

Conservation Agriculture and Precision Water Management in Alkaline Soils under Rice-Wheat Cropping System: Effect on Wheat Productivity and Irrigation Water Use-a Case Study from India

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Abstract : The biggest challenge in agriculture is to produce more food for the continually increasing world population with in the limited land and water resources. Serious water deficits and reducing natural resources are some of the major threats to the agricultural sustainability in many regions of South Asia. Food and water security may be gained by bringing improvement in the crop water productivity and the amount produced per unit of water consumed. Improvement in the crop water productivity may be achieved by pursuing alternative modern agronomics approaches, which are more friendly and efficient in utilizing natural resources. Therefore, a research trial on conservation agriculture (CA) and precision water management (PWM) was conducted in 2018-19 at Karnal, India to evaluate the effect on crop productivity and irrigation in sodic soils under rice-wheat (RW) systems of Indo-Gangetic Plains (IGP). Eight scenarios were compared varied in the tillage, crop establishment, residue and irrigation management i.e., {First four scenarios irrigated with flood irrigation method; Sc1- Conventional tillage (CT) without residue, Sc2-CT with residue, Sc3- Zero tillage (ZT) without residue, Sc4-ZT with residue}, and {last four scenarios irrigated with sub-surface drip irrigation method; Sc5-ZT without residue, Sc6- ZT with residue, Sc7-ZT inclusion legume without residue and Sc8- ZT inclusion legume with residue}. Results revealed that CA-flood irrigation (S3, Sc4) and CA-PWM system (Sc5, Sc6, Sc7 and Sc8) recorded about ~5% and ~15% higher wheat yield, respectively compared to Sc1. Similar, CA-PWM saved ~40% irrigation water compared to Sc1. Rice yield was not different under different scenarios in the first year (kharif 2019) but almost half irrigation water saved under CA-PWM system. Therefore, results of our study on modern agronomic practices including CA and precision water management (subsurface drip irrigation) for RW rotation would be addressed the existing and future challenges in the RW system.

Keywords : Sub-surface drip, Crop residue, Crop yield , Zero tillage

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