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for managing natural resources and a better life for all”

From afterthought to forefront: Transforming agricultural resilience through co-designed socio-technical innovations

COSMAS LUTOMIA¹, EILEEN NCHANJI², DESSALEGN KETEMA³

¹*The Alliance of Bioversity International & CIAT, Crops for Nutrition and Health, Kenya*

²*The Alliance of Bioversity International & CIAT, Pan African Bean Research Alliance (PABRA), Kenya*

³*The Alliance of Bioversity International & CIAT, Crops for Nutrition and Health, Ethiopia*

Abstract

Technological innovation has contributed significantly to addressing challenges posed by climate change on agricultural productivity yet resilience to droughts and other adverse climatic events remains a persistent challenge in rural communities. Although social innovations are recognised as important to enabling technology use, when implemented, they are often considered as an afterthought or rarely bundled with technological innovations. The study used collected from 783 farmers in three counties of Kenya to assess the effectiveness co-designed socio-technical innovation bundles in enhancing the climate resilience capacities of agricultural households. Inferential statistical test of farmers capacities to smooth consumption and quickly return to normal functioning when they experience climate-related shocks showed significant differences between users and non-users of social-technical innovation bundles. 51% of socio-technical innovation bundles users compared to 33% had moderate to very high capacity (absorptive) to resist and face the immediate negative impacts of the climate-related shocks. Farmers using socio-technical innovation bundles had higher adaptive capacity than non-users, with 15% of users and 9% recovering speedily (within a month) post-shock. Additionally, significant differences in agricultural output were reported, with users demonstrating higher productivity in maize (545 kg acre⁻¹ vs. 398 kg acre⁻¹) and beans (237 kg acre⁻¹ vs 187 kg acre⁻¹) when they experienced prolonged droughts. The effect of the bundles on productivity was higher when co-designed for both crops – maize (556 kg acre⁻¹ vs 520 kg acre⁻¹) and beans (240 kg acre⁻¹ vs. 231 kg acre⁻¹). However, no significant differences were reported regarding the effect of co-designed socio-technical innovation bundles on farming households' capacity to obtain support from community/local groups in times of climate-related shocks. These findings underscore the importance of co-designing and integrating social innovations into existing technological bundles in agricultural programs. Development practitioners and policymakers should prioritise co-designing of socio-technical solutions with direct community participation to optimise climate resilience and agricultural productivity.

Keywords: Adaptation, climate resilience, co-design, Kenya, resilience capacities, socio-technical innovation