

Effects of Transgenic Cotton-Based Cropping Systems and Their Fertility Levels on Succeeding Wheat Crop

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Cotton–wheat is the second most important cropping system after rice–wheat in India and Pakistan, and is practiced on about 4.02 mha. By 2010, more than 6 million Indian farmers had adopted transgenic Bt cotton on 9.4 mha—almost 90% of the country’s total cotton area. There is a paucity of information on the effects of intercropping and integrated nitrogen (N)–management practices in transgenic Bt cotton on productivity, nutrient availability, and soil biological properties in the succeeding wheat crop in a cotton–wheat system. A study was made to evaluate and quantify the residual effect of two-tiered intercropping of cotton and groundnut with substitution of 25–50% recommended dose of nitrogen (RDN) of cotton by farmyard manure (FYM) on productivity and soil fertility in a cotton–wheat system at New Delhi during 2006–2008. Wheat following groundnut-intercropped cotton receiving 50% RDN substitution through FYM had significantly 5% greater grain yield than that after sole cotton. Residual soil fertility in terms of organic carbon (C), potassium permanganate (KMnO₄)-N, and dehydrogenase activity (14%) showed an improvement under cotton + groundnut–wheat system with substitution of 50% RDN of cotton by FYM. Apparent N balance as well as actual change in KMnO₄-N at wheat harvest was negative in most of the treatments, with greater loss (–58.1) noticed under pure stand of the cotton–wheat system with 100% RDN of cotton through urea. The study suggested that inclusion of legume and organic manure in transgenic Bt-cotton–wheat system is a sustainable practice for combating escalating prices of N fertilizers with environmental issues and instability of transgenic hybrids in south Asian countries.