

Macro- and microalgae – biostimulants for agricultural crops

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The category of plant biostimulants also includes the group of algal extracts and concentrates. Algae have been used for millennia to improve soil fertility and the productivity of agricultural crops. Specifically, brown marine algae have been applied in agriculture since the beginning of the 12th century (Temple and Bomke, 1988). They were incorporated into the soil as compost or in the form of meal (concentrate) after drying and grinding. The compost and meal have served as a kind of fertilizers for plants, as well as a means of improving soil properties.

Since the mid-20th century, the industrial production of various algal concentrates (AC) has begun (Milton, 1952). Today, they are used for the production of biofuels, biomass for energy purposes, ameliorative additives, medical products, and others. In agriculture, in addition to being soil improvers and a source of nutrients, AC are also applied as plant biostimulants. It has been established that they increase seed germination, stimulate

growth and flowering, improve plant tolerance, increase yields and exert a number of other positive effects (Mattner et al. 2013).

There are several factors that determine the wide introduction of bioproducts, including plant biostimulants, in agriculture. Among them are: (1) the encouragement by the European Union of the development of technologies that reduce the use of traditional agrochemicals (Regulation No. 1107/2009 / 14 June 2011); (2) the need for alternative products to overcome resistance to herbicides and fungicides; (3) the rising prices of mineral fertilizers; (4) climate change and the associated negative stress effects on plants; (5) the constantly increasing environmental requirements for food, among others.

The supply on the market of plant biostimulants that contain wholly or partially algal substances in our country is considerable. The present material contains brief information on their production, the potential benefits of the organic substances they contain, as well as on the established positive effects of their application on agricultural crops.

Algal concentrates are formulated as meals, powders, liquid extracts and suspensions of living cells. They are applied to seeds and growing plants by inclusion in irrigation water, foliar spraying or a combination of both. Powders and liquid products generally have a wider application compared to algal meals. They have higher biological efficacy due to the presence of free active substances, whereas in meals it is necessary for these active substances to be released through reactions in the soil environment (Metting et al., 1990).

Plant biostimulants derived from algae contain a complex mixture of phytohormones, polysaccharides, protective compounds and a number of other substances beneficial to plants. They have a positive effect on the main physiological processes in plants, as a result of which they stimulate growth, improve crop tolerance to abiotic and biotic stress factors and ultimately contribute to increasing yields and the quality of crop production. The mechanisms of their action are still not well elucidated and are the subject of intensive scientific research. In recent years, as a result of the introduction of molecular methods in research activities, innovative information has been obtained on the effects of certain algal biostimulants on gene expression, biochemical pathways and physiological processes in plants. Better knowledge of these mechanisms in the future will contribute to the optimization of algal products and this renewable resource will be used more rationally for the purposes of sustainable agriculture.

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You can read the full text in issue 5/2017 of the special supplement “BIOSTIMULANTS FOR AGRICULTURAL CROPS”, which is distributed together with the main printed body of the journal “Plant Protection”. There you will also find a table on the influence of biostimulant products from algae on some agronomic indicators of agricultural plants.