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Impact of Tillage and Crop Establishment on Fertility and Sustainability of the Rice-Wheat Cropping System in Inceptisols of Varanasi, Up, India

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Abstract : In the Indo-Gangetic Plains of South-East Asia, the rice-wheat cropping system (RWCS) is dominant with conventional tillage (CT) without residue management, which shows depletion of soil fertility and non-sustainable crop productivity. Hence, this investigation was planned to identify suitable natural resource management practices involving different tillage and crop establishment (TCE) methods along with crop residue and their effects, on the sustainability of dominant cropping systems through enhancing soil fertility and productivity. This study was conducted for two consecutive years 2018-19 and 2019-20 on a long-term field experiment that was started in the year 2015-16 taking six different combinations of TCE methods viz. CT, partial conservation agriculture (PCA) i.e. anchored residue of rice and full conservation agriculture (FCA)] i.e. anchored residue of rice and wheat under RWCS in terms of crop productivity, sustainability of soil health, and crop nutrition by the crops. Results showed that zero tillage direct-seeded rice (ZTDSR) - zero tillage wheat (ZTW) [FCA + green gram residue retention (RR)] recorded the highest yield attributes and yield during both the crops. Compared to conventional tillage rice (CTR)-conventional tillage wheat (CTW) [residue removal (R 0)], the soil quality parameters were improved significantly with ZTDSR-ZTW (FCA+RR). Overall, ZTDSR-ZTW (FCA+RR) had higher nutrient uptake by the crops than CT-based treatment CTR-CTW (R 0) and CTR-CTW (RI).These results showed that there is significant profitability of yield and resource utilization by the adoption of FCA it may be a better alternative to the dominant tillage system i.e. CT in RWSC.

Keywords : tillage and crop establishment, soil fertility, rice-wheat cropping system, sustainability
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