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Effect of tillage and nutrient management on productivity, soil fertility and profitability of cotton+soybean rotated with soybean+pigeonpea intercropping system under semi-arid Vertisols in India

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ABSTRACT

Field experiments were conducted with cotton+soybean (1:1) in *kharif* seasons of 2005, 2007, 2009 rotated with soybean+pigeonpea (4:2) in 2006 and 2008 to identify an efficient tillage and nutrient management practice in a semi-arid Vertisol at Parbhani. The study was conducted in split-plot design with 3 tillage and 5 fertilizer N treatments. The cotton equivalent yield (CEY) ranged from 994 to 1419 kg ha⁻¹ with mean of 1193 kg ha⁻¹ and variation of 9.8%; while RWUE ranged from 1.21 to 1.69 kg ha⁻¹ mm⁻¹ with mean of 1.43 kg ha⁻¹ mm⁻¹ and variation of 9.2% over years. Conventional tillage (CT) and reduced tillage (RT₁) with 100% recommended RDF gave significantly higher CEY and RWUE compared to other treatments. CT + FYM @ 5 t ha⁻¹, CT + 50% RDF + Vermicompost @ 1.5 t ha⁻¹ and RT₁ + 50% RDF + VC @ 1.5 t ha⁻¹ gave lower bulk density; while CT + FYM @ 5 t ha⁻¹ and CT + 50% RDF + FYM @ 2.5 t ha⁻¹ gave higher infiltration. Runoff and soil loss were significantly lower under CT + FYM @ 5 t ha⁻¹ and CT + VC @ 3 t ha⁻¹. CT + 50% N + FYM @ 2.5 t ha⁻¹ and CT + 100% N gave maximum gross returns, while CT + 100% RDF and RT₁ + 100% N gave maximum net returns. RT₁ + FYM @ 5 t ha⁻¹, RT₁ + 50% RDF + FYM @ 2.5 t ha⁻¹ and RT₁ + 100% RDF were superior for maximum BC ratio. Based on a regression model of CEY through rainy days and crop seasonal rainfall, CT + 100% RDF and RT₁ + 100% RDF were superior with maximum sustainability yield index over years.