

Section 1. Biotechnologies

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THE EFFECT OF “COMPLEX-CO” PREPARATION ON THE TILLERING AND EFFICIENCY INDICATORS OF A FEW SPIKED CEREALS (BARLEY, EMMER, WHEATGRASS). THE FIRST MESSAGE

Abstract. The influence of the “Complex-Co” preparation, on the yield of some grain crops by the method of pre-sowing seed treatment under irrigated conditions of Armenia was studied. The data showed that at different stages of ontogeny grain cultures displayed positive results. Further research is needed for the preparation widespread use in agricultural production.

Keywords: “Complex-Co”, growth stimulant, seed disinfectant, barley, emmer, wheatgrass.

Introduction

The increase of grain production is considered to be one of the main strategic directions for the development of agriculture in the country, which pri-

marily contributes to the solution of food security problems. A country is considered a developed agricultural one if it has a stable grain economy. The increase in grain volume is largely connected with the

use of intensive crop cultivation technologies, which can help to accelerate plant growth at high yields in dry conditions and to increase efficiency indicators [8, 38–46; 7, 582–588]. In addition to increasing the volume of the product, it is also important to obtain the quality indicators of the harvest, the chemical composition, the reduction of the remaining quantities of harmful, undesirable compounds in it, the exclusion of which can be achieved through the use of organic preparations during plant cultivation.

Organic agriculture strictly follows the universally recognized and approved principles adopted by the International Federation for Development (IFOAM) aimed at improving socio-economic, geographical, ethnic and cultural issues. Organic agriculture is an ecological system of production management, which promotes biodiversity, activates vital processes in the soil and plants [12; 13]. Organic preparations not only contribute to the intensive growth and development of crops, increasing the yield of field-perennial fruits by 8–15%, but also greatly promote the efficient assimilation of microelements in the soil [9, 702–707]. In contemporary intensive agriculture, the role of microelements is great, which is the primary guarantee for obtaining high quality crops [11, 39–42; 6, 29–32]. The latter, being a structurally important component of enzymes, play an important role in a number of biochemical processes in the plant and are essential throughout the vegetation of crops at all stages of their growth and development [10, 117–119]. Although the soil contains a certain amount of microelements (zinc, manganese, iron, copper, etc.), their solubility and availability to plants is very low, and scarcity of different microelements in crops is manifested by very different symptoms [1, 72–79; 4, 21–30].

We have studied the effect of “Complex-Co” preparation, a natural stimulant-disinfectant, on the tillering of grainy cereals and on the efficiency indicators.

The Material and Method

The “Complex-Co” preparation, which contains microelements, was obtained in the basic research

laboratory of “Acquisition of Quality Pesticides and Quality Control” of ANAU Foundation with affordable technology of acid processing of wine-yeast sediment [2, 116–125]. There has also been studied the susceptibility of spring barley “Araratyan”, emmer “Garni”, “Branched” varieties of autumn wheatgrass to a plant-derived preparation of natural origin, which stimulates plant growth. The experiments were carried out in the conditions of watery, cultivated-irrigated lands of Echmiadzin region of Armavir marz of RA. Experiment was conducted over three years. For this purpose, a 1.5% solution of this preparation was used to make pre-sow treatment of the seeds of grainy cereals (barley, emmer, and wheatgrass) [3, 1–7; 4, 21–30]. The sowing of autumn wheatgrass was done every year in the second ten days of October – 6.0 million viable seed, and the sowing of spring wheatgrass in the second ten days of March, respectively 5.0 and 4.5 million with germinal grain norm. The experiments were carried out in three versions, with four replications; with 25 m² of planting area. During the tillering period on the site in late autumn (11/29/21) and early spring (03/06/22), the vegetation cover was treated with a 1% solution of the same preparation for external root feeding. The received data were estimated according to the mathematical processing Dospekhov [5, 352].

Results and Discussion:

During the vegetation period, the process of seed germination, plant tillering, and their growth was studied and the average results of three years of research are summarized in Table 1.

The data in the Table 01 clearly show that the number of sprouts in per unit area of all tested variants was significantly higher than in the controlled ones of the same crop. That difference was 39.5 for barley; 27.5 for emmer and 41.4 for wheatgrass. Accordingly, there was a noticeable increase in the percentage of field germination of seeds in the varieties cultivated with the preparation “Complex-Co”, which increased 6.1–7.9% compared with the controlled variants of the three breeds of cereals.

Table 1.– The effect of "Complex-Co" preparation on the germination and germination time of grainy cereals

Crop	Option	Number of sown seeds 1m ² , pcs	Number of sprouts 1m ² , pcs	Field. Germination%	Germination duration:, day	Duration between germination and tillering
Barely	Controlled	500	451.0	90.2	9	16
	Cultivated		490.5	98.1	7	13
	The smallest Average Difference (SAD0 _s)		42.7	–	1.4	1.8
Emmer	Controlled	450	393.3	87.4	9	15
	Cultivated		420.8	93.5	8	13
	The smallest Average Difference (SAD0 _s)		44.3	-	1.3	1.7
Wheat-grass	Controlled	600	530.4	88.4	8	18
	Cultivated		571.8	95.3	7	14
	The smallest Average Difference (SAD0 _s)		48.5	–	1.3	1.9

The tested organic preparation had a noticeable beneficial effect on the germination time of seeds, accelerating this process for cereals by an average of 1–2 days. As a result, there was a reduction in the transition

period to plant tillering, which was more pronounced here; these differences between the "controlled" and "tested" versions have already been 2–4 days.

Table 2. – The effect of "Complex-Co" preparation on the efficiency indicators of cereals

Crop	Option	Plant height in tillering stage, cm	Degree of tillering		Plant height in spike stage	Spike height, cm	Grain number in spike, psc.	Disease-infected, unit
			General	Effective				
Barely	Controlled	13.5	2.11	1.97	71.4	7.4	31.2	4.7
	Cultivated	16.7	3.22	2.24	88.3	9.8	39.8	4.9
	The smallest Average Difference (SAD0 _s)	2.7	1.2	1.3	12.7	1.7	4.3	–
Emmer	Controlled	12.0	1.91	1.02	64.3	5.3	24.7	4.8
	Cultivated	14.7	2.42	1.91	71.3	6.4	30.1	5.0
	The smallest Average Difference (SAD0 _s)	2.4	1.3	1.2	14.5	1.6	4.3	–
Wheat-grass	Controlled	17.9	3.24	2.01	161.3	9.7	45.4	4.9
	Cultivated	20.9	4.15	2.97	197.4	11.9	55.5	5.0
	The smallest Average Difference (SAD0 _s)	2.7	1.6	1.4	24.2	1.8	7.8	–

The results of the effect of “Complex-Co” preparation on the efficiency indicators of cereals are given in Table 2.

The data in the Table 2 show that the preparation “Complex-Co” had a significant effect on the height of the plants during both the tillering and the heading stage. The height of the plants increased by 2.2–3.0 cm compared to the controller in the tested versions, while in the spike stage this difference became more obvious. Thus, if the “Complex-Co” preparation at the stage of spike contributed to the increase in the height of emmer plants by 7.0cm, barley plants by 16.9 cm, then in wheatgrass, the difference reached an unprecedented size of 36.1 cm, which also plays a big role in obtaining a high crop of straw.

Similar patterns have been observed in the case of general, effective tillering of cereals. The amount of effective tillering plays a very important role in the formation of the grain crop; it had an unprecedented high result in the tested versions, reaching 1.91–2.97.

In the formation of the expected crop no less importance has the length of the spike, the number of grains in it, which are the main guarantees of a high yield.

It should be noted that the spike length of all varieties of cereals developed with the preparation “Complex-Co” was increased by an average of 1.1–2.4 cm compared to control, which is due to the positive effect of the used stimulant. It is known that the spike is formed during the embryonic stage and in the embryonic state it is disposed in the til-

lering node, and the applied stimulant at this stage greatly contributes to the increase of the length of the newly hatched spike. From this point of view, the “Branched” variety of wheatgrass stood out, where the spike length was increased by 2.4 cm relative to the control, and the average number of grains per grain was 10.1, compared to 5.4 emmer, barley for 8.6 grains.

“Complex-Co” is distinguished by its excellent seed disinfectant properties, which are best manifested in the processing of cereal grains, these data are given in Table 02. Here it is clear that in the cultivated versions the plants were not infected with fungal diseases at all, in this respect they were rated the highest with 5 points. During one year of barley studies only, a few traces of stem rust were observed, which was due to the unprecedented high amount of precipitation that year.

Thus, summarizing the results of many years of research, it can be concluded that at different stages of ontogeny, grainy cereals have high sensitivity to the “Complex-Co” preparation. Without the use of mineral fertilizers or pesticides for seed disinfection, the use of “Complex-Co” leads to a positive result, which contributes to the production of efficient and environmentally friendly products, at the same time saving significant funds and reducing the cost of the product. It is recommended to widely use the product of organic origin “Complex-Co” in production as a growth stimulant and valuable disinfectant.

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