

**National Symposium
on
Sustaining Agricultural Productivity in Arid Ecosystems:
Challenges & Opportunities
(SAPECO-2015)**

August 19-22, 2015

**Lead Papers
and
Abstracts**



Arid Zone Research Association of India
CAZRI Campus, Jodhpur 342 003, India

Performance assessment of CropSyst model for yield, nitrogen uptake and water use of crops in hot arid north western Rajasthan

N.D. Yadava^{1*}, V.S. Rathore¹, M.L. Soni¹, Birbal¹, V. Nangia²,
A. Kumawat¹ and Mariya Glazirina²

¹ICAR-CAZRI, Regional Research Station, Bikaner - 334 004, India

²International Centre for Agricultural Research in Dry Area, Amman, Jordan

*Email: narendra_yadava@yahoo.co.in

The crop yield and water productivity is a complex indicator because it can be ascribed mainly to agro-techniques, plant factors, and environment. Appropriate crop management strategies to improve yield and water productivity should be taken into account of these different factors and their potential interactions. Studying different factors and their interactions affecting yield and water productivity of crops are difficult, time consuming and expensive. To overcome these problems, simulation model offers the opportunity to gain detailed insights into the system behavior in space and time. A study was undertaken to assess the ability of the CropSyst model to predict yields, and nitrogen uptake of cotton, clusterbean, wheat, and Indian mustard in IGNP stage-I of north-western Rajasthan. The model was parameterized and calibrated using field data on leaf area index, nitrogen uptake, water use, above ground biomass and economic yield of crops collected from Mainawali site (74°20'34" - 74°20'60" East and 28°37'62"-29°21'39" North; 235 m asl) of Hanumangarh, Rajasthan. The model performance was evaluated using root mean square error (RMSE), relative root mean square error(RRMSE), coefficient of correlation (R^2) and Willmott index of agreement (d) as criteria.

The simulated and observed economic yield of crops matched well which ranged from (RMSE: 84.3-158 kg ha⁻¹, RRMSE: 3.8-6.4, R^2 : 0.74-0.86 and d: 0.81-0.85). The model provide good prediction of biomass yields of crops (RMSE: 215-700 kg ha⁻¹, RRMSE: 4.7-8.9, CC: 0.73-0.88 and d: 0.51-0.90). The RMSE ranged from 6.2 to 14.3 kg ha⁻¹ for simulating N uptake for different crops. Generally, the model performed better for simulating economic and biomass yields than N uptake. The results further indicated that CropSyst is capable of simulating crops yields under irrigated conditions of north western Rajasthan.