

# **Biostimulant components micronutrient fertilizers**

## **Biostymulatory składnikami nawozów mikroelementowych**

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The recommendations of the European Union regarding integrated pest management and limiting the use of mineral fertilizers, created an opportunity for sustainable development in the agricultural production, using fertilizers containing biostimulants. They can be obtained from different organic materials and including: humic substances, complex organic compounds, peptides and amino acids. Additionally, their composition is based upon inorganic salts, seaweed extracts, antitranspirants and chitin and chitosan derivatives. Plants biostimulant are diverse substances used to enhance plant growth and are defined as materials that contain one or more substances, which are able to stimulate nutrients uptake and their efficient use by plants. They increase plants tolerance to biotic and abiotic stress and improve crop quality when applied in small amounts (Calvo et al. 2014). Furthermore, plants biostimulant can increase the activity of enzymes, the production of hormones in soil and plants and they can stimulate the photosynthetic process. They influence gene expression and activity of enzymes operating in the plant metabolism. Among their different functions, biostimulants influence significant increase in root hair length and density, suggesting that these substances induce a nutrient acquisition response that favors nutrient uptake in plants via an increase in the absorptive surface area.

In recent years, the interest in this group of substances both from producers, the scientific community and food producers, has increased significantly. The global market for biostimulants is projected to reach \$2,241 million by 2018 and to have annual growth rate of 12.5 % from 2013 to 2018 [Anonymous 2013]. On the other hand, the number of publications on biostimulants (eg. in Scopus) confirms increased interest in this group on the part of the scientific community.

In this review, primarily tree classes of plants biostimulant will be reflected: humic substances, amino acids and extracts of seaweed.