



Effect of farmyard manure and fertilizer application on crop yield, runoff and soil erosion and soil organic carbon under rainfed pearl millet (*Pennisetum glaucum*)

GOPAL KUMAR¹, R S KUROTHE², BRAJENDRA³, A K VISHWAKARMA⁴, B K RAO⁵ and V C PANDE⁶

Central Soil and Water Conservation Research and Training Institute, Research Centre- Vasad, Anand, Gujarat

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ABSTRACTS

A field experiment with four treatments namely control- no application of manure and fertilizer (T1), application of farmyard manure (FYM) at the rate of (@) 5 tonnes/ha/year (T2), application of FYM @ 5 tonnes/ha/year + N:P:K @ 100: 60: 40 every year (T3) and application of FYM @ 10 tonnes/ha/year + N:P:K @ 100: 60: 40 every year (T4) in pearl millet (*Pennisetum glaucum* (L.) R. Br. emend. Stuntz) was conducted on sandy loam soils of central Gujarat from 2009 to 2011 under rainfed condition. Plants under T4 were 14 cm, 40.4 cm and 34.2 cm taller than T1 at 30 DAS, 60 DAS and at the time of harvest respectively. Plant height in T3 at the time of harvest was at par with T4. Final biomass under T4 was 25.3, 94.4, and 36.6% higher than T1 during 2009, 2010, and 2011 respectively that gave overall gain of 59.2% in pooled data. Biomass under T4 was 1.2, 5.9 and 11.1% higher as compared to T3 at the time of harvest during 2009, 2010 and 2011 respectively. Effect of application of higher dose of manures in combination with fertilizer (T4) was more prominent in terms of yield as compared to plant height and biomass. Yield under T4 was 153.9, 112.8, and 20.2% higher than T1, T2 and T3 respectively during 2010 whereas it was 70.5, 34.4 and 21.7% higher during 2011. All growth parameters under T2 and T3 were intermediate between T4 and T1. Runoff coefficient was in the range of 22.7 to 30.2% during 2010 and 12.3 to 13.4% during 2011 that was in decreasing order from T1 to T4. As compared to T1, T4 registered 27.7 and 30% per cent low seasonal soil loss in 2010 and 2011 respectively. Application of FYM@ 5 tonnes/ha/year (T2) over the control (T1) had more prominent effect in reducing runoff and soil loss where as application of NPK @ 100:60:40 in addition to FYM@ 5 t/ha (T3) showed no significant effect on runoff and soil loss. Sediment concentration was high in initial few runoff events, highest under T1 and lowest under T4. Strong linear relation ($R^2 > 0.92$) of sediment concentration under T1 with sediment concentration under rest of the treatments was observed. Total soil organic carbon up to depth of 90 cm was 3.43 kg/m² under T4 that was higher by 0.13 kg/m² as compared to T1. Improvement in SOC was more prominent in 0-15 cm layer and it was 23.8% higher in T4 as compared to T1. Irrespective of the depth of samples, SOC were high in water stable aggregates (WSA) of size > 0.5 mm. Higher SOC in WSA of 0-15 cm soil as compared to deeper soil were recorded in all the treatments with highest in case of T4. Application of FYM @ 10 tonnes/ha/year + N:P:K @ 100: 60: 40 showed high gain during favourable weather condition in terms of better crop growth parameters, higher yield, lower runoff, lower soil loss and built-up of SOC.