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Can short-season grain legumes contribute to more resilient and productive farming systems in semi-arid Eastern Kenya?

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Abstract

Lately grain legumes have come out of the shadows in research and extension because of their highly valued and multiple benefits for the farmer and the farming systems across the developing world. For semi-arid regions in particular, inadequate and highly variable rainfall and short growing periods limit yield potential and create a risky primary production environment. However, short-season crop varieties offer a promising option for farming with increased uncertainties. Against this background, the aim of this work was to collect field trial data for multiple seasons in Eastern Kenya to better calibrate the existing APSIM (Agricultural Production System sIMulator) legume models for short-season varieties of common bean (*Phaseolus vulgaris* L.), cowpea (*Vigna unguiculata* (L.) Walp.) and lablab (*Lablab purpureus* (L.) Sweet) and to evaluate the performance of the adapted models in terms of biomass production and yield. Finally with the use of a simulation study, the impact of management options (e.g. sowing time, planting density) and future climate predictions on the overall production potential of the different short-season grain legumes was explored. Results indicate that decisions on optimal sowing times will become more important with shortened growing periods to take full advantage of in-season rainfall. Short-season cultivars of beans were advantageous in extreme short growing periods with external droughts due to their very short maturity time. Lablab seemed to cope best with high in season rainfall variability producing stable yields across a range of rainfall scenarios independent of future climate predictions. Cowpea instead was out yielding beans and lablab in wet years and had a very high biomass production. Consequently, using the full diversity of available short-season legumes can function as an essential part of a sustainable risk management strategy to design more resilient farming systems and increase food security in semi-arid Eastern Kenya. Finally, if well calibrated and tested, simulations models have proved to be an excellent tool for ex-ante assessment of agricultural management interventions in the view of future climate change.

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