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Performance of integrated climate smart push-pull system with pigeon pea as an intensification pathway

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Abstract

African farming systems are increasingly being intensified to address need for food and challenge on diminishing arable land. Push-pull technology is promoted in western Kenya to sustainably intensify farms and for the management of stem borer, fall armyworm and *Striga* weed. Integration of push-pull systems with other sustainable intensification practices has potential to advance its acceptability and adaptability among smallholders. Push-pull is currently limited in diversity of utility mainly because the companion crops, *Desmodium* (push crop) and *Brachiaria* (pull crop) are not edible. Participatory research carried out among smallholder farmers in western Kenya revealed intercropping, agroforestry and crop-livestock integration as priorities for further intensification of push-pull farming systems. The aim of the study was to determine the effectiveness of push-pull system integrated with pigeon pea (*Cajanus cajan*) on productivity and soil fertility. Field experiments consisting of four treatments (climate smart push-pull (maize + *Desmodium* + *Brachiaria*), push-pull + pigeon pea, maize + pigeon pea, and maize monocrop) were established on fifteen farms in three counties of western Kenya. A section of the plot was demarcated and used for data collection on growth, grain and stover yield. Preliminary results show that growth and yield vary across counties, seasons and treatments. Overall productivity of the intensified system was best in Siaya, followed by Kisumu and Vihiga counties respectively. Push-pull + pigeon pea and maize + pigeon pea were superior in performance based on maize growth and stover yield for season one. Maize + pigeon pea and push-pull performed better in grain yield than push-pull + pigeon pea and maize monocrop for both seasons. Reduction in yield per unit area resulting from intensification of push-pull with pigeon pea is leveraged by alternative products such as fodder, firewood and diversified diets. Intensification with pigeon pea resulted in better stover and grain yield in the long rain season further it provided additional products such as alternative diets in the dry season of 2022, firewood from twigs and stems, fodder from leaves and pods, soil organic matter from litter and overall system resilience. Diversification of push-pull can guarantee its successful upscaling in East Africa for synergy in sustainable food production and environmental conservation.

Keywords: Biomass, *Brachiaria*, intercropping, pigeon pea, push-pull system, sustainable intensification