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"Bridging the gap between increasing knowledge and decreasing resources"

Evaluation of Climate Adaptation Options for Cotton Cultivation in the Sudan Savannah of West Africa

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Abstract

In the Sudan Savannah region of West Africa, cotton is one of the most important cash crops. Some of the major constraints for its production are low soil fertility and intra and inter-annual rainfall variability. We evaluated the effect of tillage practices (contour and reduced tillage), nitrogen fertiliser regimes (no nitrogen 0-kg N ha^{-1}, moderate nitrogen -45 kg N ha^{-1} and high nitrogen -90 kg N ha^{-1}) and residue management (improved and standard) on the yield of a non-transgenic cotton variety FK 37, for two landscape positions (upslope and downslope) in the Sudan Savannah zone of Burkina-Faso (Dano) and Republic of Bénin (Dassari). The on-farm research managed experiment was carried out as split-plot design with four replications at each of the two sites. Across the two sites, both potassium and phosphorus fertilisers were applied to be non-limiting at 40 kg K_2O ha^{-1} and 60 kg P_2O_5 ha^{-1}. Contour tillage, improved residue and moderate nitrogen all improved yields at Dassari but only contour tillage and improved residue were significant ($p < 0.1$). At Dano, contour tillage, improved residue and moderate nitrogen also improved yield but none was found to be significant ($p < 0.1$). Across the two sites, interaction effects of tillage and slope position had significant ($p < 0.1$) effects on yield and aboveground biomass at harvest. Cotton yield from contour tillage planted at foot slope position gave the highest yield of 1.10 t ha^{-1} across sites and this was approximately 39 % higher than the lowest yield (0.79 t ha^{-1}) recorded by combined effects of reduced tillage and foot slope position. Even though the two sites belong to the same agro-ecological zone, treatment effects were site specific and this may be attributed to climate variability and different soil types. According to the results of this study, cotton should be cultivated with recommended fertiliser with improved residue management regardless of the landscape position.

Keywords: Climate change adaptation, landscape position, reduced tillage, residue management, Sudan savannah

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