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## Effects of conservation tillage based agro-geo-textiles on resource conservation in sloping croplands of Indian Himalayan Region

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### ABSTRACT

Despite investigations suggesting that agro-geo-textiles (AGT) could be an effective and inexpensive soil conservation method, limited quantitative data are available on erosion-reducing effects of AGT under field conditions and effects on crop productivity. Field experiments (probably first of its kind) were conducted on two crop rotations during 2015–16 and 2016–17 at Dehradun on a 4% land slope in the Indian Himalayan Region (IHR). Seven treatments were executed to evaluate the conservation effects of AGT prepared from giant-cane (*Arundo donax*) and maize (*Zea mays* L.) straw; and comparisons were made with coir-geo-textile, cowpea (*Vigna unguiculata*), and grass weed vegetative filters (all placed at 1 m vertical intervals, within 100 m length plots in the rainy season maize crop) on crop productivity, profitability, runoff and soil loss reduction, and moisture conservation. During two years of experimentation, a total of 35 runoff events were observed in maize crops in rainy months (June to September). Results revealed that the highest ( $p < 0.05$ ) maize grain yield ( $2.8 \text{ Mg ha}^{-1}$ ) was recorded in *Arundo donax* AGT treatment (conservation agriculture plus), which was 36% higher than maize crops raised without AGT (conservation agriculture only). This treatment also reduced runoff (24%) and conserved soil losses ( $8.22 \text{ t ha}^{-1} \text{ year}^{-1}$ ) across 18 runoff events, resulting in more soil moisture conserved in the soil profile than without AGT (35 runoff events). Productivities of succeeding pea (*Pisum sativum* var. *hortense*) and wheat (*Triticum aestivum* L. emend Fiori & Paol.) crops were enhanced by 122 and 36%, respectively, which resulted the higher net return ( $736 \text{ US\$ ha}^{-1}$ ) than in a maize-pea-wheat system in conservation agriculture only ( $128 \text{ US\$ ha}^{-1}$ ). In summary, conservation tillage practices along with AGT (conservation agriculture plus) are more profitable than conservation tillage practices alone on 4% land slopes of IHR.