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Farmers’ and academia’s views”

Economic risk analysis of Gliricidia-maize system in selected dryland areas of Dodoma region in Tanzania

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Abstract

Using data from farm budget and from simulations using the Gliricidia and maize models of the Next Generation version of the Agriculture Production System sIMulator (APSIM), this paper evaluates the economic viability and risk of Gliricidia-Maize and sole maize systems. A monte Carlo simulation model was used to simulate maize yields and net returns of the Gliricidia-Maize and sole maize systems. Results show that the probability of attaining the potential grain yields of maize ($4.5^{\text{th}}\text{a}^{-1}$) is higher in the Gliricidia-Maize than in the sole maize system (0.34 versus 0.03). In contrast, risks to net returns is higher in the sole maize (CV=44.93%) than in the Gliricidia-Maize system (CV=37.95%). The probability of exceeding the income poverty line of around Tsh 600,000 per adult equivalent per year is higher in the Gliricidia-Maize than in the sole maize system. Stochastic efficiency analysis results show that the Gliricidia-Maize system is more preferred than the sole maize system at lower (0) and upper (4) Risk Aversion Coefficients (RAC). The certainty equivalent values of grain yields of maize in the Gliricidia-Maize system are 17.5% and 5.9% higher at lower and upper RAC, respectively, under the negative exponential utility function. Based on these results, it is plausible to argue that the Gliricidia-Maize system is more economically viable than the sole maize system thus risk-neutral and extremely risk-averse smallholder farmers would prefer this system. Scaling up of Gliricidia-Maize agroforestry intercropping technology is therefore expected to lead to a reduction of food and income poverty in selected dryland agro-ecologies of the Dodoma region in Tanzania.

Keywords: APSIM, dryland areas, Gliricidia-maize system, Monte Carlo simulation, risk