ABSTRACT

Globally, green gram is a significant pulse, particularly in Arid and Semiarid Lands (ASALs), as a source of food, livelihood, soil management and integrates easily into different cropping systems. Green gram availability in Tharaka South Sub County is equivalent to household income and food security. Despite this importance, green gram yield in Tharaka South Sub County is still low at 0.56 mt/ha far below the crop's estimated national potential of 1.5 mt/ha and compares unfavorably with the global and national averages of 0.73 mt/ha and 0.67 mt/ha, respectively. Green gram yield is mainly constrained by climate variability, fluctuating producer prices and inefficiencies in production. Given that production of green gram is predominantly rain-fed, climate fluctuation affects the ideal conditions needed for the crop growth. Further, rational producers may only improve yield and technical efficiency in response to anticipated price increase. This study aimed at analysing the effect of climate variability, adaptation and price changes on yield and green gram production technical efficiency in Tharaka South Sub County. The research employed descriptive research design and utilize both primary and secondary data. Primary data was obtained from 385 smallscale farmers selected randomly and five Key Informants' Interviews (KII) who were purposively selected. Further, secondary data on seasonal rainfall, temperature, yield and farm gate prices was obtained from the Meteorological Services and County department of Agriculture, respectively. The analysis on the effect of rainfall, temperature variability and price, on green gram yield was analyzed using the pearson correlation coefficient, simple and multiple regression methods. Cobb-Douglas stochastic frontier method was used to determine technical efficiency of the various adaptation strategies used by green gram farmers. The findings of the study showed that rainfall variability explained 30.4% of the variables affecting green gram yield. The findings of the model further showed that a 1% increase in rainfall during March-April- May (MAM) season increased green gram yield by 49.3% with no effect during OND (October-November-December) season. Temperature variability explained 28.5% of the variables affecting green gram yield. Further, the model findings revealed that a 1% increase in temperature during OND season decreased yield of green gram by 48.5% with no effect during OND season. A combination of rainfall and temperature variability resulted to the highet effect, and explained 34.2% of the variables affecting green gram yield. The assessment on the technical efficiency levels of the climate adaptation strategies utilized by small holder green gram farmers showed that use of minimum tillage was the most efficient strategy with a technical efficiency of 75.58%. Use of crop rotation, maximum soil cover, early maturing green gram varieties showed a technical efficiency of 75.55%, 74.86% and 73.09% respectively. Crop insurance as a climate adaptation strategy was the least efficient strategy at 51.67%. Price changes on the other hand explained 25.3% of the variables affecting green gram yield. The findings of the regression analysis showed that there existed an inverse relationship between output price and green gram yield. A 1% increase in price was associated with 0.47% decrease in yield probably due to reuse of the grains as seed. The study concluded that climate variability and output price had an effect on green gram yield. Based on the findings there was a positive effect between rainfall and green gram yield while temperature variability and price changes had a negative effect on yield. Futher, adaptation to climate change is an important factor explaining efficiency differentials among smallscale green gram farmers. The study recommends that green gram farmers in ASALs need to adopt and intensify use of minimum tillage. A functional agricultural commodity market should be set for structured marketing of green gram. Further research institutions and department of agriculture need to ensure access to certified seed for the farmers to reduce chances of seed recycling or reuse.