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ABSTRACT

Field experiment were conducted for two consecutive years from rabi 2002-03 to rabi 2003-04 on sub-tropical calcareous sandy loam soil of the experimental farm of TCA, Dholi (Muzaffarpur) under Rajendra Agril. University, Bihar, Pusa comprising of sixteen treatment combinations of different tillage and irrigation levels in split plot design with three replications.

There was reduction in soil hardiness (bulk density and soil-strength) with subsequent increase in infiltration rate due to different tillage practices. Rotavator tilled maize reported to be superior overall other tillage practices in respect of improvement in soil-physical properties. Plant height, no. of leaves, leaf length, LAI, CGR, RGR, root volume and dry matter production per plant (g) was found significantly higher in rotavator tilled maize at all the growth stages over zero tilled maize while, crop receiving 5 to 6 irrigations were found significantly superior over lower frequencies of irrigation in both the years.

Specific leaf weight and relative leaf water content (RLWC) was found significantly higher in rotavator tilled maize while water saturation deficit was significantly lower in rotavator tilled maize over zero tilled maize with 5 to 6 irrigation. The computed data on water expense efficiency and water use efficiency tended to

increase significantly with increasing fineness of soil. Rotavator tilled maize showed significant higher water use efficiency and water expense efficiency over all other tillage practices, while these parameters were found minimum at the highest level of irrigation (6 irrigations). Crop receiving 5 irrigations was found at par with those of crop receiving 6 irrigations in all respects at each stage.

Among sixteen treatment combinations of tillage and irrigation, rotavator with five irrigation fetched the maximum grain and stover yield to the extent of (5831 and 5960 kg ha^{-1}) and (8586 and 8808 kg ha^{-1}) in both the years, respectively. Nutrient uptake (N, P & K) was found significantly higher in rotavator tilled maize under 5 to 6 irrigation in both the years over zero-tilled maize. Rotavator tilled maize with 5 irrigations fetched significantly higher gross return, net return and net return per rupees of investment over zero tilled maize with all frequencies of irrigation in both the experimental years.

Significant positive correlation was observed in respect of all growth & yield parameters with yield except water saturation deficit, bulk density and soil-strength which were negatively correlated.