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## **Utilization of traditional processed and preserved cowpea leaves in the Coastal Region of Kenya**

### **A review of the Contribution of Cowpea Leaves to Food and Nutrition Security in East Africa**

#### **Cowpea leaves for food and nutrition security**

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### **Abstract**

Cowpea leaf is one of the African indigenous vegetables that have been utilized as food in sub-Saharan Africa. Whereas the seasons of glut have massive spoilage and postharvest losses of the vegetable, seasons of drought experience scarcity and less utilization of cowpea leaf. Through customized techniques, traditional communities have sought to improve its availability and utilization. However, the efficiency of these techniques in improving the utilization of this vegetable in and out of season is yet to be established. The current study sought to establish the traditional food preservation and processing techniques and their efficiency in improving utilization of the vegetable. The study used a cross-sectional design with random sampling of 205 households in Taita Taveta County which ranks among the top producers of the vegetable in Kenya. Results showed that of the households that produced cowpea leaves about three quarters (73.7%) utilized cowpea leaves as a priority vegetable compared to 34.6% and 19.0% who favoured kales and cabbages respectively. Boiled, sun-dried and blanched cowpea leaves were the most utilized forms of the vegetable by 81.5%, 44.9% and 16.5% of the households respectively. The traditional preservation methods practised in the households were sun-drying (77.5%), blanching (27.3%) and a combination of the two (54.1%). Drought and low production quantities constrained the utilization of the vegetable in 83.4% and 51.2% of the households. During drought, 42.9% of the households utilized dried vegetables which would keep for up to one year. Source of the vegetable and the person who determines the food to be bought in the household significantly ( $p < 0.05$ ) associated with the utilization of dehydrated vegetables during scarcity. Households whose production of the vegetable was severely challenged by access to seed, weeds, massive postharvest losses and seed scarcity had odds ratio of 7.2, 0.3, 0.3 and 0.2 respectively of drying cowpea leaves for later use. In conclusion, drying of cowpea leaves enhances the utilization of the vegetable in the area. The up-scaling of the technique can be used to increase availability of the vegetable to improve its utilization.

**Key words:** Cowpea leaves, Traditional, Utilization, Processing, Preservation.

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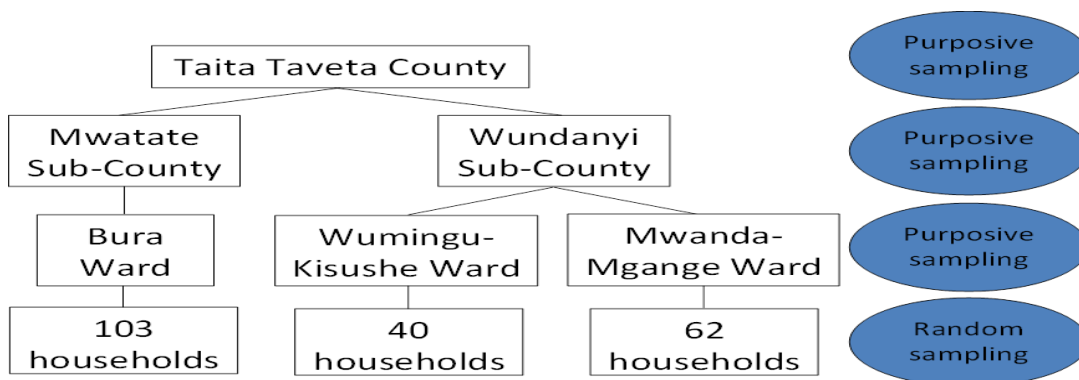
## Introduction

Cowpea (*Vigna unguiculata*) leaf is one of the most cultivated and utilized African indigenous vegetables in sub-Saharan Africa (FAOSTAT, 2019; Horticultural Crops Directorate, 2016). The crop has drought tolerance property that has made it suitable for the arid and semi-arid lands (ASALs). Additionally, the vegetable is rich in protein and micronutrients including iron and beta carotene whose deficiency is prevalent in SSA countries (Kirakou et al., 2017; Van Jaarsveld et al., 2014). Nutrition intervention programmes through the dietary diversification programmes promote the production and utilization of the vegetable to fight malnutrition. However, less success has been achieved as the utilization of both the fresh and preserved vegetables still remains low among the population in SSA.

Cowpea leaves have a glut supply in-season whereas during the offseason, the supply is limited occasioning low levels of its utilization (Seidu et al., 2012). Moreover, this has often resulted into huge postharvest losses during glut that leaves the producing households exposed to food and nutrition insecurity in seasons of drought. Local communities have traditional processing and preservation techniques whose efficiency in promoting utilization and availability of the vegetable is yet to be established. Moreover, the scope of practise and the constraints limiting these practices among local communities are still not established in any documented literature. This study sought to establish the contribution of the traditional preservation techniques of cowpea leaves to their utilization among the communities living in the Coastal ASAL areas of Kenya.

## Material and Methods

The study was conducted in Taita Taveta County which is located in the Coastal region of Kenya. The sample size was determined as per the Yamane 1967:886 formulae (Israel, 1992) and the sampling flow done as illustrated in **Figure 1**. Households who were producers of the cowpea leaves and had been living in the study area for the last one year were eligible for the study. Data collection was done using semi-structured questionnaires administered through the Open data kit tool (ODK). Statistical analysis was done using statistical package for social sciences (SPSS) version 25. The frequencies of the socio-demographic and economic characteristics and constraints of production were generated. Odds ratios and logistic regression were used to test the significant factors determining the sourcing and utilization of dried cowpea leaves at  $p < 0.05$ .



**Figure 1: Sampling schema**

## Results and Discussion

### *Socio-demographic and economic characteristics of cowpea leaves producing households*

Two thirds (66.8%) of the cowpea producing households were headed by men with the remaining a third headed by women (33.2%). This is explained by the patriarchal nature of the study area. The average age of the household heads were  $50.1 \pm 16.2$  years pointing to a disturbing fact of low participation by the youths in cowpea leaves production. Farming (71.8%) was the main occupation among the household heads considering that the study area was rural where the most source of employment is the farm. The average household size was  $3.4 \pm 2.2$  persons. Majority (52.7%) of the households had their daily choice of food solely determined by the women whereas 46.8% had males solely determining the food to be eaten; this is corroborated by the culture of the community as women handle the household duties more than the males.

### *Production of cowpea leaves*

Households that sourced their cowpea leaves from roadside vendors rather than from other sources in the in-season were twice more likely to consume dried vegetables during the scarcity (**Table 1**). This is explained by the fact they would source dried vegetables from these vendors too. Household in which either the leaves were sourced from the markets or the food to be taken was determined by a man were three times less likely to consume the leaves than those that did not have the respective characteristic. These households thereby would derive more nutritional benefit from the consumption of the vegetable.

**Table 1: Odds of sourcing cowpea leaves off-season based on socio-economic characteristics**

Socio-economic characteristics of households		Source of cowpea leaves off-season		
		Buy from other places	Use dried vegetables	Don't consume
Source of cowpea leaves in-season	Own farm (Yes/No)	2.5	2.1	1.1
	Purchase from roadside vendors (Yes/No)	1.7	2.4*	0.1*
	Purchase from the market (Yes/No)	0.2*	0.3*	1.3*
Who decides food to be bought in the household (man/woman)		0.6	0.3*	21.9*
*p<0.05				

### *Utilization of cowpea leaves*

Cowpea leaves was the most utilized indigenous vegetable in the study area (Figure 2). Sun-drying (73.4%) was the most practised form of preservation by the households, followed by the combination of sun-drying and blanching (54.1%) and blanching only (27.3%), respectively. Sundried vegetables were utilized in four of every ten (44.9%) of the households, second to only the fresh boiled leaves (81.5%). This points to a higher level of utilization of the leaves in the ASAL areas of the coastal region due to the suitability for the area. In as much as dried cowpea leaves yield a poor quality product, the technique is easily adaptable to resource poor-households (Kiremire et al., 2010); this explains the wider use than other techniques. Seed scarcity and low pricing increased the likelihood of utilizing cowpea leaves during the off-season as shown in equation 1. Low pricing discourages commercialization of the crop thus more farmers would opt to preserve the surplus for later consumption.

## Equation 1: Regression model for the predictors of drying of cowpea leaves

$$y = 4.5 - 1.8x_1 + 3.1x_2 - 4.4x_3 + 3.7x_4 - 2.5x_5,$$

Where  $y$  = practise of drying of cowpea leaves,  $x_1$ =Field pests,  $x_2$ =Seed scarcity,  $x_3$ =Low yields,  $x_4$ =Low prices for leaves,  $x_5$ =Lack of access to improved seeds.  $R^2=0.60$ .

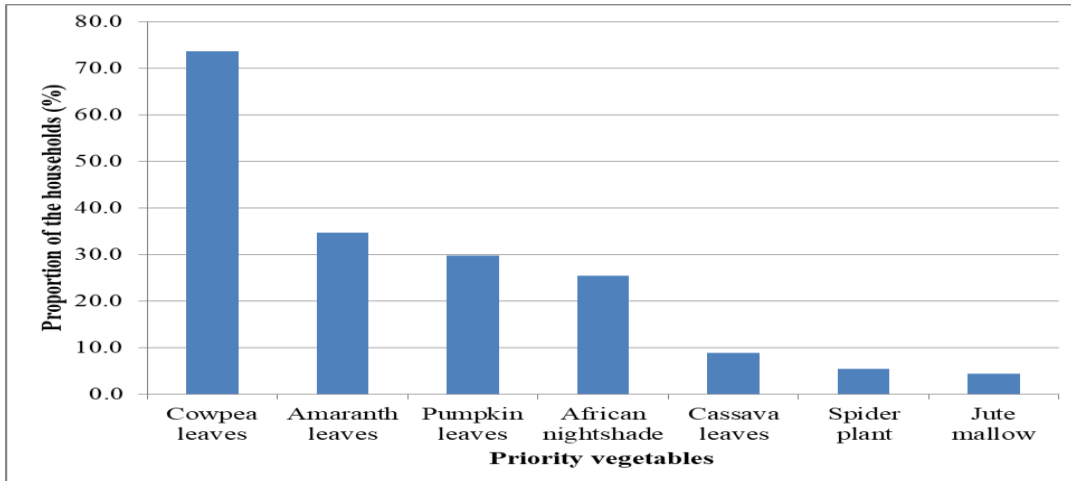


Figure 2: Prioritization of indigenous vegetables in the ASAL areas of the Coastal region of Kenya

## Conclusions and Outlook

In conclusion, this study established that cowpea leaves, both the fresh and preserved forms, were greatly preferred among households living in ASAL areas in the coastal region. However, such utilization is constrained by challenges encountered at the primary production point. Alleviation of these challenges and promotion of value-addition of the crop would improve the utilization of the vegetable among these households.

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