

Abstract

Climate-Smart Agricultural (CSA) technologies and practices are promising solutions to enhance productivity, build resilience, and support mitigation in the face of climate change, particularly in vulnerable arid and semiarid lands (ASALs). However, limited evidence exists on smallholder farmers' preferences for specific CSA options. This is hindering targeted up scaling of the key pillars of productivity, adaptation, and mitigation in arid and semi-arid regions. Therefore, identifying farmers' preferences and investigating determinants of preferences for climate-smart technologies and practices is vital to enhance adoption rates, which in turn strengthens climate resilient agricultural productivity. Data were collected from 196 smallholder groundnut farmers using structured questionnaire of multi profile best worst experimental design in which each farmer assessed only one profile across Siaya and Elgeyo Marakwet counties in Kenya. Descriptive analysis showed significant variation in groundnut production per season in arid and semi-arid regions, with 669 kg in Elgeyo Marakwet and 859.41 kg in Siaya County, while Kenya's overall seasonal production averaged 764.97 kg. Furthermore, data were subjected to Best-Worst Scaling (BWS) and Latent Class Analysis (LCA) methods. LCA model output revealed that education level, number of adults in household, access to extension, access to training, farming experience, land size, and yield per season in kg were statistically significant and had strong associations with farmers' preference for CSA technologies and practices. Conversely, age, sex, access to credit, group membership, season, and land covered by groundnut were not statistically significant factors in the LCA. Key findings from BW analysis demonstrate that strong farmers' preference for full reliance on organic fertilizers (BW score 357) and intercropping (BW score 141). Conversely, supplemental chemical fertilizer use (BW score -357) and monoculture systems (BW score -141) were least preferred attributes. These results highlight clear divergence between farmers' priorities and conventional agricultural approaches. Policy recommendations include prioritize demand driven technology design, which may help to insure that CSA technologies and practices align with farmers' actual need. Inclusive participation of all stakeholders including farmers, development agents, researchers, and policymakers in the design, testing, and evaluation of technologies and practices is vital to foster ownership, ARTICLE IN PRESS ACCEPTED MANUSCRIPT ARTICLE IN PRESS relevance, and long-term sustainability.