Expl Agric. (2012), volume 48 (1), pp. 1–20 © *Cambridge University Press 2011*
doi:10.1017/S0014479711000792

EFFICIENT TILLAGE AND NUTRIENT PRACTICES FOR SUSTAINABLE PEARL MILLET PRODUCTIVITY IN DIFFERENT SOIL AND AGRO-CLIMATIC CONDITIONS

By G. R. MARUTHI SANKAR†, P. K. MISHRA†, K. L. SHARMA†,‡, S. P. SINGH§, A. K. NEMA§, D. K. KATHMALE¶, S. K. UPADHYE¶, M. S. SIDHPURIA††, M. OSMAN†, G. RAVINDRA CHARY†, J. KUSUMA GRACE†, B. VENKATESWARLU† *and* A. K. SINGH‡‡

†All India Coordinated Research Project for Dryland Agriculture (AICRPDA), Hyderabad–500059, Andhra Pradesh, India, §AICRPDA, RBS College, Agra, Uttar Pradesh, India, ¶AICRPDA, Mahatma Phule Krishi Vidyapeeth, Solapur, Maharashtra, India, ††AICRPDA, Choudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India and ‡‡Natural Resource Management, ICAR, New Delhi, India

(*Accepted 28 June 2011; First published online 13 September 2011*)

SUMMARY

Long-term field experiments were conducted at Agra, Solapur and Hisar from 2000 to 2008 to identify efficient tillage and nutrient management practices and to develop predictive models that would describe the relationship between crop yields and monthly rainfall for rainfed pearl millet grown on arid and semi-arid Inceptisol, Vertisol and Aridisol soils. Nine treatments comprising a factorial combination of three tillage practices, viz., conventional tillage (CT), low tillage + interculture (LT1) and low tillage + herbicide (LT2) and three fertilizer treatments viz., 100% N from an organic source (F1), 50% organic N + 50% inorganic N (F2) and 100% inorganic N (F3) were tested in a split-plot design at the three locations. Studies revealed that tillage and fertilizer treatments, and their interactions, significantly influenced pearl millet grain yields at the three locations. Prediction models describing the relation between grain yield and monthly rainfall indicated that rainfall occurring in June, July and August at Agra; June and July at Solapur; and June and August at Hisar significantly influenced pearl millet grain yield attained by different treatments. The R^2 values of the model ranged from 0.64 to 0.81 at Agra; 0.63 to 0.92 at Solapur, and 0.75 to 0.89 at Hisar. When averaged over all the treatment combinations, mean pearl millet grain yields varied from 1590 to 1744 kg ha^{-1} at Agra; 1424 to 1786 kg ha^{-1} at Solapur; and 1675 to 1766 kg ha^{-1} at Hisar while their corresponding sustainability yield indice (SYI) varied from 35.4 to 42.2%, 19.9 to 45.6% and 64.1 to 68.3%, respectively. At Agra (Inceptisol), CTF3 resulted in significantly higher mean net returns (Rs 11 439 ha^{-1}), benefit-cost ratio (2.33), rainwater use efficiency (RWUE) (3.52 kg ha^{-1} mm^{-1}) and the second best SYI (39.9%). At Solapur (Vertisol), the LT1F3 resulted in significantly higher net returns (Rs 12 818 ha^{-1}), benefit-cost ratio (3.52), RWUE (3.89 kg ha^{-1} mm^{-1}) and the fourth best SYI (42.6%). At Hisar (Aridisol), the LT_1F_3 treatment gave higher net returns (Rs 3866 ha^{-1}), benefit-cost ratio (1.26), RWUE (5.05 kg ha^{-1} mm^{-1}) and the fourth best SYI (67.8%). These treatment combinations can be recommended for their respective locations to achieve maximum RWUE, productivity and profitability.