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Dry Matter, Nitrogen, Phosphorous, and Potassium Partitioning, Accumulation, and Use Efficiency in Transgenic Cotton-Based Cropping Systems

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*A better understanding of the fate of nutrients in transgenic cotton (*Gossypium hirsutum *L.) fields will improve nutrient efficiencies, will optimize crop growth and development, and may help to enhance soil quality. A study was made to evaluate and quantify the effect of cropping system [sole cotton and groundnut (*Arachis hypogaea*) intercropping with transgenic cotton] and nitrogen (N) management [control (0N), 100% recommended dose of nitrogen (RDN) through urea, substitution of 25% RDN through farmyard manure (FYM), and substitution of 50% RDN through FYM] on dry matter (DM) and nutrient partitioning and accumulation by transgenic cotton and groundnut at New Delhi during 2006–2007. Soil and plant samples were collected and analyzed at 60, 90, and 120 days after sowing and at harvest. Results revealed that intercropping of groundnut with cotton did not significantly affect DM and nutrient partitioning in cotton, but residual soil fertility in terms of potassium permanganate ($KMnO_4$) N showed an improvement in contrast to Olsen's P and ammonium acetate (NH_4OAc)–exchangeable K over sole cotton. At harvest, of total DM assimilated, leaves constituted 10–20%, stem 50%, and reproductive parts of cotton accounted for the rest. For each kilogram of seed cotton produced, the crop assimilated 61 g of N, of which 23 g was partitioned to harvested seed cotton. Substitution of 25% RDN through FYM, being on par with 100% RDN through urea, recorded greater DM, nutrient uptake in different parts of cotton, agronomic N-use efficiency (9.5 kg seed cotton kg N^{-1}), and apparent N recovery (83.3%) over 50% RDN substitution through FYM and control. The control, being on par with 50% RDN substitution through FYM, recorded significantly greater DM and nutrient uptake by intercropped groundnut over other treatments. Apparent N and potassium (K) balance at the end of study was negative in all treatments; however, the actual change in $KMnO_4$ N was positive in all the treatments except control. Our study suggests that intercropping of groundnut with transgenic cotton and substitution of 25% dose of N through FYM is sustainable in tropical countries.*