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Effect of crop diversification and organic manuring on system productivity and soil health

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ABSTRACT : A field experiment was conducted during 2005-06 and 2006-07 to find out the most remunerative rice based cropping sequence and source of organic nutrition for sustainable production on sandy clay loam soil, low in available N and S and medium in P and K. RGEY was recorded highest with the treatment comprising application of nitrogen through organic manure along with bio-inoculants (*Azotobacter* and PSB) followed by only N through organic manure. RGEY and gross return was recorded significantly higher in rice-potato-onion cropping sequence. Net return was also recorded significantly higher under rice-potato-onion cropping sequence except rice-rajmash-onion. Production efficiency was also recorded significantly higher in rice-potato-onion cropping sequence than rest of the treatments. Nutrient uptake had obtained significantly highest value in rice-maize-cowpea cropping sequence. Nutrient status of the soil and microbial profile got improved significantly under treatment in which 100 per cent RDN was applied through organic manures along with biofertilizers.

Key Words : Crop diversification, Organic manure, Soil healthy

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Increased consumer awareness of food safety issues and environmental concerns has contributed to the growth in organic farming over the last few years. Organic farming has to be understood as part of a sustainable farming system and a viable alternative to the more traditional approaches to agriculture. During the green revolution, the strategy of intensive external inputs mostly inorganic fertilisers oriented agriculture has depleted soil fertility considerably in all major agricultural production system. This has led to a stagnation of food grain production in recent years inspite of consistent increment in fertiliser use (Abrol *et al.*, 2000). This stagnation in agricultural productivity is often attributed to degradation of soil due to various biotic and abiotic stresses inflicted in soil (Wang *et al.*, 2003). So, application of organic manures is again emerging as an important aspect in giving impetus in sustaining soil health and maintaining there by the productivity levels of soils. There is a gap of approximately 10 mt of NPK between addition and removal of nutrients from the soil. At present, most optimistic estimates show that about 25-30 per cent nutrient needs of Indian agriculture can be met by utilizing various organic sources. Supplementation of entire N through FYM sustains crop productivity at much lower level. Since,

the estimates of NPK availability from organic sources are based on total nutrient content, efficiency of these sources to meet the nutrient requirement of crops is not assured as mineral fertilizers. The incorporation of organic manures has favourable effect on soil properties such as pH, organic carbon, water holding capacity and bulk density. It adds plenty of carbon and thus increases heterotrophic bacteria and fungi in the soil, which further increase the activity of soil enzymes responsible for the conversion of unavailable to available forms of nutrients. Besides major nutrients a fair amount of micronutrients *i.e.* Mn, Zn, Cu and Fe are simultaneously added to the soil. Organic farming relies on crop rotations, crop residues, animal manures, legumes, green manures, organic wastes and aspect of biological pest control to maintain soil productivity and tilth to supply plant nutrients and to control insect, weed and other pest. The concept of soil as a living system, that develops the activities of beneficial organisms is the centre to this definition. Keeping these facts in view an attempt has been made to work out the most remunerative high value cropping sequence and suitable source of organic manuring.