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INFLUENCE OF BIOPRODUCTS ON SOWING QUALITY OF SUNFLOWER SEEDS

Obtaining low sunflower yields is largely due to the negative impact of diseases, pests and weeds. On the other hand, the growth and development of sunflower plants is influenced not only by abiotic factors[1].

An exceptional role in this process belongs to climatic conditions, since they largely determine the nature of the relationship between all components of the agrocenosis. Therefore, an important problem is not only the fight against diseases and pests, but also with the entire spectrum of other stress factors of the external environment[2].

In the modern ecological situation, the use of highly effective plant growth regulators, safe for humans and the environment, is of great scientific and practical importance in the formation of highly productive sunflower agrocenoses, since in a relatively short period of time a significant number of domestic microbial preparations have been created and their experimental and semi-industrial production has been organized[3].

Competent use of biological preparations ensures the receipt of high agronomic and economic results.

[1] Shakalii, S. M., Yurchenko, S. O., Bagan, A. V., Shevchenko, V. V. & Zaroza, A. O. (2022). Peculiarities of sunflower growth and development depending on biological products. Bulletin of the Poltava State Agrarian Academy. 3. 11–17. DOI https://doi.org/10.31210/visnyk2022.03.01 URL: http://dspace.pdaa.edu.ua:8080/handle/123456789/12566 [in Ukraine].
[2] Pasternak, O. (2011). Prospects of the rapeseed and sunflower market. Bulletin of the Khmelnytskyi National University. 3. 40–44 [in Ukraine].
[3] Gamayunova, V. V., Kovalenko, O. A. & Khonenko, L. G. (2018). Modern approaches to agricultural management based on biologization and resource conservation. Rational use of resources in the conditions of ecologically stable territories: collective monograph, ed. P. V. Pisarenka. Poltava: PDAA, 232–241 [in Ukraine].

In addition, they significantly improve the ecological and sanitary-hygienic situation. Their use allows for a more rational use of material and energy resources and to solve many issues caused by environmental pollution by agrochemicals and pesticides[4].

The works of many scientists have shown the great influence of physiologically active substances of synthetic or natural origin on the metabolism of substances in the plant, as a result of which there is a change in the processes of growth and development of the whole organism or its individual organs and increased resistance to stress factors.

Growth regulators do not replace fertilizers, but supplement them in the crop nutrition system, increasing the utilization rate of nutrients from the soil and fertilizers[5]. These preparations are usually used for seed treatment before sowing and in the phase of 3-5 pairs of leaves in sunflower. In this case, the yield can increase by 0.22-0.31 t/ha, and the fat content by 0.3-0.5 %[6].

The economic efficiency of chemical means of combating diseases and pests of agricultural crops is gradually decreasing, as resistant races of diseases and pests appear over time, which requires the development of more expensive drugs. In addition, the use of pesticides in large quantities disrupts the biological balance in agricultural landscapes and leads to environmental pollution[7].

Therefore, to assess the impact of biological drugs on the sowing quality of sunflower, we conducted laboratory studies, the purpose of which was to identify the most effective type of biological drug and the optimal timing of their treatment to improve the

[4] Pasternak, O. (2011). Prospects of the rapeseed and sunflower market. Bulletin of the Khmelnytskyi National University. 3. 40–44 [in Ukraine].
[5] Shakalii, S. M., Bagan, A. V. & Barabolya, O. V. (2019). Productivity of sunflower hybrids depending on sowing density and row spacing. Scientific reports of NUBIP of Ukraine: electronic journal. 5. DOI: http://dx.doi.org/10.31548/dopovidi2019.05.003. URL: http://dspace.pdaa.edu.ua:8080/handle/123456789/7051 [in Ukraine].
[6] Shakalii, S. M., Yurchenko, S. O., Bagan, A. V., Shevchenko, V. V. & Zaroza, A. O. (2022). Peculiarities of sunflower growth and development depending on biological products. Bulletin of the Poltava State Agrarian Academy. 3. 11–17. DOI https://doi.org/10.31210/visnyk2022.03.01 URL: http://dspace.pdaa.edu.ua:8080/handle/123456789/12566 [in Ukraine].
[7] Shakalii, S. M., Yurchenko, S. O., Bagan, A. V., Shevchenko, V. V. & Zaroza, A. O. (2022). Peculiarities of sunflower growth and development depending on biological products. Bulletin of the Poltava State Agrarian Academy. 3. 11–17. DOI https://doi.org/10.31210/visnyk2022.03.01 URL: http://dspace.pdaa.edu.ua:8080/handle/123456789/12566 [in Ukraine].

sowing quality of seeds[8].

The friendliness of seedlings, in turn, depends on the energy of seed germination. The energy of seed germination is the ability of agricultural crop seeds to quickly friendly germination. It is determined simultaneously with the germination by the number of germinated seeds (in %) during the period specified for each crop, for example, for field plants, 3-5 days.

The treatment of sunflower seeds with biological drugs to a greater extent contributed to the increase in germination energy. Some biological products also increased the laboratory germination of sunflower seeds.

The most significant increase in the germination energy of sunflower seeds (90 %) was observed in the variant with the biopreparation Phytosporin, treated 7 days before sowing, the biopreparation Biotrinsic also showed good results – 86 % when treated 7 days before sowing, while in the control this figure was 51 percent.

Fig. 1. Germinated seeds on the control after 7 days (water treatment)

[8] Tkalich, I. D., Girka, A. D., Bochevar, O. V. & Tkalich, Yu. I. (2018). Agrotechnical measures to increase the yield of sunflower seeds in the conditions of the steppe of Ukraine. Grain crops. 2, 1. 44–52 [in Ukraine].

[9] Borisenko, V. V. (2016). Productivity of different-ripening sunflower hybrids depending on the sowing density and row spacing in the Right-Bank Forest-Steppe: dissertation for the degree of candidate of agricultural sciences. Uman, 152 p. [in Ukraine].

Fig. 2. Germinated seeds treated with Phytosporin 7 days after treatment

The biopreparations PhytoHell and Flavobacterin were worse in this indicator - 65 and 64 %, respectively (treatment 7 days before sowing).

The biopreparations Flavobacterin and PhytoHell had the best results in terms of the impact on the germination energy when sowing seeds on the day of treatment - 78 and 70 %, respectively.

This is due to the presence of living microorganisms in these biological products and with prolonged storage of seeds, their vital activity decreases and, accordingly, their positive effect on the energy of seed germination decreases[10].

Therefore, it is necessary to treat seeds with these biological products directly on the day of sowing, while observing technological requirements.

The best indicators of the effect on laboratory seed germination were shown by the biological products Flavobacterin (98 %) and PhytoHell (96 %), which were treated on the day of sowing.

Thus, pre-sowing treatment of seeds with biological products leads to the rapid and friendly emergence of seedlings, and, accordingly, to the early transition of plants to

[10] Gamayunova, V. (2019). The impact of nutrition optimization on the productivity of spring oilseed crops on southern black soil in the Steppe zone of Ukraine under the influence of biological products. Bulletin of the Lviv National Agricultural University. Series "Agronomy". Lviv, 23.112-118 [in Ukraine].

autotrophic nutrition.

To assess the effect of biological products on growth processes at the initial stages of plant development, we analyzed some parameters of sunflower sprouts

Table 1. The effect of biological products and treatment times on the sowing quality of sunflower seeds

Biological products	Processing time	Germination energy, %	Laboratory germination, %	Root length, cm	Shoot length, cm	Weight of 100 pcs. shoots, g.
Control	no treatment	51	93	2,54	1,04	17,73
Fitosporin	on the day of sowing	84	93	3,75	1,78	23,69
	7 days before sowing	90	92	6,13	2,19	26,32
	14 days before sowing	85	95	4,26	1,55	19,77
Biotrinsic	on the day of sowing	77	93	3,86	1,82	23,40
	7 days before sowing	86	92	4,71	1,83	24,90
	14 days before sowing	72	95	3,1	1,30	19,91
PhytoHell	on the day of sowing	78	96	3,81	1,28	20,62
	7 days before sowing	65	95	3,37	1,34	20,69
	14 days before sowing	61	92	2,77	1,08	18,23
Flavobacterin	on the day of sowing	70	98	3,88	1,12	20,02
	7 days before sowing	64	95	2,96	1,09	20,61
	14 days before sowing	63	95	2,60	1,06	16,92

For example, under the influence of biological preparations, the mass of seedlings increases. This is probably due to their strong stimulating effect on the stretching and vacuolization of cells, which is accompanied by an increase in their water content.

At the same time, it should be noted that the greatest effect on the length of roots and shoots was produced by the treatment of seeds with the drug Fitosporin 7 days before sowing. At the same time, the length of the roots increases by 2.1 times, which indicates the growth-stimulating effect of this drug.

The drug Biotrinsic has a somewhat smaller effect on the analyzed indicators (an increase of 1.9 and 1.8 times).

The effect of PhytoHell and Flavobacterin is lower compared to the previously mentioned drugs. At the same time, the greatest effect of these drugs is achieved when treated on the day of sowing.

When analyzing the mass of seedlings, the patterns of the effect of biological preparations on the parameters of seedlings are preserved.

Thus, based on the research results, the following conclusions can be drawn:

1. The most effective preparations that affect the sowing quality of sunflower seeds are the biological preparations Fitosporin and Biotrinsic.

2. For the biological preparations Fitosporin, Biotrinsic, the optimal treatment period is 7 days before sowing. PhytoHell and Flavobacterin should be treated with seeds directly on the day of sowing.