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Efficient tillage and nitrogen practices for improving monetary returns and yield of finger millet and pigeonpea in semi-arid Alfisols

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ABSTRACT

Field experiments were conducted with three tillage treatments *viz.*, CT: Conventional tillage (3 ploughings + 3 intercultures), RT: Reduced tillage (2 ploughings + 2 intercultures) and MT: Minimum tillage (one ploughing + one interculture) in combination with three nitrogen levels *viz.*, F1: 100% N (organic), F2: 50% N (organic) + 50% N (inorganic) and F3: 100% N (inorganic) to identify the best management practices for improving soil fertility and sustain yield of finger millet (*Eleusine coracana*) and pigeonpea (*Cajanus cajan*) under semi-arid Alfisols during 2003 to 2011. The results revealed that CTF2 gave significantly higher mean finger millet yield of 2613 kg ha^{-1} and rainwater use efficiency (RWUE) of 4.48 kg ha^{-1} mm^{-1}, while CTF1 gave significantly higher pigeonpea yield of 907 kg ha^{-1} and RWUE of 4.10 kg ha^{-1} mm^{-1} over years. Further, CTF2 gave maximum net returns of ₹ 31639 ha^{-1} and benefit-cost (B:C) ratio of 3.65 with sustainability yield index (SYI) of 59.0% from finger millet, while CTF1 gave net returns of ₹ 43801 ha^{-1} and B:C ratio of 3.26 with SYI of 56.6% from pigeonpea. Based on the effects of tillage and nitrogen on soil parameters observed in 2003 and 2011, there was a decrease in the pH, soil P and organic carbon, while there was an increase in the electrical conductivity, soil N and K. Application of N through organics or as combination of organics and inorganics, maintained maximum soil fertility compared to inorganic N alone. We conclude that CT + 50% N (organic) + 50% N (inorganic) for finger millet and CT + 100% N (organic) for pigeonpea under rotation are efficient for attaining maximum yield, RWUE, monetary returns and SYI in semi-arid Alfisols.