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BIOLOGICAL INDICATORS OF SOIL FERTILITY UNDER INTENSIVE CROPPING SYSTEM

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Intensive cropping system is the farming system which focuses on achieving maximum yields from a minimum area of land, but it is important to increase biodiversity and sustain soil productivity. The biologically active component of soil *i.e*., soil enzyme serves as indices of soil microbial status and physico-chemical conditions for evaluating short-term changes in soil quality. The present study was initiated during the year 2017- 18, AICRP on IFS unit at an experimental farm located at College of Agriculture, Rajendranagar, Hyderabad and the experiment was carried out in *kharif* and *rabi*, 2019-2020 to investigate the activity of soil enzyme towards maintaining soil fertility as influenced by different cropping system in the ongoing long-term field trial (after third year). The soil is sandy loam in texture, neutral to alkaline in soil reaction (pH 7.81), the N status was low (112 kg ha^{-1}), medium in available P (23.40 kg ha^{-1} P_2O_5), available K status was in medium range (170 kg ha^{-1} K_2O), soil organic carbon (3.9 g kg^{-1}) and electrical conductivity (0.11 dSm^{-1}) were in low range at the initiation of the experiment. Treatments consist of ten combinations of cropping sequence *viz*., CS_1: Rice – Maize, CS_2: Bt cotton – Fallow, CS_3: Bt cotton + Green gram (1:3) row inter crop – Groundnut, CS_4: Pigeon pea + Green gram (1:3) inter crop – Sesame, CS_5: Maize + Pigeon pea (1:3) row inter crop – Groundnut, CS_6 : Pigeon pea + Groundnut (1:7) row intercrop – Ragi, CS_7: Fodder sorghum + Fodder cowpea (1:2) row inter crop – Horsegram – Sunhemp, CS_8: Fodder maize – Lucerne, CS_9: Sweet corn – Vegetables (Tomato) and CS_{10}: Bhendi – Marigold – Beetroot in RBD design with three replications.

The surface soil samples were collected in various treatments within different cropping systems at 30 DAS and 60 DAS in *Kharif* and *Rabi* crops, 2019–2020 and assayed for soil enzyme activity *viz*., dehydrogenase, urease, phosphatase (acid and alkaline) and catalase by following standard procedures. During 30 DAS *kharif* 2019-2020, highest activities of dehydrogenase (10.72 µg of TPF g^{-1} soil day^{-1}), urease (11.07 NH_4^{-1} – N g^{-1} soil $2hr^{-1}$), alkaline phosphatise (14.50µ p-nitrophenol g^{-1}soil hr^{-1}) and acid phosphatase (46.67µ p-nitrophenol g^{-1}soil hr^{-1}) were observed in Pigeon pea + Groundnut (1:7) – Ragi. In general, these activities were higher in systems which include legume crops (CS3, CS4, CS_5, CS_7) than in cropping systems without legume crop. Catalase activity was not significantly affected by any cropping and decreased at 60 DAS. During 30 DAS *rabi* 2019-2020, highest activities of dehydrogenase (38.84 µg of TPF g^{-1} soil day^{-1}), urease (15.45 NH_4^{-1} – N g^{-1} soil $2hr^{-1}$), alkaline phosphatase (83.53µ p-nitrophenol g^{-1}soil hr^{-1}) and acid phosphatase (53.41µ p-nitrophenol g^{-1}soil hr^{-1}) were in CS_5: Maize + Pigeon pea (1:3) – Groundnut. At 60 DAS in *kharif* and *rabi*, the activity of all enzymes increased over that at 30 DAS in respective seasons and the trend was similar being highest in CS_6, CS_7, CS_5, CS_4 and CS_3 than any other cropping systems. So, it can be concluded that Inclusion of legume component in the cropping system enhanced soil enzyme activities. Therefore, it is imperative to recommend the famers to include legume crops in cropping systems to sustain the fertility status of the soil for future generation.