

## APPLICATION OF THE GROWTH REGULATOR FITOVITAL IN THE PLANT PROTECTION SYSTEM

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**Summary.** The results are presented showing the possibility of using the plant growth regulator Fitovital as an environmentally friendly means of influencing plants. The drug can be used to increase the productivity of agricultural crops and improve the quality of the products obtained while reducing the pesticide load on the environment.

**Keywords.** *Fytovital, growth regulator, synergist, antidote, immune stimulant.*

**Introduction.** An important element of the technology of cultivation of agricultural crops in the conditions of Belarus is the protection of crops from harmful organisms. The humid and moderately warm climate of the republic favors the spread and development of about 300 species of weeds, 100 species of diseases and 65 species of pests [1]. Under such conditions, if the use of plant protection products is abandoned, the yield of grain crops can be reduced by 30–40%, industrial crops by 60–70%, and vegetables and orchards can be completely lost [2].

For the ecologization of plant protection against harmful organisms, a promising method is the combined use of pesticides with the growth regulator Fitovital. This allows you to reduce the consumption rates of the drugs used without reducing their effectiveness.

**Materials and methods.** The studies were carried out on cultivated soddy-podzolic cohesive sandy loam soil according to the generally accepted method [3]. The studied crops on which Fitovital was applied were cultivated in accordance with [4].

**Results and discussion.** It has been established that the use of narrow-leaved growth regulator Fitovital (0.6 l/ha) in the phase of 4-5 leaves of lupine in combination with a 12.5% reduction in the consumption rate of Fuzilad Super herbicide (1.75 l/ha) has approximately the same effect. on the infestation of couch grass in the crops of this crop and grain yield, as well as the recommended rate of this herbicide (2.0 l/ha) [5].

Growth regulator Fitovital can also be used with glyphosate-based herbicides, which are used in the post-harvest period to kill couch grass and other perennial weeds that are most harmful. Thus, the use of a mixture of herbicide based on glyphosate Shkval (3.0 l/ha) and growth regulator Fitovital (0.6 l/ha) after harvesting the predecessor and regrowth of weeds ensured the death of couch grass and the yield of winter crops at the level of the recommended application rate of this preparation (4.0 l/ha) [1].

Reducing the need for herbicides is facilitated by semi-fallow tillage, which clears its top layer of viable weed seeds. The herbistat effect of semi-fallow treatment can be enhanced by the growth regulator Fitovital, which ensures the disruption of the dormant state of weed seeds. The use of this drug at a rate of 1.2 l/ha immediately after plowing with its incorporation into the soil by a cultivator increased the number of weed shoots on its surface by 66%, which were destroyed by subsequent cultivation [6]. This made it possible to obtain the yield of buckwheat grain at the level of its cultivation technology using the herbicide Agribit (2.0 l/ha) during the growing season [7].

Growth regulator Fitovital can be used as a stimulator of weed seed germination not only during semi-fallow tillage, but also in compacted busy fallow. It has been established that in a 2-mowed fallow (annual legume-cereal grasses for green mass + oil radish for green mass), the introduction of Fytovital (1.2 l/ha) after harvesting annual grasses in preparing the soil for sowing oil radish increased germination. weed seeds and their number in crops of intermediate cruciferous crops by 41.2%. Mowing the green mass of oil radish before seeding of weeds contributed to a more intensive reduction in the potential contamination of the upper soil layer. Therefore, during the cultivation of subsequent buckwheat for non-moldboard processing, the weediness of its crops decreased by 37.8%, and the grain yield increased by 10.9% [1].

When carrying out plant protection measures, mixing pesticides and fertilizers in the sprayer tank has become widespread. This allows you to reduce the frequency of processing and reduce production costs. However, in a number of cases, with the combined use of pesticides and fertilizers, negative

phenomena were noted associated with an increase in the phytotoxicity of the drugs used in relation to cultivated plants. To prevent phytotoxicity of tank mixtures based on herbicides, it is recommended to include special preparations in their composition - antistress agents (antidotes), which accelerate the destruction of the active substance of herbicides in cultivated plants without affecting its metabolism in weeds [1].

It was found that the highest grain yield of spring wheat (43.3 c/ha) was ensured by the use of a tank mixture, in which, along with a reduced by 25% rate of herbicide Granstar (7.5 g/ha), CAS (N30), Fytovital (N30) was additionally included ( 0.6 l/ha). The increase in yield in this case amounted to 3.9 c/ha, which is 1.2 c/ha, i.e. 1.4 times more compared to a two-component tank mix without Fitovital (Table 1). This is due to the fact that when it was used, an increase in the number of grains per ear and the density of the productive stalk of spring wheat was noted [8].

Table 1 - Effect of herbicide Granstar and its tank mixtures with UAN and growth regulator Fitovital on weediness, yield and biometric parameters of spring wheat

Option	Population weeds, pcs/m <sup>2</sup>	Raw mass weeds, g/m <sup>2</sup>	Grain yield, c/ha	Productive stem, piece/m <sup>2</sup>	Spike length, cm	Number of grains in spike, pcs.	Weight of 1000 grains, g
N60P60K90 + N30 (KAS) – background (BG)	150	294,7	39,4	417	8,6	32,0	33,4
BG + Granstar, 10 g/ha*	39	52,2	41,9	431	8,5	30,4	34,5
BG + Granstar, 7.5 g/ha**	38	61,5	42,1	437	8,5	30,5	34,4
BG + Granstar, 7.5 g/ha+Fitovital, 0.6 l/ha**	45	72,4	43,3	440	9,0	32,3	34,0

Note:\* - separate application of UAN and Granstar herbicide, \*\* - joint application of UAN and Granstar herbicide

The use of the Fytophytal growth regulator is of undoubted interest not only when carrying out measures to protect crops from weeds, but also from diseases. The possibility of using this drug to activate the metabolic and

protective reactions of spring barley plants, affecting the content of photosynthetic pigments, the release of water-soluble substances from cells and the activity of lipid peroxidation of membranes, was revealed. A significant decrease under the influence of Fytovital of barley damage by diseases such as *Alternaria alternata* was established; *Helminthosporium teres*; *Helminthosporium sativum*; *Fusarium spp.*, which contributed to the increase in plant productivity [9].

A promising technique is the combined use of the growth regulator Fitovital and fungicides (table 2). It has been established that the treatment of crops of naked oats with this preparation (0.6 l/ha) at the beginning of panicle formation, along with the improvement of the conditions for mineral nutrition of plants, increased the resistance of the crop to leaf damage by red-brown spotting, which ensured an increase in grain yield by 3.6 centners/ha. ha or 10.8% due to an increase in the number of grains of the panicle and the mass of 1000 grains. The use of Fitovital in a tank mix with the Bumper fungicide contributed to a more significant reduction in the development of red-brown spotting compared to the use of the fungicide in its pure form. This contributed to an increase in yield by 6.4 c/ha (19.2%) compared to the control, where these preparations were not used, and by 1.3 c/ha (3.4%) in relation to the use of pure fungicide [10].

Table 2. Influence of growth regulator Fitovital and fungicide Bumper on the development of red-brown spotting and yield of naked oats

Option	Development of red-brown spotting, %	Yield, c/ha	Increase	
			c/ha	%
1. Control	51,3	33,3	-	-
2. Fitovital 0.6 l/ha	45,5	36,9	3,6	10,8
3. Bumper, 0.5 l/ha	25,7	38,4	5,1	15,3
4. Bumper, 0.5 l/ha + Fitovital 0.6 l/ha	21,4	39,7	6,4	19,2

When cultivating spring triticale without the use of fungicides, the grain yield was 35.3 q/ha. The use of Echion fungicide (0.5 l/ha) in the flag leaf phase of this crop increased the grain yield by 7.1 q/ha (20.1%). Approximately at the

same level, the above indicator was when using a mixture of fungicide Echion (0.35 l/ha) and growth regulator Fitovital (0.6 l/ha). At the same time, the consumption rate of the fungicide was reduced by 30%. A similar pattern was observed when using the above preparations on crops of winter triticale [1].

**Conclusions.** Thus, in solving the problem of reducing the use of herbicides and fungicides on crops, it is important to use them together with the growth regulator Fitovital, which can be used as a synergist, antidote, plant immunity stimulator and weed seed germination. This makes it possible not only to reduce the pesticide load on the environment, but also to reduce the production costs for the use of plant protection products as a result of reducing their consumption rates.

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