



COWPEA LEAVES: PRODUCT DEVELOPMENT AND VALUE ADDITION

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A brochure prepared for dissemination of processing technologies for cowpea leaves

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1.1 Introduction

- The vegetable is the most consumed African Leafy vegetable in Kenya and is also known for its grains ¹.
- The crop is drought tolerant and grows in diverse agro-ecological zones, thus grown in the western, central, eastern and coastal counties of Kenya.
- The leaves are a good source of iron, calcium, phosphorus, zinc, potassium, beta-carotene and vitamin C (Figure 1).
- Additionally, the vegetables are rich in phytochemicals (carotenoids, chlorophyll, phenolics) with health -enhancing properties.
- Postharvest losses that reach up to 50% of the yield for the leaves result in economic losses as well as limited utilization.

Nutritional information of fresh cowpea leaves (per 100g dry weight)

Nutrient	Amount
Protein	2.6g
Carbohydrate	5.6g
Fat	0.4g
Fiber	22.7g
Calcium	5.9mg
Zinc	1.7mg
Iron	2.9mg
Sodium	3.5mg
Vitamin C	21.1mg
Beta carotene	2.8mg

Figure 1: Nutrient composition of fresh cowpea leaves

1.2 Utilization



Figure 2: Forms of utilization of cowpea leaves. Consumed as A-vegetables with staples ie ugali, B- Composite vegetable of cowpea leaves and jute mallow and C- Dehydrated vegetable after rehydration

1.3 Good Manufacturing Practices

GMPS also go a long way in ensuring that the expected product quality is attained in processing. Some of the GMPs to be preserved in the processing of cowpea leaves include:

- Proper personnel hygiene including designated handwashing places
- Proper equipment hygiene
- Proper sanitary operation including scheduled and frequent cleaning of the facility and equipment.
- Pest control in order to avoid product contamination.
- Disease control especially among staff to ensure product safety.
- Proper storage of equipment and maintenance of the same.
- Handwashing and sanitation facilities such as toilets must be available.
- Raw material inspection in order to ensure product quality is maintained.
- Monitoring of process controls.

- Protection of food product from contamination through proper handling, packaging and storage.

1.4 Value addition techniques for cowpea leaves

1.4.1 Dehydrated cowpea leaves

- Drying of cowpea leaves is done using solar driers, sun-drying and oven-drying.

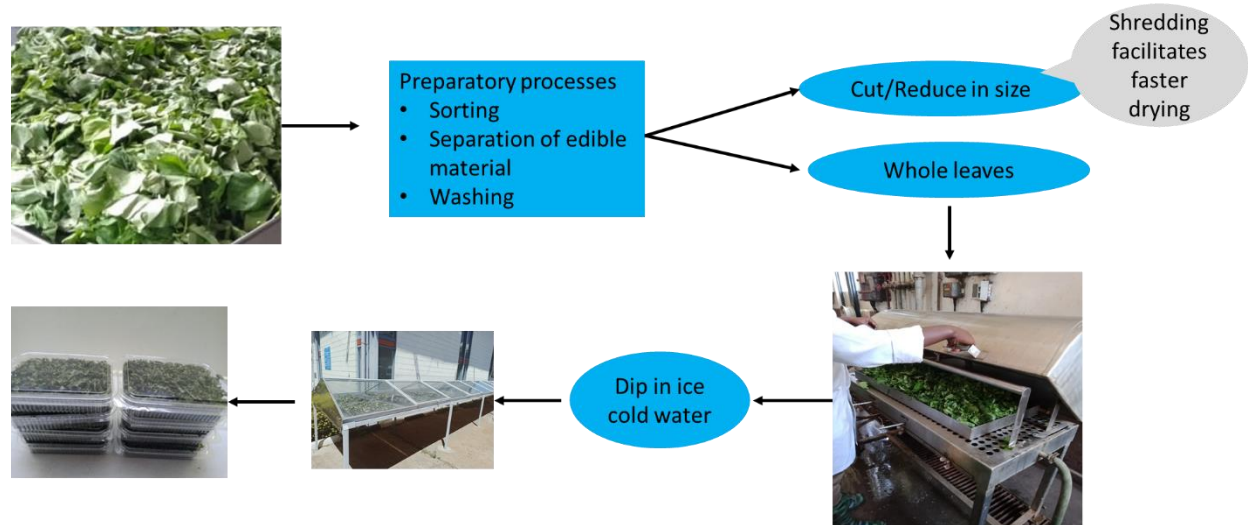


Figure 3: Dehydration of cowpea leaves

Key aspects to consider on dehydrated leaves

- Drying the vegetables without blanching results in textural and colour degradation (Browning). Additionally, nutrient losses are aggravated when the dehydration is done without blanching or fermentation.
- In order to keep the vegetables for a longer period, it is recommended that the vegetables be kept in air-tight packages in order to maintain a low moisture content of 8%.
- The dried vegetables kept under appropriate conditions can keep for one year.



Figure 4: Other techniques of dehydration of cowpea leaves. A-Sun-drying of blanched cowpea leaves, B- Forced air ventilation oven drier



Indirect solar cabinet drier



Solar cabinet drier



Greenhouse solar drier



Tunnel solar drier



Miniaturized solar drier (Dehytray)

Figure 5: Different types of solar driers

1.5 Fermentation of cowpea leaves

- Optimal fermentation is undertaken with the addition of 2% salt and 5% sugar for 16 days.

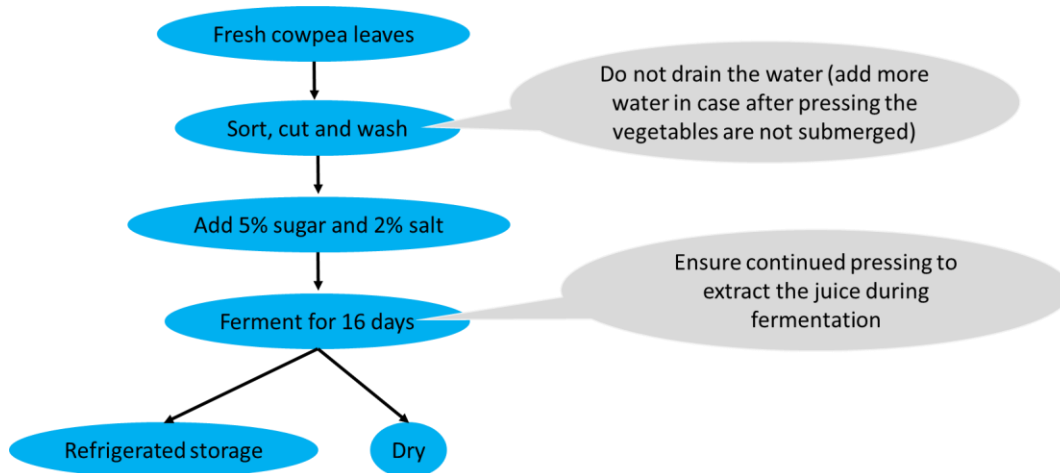


Figure 6: Fermentation of cowpea leaves

1.6 Processing of cowpea leaves soup mixes

- Dehydrated cowpea leaves soup mixes are subjected to processing as shown to formulate soup mixes.

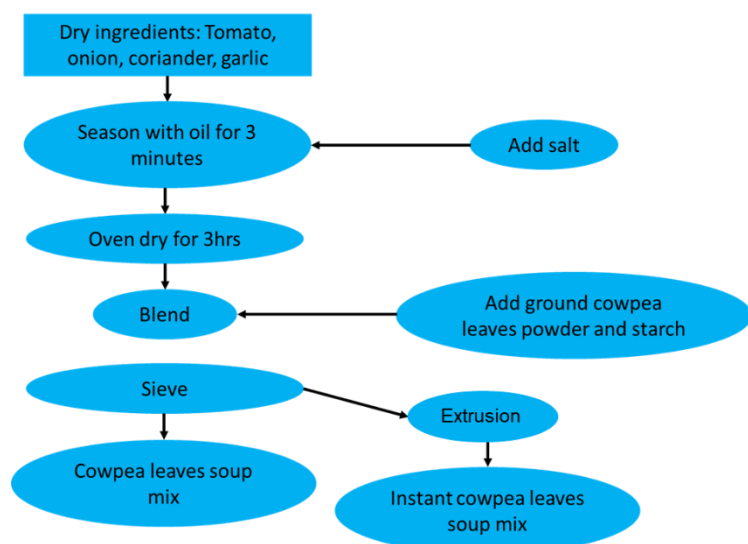


Figure 7: Processing of instant cowpea leaves soup mixes

1.6.1 Utilization of value added cowpea leaves

Dehydrated cowpea leaves	Fermented cowpea leaves	Cowpea leaves soup mixes
<ul style="list-style-type: none"> First the vegetables must be rehydrated for 1 hour with cold water or 15 minutes with warm water and cooked just as fresh. If one is to boil the vegetables first, there is no need to rehydrate Consumed with delicacies (Ugali) as the fresh cowpea leaves 	<ul style="list-style-type: none"> The soured vegetables can be consumed raw after fermentation The cooking destroys the probiotic bacteria The fermented vegetables can keep for 3 months under refrigeration The dried leaves can keep for a year 	<ul style="list-style-type: none"> Consumed as soup Taken with staples like Ugali, Chapatti and rice A weaning diet

1.7 Product marketing and costs

- A 10kg of fresh vegetable yields 1kg of dehydrated vegetables, 1.3kg of fermented vegetable, 1.5kg of cowpea leaves soup mix or 1.1kg of instant cowpea leaves soup mix.
- A 75g package of cowpea leaves soup mix sells at KES. 50 (USD. 0.5), 25% profit.

References

- Owade, J. O. et al.. A review of the contribution of cowpea leaves to food and nutrition security in East Africa. *Food Sci. Nutr.* **8**, (2020).
- Owade, J. O. et al.. Trends and constraints in the production and utilization of cowpea leaves in the arid and semi - arid lands of Kenya. *Open Agric.* **5**, 325–334 (2020).