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Biochar-Based Biofertilisers: An Emerging Technology for Sustainable Crop Production

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Abstract

In recent decades, ecological problems increased in many regions of the world and these conditions are likely to contribute to decreased food security and increasing health risks. The low technological development, improper agricultural methods and policies are major hindrances against agricultural development in many developing economies. Climate change may lead to even more degraded landscapes in many non-irrigated regions since it is accompanied by less rainfall and higher temperatures. These facts represent a serious threat to sustainable food production and to our natural resources. Owing to population growth and increasing food demand, intensive and environment-friendly agricultural techniques such as application of bio-fertilisers have become a promising model for many countries in the world. Biofertilisers contribute environmental benefits and help to conserve resources for crop cultivation, especially for poor farmers. The reduction of chemical fertilisers by using biological fertilisers is one of the effective steps in sustainable agriculture. The application of biochar to soil is considered to mitigate climate change by increasing carbon storage in soils but also to improve fertility of degraded soils, improve plant growth and development, increase fertiliser efficiency, and suppress soil pathogens. Biochar-type materials have been also suggested as inoculant carriers and will remain stable in the soil and thus may positively influence abundance of the inoculant organisms such as rhizobia, or plant growth promoting rhizobacteria. Efforts to better understand the role of biochar-based biofertilisers in nutrient uptake and plant response to environmental stress are more compelling now, since a continuous use of high amounts of chemical inputs are generating environmental problems and not sustainability. This paper discusses prospects of biochar-based biofertilisers for better agricultural productivity and increased food security, especially possible roles in better plant nutrient uptake, reduced use of chemical fertilisers, enhanced or induced systemic plants' tolerance to adverse environmental stresses, such as salt and drought stress.

Keywords: Abiotic stress, biochar, biofertilisers, crop production, sustainability