

Long Term Conversion Effects of Organic Farming Practices on Soil Microbial Responses in Rice – wheat and Rice-wheat-mungbean Cropping Systems of Northern India

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Abstract—The aim of this study was to assess and compare soil microbial responses under different organic nutrient management options and conventional cultivation practice which were managed for a prolonged period of thirteen years. We had investigated effects of different organic inputs alone and in combinations viz. , Farmyard manure (FYM), Vermicompost (VC), Crop residues (CR) and Biofertilizers (BF) on soil microbial responses under Rice–Wheat (RW) and Rice–Wheat–Mungbean (RWM) cropping systems of North-western India. Maximum microbial biomass carbon (MBC) (450. 1 and 549. 1µg-C/g soil) was found in FYM+CR+BF treatment of Rice-Wheat system and VC+CR+BF treatment of Rice-Wheat-Moongbean system respectively. In Community level physiological profiling (CLPP) in organically amended all six treatments under both Rice-wheat and Rice-wheat-Moongbean, the AWCD (Average Well Color Development), Richness (R) and Shannon-Weaver Index (H) were found significantly ($p < 0. 05$) higher than conventional practice treatment. Under RWM system, the application of VC+CR+BF attributed maximum Shannon diversity index (4. 2) of soil microbial communities. Also plots with VC +CR+BF treatment have displayed maximum α -Glucosidase enzyme activity (202. 93 nmoles/g soil/hour) and highest β -Glucosidase activity (445. 04 nmoles/g soil/hour). The RWM system have found to have more carbon cycling enzyme activity and RW system had shown more Nitrogen cycling enzyme activity. These results indicate that the organic practices involving VC, CR and BF improved soil microbial characteristics. The results indicated that soil microbial responses under organic inputs were better in comparison to conventional practices.

Keywords: Organic farming, soil microbial responses, CLPP, MBC, Enzymatic activity.