Nutritional characterization of traditional preserved cowpea leaves consumed in coastal drylands of Kenya

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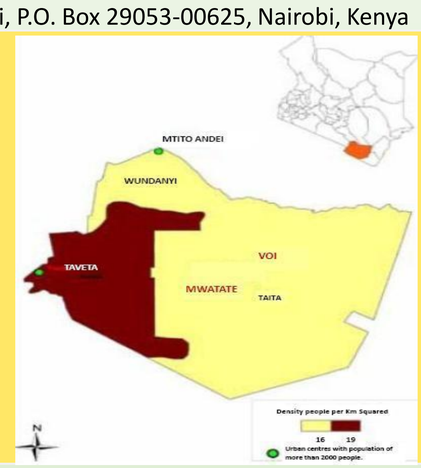
Introduction

- Consumption of African leafy vegetables such as cowpea leaves is high among communities in the arid and semi-arid lands in sub-Saharan Africa[1].
- However, seasonal availability of these vegetables has often limited their utilization.
- Consequently, some households often resort to the traditional preserved forms of the vegetables to enhance their availability.
- It is not sufficient to be dismissive of these techniques as less efficient ways of enhancing nutrient intake among communities.



Study area: Taita Taveta County, Kenya.

Methods

- Twenty samples of the preserved forms of cowpea leaves were obtained from farmer groups in Taita Taveta County.
- Similar forms of preserved leaves from the same group were mixed and homogenized; twelve samples were then subjected to nutrient analysis.

Study objective

- To characterize the nutritional quality of traditional preserved cowpea leaves in the coastal drylands of Kenya

Statistical analysis

- ANOVA was used to establish differences in nutritional composition.
- Tukey's HSD was used to separate significantly ($p<0.05$) different means.
- PCA exploration was used to establish trends in nutrient retention.

Results

- For fat, fibre, carbohydrates, zinc, calcium and iron contents, drying induced limited deterioration (Table 1).
- Beta-carotene content had the greatest variability, with sundried forms showing the least retention.
- Maximum variability (100%) in the data was explained by nine principal components (Fig 1).
- Ash, protein and fibre on one hand, while on the other hand calcium, moisture and beta carotene content had similar trends in deterioration (Fig 2).

Table 1. Nutritional content of traditional preserved cowpea leaves

Processing technique	Moisture (%)	Protein (%)	Fat (%)	Fibre (%)	Carbohydrates (%)	Ash (%)	Energy values (Kcal)	Iron (mg)	Zinc (mg)	Calcium (mg)	Beta carotene (mg)
Fresh leaves	87.3±3.4^{a}	32.4±3.4^{ab}	1.7±0.1^{a}	19.1±1.1^{a}	35.3±2.1^{a}	11.5±0.7^{a}	286.2±4.0^{b}	0.32±0.03^{a}	0.12±0.06^{a}	1.57±0.10^{a}	22.62±14.63^{a}
Blanched sundried	15.1±0.0^{b}	28.3±1.3^{c}	4.8±0.3^{a}	19.1±1.1^{a}	36.1±0.1^{a}	10.7±0.8^{b}	301.7±3.1^{ab}	0.33±0.13^{a}	0.09±0.04^{a}	1.59±0.10^{a}	0.54±0.03^{c}
Unblanched shadow drying	14.5±0.0^{b}	37.8±1.8^{a}	0.2±0.0^{b}	19.5±1.1^{a}	29.5±0.6^{a}	12.9±0.7^{a}	271.2±4.6^{b}	0.38±0.03^{a}	0.08±0.03^{a}	1.37±0.35^{a}	2.60±0.21^{b}
Unblanched sundried	12.6±1.2^{c}	30.8±5.1^{b}	1.9±0.4^{a}	16.1±3.1^{a}	40.4±8.4^{a}	11.5±0.7^{a}	302.1±12.3^{a}	0.33±0.07^{a}	0.10±0.04^{a}	1.44±0.24^{a}	0.40±0.10^{c}
%CV	109.1	15.3	104.6	15.5	19.3	8.0	5.1	21.5	43.6	15.5	219.4

Values in a column with different letters in the superscript are statistically different at $p<0.05$

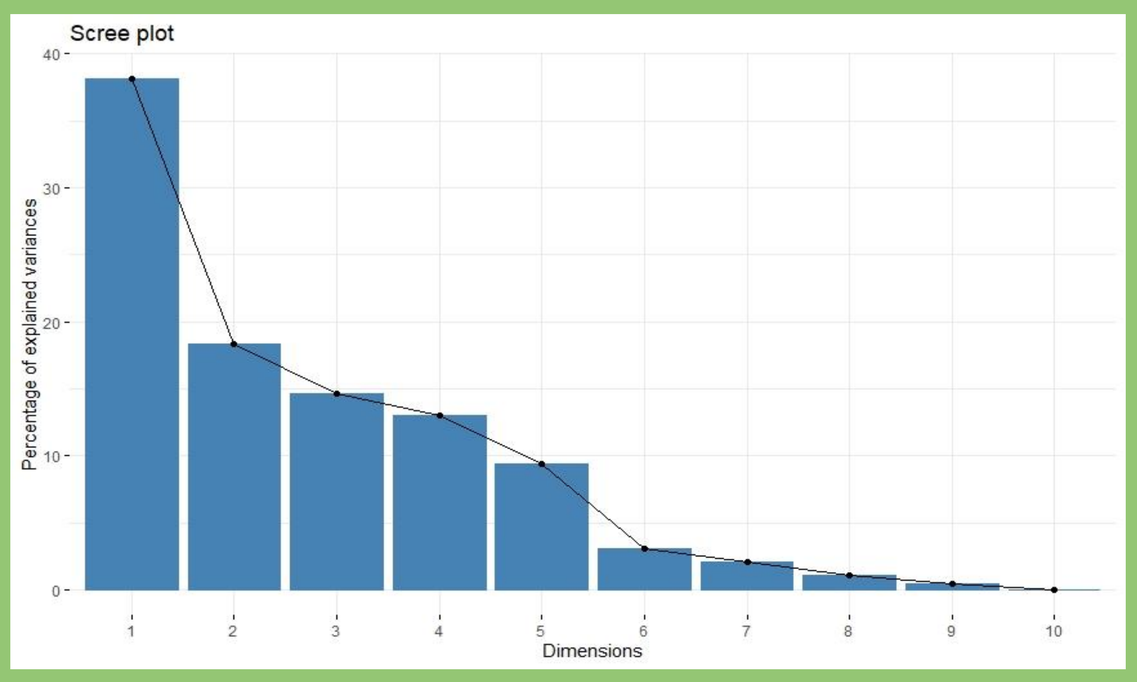


Fig 1. Screeplot for principal components for nutrient retention trends in preserved cowpea leaves

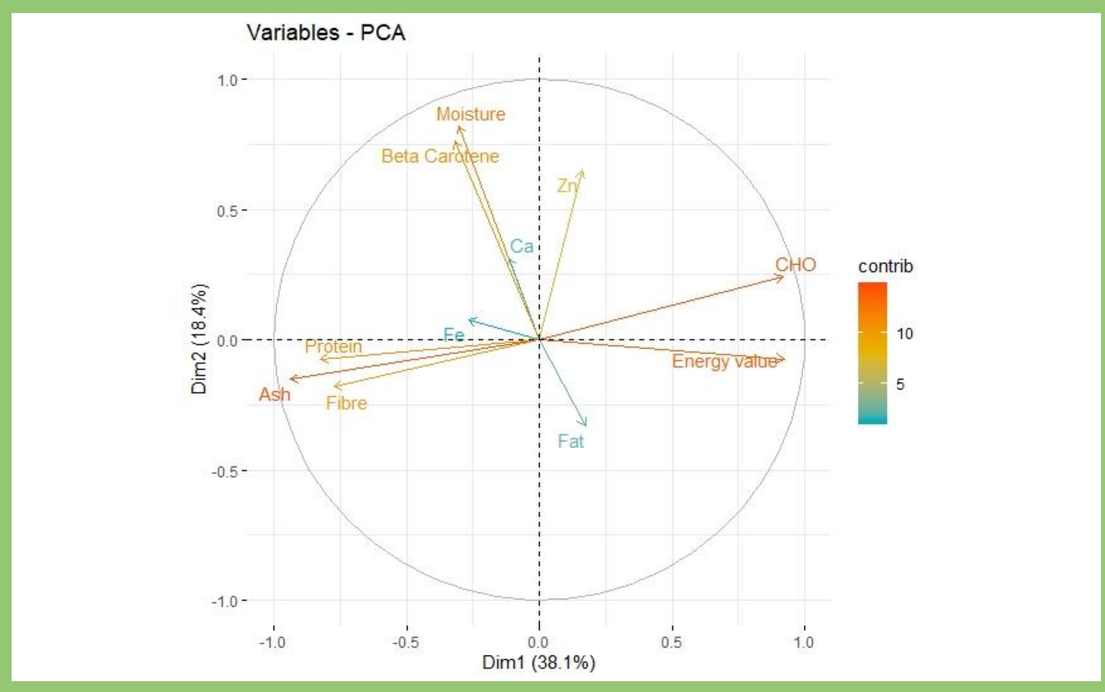


Fig 2. Principal component analysis of trends in nutritional quality of traditional preserved cowpea leaves

Discussion

- Thermal degradation is effected by transformation of all trans beta carotene to Cis form that has lower vitamin A activity[2].
- Sundrying induced higher thermal degradation on beta-carotene than shadow-drying due to exposure to photo-oxidation[3].
- The involved drying technique was dependent on moisture loss thus explains the similar trend of beta carotene and moisture contents.

Conclusion

- As much as the preservation techniques induced nutrient deterioration in the vegetables, the techniques still helped avail the key nutrients in cowpea leaves: protein, zinc, iron and beta carotene.

References

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