



Volume: 01 Issue No: 05

Development and Value Addition of Banana Leaf Extract-Based Halwa: Processing Technology, Product Quality and Economic Feasibility

Article ID: AP-V01-I05-08

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Abstract

Banana leaves are widely used as food-contact materials in tropical food traditions, but their use as an extracted ingredient in a starch-based confection requires systematic evaluation. This article describes a preliminary process for preparing banana leaf extract-based Halwa from the supplied product-development notes and examines its possible value-addition and small-enterprise economics. The proposed method involves washing and chopping leaves, preparing a filtered aqueous extract, cooking the extract with corn



flour and sugar, and incorporating ghee, cardamom and nuts before setting. A transparent illustrative cost model for one assumed batch estimates total expenditure of ₹163 and sales of ₹240 from eight portions priced at ₹30 each, corresponding to a gross operating surplus of ₹77 and a benefit–cost ratio of 1.47. These figures are scenario assumptions, not recorded business outcomes. No measured nutritional, sensory, microbiological or shelf-life data were supplied; therefore, product safety, acceptability and commercial feasibility remain to be validated. The concept may offer a local value-addition opportunity if standardized processing, food-safety assessment and market testing confirm its suitability.

Keywords: banana leaf extract; Halwa; value addition; product development; cost analysis; food safety; rural enterprise.

INTRODUCTION

The banana leaf is the leaf of the banana plant, which may produce up to 40 leaves in a growing cycle. The leaves have a wide range of applications because they are large, flexible, waterproof and decorative. They are used for cooking, wrapping, and food-serving in a wide range of cuisines in tropical and subtropical areas. (Arvanitoyannis and Mavromatis 2009; De Lange et al. 2009) They are used for decorative and symbolic purposes in numerous Hindu and Buddhist ceremonies. In traditional home building in tropical areas, roofs and fences are made with dry banana-leaf thatch. Bananas and palm leaves were historically the primary writing surfaces in many nations of South and Southeast Asia. (SAHAA *et al*, 2013).





INTRODUCTION: BANANA LEAF HALWA

• It is traditional Indian dessert originating from South India. Made from ripe bananas, milk, sugar, ghee and cardamom powder. Characterized by soft, creamy texture and sweet, caramelized flavour. Typically served warm or chilled, often at special occasions. Popular in Karnataka, Tamilnadu and Kerala, with regional variations. Banana plants provide fruit as well as leaves that are commonly used for wrapping, serving and heating foods in parts of South and Southeast Asia. The leaf's large surface area and flexibility make it a familiar food-contact material. However, traditional use of intact leaves as packaging does not establish that concentrated aqueous leaf extract is safe or nutritionally beneficial when incorporated into a dessert. A separate assessment of the intended edible ingredient is necessary.

Small-scale processing can diversify local food enterprises by combining readily available plant materials with familiar confectionery techniques. The proposed product uses banana leaf extract as a distinctive component of a corn flour-based Halwa. Its commercial prospects depend on ingredient standardization, sensory acceptance, consistent yields, food hygiene, labeling and actual costs. Standard food-processing and sensory evaluation principles provide a framework for subsequent validation (Fellows, 2017; Lawless and Heymann, 2010).

VARIETIAL DESCRIPTION

- Lady finger bananas (also known as sugar bananas, fig bananas, or date bananas) are diploid banana cultivars originating in Malaysia or Indonesia, belonging to the Sucrier subgroup of the AA banana cultivar group.
- Lady finger bananas are the most widely cultivated AA cultivar and are one of the world's most popular local bananas.
- Its fruits are finger-sized, sweet, and thinskin.

JUSTIFICATION

- Rich in potassium from banana leaves, supporting heart health
- Traditional south indian dessert, preserving cultural heritage
- Unique flavor profile and aromatic scent from banana leaves
- Supports local banana farmers and artisans, contributing to regional economic growth
- Good source of calcium from milk, promoting bone strength and overall well-being.

OBJECTIVES

- To create a flavourful and visually appealing dessert by infusing traditional banana leaf essence into a rich aromatic Halwa.



MATERIALS USED

• Banana leaves – 1 cup
• Sugar - 1/2 cup (100 Grams)
• Cornflour – 1/4 cup (50 Grams)
• Cashewnuts – 1 tbsp (25 Grams)
• Ghee – 3 tbsp (50 Milliliters)
• Water – 1 cup
• Cardamom powder – 1 tbsp (50 Grams)
• fruits – 1 tbsp (50 Grams)

METHOD OF PREPARATION

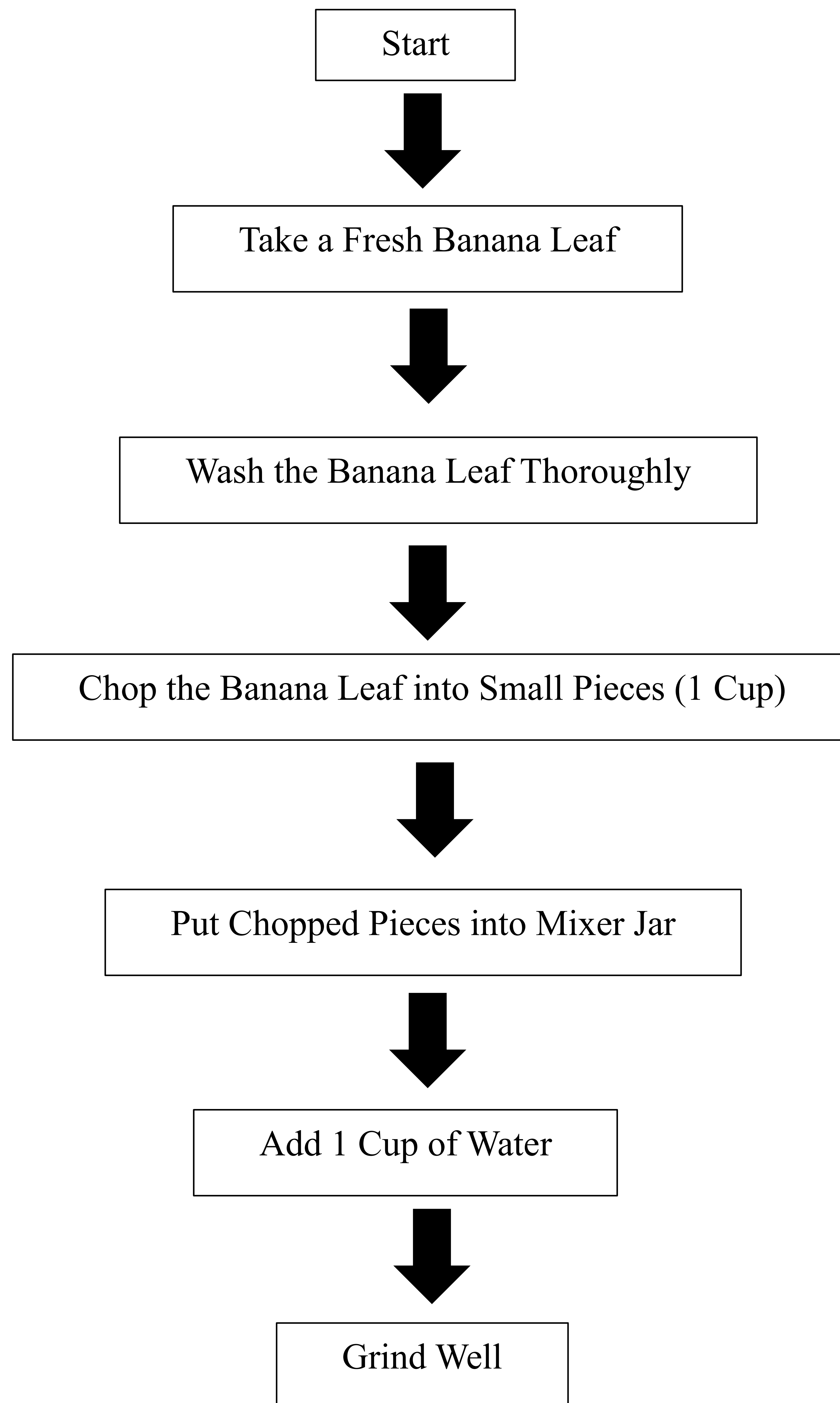
- Take a fresh banana leaf; wash it thoroughly
- Chop the banana leaf into small pieces (1 cup)
- Put the chopped pieces into a mixer jar and add 1 cup of water
- Grind well
- Filter the extract using a strainer
- Add half cup of corn flour and mix well
- Add 1.5 cup of water and stir
- Transfer the mixture to a pan and turn on the stove
- Stir well in medium flame
- The mixture attains thick consistency

METHOD OF PREPARATION

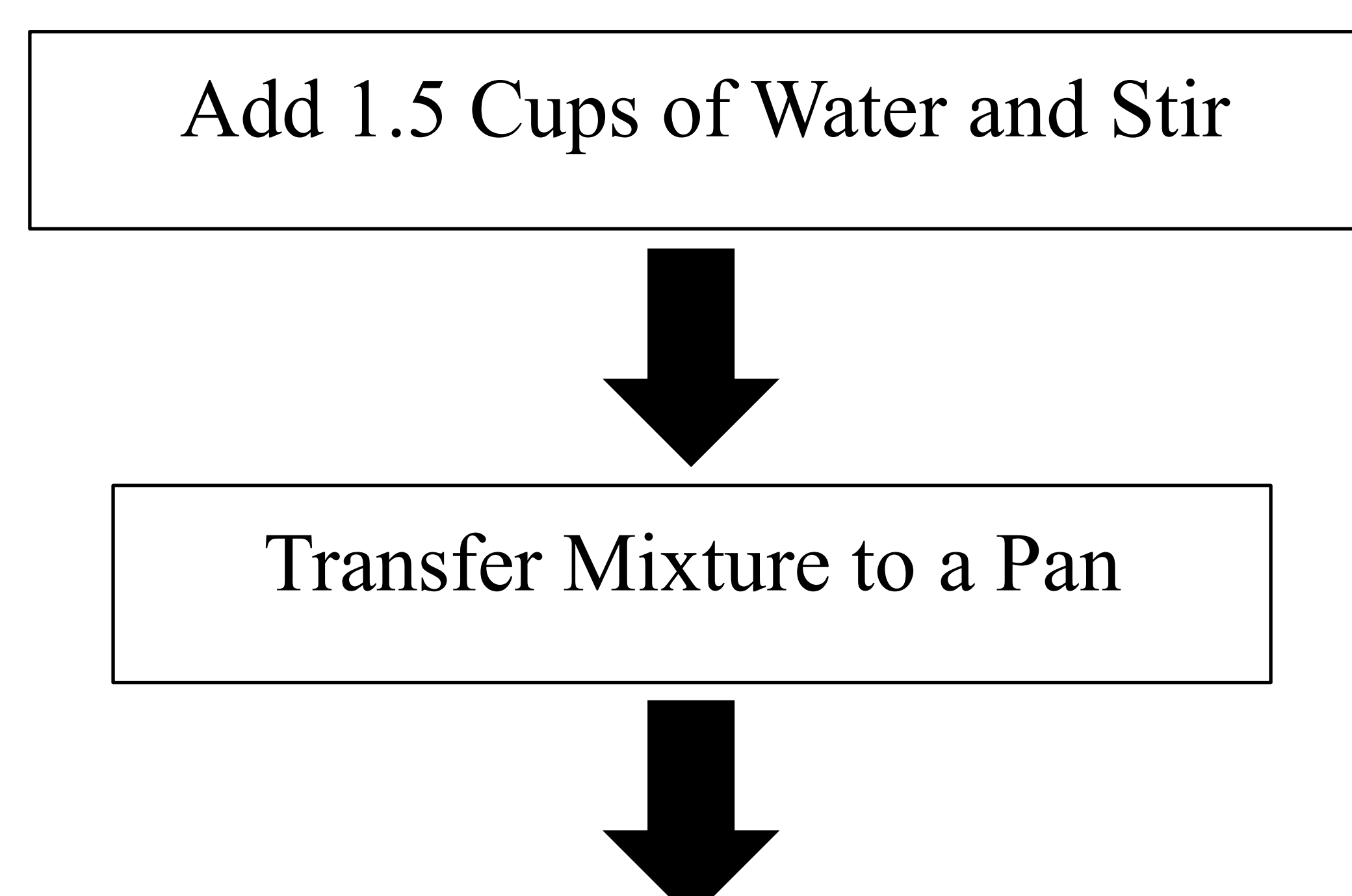
- Add half cup of sugar
- Mix well
- Add 2 tbsp of ghee and mix well
- Again add 2 tbsp of ghee and mix well
- Add half tbsp of cardamon powder
- Add cashews
- Mix well
- Greese ghee on a plate and transfer the halwa to the plate
- Add nuts for garnishing
- Rest for 30 to 45 minutes
- Cut into pieces and serv



FLOWCHART OF PREPARATION OF PRODUCT

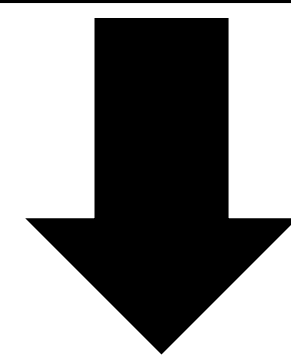


FLOWCHART OF PREPARATION OF PRODUCT

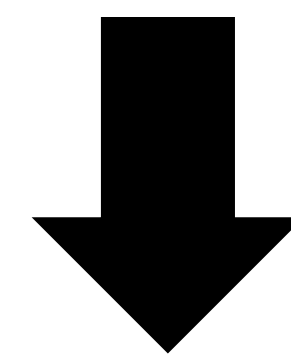




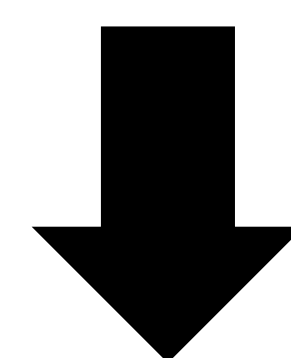
Turn on the Stove and Cook on Medium Flame



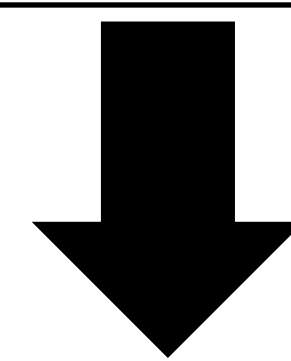
Stir Well Until Mixture Attains Thick Consistency



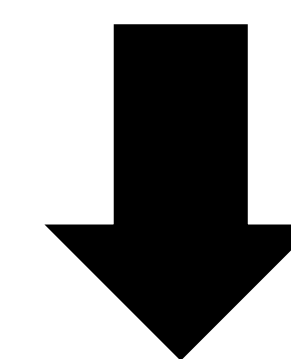
Add Half Cup of Sugar



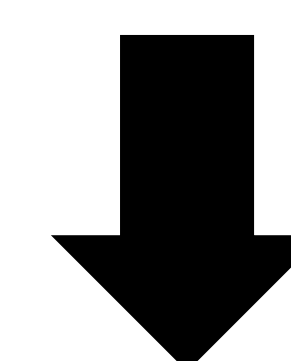
Mix Well



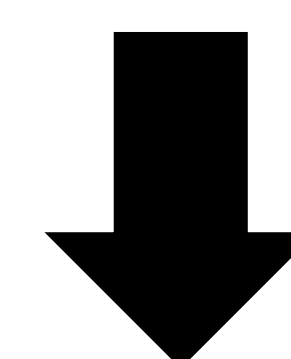
Add 2 tbsp of Ghee and Mix Well



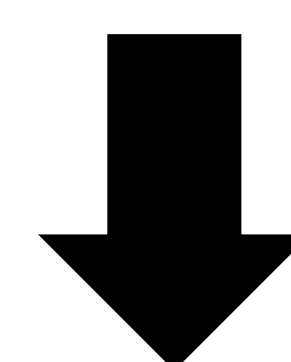
Add Another 2 tbsp of Ghee and Mix Well



Add Half tbsp of Cardamom Powder



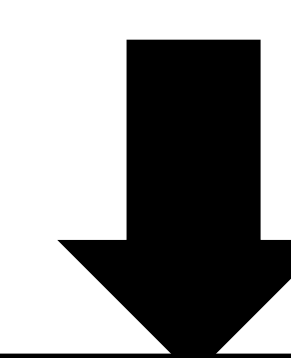
Add Cashews



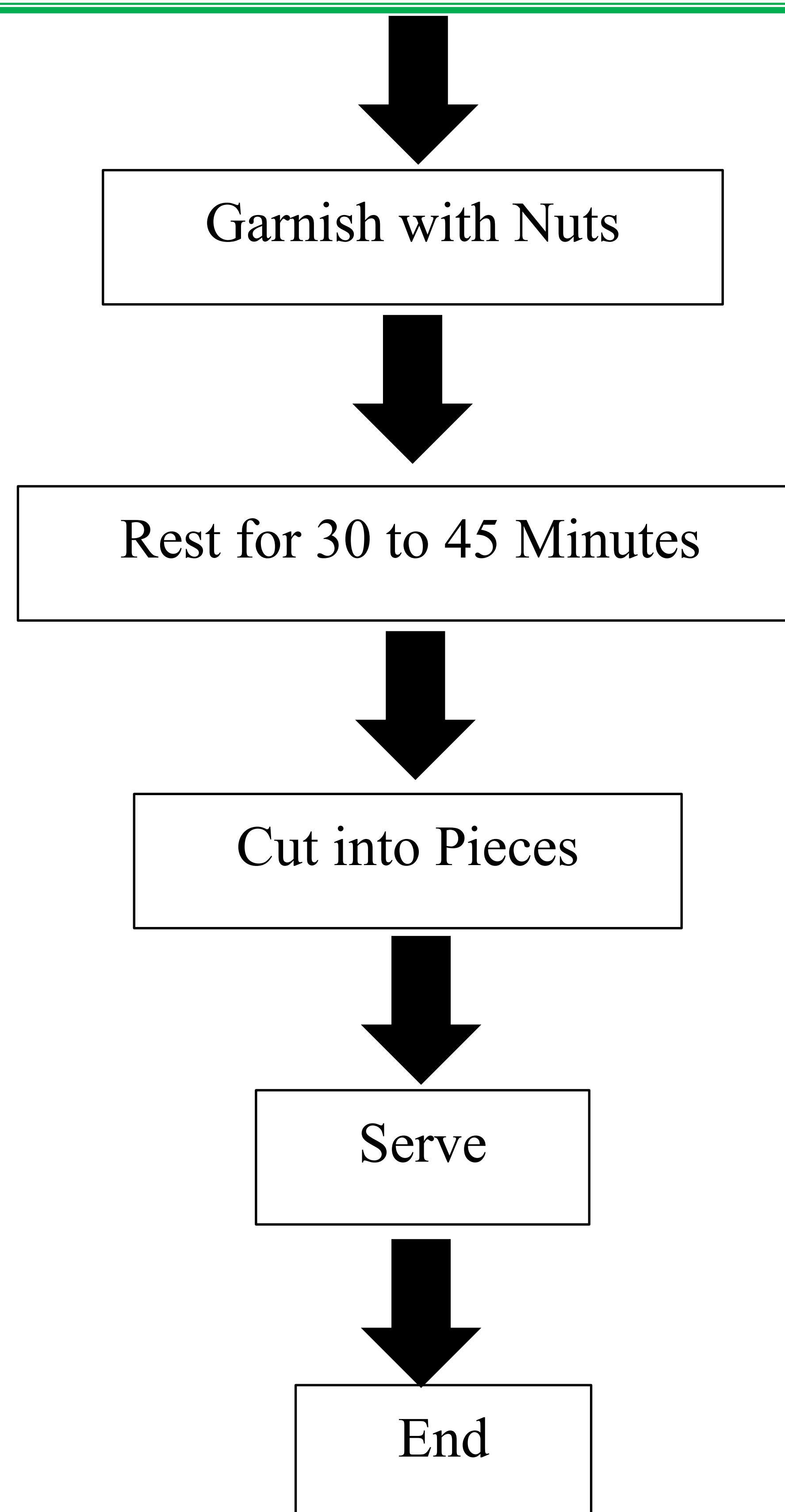
Mix Well

FLOWCHART OF PREPARATION OF PRODUCT

Grease a Plate with Ghee



Transfer Halwa to the Greased Plate



OBSERVATIONS RECORDED

Physical Observations

1. Change in color
2. Softening of leaves
3. Gelatinous texture

• Sensory Observations

1. Aroma
2. Flavor
3. Texture

Chemical Observations

1. Caramelization
2. Gelation

Other Observations

1. Time and temperature
2. Ratio of ingredients
3. Technique



NUTRITIONAL PROFILE

- Per serving (approx. 100g)
 - Energy: 250-300 kcal
 - Carbohydrates: 40-50g- Fiber: 2-3g
 - Protein: 2-3g- Fat: 10-12g
 - Saturated Fat: 7-8g
 - Cholesterol: 10-15mg
 - Sodium: 50-100mg
 - Sugar: 20-25g
 - Vitamin A: 10-15% of the Daily Value (DV)
 - Vitamin C: 2-3% of the DV
 - Calcium: 10-15% of the DV
 - Iron: 5-7% of the DV
 - Potassium: 10-12% of the DV
 - Banana leaf extract: rich in antioxidants, flavonoids, and phenolic acids- Cardamom: contains antioxidants, vitamin C, and minerals like potassium and magnesium

MATERIALS AND PROPOSED PROCESSING METHOD

The uploaded notes list banana leaves (one cup, chopped), sugar cornflour cashews, ghee, water, cardamom and optional dry fruits. The notes also give conflicting quantities in the preparation steps: cornflour, ghee and, and cardamom. The following method is a procedural synthesis, not a validated formulation. Record actual weights and batch yield before experimentation.

Select clean leaves from an identified, suitable source and exclude visibly contaminated or pesticide-treated material. Wash with potable water; chop and blend with potable water; filter the extract. Disperse measured cornflour in the extract, heat with continuous stirring until thickened, add sugar, then incorporate measured ghee, cardamom and nuts. Transfer to a hygienic tray, allow to set and portion. The original notes suggest 30–45 minutes of setting, but do not establish a safe cooling or storage protocol. Process temperature, final moisture and microbial quality require validation.

PROPOSED QUALITY EVALUATION

For a publishable experimental study, document raw-material identity and batch size, ingredient weights, cooking temperature/time, final yield and processing losses. Conduct a trained or consumer sensory test for appearance, aroma, taste, texture and overall acceptability using an appropriate hedonic scale, reporting panel size, replication and statistical methods (Lawless and Heymann, 2010). Assess moisture, ash and



macronutrients using validated laboratory procedures (AOAC International, 2019). Microbiological testing, shelf-life assessment, and compliance with applicable FSSAI requirements should precede commercial sale. Avoid antioxidant, potassium, fibre or health claims without analytical evidence.

ECONOMIC VALUE AND FEASIBILITY

The following is a hypothetical microenterprise scenario using assumed local retail costs and an assumed saleable yield of eight portions. It is provided to demonstrate the calculation method only; it is not a market survey or actual cost of the product.

Cost component	Illustrative cost (₹)
Banana leaves / sourcing	10
Sugar (100 g)	5
Cornflour (50 g)	6
Ghee (approx. 50 mL)	35
Cashews (25 g)	22
Cardamom and optional garnish	8
Water, fuel and electricity	12
Packaging (8 units)	20
Direct labour allocation	35
Cleaning, transport and other overhead	10
TOTAL ESTIMATED BATCH COST	163
Economic indicator	Illustrative calculation
Saleable output	8 portions (assumed)
Selling price	₹30 per portion (assumed)
Gross sales	$8 \times ₹30 = ₹240$
Batch operating surplus	$₹240 - ₹163 = ₹77$
Benefit–cost ratio	$₹240 / ₹163 = 1.47$
Operating margin on sales	$₹77 / ₹240 \times 100 = 32.1\%$
Break-even unit price	$₹163 / 8 = ₹20.38$

The estimated surplus excludes equipment depreciation, financing charges, taxes, unsold inventory and regulatory compliance costs unless included in the listed overhead. Real profit may be lower. Economic viability is sensitive to ghee and nut prices, batch yield, portion weight, selling price and wastage. A price and yield survey across several batches is needed before making profitability claims.



DISCUSSION

The main value-addition concept is the transformation of a commonly available banana leaf material into a differentiated confectionery formulation. Its appeal could lie in novelty, local sourcing and packaging opportunities rather than in unverified therapeutic benefits. Cornflour gelatinization is expected to contribute to setting and texture; sugar and ghee influence sweetness and mouthfeel. These mechanisms are established food-processing principles, but the specific product outcomes have not yet been experimentally measured. A controlled comparison against a halwa prepared without leaf extract would help isolate the extract's contribution to colour, aroma and liking.

For rural women's groups and small food businesses, a standardized recipe could potentially support low-volume production, but the illustrative economics cannot substitute for market testing. The practical priorities are safe sourcing, sensory preference, hygienic production, portion-size consistency and accurate labeling. Use of leaf-derived ingredients should be reviewed for regulatory permissibility and toxicological suitability; prior use of banana leaves for food wrapping is not equivalent to authorization of leaf extract as a food ingredient.

CONCLUSION

Banana leaf extract-based halwa is a preliminary food-product concept that may warrant further investigation for local value addition. The uploaded preparation notes support a basic process outline but do not substantiate nutrient composition, antioxidant activity, microbial safety, shelf life or consumer preference. An illustrative cost scenario suggests potential positive operating surplus under specified assumptions; actual commercial viability must be confirmed through standardized pilot batches, analytical testing, sensory trials and a documented cost-and-revenue study.

FUTURE ENHANCEMENT IDEAS

1. Shelf life enhancement
2. Texture improvement
3. Protein Enrichment
4. Fiber Fortification
5. Vitamin and Mineral Boost
6. Antioxidant Enhancement
7. Healthy Fat Addition
8. Spices and Herbs
9. Citrus Zest
10. Espresso or Coffee



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