

THE BIOSTIMULATOR *REGLALG* AS AN INDUCTOR OF PLANTS' VIABILITY AND VIGOR

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Summary. By the definition for the biostimulator, *Reglalg* contains substances extracted from algae that stimulate the natural plant processes that improve their tolerance to environmental abiotic stress, nutrient-use efficiency, quantity, and quality of the crop. During several years of testing, it has been demonstrated that due to the beneficial influence of *Reglalg* on the vigor and viability of different plant species, the plants are also less affected by biotic stress factors. Due to these properties, the biostimulator *Reglalg* is a highly effective preparation for use in organic agriculture.

Keywords: *biostimulator Reglalg, organic agriculture, wheat, tomatoes, vines, apples*

Introduction. One of the tasks of contemporary agriculture is to achieve organic production. To solve this task while simultaneously maintaining or even increasing plant productivity, we propose expanding the use of biostimulator. The practical implementation of biostimulator allows for minimizing the application of synthetic protective preparations and ensures economic efficiency in agriculture at a reasonable level. In recent decades, several signals have suggested that the strategy of agricultural intensification through extensive use of chemicals is bankrupt. The harmful effects of chemicals on soil fertility, the environment, and human health have become evident.

Restoring organic agriculture after a long period of application of chemical preparations of synthetic origin for protection is difficult and risky. Due to the intensive use of fertilizers and chemical plant protection preparations, aggressive breeds of microorganisms, fungi, and pests have appeared. At the same time, the species that competed with harmful organisms

were destroyed or suppressed. A natural way to increase plant vigor and viability is the broader use of biostimulator.

Taking the mentioned into account, we elaborated the biostimulator *Reglalg* containing active substances extracted from the *Spirogyra* species of algae's biomass collected in a specific development phase. The results of experiences provided during more the 25 years demonstrated that by activity and mode of action, *Reglalg* combines the advantages of biological preparations (ecological, low price) and chemical products (high efficiency, stability of physiological activity, long storage period under usual conditions). *Reglalg* demonstrates multifunctional action (biostimulator, antidote) and versatility of action on a wide range of plants. It stimulates the roots' growth rate and influences the vegetation's organogenesis and duration of ontogenesis, due to which the beneficial effects of the biostimulator *Reglalg* become evident, and the action doses are quickly established.

In this report, we include the results that show that with increasing plant vigor and viability, under the influence of the biostimulator *Reglalg*, the plants become less susceptible to attack by fungi and other pathogens.

Materials and methods. In laboratory and field research, we investigated the effects of biostimulator *Reglalg* on seeds germination, growth and maturation rate, organogenesis, resistance to the action of high or negative temperatures, and productivity of different field and horticultural plants. The obtained data were processed statistically, determining the values of the means, standard deviations, and the reliability of the difference between the averages in different variants [1].

Results and discussions. The research carried out in laboratory conditions demonstrated that the active substances with oxidation-reduction properties from the class of unsaturated fatty acids and secondary metabolites, contained in the biostimulator *Reglalg*, act as signals that activate seed germination and initiate plant adaptation processes. In the commune, these processes reduce physiological heterogeneity and the synchronization of seed germination and root growth stimulation, figure 1.

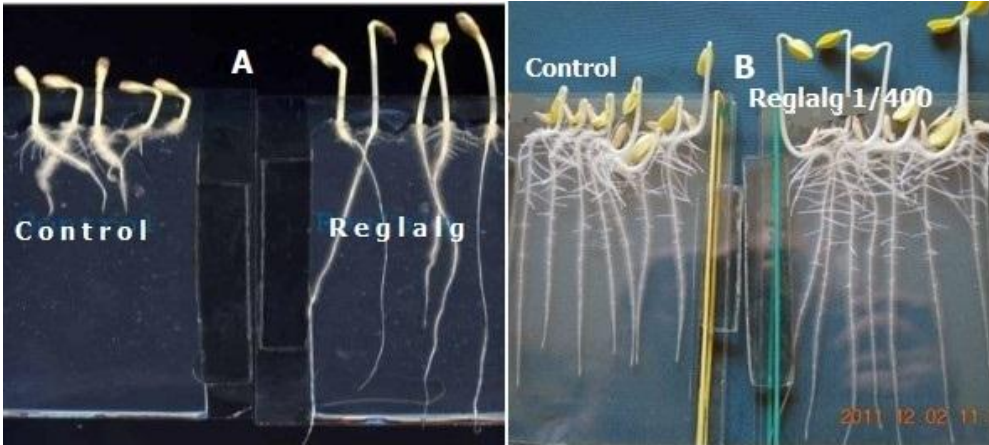


Figure 1. Plantlets of the sunflower hybrid Logofat (A) and the cucumber variety Concurrent (B), on the fourth day after the germination of the control seeds (left) and the experimental ones (right), before exposure to germination, treated with the biostimulator *Reglalg*.

After the germination of the treated with the biostimulator *Reglalg* seeds, the plants' vigor amplifies, manifested by their higher ability to adapt to stress factors, figure 2. Being previously initiated under the influence of the substances in the composition of the *Reglalg*, during real exposure to moderate doses of stress factors (drought, heat, frost, amounts of fungicides, etc.), the adaptation processes evolve faster.

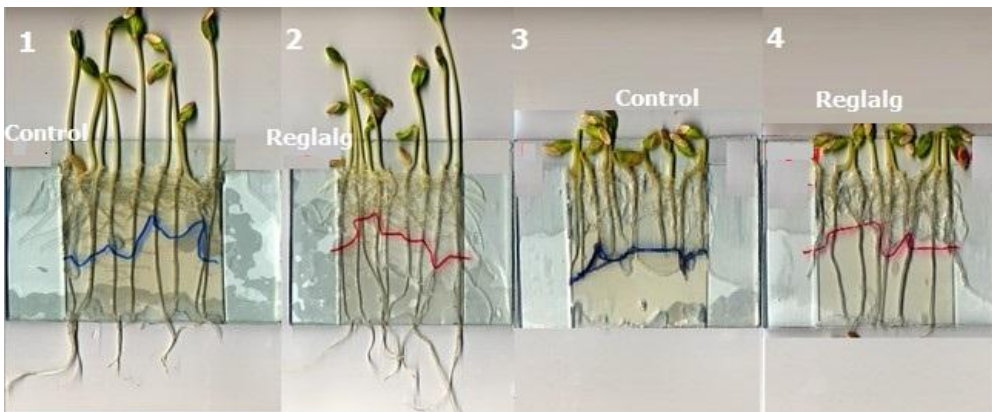


Figure 2. Photographs of cucumber seedlings, variety Concurrent, on the seventh day after exposure to germination. 1, 3, and 2, 4 – represent the seedlings that were obtained from the seeds treated before germination with water and respectively with a biostimulator *Reglalg* solution; 3, 4 – seedlings that, on the third day after the start of germination, were exposed to heat shock.

The beneficial influence of the biostimulator *Reglalg* manifests itself by reducing the adverse effects caused by stress. The increase in resistance by the ability of plants to induce more quickly and carry out more fully the processes of adaptation to stress, figure 2, the induction of morphological processes that increase the efficiency of the avoidance mechanisms (decrease in epicotyl length), figure 3. in this way, under the influence of *Reglalg*, the plants more actively restore growth after exposure to high temperatures, figure 2, and, due to the reduction of epicotyl length and the development of a more vigorous root system, figure 3, they are better protected from winter frosts, summer drought, and heat.



Figure 3. Epicotyl length in plants obtained from wheat seeds, variety Moldova 5 (A), the control and treated with a biostimulator *Reglalg* solution diluted with water in a ratio of 1/1000, 1/800, 1/600, 1/400, 1/200, or 1/100 and triticale, variety Ingen 40 (B), control and treated with biostimulator *Reglalg* solution diluted with water at a ratio of 1/200.

The plants from the wheat seeds treated with the biostimulator *Reglalg* solution were more vigorous, developed the root system better, and formed the twining node 0.5 - 2.5 cm deeper in the soil, figure 3. Due to this, they twined better and were less affected by the frosts of winter, the heat, and the summer drought. After winters with a lot of snow and moderate temperatures, the plants were less depleted due to the respiration of reserve substances and less affected by snow rot compared to the control variant, figure 4. In the spring, wheat plants obtained from the seeds treated with the preparation *Reglalg* were greener, the rate of those attacked by snow rot equaled 40%, and the plants in the control variant equaled 75%.

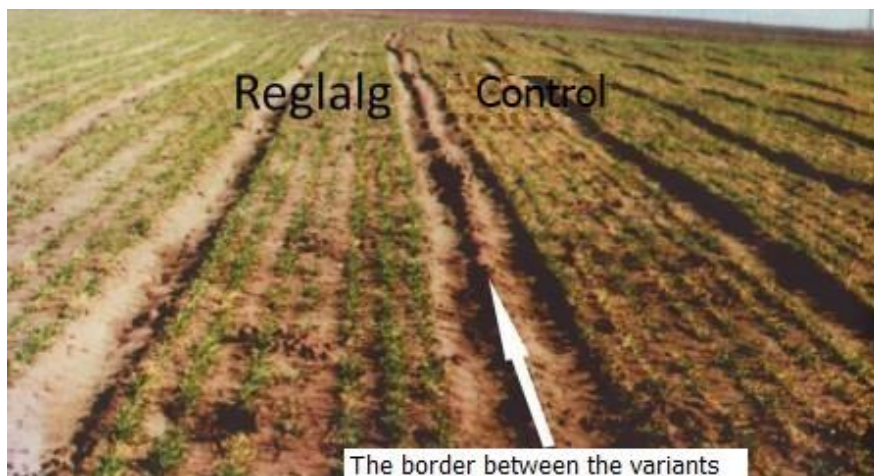


Figure 4. Photo of winter wheat sowing, the Logofat variety, in spring. On the right are plants from the control variant, and on the left - are plants obtained from the seeds treated before sowing with the biostimulator *Reglalg* diluted with water in a ratio of 1/200.

The mentioned initial effects had beneficial consequences during the entire vegetation period. The plants from the experimental variant were more vigorous, and the duration of the vegetation period of the plants from the experimental variants was longer by 3 - 7 days, which determined a higher harvest from experimental plants compared to that of the plants from the control variant, table 1.

Table 1. Results of testing the influence of pre-sowing treatment of the seeds of autumn wheat, autumn barley, and spring barley with the biostimulator *Reglalg* solution, carried out in 2016 on 55 fields in Floresti district, ICS Petcom Inspection SRL.

Culture	Variant	Surface, ha	Harvest, quintals/ha	Harvest variation, quintals/ha	Surplus medium, quintals/ha
Autumn wheat	Control	897,5	46,5	38,1 - 51,2	11,0
	Reglalg	77,5	57,5	42,7 - 75,7	
Autumn barley	Control	171,8	46,2	42,1 - 48,1	1,7
	Reglalg	429,8	47,9	42,3 - 68,2	
Spring barley	Control	15,5	42,3	39,6 - 42,4	3,5
	Reglalg	9,5	45,8	45,8	

In the specific climatic conditions of the Republic of Moldova, vine plants suffer from unfavorable environmental factors, mainly winter and early spring frosts, long-lasting rains during the ripening and harvesting period, and the attack of diseases and pests. The most widespread and dangerous grapevine diseases are downy mildew, powdery mildew, and gray rot. Annually, carried out 5 - 7 treatments with chemical fungicides to combat them, which are toxic to plants, reduce the quality of production, and negatively influence human health and the state of the environment. We demonstrated that combining the biostimulator *Reglalg* with natural fungicides provides plant protection comparable to that obtained with synthetic fungicides' help. The introduction of the biostimulator in the protection schemes ensured the two-fold reduction of fungicide norms without diminishing the degree of plant protection. As a result, the volume of the bunches of grapes increases by 15 - 40% (depending on the variety). Plants became more vigorous and wintered better than those protected using the total rate of fungicides. In the autumn, the experimental variant plants later showed the transition of the leaves into a state of senescence. Instead, they came out of dormancy earlier in the following year's spring. It follows that biostimulator *Reglalg* application and the two-fold reduction of the fungicide norms ensured increasing plants' vigor, delaying the transition of the plants to the state of senescence in autumn, and the earlier coming out of dormancy in the spring of the following year [2].

Conclusions:

1. The biostimulator *Reglalg*, used for treating the seeds of cereals before sowing, influences the plants' organogenesis due to the reduction of the length of the epicotyl. This assures the reducing the influence of low temperatures in winter, heat, and drought in summer, advantages that ensure faster development of the root system, and increase the coefficient of productive twinning of plants. Together these changes stimulate the productivity of the plants.
2. The increasing plant vigor and resistance to the action of extreme temperatures and drought after the use of the biostimulator *Reglalg* is associated with their simultaneous rise in resistance to fungal and other pathogens infection.

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