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Role of biofertilizers in achieving sustainability in crop production

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The term "sustainable agriculture" means an integrated system of plant and animal production practices focusing on site-specific application of inputs that will satisfy food, feed and fiber needs in the long-run and improves the quality of life for farmers and society as a whole [1]. Long term application of synthetic chemical fertilizers possesses adverse effects on the environment such as chemical accumulation in the air and water; and also harms the soil health, decreases soil water holding capacity, increases salinity and disparity in soil nutrients. Furthermore, there is imperative need to combat these social issues of increasing food instability, availability and nutritional insecurity through cost-effective, environment-friendly and socially acceptable agricultural options. Consequently, biofertilizers were opted to somehow reduce the adverse impact of low soil fertility, the impact of environmental stress and the effect of biotic stress such as pathogens and other microorganisms by improving the rhizospheric conditions for achieving sustainability in the crop production [2].

Biofertilizers contain living cells of agriculturally beneficial microorganisms that colonize the rhizosphere of the plant and play important role in promoting plant growth and improving soil health. Eg. Rhizobium, Pseudomonas, Trichoderma and PSB (Phosphate Solubilizing Bacteria). They are eco-friendly and organic in nature [3]. These microorganisms enhance plant survival, growth, performance, and yield by several functions viz. stimulating root growth; enabling water uptake; improving plant nutrition by increasing nutrient uptake, nutrient availability and supply of hormones and other organic element for plants; maintaining soil biodiversity; and defend plants from phytopathogenic microorganisms via antagonistic activities like release of lytic enzymes, siderophores and antibiotics. Integrated application of FYM and chemical fertilizers along with seed treatment of biofertilizers improved seed germination percentage, growth and seed yield due to increased N fixation and several other factors such as release of growth promoting substances, control of plant pathogen, and proliferation of beneficial organism [4]. Rhizobium, Azotobacter and Azolla play important role in improving nitrogen availability and PSB inoculation is useful in replenishing the available P status of soil. VAM inoculation along with PSB fulfill the one-fourth phosphorus need, indicating economization of fertilizer P to the tune of about 25% without compromising crop productivity and soil fertility ascribed to improved nutrient mobilization in soil [5]. Increased availability of nutrients from organic manure and growth-promoting substances due to biofertilizer inoculation also benefitted the succeeding crop in terms of higher growth, yield attributes and yield. Combined use of RDF with biofertilizers is capable of sustaining higher productivity and profitability on long term basis. Thus, it was evident that integration of biofertilizers in cultural practices enhanced the crop productivity and helps in sustaining health of soil and crop ecosystem.

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Biography

Pragati Yadav is from Department of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Haryana, India. Her research interests are nutrient management, biofertilizer application, incorporation of organic sources of nutrients in crop production, pulses production and crop management practices in relation to improve soil fertility and physical condition. She had done post-graduation with specialization in nutrient management of greengram under organic farming. She has been pursuing doctorate and working on the significance of nanofertilizers in crop production in view to reduce the bulky chemical fertilizer application. She has published few articles in national journals and magazines; and wrote few book chapters also.

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