# ABSTRACT

Cowpea leaf production is constrained by the short post-harvest shelf life which is associated with high moisture content. This subjects the cowpeas to quantitative, qualitative, and economic losses. Farmers lack knowledge on the best cowpea harvesting stage, drying and packaging method for quantitative and qualitative benefit. This research therefore aimed at obtaining information on the right harvesting stage that would enhance cowpea utilization by farmers as well as the most efficient and safest drying method that would reduce post- harvest losses associated with glut production during the rainy season. This study also aimed at prolonging the keeping quality of the dried cowpea leaves for use during off- season and coming up with information on the best and affordable packaging material that would ensure safety of dried cowpea leaves. The study was conducted at a farmers' field in Tharaka Nithi County. The field experiment was laid in RCBD and replicated thrice. The analysis of drying and packaging methods on nutrient composition and microbial growth was conducted at Chuka University laboratory using CRD. Cowpeas variety M66 was used for the research and the treatments included three harvesting stages (21, 35 and 49 Days after sowing, DAS), three drying methods (open sun, solar and oven) and 3 packaging methods (aluminium foil, woven bags and kraft paper). Data collected included chlorophyll content, iron, calcium, crude fibre, beta carotene, protein and moisture content and microbial contamination. The data was subjected to ANOVA using the 9.2 edition of the Statistical Analysis System and the significant different means separated using LSD at 5%. The results showed that harvesting stage at 49 DAS significantly ($p<0.05$) influenced the chlorophyll content with 49 DAS recording the highest chlorophyll content in both trials followed by 35 DAS and the least at 21 DAS nm. The harvesting stage also influenced significantly $p<0.05$ the moisture, protein, crude fibre, beta carotene, iron and calcium content. The results showed a reduction in moisture content as the harvest days increased in both trials with the highest moisture content was observed at 21 DAS and the least at 49 DAS. The iron content of cowpea leaves was significantly ($p<0.05$) different at 49 DAS in both trials. In trial one and two,21 and 35 DAS were not significantly($p<0.05$) different. The calcium content at 21 and 49 DAS in both trials was significantly ($p\leq0.05$) different. The protein content was significant in all the stages of harvesting. The highest protein content in both trials was recorded at 21 DAS at 29.41% and 28.47%, respectively with 49 DAS recording the least protein content in both trials at 27.52% and 24.07%, respectively. For Beta carotene, 49 DAS recorded the least content at 7.61mg and 10.51 mg in both trials. Crude fibre content increased with the stage of harvesting. In both trials,49 DAS recorded the highest crude fibre content at 8.02mg and 5.83mg and the least fibre content recorded at 21 DAS at 2.21 mg and 2.53 mg in both trials respectively. Interaction effect of harvesting stage and drying methods showed significant ($p< 0.05$) difference on moisture, iron, calcium, proteins, beta carotene and crude fibre content in both trials. Oven and solar drying methods showed better nutrient and mineral retention in the three harvesting stages when compared to the open sun drying method. The combination of harvesting stage, drying method and packaging material significantly ($p<0.05$) influenced microbial load (bacterial and fungal). No coliforms were observed. Oven dried cowpea leaves, harvested at 49 DAS, and packaged in kraft paper resulted in the least bacterial and fungal contamination. It can be concluded that harvesting cowpea leaves at 21 and 35 DAS and drying using the oven and solar methods and packaging in kraft papers can help in reducing the post- harvest losses and ensure cowpea leaves availability in all seasons.