**Evaluation of Water Productivity for Improved Soil and Water Management at the Scheme Scale using**

**CropSyst Model**

**Deepak Kumar Jat\* Dr. S. R. Bhunia \*\***

(Research Scholar) (Major Advisor)

ABSTRACT

An experiment entitled “Evaluation of water productivity for improved soil and water management at the scheme scale using CropSyst model” was carried out at village Menawali, Hanumangarh, Rajasthan, during *kharif* and *rabi* season of 2013-14. After calibration of the CropSyst model for *kharif* and *rabi* season crops (cotton, clusterbean,wheat, barley and mustard) in 2012-13. The calibrated model was validated during 2013-14 for the site conditions using the crop model parameter values calibrated as mentioned years with associated water management. Soil characteristics, initial conditions of available soil water, nitrogen and organic matter and daily weather data were model input data for CropSyst as observed in the experiment. Model evaluation and validation was conventionally made by comparing simulation outputs with observed and simulated data. The CropSyst model was validated using the field experiment data conducted in 2013-14 growing season. It was validated for aboveground biomass (AGB), grain yield, N-uptake and green area index (GAI) of each crops were collected from 15 farmers. Bt–cotton and clusterbean of *kharif* and wheat and Indian mustard in *rabi* were prominent crops; cotton–wheat, cotton–mustard, clusterbean–wheat and clusterbean–mustard were major cropping sequences of the study region.

In *kharif* season, Bt-cotton gave higher economic and biomass yields than clusterbean and amongst *rabi* season crops, wheat produced higher economic and biomass yields than barley and mustard. The economic yield of cropping sequences were higher for cotton wheat (6390 kg ha-1) and lower for clusterbean–mustard (3548 kg ha-1) and cotton–mustard (4148 kg ha-1). Clusterbean-mustard cropping system recorded highest water productivity (20.2 kg ha-1 mm) followed by clusterbean-wheat (18.5 kg ha-1 mm). The clusterbean-mustard cropping sequence was most profitable (120px-Indian_Rupee_symbol178 ha-1mm) and fetched highest net return followed by cotton-mustard (120px-Indian_Rupee_symbol146 ha-1mm).

The CropSyst model simulates and validates the biomass and grain yield reasonably well for cotton, clusterbean, wheat, mustard and barley. The model underestimated the biomass and grain yield of clusterbean, mustard and grain yield of wheat while overestimated cotton, barley and biomass yield of wheat. The results suggested that cotton based cropping system were more profitable and clusterbean based cropping system were more water productive than other cropping system.

\* Post Graduate Scholar, Department of Agronomy, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner

\*\* Professor, Agronomy, Swami Keshwanand Rajasthan Agricultural University, Bikaner.