

Microbial and non-microbial plant biostimulants: what they are and what they do according to the EU Regulation 2019/1009

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According to the EU Fertilising Products Regulation 2019/1009, a plant biostimulant means a product stimulating plant nutrition processes independently of the product's nutrient content with the sole aim of improving one or more of the following characteristics of the plant or the plant rhizosphere (claims): i) nutrient use efficiency; ii) tolerance to abiotic stress; iii) quality traits; iiiii) availability of confined nutrients in soil or rhizosphere. Therefore, biostimulant function is not to supply nutrients (like fertilizers) and is not to protect plants from pathogens and pests (like plant protection products). The EU Regulation divides the plant biostimulants into two sub-categories: microbial and non-microbial plant biostimulants. Microbial biostimulants include mycorrhizal fungi and nitrogen-fixing bacteria (*Azotobacter* spp., *Rhizobium* spp., *Azospirillum* spp.) while non-microbial biostimulants can be derived from various organic and inorganic substances (see Component Material Categories in Annex II of EU Reg. 2019/1009) and can include substances like humic compounds, protein hydrolysates and seaweed extracts. Moreover, the EU Regulation sets limit values on biostimulant products for contaminants (e.g., phosphonates), heavy metals (e.g., Cd, Cr(VI), Pb, Hg, Ni, As, Cu, Zn) and some human pathogenic microbes (e.g., *Salmonella* spp., *Escherichia coli*). The European standards organisation CEN with its technical committee TC 455/WG2 has developed Technical Specifications defining the methodologies to be used for justifying the claims, and the quality criteria which must be adopted to carry out the trials for assessing the conformity of a product as plant biostimulant. Once the conformity assessment process has been successfully completed for a plant biostimulant, the marketer can affix the CE mark in the product label, and the product can be marketed in all EU countries. In the last years several plant biostimulants have been awarded CE Mark Certification for use on many crops, and some case studies will be presented and discussed.