

RT for the nine seasons under the three cropping systems. Average annual gross margins over the nine seasons ranged from USD 247 in the continuous cereal (RT minus crop residue) to USD 435 in the soybean-maize intercropping system (CT minus crop residue) (**Table 3**). These gross margins were influenced by the cropping system and were in the order intercropping > rotation > continuous maize. Although savings in labor in RT lowered the costs of production, this could not compensate for the reduced income from lower yields in the RT system. Longer time periods (> nine seasons) are required to make RT economically viable for farmers, and this is one of the key factors discouraging wide-scale adoption of conservation agriculture in mixed maize and legume-based smallholder farming systems.

## Summary

RT with application of residues resulted in soybean yields comparable to CT system treatments, for rotation and intercrop systems, with no yield reduction observed over nine seasons. However, maize yields were initially suppressed in RT treatments under monocrop, rotation and intercrop systems, and at least six seasons of continued RT practice were required for the yields to match those under CT. The lower yields under RT resulted in lower mean gross margins for nine cropping seasons, and this is a disincentive for farmers to switch from conventional tillage to conservation tillage. More work is required to develop effective management practices to control weeds and to supply greater soil cover in the RT system to avoid soil-

crusting problems which lead to the initial lower maize yields with RT under smallholder condition in sub-Saharan Africa. **DC**

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*Dr. Kihara is a Researcher at the Tropical Soil Biology and Fertility Institute of the International Center for Tropical Agriculture; e-mail: j.kihara@cgiar.org. Mr. Njoroge is a Research Assistant at the Tropical Soil Biology and Fertility Institute of the International Center for Tropical Agriculture; e-mail: s.kinyanjui@cgiar.org.*

## References

- Erenstein, O. 2003. *Agriculture, Ecosystems and Environment* 100:17-37
- Fowler, R. and J. Rockstrom. 2001. *Soil & Tillage Research* 61: 93-107.
- Kihara, J., C. Martius, A. Bationo, M. Thuita, D. Lesueur, L. Herrmann, W. Amelung, and P.L.G. Vlek. 2012. *Applied Soil Ecology* 58:12-20
- Madari, B., P.L.O.A. Machado, E. Torres, A.G. de Andrade, and L.I.O. Valencia. 2005. *Soil & Tillage Research* 80:185-200.
- Malhi, S.S., R. Lemke, Z.H. Wang, and B.S. Chhabra. 2006. *Soil & Tillage Research* 90:171-183.
- Rockstrom, J., P. Kaumbutho, P. Mwalley, and M. Temesgen. 2003. In Garcia-Torres L, Benites J, Martínez-Vilela A, Holgado-Cabrera A (eds.). *Conservation agriculture*. Kluwer Academic Publishers, Dordrecht, London, pp 459-470.
- Taa, A., D. Tanner, and A.T.P. Bennie. 2004. *Soil & Tillage Research* 76:69-82.

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