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Understanding the Dynamics of Agricultural Technology Adoption: Integrated Soil Fertility Management in South Kivu, DR Congo

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Abstract

The adoption of new agricultural technologies by smallholder farmers is still a pertinent question for academics and policy-makers. Relatively little is known about technology adoption in the poorest countries and about the adoption of composite technology packages. In this paper we analyse the adoption of Integrated Soil Fertility Management (ISFM) practices by smallholder farmers in South Kivu, DR Congo, after the introduction of these techniques by the Consortium for Improving Agricultural-based Livelihoods in Central Africa (CIALCA). ISFM is a complex technology including the simultaneous use of improved germplasm, judicious chemical fertiliser application and organic matter management.

We use original data from a farm-household survey among 450 households, conducted in the period February - June 2011 in two different territories in South-Kivu. We specifically model consecutive steps in farmers' adoption decisions as factors might differently affect the tryout of a new technology and the sustained adoption of it. We model technology adoption as a three step process including awareness, tryout and sustained adoption. By specifying awareness as the first step in the adoption process, we explicitly account for selection bias caused by non-exposure. In addition, we explicitly model the adoption of different components of ISFM. We use a combination of probit and Heckman selection models.

We find that awareness rates are higher for improved germplasm (84%) and organic matter management (73%) compared to chemical fertiliser (57%). Tryout rates range between 57% and 8% for different components but adoption rates are quite low (36% to 4%). Membership of farmers' associations and CIALCA presence in the village increase the likelihood of farmers to be aware, test and adopt ISFM technologies. Farm size has no major impact, but farmers renting a larger share of their plots have a higher likelihood of testing and adopting chemical fertiliser and improved germplasm. Land fertility is found to decrease the application of organic matter management and increase the adoption of chemical fertiliser. Access to off-farm income, livestock and non-land asset ownership significantly increase the likelihood of adoption of all components (with the largest effect for chemical fertiliser), which points to the importance of cash constraints.

Keywords: Adoption, agricultural technology, fertiliser, improved germplasm, integrated soil fertility management, organic matter management