

Abstract

Maize and green grams are important food security crops grown and consumed in the arid and semi-arid regions of Kenya. High temperatures and low soil moisture lead to yield reduction. A two-season study was conducted to investigate the effect of different shade intensities (0 %, 50 % and 70 %) on green gram and maize growth, biomass and grain yield in Kitui County (1.4° S, 37.9° E). The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications at the South Eastern Kenya University (SEKU) farm. Results showed that maize had significantly ($p < 0.05$) higher plant height, Ear height, cob weight, total biomass and grain yield per hectare in 50%, followed by 70% and lowest in 0%. Green gram plants had significantly ($p < 0.05$) higher number of pods, seeds per pod, total above-ground biomass and grain yield per hectare 50 % (1759 kg/Ha), 70 % (1553 kg/Ha) and lowest in 0% (478 kg/Ha). The plants grown under 50% shade intensity had higher grain and biomass yield for both green grams and maize compared to those under 70% and 0% shade intensity, which may be attributed to adequate moisture due to reduced evapotranspiration. The study demonstrated that the cost-benefit analysis of shade intensity on green grams farming system yield and break-even price was best at 50% shade intensity. The study demonstrated that the cost-benefit analysis of shade intensity in maize farming systems is not significant. To improve grain and biomass yield of both green grams and maize for food and nutrition security, study recommends the use of 50% intensity in growing green grams in ASALs due to benefits including soil moisture conservation, improved plant growth, yield, economic efficiency and cost-benefit ratios