



Impact of rainwater conservation and nutrient management practices on cotton productivity and soil health in sub-humid rainfed Vertisols of India

J.V Singh (1), K Velmourougane (2), and S.Y Babar (3)

(1) Central Institute for Cotton Research, ICAR, Nagpur, India, Crop Production, Nagpur, India (mr.rawatjs56@rediffmail.com), (2) Central Institute for Cotton Research, ICAR, Nagpur, India, Crop Production, Nagpur, India (velicar@gmail.com), (3) Central Institute for Cotton Research, ICAR, Nagpur, India, Crop Production, Nagpur, India (drshilpa.babar@rediffmail.com)

Despite an increase in productivity of cotton due to commercialization of Bt transgenic hybrids, the productivity of rainfed cotton still remains low as compared to irrigated cotton. Parameters such as erratic rainfall, unsuitable soils (shallow soils), low water permeability (high clay), and available water content at boll formation stages are identified as major factors which influences cotton productivity in rainfed areas. The nutrient use efficiency in rainfed cotton is low resulting in a net depletion and a negative nutrient balance compared to irrigated cotton. Unless the nutrients removed from the system are replenished, the soil fertility and productivity would decline further. While natural processes like weathering can replenish some amount of plant nutrients depleted, the remaining has to be met through external fertilization. A balanced nutrient management along with rainwater conservation technique is the only option to improve the productivity of cotton and soils under rainfed situations. Cotton hybrids sown of wider row spacing provide space for cultivation of short duration intercrops which conserve rainwater and stabilizes the productivity besides improving farm income. In rainfed regions, most of the rainfall received is during the early part of cotton growth and later period its recedes when water demand is more for cotton. In this scenario, suitable moisture conservation and nutrient practices are most essential for rainfed cotton growing regions of India to sustain cotton productivity and soil health. Thus, the objective of this study was to evaluate the effects of nitrogen applied through different sources (organic manures, inorganic fertilizer) along with different rainwater conservation techniques on seed cotton yield and nutrient utilization efficiency of Bt cotton hybrid (*Gossypium hirsutum* L.) in rainfed vertisol. The experiment was laid out in a split plot design with 3 replications with four main treatments for soil moisture conservation techniques (M1- opening of furrows in alternate row of cotton; M2- intercropping green gram with cotton; M3- sunnhemp mulching in-situ; M4- flat bed system- conventional method) and six integrated nutrient management treatments (F1- 100 % recommended dose of N (RDN) as inorganic; F2- 75% RDN + 25% N through FYM; F3- 75% RDN + 25% through vermicompost; F4- 50% RDN + 50% N through FYM; F5- 50% RDN + 50% N through vermicompost; F6- 100% RDN + micronutrients Fe (iron) + B (boron) each @ 10 kg/ha) as sub plot factors. Based on the three year trial (2007-2009), higher seed cotton equivalent yield was recorded with intercropping of green gram (2.07 Mg/ha), mulching of sunnhemp (1.69 Mg/ha), alternate furrows interculture (1.68 Mg/ha) as compared to conventional method (1.33 Mg/ha). Better soil biological properties were observed with intercropping treatments and organic manures treated plots. Surface mulching improved available soil moisture in and resulted in higher seed cotton and nutrient utilization efficiency.