Effects of microbial biostimulants on horticultural crops

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The use of microbial biostimulants such as plant growth-promoting bacteria (PGPB), arbuscular mycorrhizal fungi (AMF), alone or in combination with beneficial microorganisms such as fungi of the genus *Thichoderma* spp., has been gaining ground in recent years as an environmentally sustainable approach to increase the yield and quality of horticultural species. Our study was focused on the qualitative and quantitative effects of treatments with microbial biostimulants approved by Regulation (EU) 2019/1009 on different vegetable crops. Through a meta-analysis based on the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) method, which until now has mostly been applied to studies of medical interest, it was possible to identify, select and evaluate all relevant literature studies from 2010 to 2022, with the aim of providing a critical assessment of the most recent findings related to microbial biostimulants and their beneficial effects on horticultural crops. Among the papers reviewed were our studies on different tomato varieties treated with biostimulants of different microbial composition, on which we performed morphological and metabolic profile analyses. Treatments with the biostimulants resulted in positive effects on yield, fruit number, content of essential amino acids, γ-aminobutyric acid (GABA), monoethanolamine (MEA), and secondary metabolites with antioxidant action such as polyphenols and lycopene. These results demonstrate that microbial biostimulants could represent a valid eco-sustainable strategy due to their ability to influence the physiological mechanisms of plants by increasing their yield and/or quality. Indeed, it is essential to understand their mechanism of action in order to design more efficient biostimulants that can reduce the environmental impact caused by the excessive use of chemical fertilizers in agriculture.