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## Sustainable intensification of smallholder farming systems using push-pull as a template

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### Abstract

Push-pull technology is one of the intensification practices that has been used to increase yield and income in smallholder cereal-based production systems by controlling insect pests (fall armyworm and stemborer) and the parasitic striga weed, while improving soil health and providing fodder for crop-livestock integration. The technology is however restricted to maize and traditional cereals, and its mainly practiced on small plots. Harnessing the full potential of push-pull requires further intensification of the technology, to expand its scope and applicability in smallholder farming systems. The overarching aim of the study is to identify opportunities for further intensification of push-pull technology in western Kenya and to determine the effectiveness of identified (i.e. selected) sustainable intensification practices. Sustainable intensification practices that farmers want to integrate in push-pull systems were determined through focus group discussion (FGD) with 91 participants in 10 village level groups drawn from Siaya Kisumu and Vihiga counties and key informant interviews (KII) with 25 participants (scientists, extension officers, key farmers, civic leaders). Preliminary results of FGD and KII suggested that farmers prefer options that increase productivity and boost or diversify income and that provide firewood and fodder. To test the impact of sustainable practice integration on plant growth, striga and insect control efficiency of push-pull system, soil fertility and crop yield, test fields have been established on 15 farms (each with four treatments) in the three counties. The four treatments include (climate smart push-pull (maize + desmodium + brachiaria), push-pull +pigeon pea, maize + pigeon pea, and maize monocrop). The impact of the intensified system on soil fertility (relative to initial soil nutrient levels), crop productivity and pest pressure will be discussed.

**Keywords:** Cereals, desmodium, focus group discussion, intercropping, key informant interviews, push-pull system