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Effect of crop diversification and moisture regimes on productivity and water use efficiency under rice–based cropping system

Rinki Kumari, Ravi Nandan and Vinod Kumar

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ABSTRACT : A field experiment was conducted during 2012-2013 and 2013-2014 at Rajendra Agricultural University, Bihar, Pusa to study the effect of crop diversification and moisture regimes on productivity and water use efficiency under rice-based cropping system. The experiment was laid out in split plot design with three replications. Among the different cropping systems tested the maximum rice equivalent yield (281.12 q/ha), gross returns (366916 Rs/ha) and WUE (229.64 kg/ha–cm) were recorded under rice–maize+potato–dhaincha cropping sequence, which was significantly superior to rice–potato–vegetable cowpea, rice–potato–mungbean and rice–maize+vegetable pea but was statistically at par with rice–potato–groundnut sequence. Net returns was significantly higher with rice–maize+potato–dhaincha (230301 Rs/ha) sequence as compared to rice–potato–vegetable cowpea (170400 Rs/ha) and rice–potato–mungbean (176274 Rs/ha) but was statistically at par with rice–maize+vegetable pea (226403 Rs/ha) and rice–potato–groundnut (221999 Rs/ha) sequences. B:C ratio was significantly higher with rice–maize+vegetable pea (3.05) sequence than all the other sequences. Water productivity was the highest with rice–maize+potato–dhaincha (18.84 ‘/m^3) sequence recording statistical parity with rice–maize+vegetable pea (18.51 Rs/m^3) and rice–potato–groundnut (17.59 Rs/m^3) sequence but was significantly higher than other sequences. Production efficiency of rice–potato–groundnut (88.08 kg/ha/day) sequence was statistically at par with rice–maize+potato–dhaincha (83.42 kg/ha/day) sequence and both were significantly higher than all other sequences while LUE was the highest with rice–maize+potato–dhaincha (92.33 %) sequence. REY (256.97 q/ha), gross returns (335724 Rs/ha), net returns (214530 Rs/ha) and production efficiency (82.68 kg/ha/day) were favourably influenced by moisture regimes and were higher at 1.2 IW/CPE ratio than 0.8 IW/CPE ratio but were statistically at par with 1.0 IW/CPE ratio. B:C ratio, WUE, water productivity and LUE were not influenced by moisture regimes.

Key Words: Crop diversification, moisture regimes, rice–based cropping system, productivity, water use efficiency.