discomforts. Note: pre-sowing seeds simultaneously with rhizorthorphin treatment of the plant allows to increase the productivity of soybean grain up to 0.3–0.4 tons. (Balakay G.T. and dr., 2008), [3]

Growth regulators have the ability to positively affect the yield and quality of soybean seeds. They increase the resistance of the plant to water, temperature and other adverse conditions. In order to achieve the maximum effect, seeds are obtained by step-by-step processing (Khokhoeva N.T), [8].

Ran O.P., Selikhova O.A., Tikhonchuk P.V. (2009) noted that when soybeans are grown in arid regions, they are not irrigated during the rainy season. In some regions, due to the effect of drought, the harvest is reduced, a lot of damage is seen. Damage from drought depends on the duration of the drought period, the period of plant development, evaporation and soil conditions. Water deficit (drying of the soil) is expressed by the closing of the leaf apices, the reduction of transpiration and photosynthesis [5].

Kh.N. Atabaeva., F.B. Namozov., A.A. Kurbanov and S.Sh. Khayrullaev in their experiments conducted in 2018-2020, when they applied micronutrients to the soybean crop, micronutrients affected the height of the soybean stem, leaf, root development, nodule formation, grain quality and productivity, and provided a high yield [10].

According to R. Jo'raeva., J. Toshpol'atov., A. Iminov., Kh. Bozorov and L. Zaynitdinova, S. Khatamov and S. Sh. Khayrullaev, in their experiments conducted in 2015-2017, soybean plant mineral fertilizers and belonging to the rhizobium group

it was observed that the yield increased by 12.6-12.8 q/ha when exposed to azotobacteria strains compared to the control variant [11, 14].

According to Khayrullayev Sardor Shamsiddin ugli (2021), the application of micronutrients in the suspension method 2 times during the application period of soybean varieties in the conditions of meadow-swamp soils provides an increase in grain quality [16]. According to data of Atabayeva Khalima Nazarovna, Khayrullaev Sardor Shamsiddin o'g'li, and Usmonova Shohista Usmon qizi (2020), sulfur has a positive effect on the branching of soybean varieties on the background of mineral fertilizers, and in 2018 the number of branches in the variety "Orzu" increased by 0.8-1.3 compared to the control option due to the micro element sulfur. In the "Nafis" variety, this figure was 0.3-0.4, and good results were obtained from medium and high sulfur standards. In 2019, these indicators increased by 0.3-0.7 in the variants of sulfur compared to the control in the "Orzu" variety, increased by 0.1-0.3 in the "Nafis" variety, and good results were obtained from the medium and high standards of sulfur [13]. According to Iminov Abduvali Abdumannobovich, Khayrullayev Sardor Shamsiddin ugli, et al, Nitragine treatment of soybean and mung bean seeds before sowing had a positive effect on seed germination under both laboratory and field conditions, the germination rate of seeds in the laboratory under the conditions of cotton cultivation in the following year under the background of non-treatment by nitragine before sowing the seeds of soybean and mung bean crops grown as a secondary crop after winter wheat was 0.3-1.3%, and field fertility was 0.2-0.8% higher. Also, it was found that the use of phosphorus and potassium fertilizers in soybean and mung bean crops grown as a secondary crop was 0.6-1.0% higher in the laboratory, and 0.6-0.7% higher in the field than in the control options without mineral fertilizers in studies [12]. According to Umarova Nigora Sadriddinovna, Bo'riboyev Bekzod Yetmish ugli, Khayrullayev Sardor Shamsiddin ugli, Usmonova Shokhista Usmon kizi, & Turdaliyeva Shokhista Tulkinjon kizi, the demand of the soybean plant for mineral fertilizers, it was observed that when NPK and liquid fertilizer were used together, all the biometric parameters and yields of the plant increased by varieties compared to other methods. The use of mineral fertilizers in different ways in typical sierozem soil conditions affects the grain yield of local and foreign varieties. In other words, the average yield of medium-ripe soybean varieties "Nafis" was 43.4 c / ha, "Vilana" was 42.4 c / ha, and the best way to increase the yield is to apply fertilizers as NPK in combination with liquid fertilizer [17]. According to data of Khayrullayev Sardor Shamsiddin o'g'li and Usmonova Shohista Usmon qizi, the location of the lower first pod in soybean varieties is 12.8-15.9 cm in Orzu variety, 3-3.1 cm in Radimax stimulator, 2.2-2.4 cm in Gummat

stimulator, 2.1 cm in Tecamin stimulator and 3.1 cm in Algora stimulator was found to be high. The most effective results were observed in Radimax, Gummat and Algora bio-simulators, and the location of the lower first pod was detected 14.7-17.6 cm in the "Nafis" variety, which was 2.5-2.9 cm higher in the Radimax stimulator, 2.2-2.5 cm higher in the Gummat stimulator, 2.1 cm higher in the Tecamine stimulator, and 2.4 cm higher in the Algora stimulator than in the control variant. The most effective results were observed in Radimax, Gummat and Algora biosimulators [15]. According to Atabayeva, K. N., Umarova, N. S., Yakubov, S., & Khayrullaev, S. S, positive results were obtained from moderate levels of sulphur and manganese, and low levels of iron. Macro and micronutrients had a positive effect on soy yield. An additional 7.6 quintals (q)/ha was harvested in exchange for macro fertilizer. Compared to the background variant, the yield was 4.6-8.3 q/ha for sulphur and 4.9-9.8 q/ha for manganese. The yield of the iron element was lower than that of the background variant. Grain quality has changed in exchange for macro and micronutrients. In exchange for mineral fertilizers, this figure increased by 2.4%. In exchange for the element sulphur, the protein increased by 3.1-5.8%; an increase of 4.4-8.4% was observed in exchange for the element manganese. It was noted that the protein increased by 7.9-8.7% in exchange for the element iron [18]. According to Ugli Khayrullayev, S. S., & Kizi Usmonova, S. U., mineral fertilizers and sulfur microelements activate the symbiotic activity of soybean variety "Orzu", averaging 32.4-42.3 million nodules per hectare, the number of nodules due to the background of mineral fertilizers increased by 13.6%, and there was an increase of 19.4-23,4% due to sulfur, as well as an average weight of nodules was 6.46-9.56 c / ha, the weight of nodules increased by 5.3% due to mineral fertilizers, and 17.1-32.4% due to sulfur. During the application period, 6.46-9.56 c / ha of nodules mass was accumulated per hectare according to the studied variants, which contributes to the increase of nitrogen and organic matter in the soil and a slight increase in biological efficiency [19]. According to Usmonova Sh.U, Khayrullaev S.Sh, Shomuqimov N.N, & Gaynanova A.F, the influence of stimulants on soybeans affected the weight of 1000 grains of Vilana cultivar, under the influence of Gummat stimulator this figure was 2.2-7.4 grams higher than on basis of mineral fertilizers (Background), and under the influence of Rival stimulator-3.0-6.0 grams [20]. According to Khayrullaev S. S, In the variant, where not used mineral fertilizers and micronutrients, the leaf area in the control variant of the Orzu variety of soybean was 51.1 thousand m^2 / ha. Under the influence of microelements, the leaf area of Orzu was 59.1-64.6 thousand m^2 / ha. The highest rates of exposure to micronutrients were observed with medium use of sulfur and manganese. Under influence macro and

micro fertilizers, the leaf area of Orzu variety increased from 4.0 to 13.5 thousand m^2 / ha, or from 7.3 to 20.9% [21].

METHODS AND MATERIALS

Experiments are carried out in field and laboratory conditions. In the research "Methods of conducting field experiments" (T.UzPITI 2007), "Methodology of field experiment (B.Dospekhov, 1985), “Methodology of the State variety testing of agricultural crops” (1985, 1989), “Methods of agrochemical, agrophysical studies of the soil of Central Asia” (1988) methods are used.

Nafis variety. The variety was created by the method of individual selection at the Rice Research Institute of Uzbekistan.

The growing period is 115-120 days. The height of the plant is 145-150 cm. The location of the lower pod is 14-16 cm, the number of branches is 2-4, the number of pods in one plant is 120-130, the number of grains in one pod is 2-4.

Grain quality and technological parameters: weight of 1000 seeds is 165-175 g. The protein content of grain is 40-41%, the oil content is 25-27%. Resistant to lodging, shedding, diseases and mechanized harvesting.

Yield: 30-32 q/ha grain yield and 250-300 q/ha blue mass can be obtained from the variety under favorable conditions.

Vilana variety: The variety was created at the All-Russian Institute of Oilseeds. This variety was obtained by crossing the hybrid generation L-309 with collection sample 0240 and individual and mass selection in F2 and F3 varieties. Plant feathers are gray. The flowers are purple, the pods are brown, the seeds are yellow, dull, without spots. The variety is medium-ripening, resistant to unfavorable conditions, drought-resistant, and the yield increases when water is provided.

The growing period is 116-120 days. Seed yield without irrigation is 32-34 q/ha, and with irrigation up to 42 q/ha. The height of the plant is 111-115 cm, the location of the lower pod is 16-17 cm. The amount of protein in the grain is 40.1-40.3%, the amount of oil is 22.4-22.6%

Place of experiment, conditions and agrotechnical measures

The experiments were conducted in the scientific experimental fields of the Rice Research Institute in Tashkent region.

The soil layers are swamp type soils characteristic of an oasis. There are also large and small stones and sand mixtures in different depth layers. These soils derive from the typical excess moisture conditions of the left bank of the river and are ideal for rice cultivation. The soil is grassland. The soil of the experimental field is not saline, the Khaydov layer is 30- 40 см. The pH of the solutions in the soil is 6.8-7.3 units, and it is heavy clay according to its mechanical composition. Experiments are being conducted in 4 checks of 12 cards.

Prior to planting, the background was established in the program, in which 50 kg of nitrogen, 100 kg of phosphorus and 70 kg of potassium were applied. Planting method is wide rows, row spacing is 70 cm, bush spacing is 5 cm. Nitragin was not

used because soybeans are always grown at the Rice Institute and the soil contains Rhizobium bacteria.

The experimental field was irrigated 2 times during the period of operation. Cultivation was carried out 2 times in the experimental field with the help of equipment. Soy varieties were fed in 3 different ways, suspension was used.

RESULTS AND DISCUSSION

Stimulators participate in the synthesis of a number of organic substances in the plant cell and help in the normal passage of physiological and biochemical processes in the cell. In particular, they accelerate biological synthesis processes, ensure plant growth, development, yield, increase in oil content, and protein synthesis.

When analyzing the grain of Nafis variety in the experiment, the amount of protein in the variant with mineral fertilizers was 40.1%, and the amount of protein was by 0.1 1.7 and 1.1% under the effect of background+Uzgumi stimulator respectively, under the influence of background+Fulvogummat stimulator; it was by 0.6, 0.9 and 0.8%, respectively, compared to the background variant, and under the influence of background+Rival stimulator, it was found that it increased by 1.2, 1.6 and 1.4% (see Table 1).

Table 1

Effect of stimulators on grain quality of soybean varieties, %

Methods of stimulators application	Varieties			
	Nafis		Vilana	
	protein	oil	protein	oil
Background -$N_{50}P_{100}K_{70}$ kg/ha	40.1	18.8	37.8	19.0
Background+Uzgumi (seed treatment)	40.2	21.9	40.1	23.4
Background+Uzgumi (foliar application)	41.8	19.2	40.0	23.2
Background+Uzgumi (seed treatment+foliar application)	41.2	19.1	39.4	20.9
Background+Fulvogummat (seed treatment)	40.7	20.1	41.1	27.3
Background+Fulvogummat (foliar application)	41.0	20.0	40.5	26.0
Background+Fulvogummat (seed treatment+foliar application)	40.9	19.8	39.8	23.8
Background+Rival (seed treatment)	41.3	20.7	41.3	27.1

Background+Rival (foliar application)	41.7	19.1	41.0	25.3
Background+Rival (seed treatment+foliar application)	41.5	18.9	39.9	23.3

Grain analysis showed opposite results for protein and fat content. If the amount of protein increases, the amount of fat decreases, or if the amount of protein decreases, the amount of fat increases. The amount of oil in Nafis variety was 18.8% in the variant with mineral fertilizers. Under the effect of Background+Uzgumi stimulator, the amount of protein was by 3.1 0.4 and 0.3%, respectively, compared to the background option; under the influence of background+Fulvogummat stimulator; it was by 1.3, 1.2 and 1.0%, and under the influence of background+Rival stimulant, it was higher by 1.9, 0.3 and 0.1%.

According to the results of the grain analysis of the Vilana variety, the protein content in the variant with mineral fertilizers was 37.8%, and under the effect of background+Uzgumi stimulator, it was by 2.3, 2.2 and 1.6%, respectively, compared to the background variant; under the influence of background+Fulvogummat stimulant, it was by 3.3, 2.7 and 2.0%, and under the influence of background+Rival stimulant, it was higher by 1.2, 0.9 and 2.1%.

The amount of oil in the Vilana variety was 19.0% in the variant with mineral fertilizers. Background+Uzgumi stimulator increased oil content by 4.4% compared to treated with mineral fertilizers. When Background+Uzgumi stimulator was applied from the leaf was by 4.2%, and when Background+Uzgumi stimulator was applied from the seed+leaf, it was 1.9% higher than control variant.

Background+Fulvogummat stimulator applied by seed increased oil content by 8.3% compared to the background option of mineral fertilizers, oil content was 7.0%, background+Fulvogummat stimulator was used by foliar application, and Background+Fulvogummat stimulator was used by seed treatment+foliar application, it was observed that it was higher by 4.8%. Background+Rival stimulator increased oil content by 8.1% compared to mineral fertilizers of background, when background+Rival stimulator foliar applied, it was found to be 6.3%, and background+Rival stimulator applied by seed treatment+foliar application, it was found to be higher by 4.3% (see Table 1).

CONCLUSION

In conclusion, the amount of protein in Nafis variety increased by 0.1-1.7% due to Uzgumi stimulator, 0.6-0.9% due to Fulvogummat stimulator, 1.2-1.6% due to Rival stimulator. The amount of protein in Vilana variety increased by 1.6-2.3% due to Uzgumi stimulator, 2.0-3.3% due to Fulvogummat stimulator, 2.1-3.5% due to Rival stimulator; In Nafis variety, the amount of oil decreased due to the increase

in protein, and in the Vilana variety, an increase in the amount of oil was observed due to a slight decrease in the protein content.

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