



Tropentag, September 18-20, 2019, Kassel

“Filling gaps and removing traps  
for sustainable resource management”

## Towards a Cropping System Sustainability Tool (CROSST) Evaluating Performance of Green Manure Cover Crops in Benin and Kenya: A Pilot Study

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### Abstract

Farming practices in sub-Saharan Africa have resulted in declining soil fertility. Hence, Green Manure Cover Crops (GMCC) are promoted for soil improvement and protection. For farmers, adopting GMCCs and making informed decisions to integrate them in their cropping systems, they require a good understanding of the multi-dimensional impacts of these crops. We therefore developed the Cropping Systems Assessment Sustainability Tool (CROSST) which can assess the performance of different cropping systems with and without the integration of GMCCs. CROSST is an Excel based tool that assesses both agro-environmental and socio-economic impacts of GMCC technologies. The tool looks at gross margin, productivity (yield), soil health (N and P balances, soil structure and soil organic carbon), labour hours and the trade-offs between these. It adopts a static rule-based framework and follows a three-step approach (i) identification of alternative crop rotations, (ii) selection of agronomic, environmental and socio-economic parameters and (iii) assessing and comparing the different crop rotations. The tool was pilot tested in Benin and Kenya under the BMZ-GIZ programme on ‘Soil Protection and Rehabilitation for Food Security’. Data were collected through literature reviews, focus group discussions and key expert interviews. The crop rotations were selected and designed by experts with in-depth knowledge on the local cropping systems of North and South of Benin and Western Kenya. First results indicate that GMCCs improve soil structure/soil organic matter as well as soil N balances in both countries. However, investing in soil improvement can result in loss of profitability especially when a crop that produces grain for consumption or sale is swapped for a crop that produces biomass for soil amendment only. CROSST still needs further data refinement with recent official census as well as independent field measurements. Once validated it can serve as a decision-support tool for development agencies, implementing partners and local stakeholders when designing sustainable cropping systems that integrate GMCCs.

**Keywords:** Cover crops, green manure, impact assessment tool, soil fertility, sub-Saharan Africa