

## ABSTRACT

Cowpea (*Vigna unguiculata* (L.) [Walp]) is one of the versatile crops increasingly sought for its climate resilience, ecological role in improving soil fertility, and provision of livestock feed and human foods. However, crop production in Kenya is still low due to various biotic and abiotic factors, including insect and weed pests, drought, and low soil fertility, particularly phosphorous (P). A Baseline survey was done to determine the available crop management techniques and assess farmer's knowledge and perception of integrating mulches and phosphorous fertilizer application on cowpea production. Further, a field study was conducted to determine the effects of integrating mulches and phosphorous fertilizer application on selected pest populations, yield and yield component of cowpea in Karingani Ward, Chuka Sub-County, Tharaka-Nithi County. The field experiment, laid in RCBD, involved the integration of four types of mulches (30-micron plastic mulch black-white, rice straw, weeded unmulched and unweeded unmulched) with four rates of phosphorous (P) fertilizer application (0, 20, 40, and 60 kg P<sub>2</sub>O<sub>5</sub>/ha) using cowpea M66 variety and each treatment was replicated three times. Aphids (*Aphis craccivora*) were visually examined to score for the degree of infestation, weeds were destructively sampled in each plot using a 0.5 m x 0.5 m quadrant randomly placed along the diagonal in the middle of each treatment, and the growth and yield parameters of cowpea were collected as per the requirements. Survey data was analyzed using SPSS software version 21.0 and the field data was subjected to analysis of variance as implemented in SAS version 9.4. Significant different means were separated using the Least Significant Difference test at a 5% probability level. The survey findings showed that cowpea farming in the study area is dominated by males aged 40-50, and most attained the primary level of education. Farmers in the area are small farmholders, relying on prolonged rain between March and June and short rain between August and December). It was found that M66 was the most preferred cowpea variety for sale and consumption and the source of planting seeds from the previous harvest seeds. Among other production challenges in cowpea farming, drought and some pests were characterized as severe production constraints. Most farmers firmly agree that phosphorous fertilizer application is essential in cowpea production. However, it was found that most apply inappropriate amounts of fertilizers on their farms. The binary logistic model measured the relationship between the categorical target variable and the independent variables. The field study findings show that integrating mulching and phosphorous fertilizers application significantly affects pest populations, growth, and yield components of cowpeas at  $p < 0.05$  in trials I and II. Integrating plastic mulch with 60 kg P per ha resulted in the least aphids count with a mean of 12.58 and 15.25 per plant in trials I and II, respectively further, the integration also resulted in the lowest weed count, with a mean weed count of 1.50 and 1.44 at 44 days in trials I and II, respectively, compared to other treatments. Additionally, integrating plastic mulch with 60 kg P per ha yielded the highest mean production of 1269.14 kg per ha and 1235.39 kg per ha in trials I and II, respectively. This integration was followed by integrating rice straw with various rates of P, resulting in better pest management and increased production compared with weeded unmulch with different rates of P. Finally, unweeded unmulch with different P rates applications were found to be the most inappropriate integration because of high pest infestation and poor plant growth and development. Therefore, integrating plastic mulch with 60 kg P is appropriate for optimal pest management and enhanced cowpea outputs and is recommended for use by small-scale farmers.