



# STUDY ON DEVELOPMENT AND FORMULATION OF MOMORDICA CYMBALARIA SOUP MIX INCORPORATED WITH NENDRAN PEEL POWDER

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**Abstract:** Diabetes mellitus is a chronic condition brought on by insufficient insulin production by the pancreas or inefficient insulin utilisation by the organism. The National Diabetes Statistics Report for 2022 was just published by the Centres for Disease Control and Prevention (CDC). The National Diabetes Statistics Report for 2022 was just published by the Centres for Disease Control and Prevention (CDC). According to this data, there are more than 130 million Americans who have diabetes or prediabetes. For a very long period, karchikai has been utilized in many Asian traditional medical systems. The momordica cymbalaria plant has historically been used to treat diabetes, rheumatism, ulcers, skin conditions, and diarrhoea. The nendran peel includes naturally occurring bioactive substances as carotenoids, derivatives of quercetin, phenolic acids, and highly concentrated saponins. Nendran peel flour, like pulp, provides opportunity for making new processed nutraceutical products. In Asia and Africa, these nendran banana portions have a long history of usage in traditional medicine. It exhibits significant cytotoxic action against MCF-7 breast cell lines and is advantageous for human health as an antioxidant, anticancer, antibacterial, and antitumor agent. The products were prepared by Athalakkai powder, nendran peel powder, black pepper powder, cumin powder, corn flour, salt, sugar free, water. Soup mix was developed in various proportion for evaluating the overall acceptability.

**Index Terms –** Diabetes mellitus, MCF -7 cell line , fibre , sun dried , traditional medicine, MCSM

## I. INTRODUCTION

### MOMORDICA CYMBALARIA :

Diabetes mellitus is a chronic condition brought on by insufficient insulin production by the pancreas or inefficient insulin utilisation by the organism. The National Diabetes Statistics Report for 2022 was just published by the Centres for Disease Control and Prevention (CDC). According to this data, there are more than 130 million Americans who have diabetes or prediabetes. In 2019 among those 18 and older, an estimated 1.4 million new cases of diabetic problems were identified.

*Luffa tuberosa*, also known as *Momordica cymbalaria* in science, is a medium-sized plant that thrives in warm climates and belongs to the Cucurbitaceae family. Common names for it include Athalakkai, Karchikai, Karrol, and Kasarakayee. It is a trailing plant with a turnip-shaped rootstock and large tuberous roots.

For a very long period, karchikai has been utilised in many Asian traditional medical systems. *Momordica cymbalaria* is a plant that has historically been used to treat diabetes, rheumatism, ulcers, skin conditions, and diarrhoea.

*Momordica cymbalaria* has a calcium concentration that is three times greater than *Momordica charantia*. Calcium is necessary for bone and tooth formation, as well as for regular heart rhythm, blood clotting, muscular contraction, and nerve responses. The root is also used to cure rheumatism, diabetes, diarrhoea, and indigestion. It is also an astringent, abortifacient, and aphrodisiac.

According to a study by *Koneri et al. (2014)*, *Momordica cymbalaria* roots exhibit anti-diabetic effect in the presence of a triterpenoid saponin of the oleanane type in rat insulinoma cell line (RIF-5F).

*Momordica cymbalaria* contains (290mg) of vitamin C per 100g and has the following amounts of sodium, potassium, calcium, and iron per 100g of the plant: 40 mg of sodium, 500 mg of potassium, 72 mg of calcium, and 1.70 mg of iron. (*Jha et al., IJPSR, 2018*)

**NENDRAN BANANA PEEL :**

With an annual yield of more than 14.2 million tone's, the Nendran banana is one of the largest fruit crops farmed in India. The chips industry, which produces 2 lakh tones of chips yearly at a cost of 500 crores, also generates an equivalent amount of peel and trash, and is anticipated to grow as clustering processing factories emerge. Peel, the primary by-product of bananas, contributes to 30–40% of the fresh biomass of the Nendran fruit and was shown to have much more healthy compounds than other fruit sections.

Natural bioactive substances such carotenoids, quercetin derivatives, phenolic acids, and saponins are concentrated in significant amounts in the nendran peel. Similar to pulp, Nendran peel flour offers up possibilities for creating unique processed nutraceuticals. In Asia and Africa, these nendran banana portions have a long history of usage in traditional medicine. As an antioxidant, anticancer, and antibacterial drug that exhibits significant cytotoxic action against MCF-7 breast cell lines, it is advantageous for human health.

On a dry weight basis, Nendran banana peels are rich in micronutrients, poly unsaturated fatty acids, and essential amino acids. They also contain small amounts of protein (6–9%), crude fat (3.8–11%), total dietary fibre (43.2–49.7%), and crude fat. Additionally, the peels of Nendran bananas are a good source of pectin (10–21%), lignin (6–12%), cellulose (7.6–9.6%), hemicelluloses (6.4–9.4%), and galacturonic acid. (*P. S. KUMAR et al., IJPSR, 2019*)

**OBJECTIVES :**

- ❖ To identify the concept of the new product and develop the product.
- ❖ To estimate the nutrient content of developed soup mix.
- ❖ To evaluate the sensory analysis of developed soup mix.
- ❖ To design and label the developed soup mix.

**MATERIALS AND METHOD :****PROCUREMENT OF RAW MATERIALS:**

The raw material such as Athalakkai, Nendran peel, black pepper, cumin, salt, sugar free, corn flour, water.

**PACKAGING MATERIAL:**

Packaging materials are Metalized Polyester Polyethylene is required for storage study were procured from Madurai.

**CHEMICALS:**

The chemicals and reagents used for the study were Laboratory Reagent (LR), Analytical reagent (AR) or Guaranteed Reagent (GR) grades.

**UTENSILS:**

Stainless steel vessels, spoon, plate, ladle, tray and bowl where used for preparing and serving the developed products.

**ENERGY SOURCE:**

Electric current and Liquid petroleum gas were used as heating sources

**EQUIPMENTS USED:**

- Weighing balance
- Electronic balance
- Hot plate
- Mixer
- Hot air oven
- Infrared moisture analyzer
- Magnetic stirrer
- Muffle furnace
- KelPlus-Digestion & Distillation
- Socs Plus apparatus
- Fibro plus apparatus

**PROCESS OF MAKING MOMORDICA CYMBALARIA SOUP MIX**

Outline procedure of MCSM is depicted in Figure 1

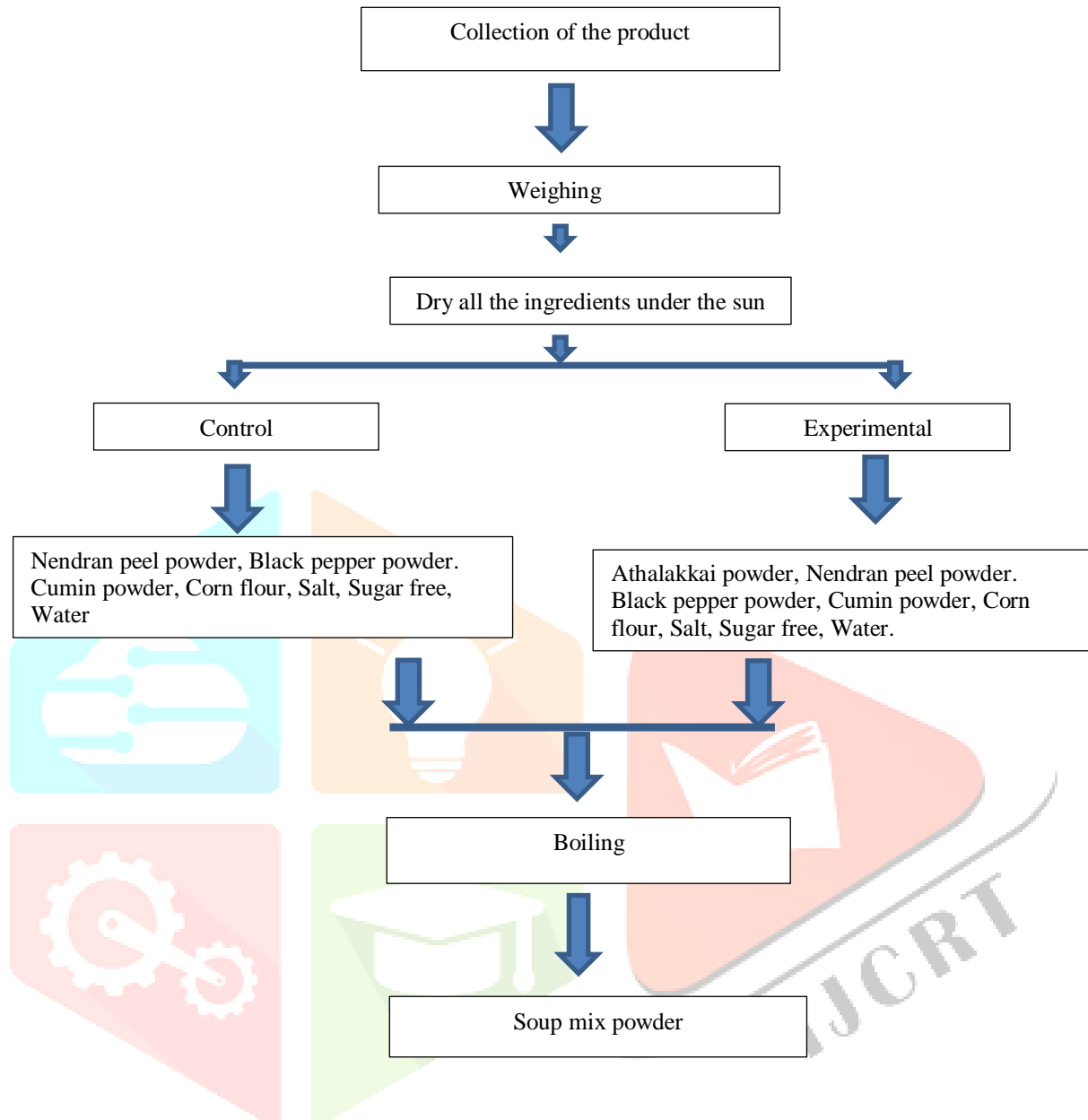


Figure 1

\*MCSM - Momordica Cymbalaria Soup Mix

#### **FORMULATION OF MOMORDICA CYMBALARIA SOUP MIX :**

#### **PRELIMINARY PREPARATION OF SELECTIVE INGREDIENTS:**

The procured raw materials such as Athalakkai powder, Nendran peel powder, Black pepper powder, Cumin powder, Corn flour, Sugar free and salt are cleaned to remove dirt, dust, stones and other foreign materials.

- Nendran Banana peel is cut into pieces and sun dried for 2 days. Then the sun dried peel is dried in hot air oven to reduce the moisture content and it should be crispy. Then it blends into a coarse powder
- Clean and wash the fresh athalakkai then bring it to a boil. Add this veggie and half cook till they are soft. Place under direct sun and sun dry for 1,2 days or check if they are crispy and fully dry or keep again for another day. Then blend into a coarse textured powder.

**VARIATIONS OF MOMORDICA CYMBALARIA SOUP :**

Athalakkai powder and nendran peel powder have high nutritive value and enormous health benefits, the prepared products were made into 3 variations.

- MCSM 1 – Athalakkai powder and nendran peel powder incorporated in the ratio of 7:3
- MCSM 2 –Athalakkai powder and nendran peel powder incorporated in the ratio of 5:5
- MCSM 3 –Athalakkai powder and nendran peel powder incorporated in the ratio of 3:7

\*MCSM – Momordica Cymbalaria Soup Mix



Standardized procedure was followed for all formulated recipes.

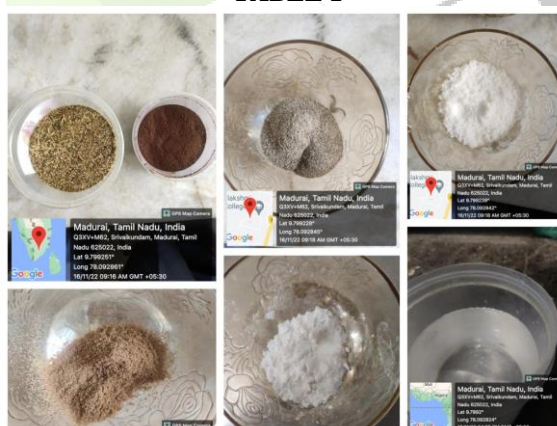
**DEVELOPMENT OF MOMORDICA CYMBALARIA SOUP MIX :**

The proportion of ingredients used to prepare momordica cymbalaria soup mix, and its variations are given in Table No. 1.

First of all the main ingredients such as Athalakkai, Nendran peel are dried under the sun for 2 to 3 days. Then blend it into a course textured powder for get a perfect consistency. In order to get a perfect taste we added some extra ingredients such as Black pepper powder, cumin powder, sugar free pills, salt. Corn flour also added to get perfect consistency of soup mix. The pack of 100g needs 250ml of water, 7g of athalakkai powder in MCSM1, 5g in MCSM2, 3g in MCSM3 , 3g of nendran peel powder in MCSM1, 5g in MCSM2, 7g in MCSM3, 5g of corn flour, 10g of black pepper powder, 5g of cumin powder, 1g of sugar free pills and 5g of salt were added and get boiled to get perfect consistency of soup mix with pleasant aroma. Ingredients are shown in Plate 1

S.no	Ingredients	Quantity(g)			
		Control	MCSM 1	MCSM 2	MCSM 3
1.	Athalakkai powder	-	7g	5g	5g
2.	Nendran peel powder	10g	3g	5g	7g
3.	Corn flour	5g	5g	5g	5g
4.	Black pepper powder	10g	10g	10g	10g
5.	Cumin powder	5g	5g	5g	5g
6.	Sugar free	0.20g	1g	1g	1g
7.	Salt	5g	5g	5g	5g

**TABLE 1**



**PLATE 1**

**ORGANOLEPTIC OR SENSORY EVALUATION: -**

Institute of Food Technologies (IFT) defines sensory evaluation as, “The Scientific discipline used to evoke measure, analysis and interpret those reaction to characteristics of food and materials as perceived through the senses of light, smell , taste, touch and hearing (*Murana and Siva Lingam, 2005*)

The sensory evaluation was conducted to analyze the acceptability of the developed products. The developed momordica cymbalaria soup mix was assessed by 15 panel members.

The developed food product along with its 3 variations was evaluated by the panel members using score card with 5 Points Hedonic scale rating by mentioning the product variations as Sample A, Sample B, Sample C and Sample D.

**Overall mean score of the sensory evaluation is depicted in Table 2**

S.NO.	Sensory attributes	Colour	Flavour	Texture	Taste	Appearance	Overall meanscore
1.	MCSM 1	4.2	4.5	4.1	4.5	4.1	4.1
2.	MCSM 2	4.5	4.5	4.2	5	5	5
3.	MCSM 3	4.5	4.3	4.2	4.5	4.5	4.5

**TABLE 2**

**\*MCSM – Momordica Cymbalaria Soup Mix**

Among the developed products, the overall mean score in MCSM 2 was highly acceptable. The result revealed that MCSM 2 secured highest score and the sensory attributes this sample got more preference than other developed products

**NUTRIENT ANALYSIS :**

- Nutritional quality can be assessed by chemical or instrumental analysis for specific nutrients (*Norman et al.,2005*)
- Nutrient analysis refers to the process of determining the nutrient content of food and food products
- The formulated momordica cymbalaria soup mix with 5% of Athalakkai powder, 5% of nendran peel powder were subjected to nutrient analysis of Energy, carbohydrates, protein, Fat, Crude fiber, Moisture, Total ash & acids insoluble ash.
- Results of nutrient analysis is depicted in Table 3

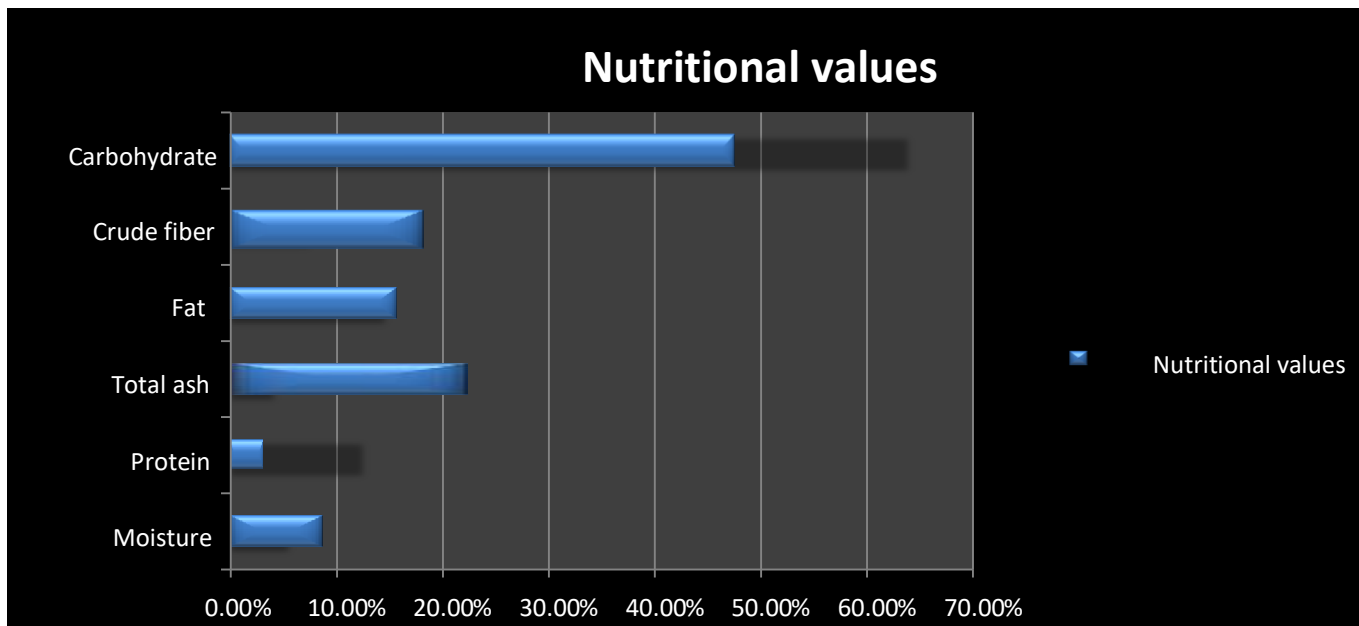
S.No	Nutrients	Values
1.	Moisture	9.8 %
2.	Protein	0.67 %
3.	Total ash	23.0 %
4.	Fat	15.7 %
5.	Crude fiber	19.37 %
6.	Energy	335.62 kcal/100g
7.	Carbohydrate	47.7 %

**TABLE 3**

**SHELF LIFE ANALYSIS :**

The standardized Momordica Cymbalaria soup mix are subjected to shelf-life study by placing it in room temperature from the day of development till the physical and chemical composition of product changes.

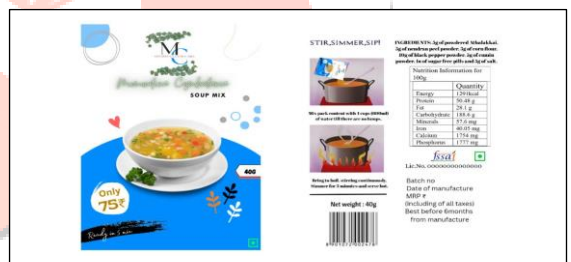
Properly stored , a package of soup mix will generally stay at best quality for about 3-4 months.



**PACKAGING AND LABELLING**

Most of the soup mix are packaged in flexible pouches that contain aluminium foil as the barrier layer. Aluminium foil is an essential component of laminates and is widely used in food packaging. It generally performs better than any plastic laminate material in terms of its ability to barrier function in opposition to the migration of the moisture, oxygen and other gases, volatile aroma, as well as against the effect of light.

A label for product identification must be present on the product. Every packaging could have a statement detailing the name and location of the manufacturer. So I design a label for my goods in accordance with the FSSAI regulations. This is a sample label that I made for my product.



**RESULTS AND DISCUSSION**

**SENSORY EVALUATION**

Among the developed product, the overall mean score in MCSM 2 was highly acceptable. The results have revealed that MCSM 2 secured highest score and the sensory attributes which was more or is equal to other developed products. The overall mean score for MCSM 1, MCSM 2, MCSM 3 in shown in figure 2.

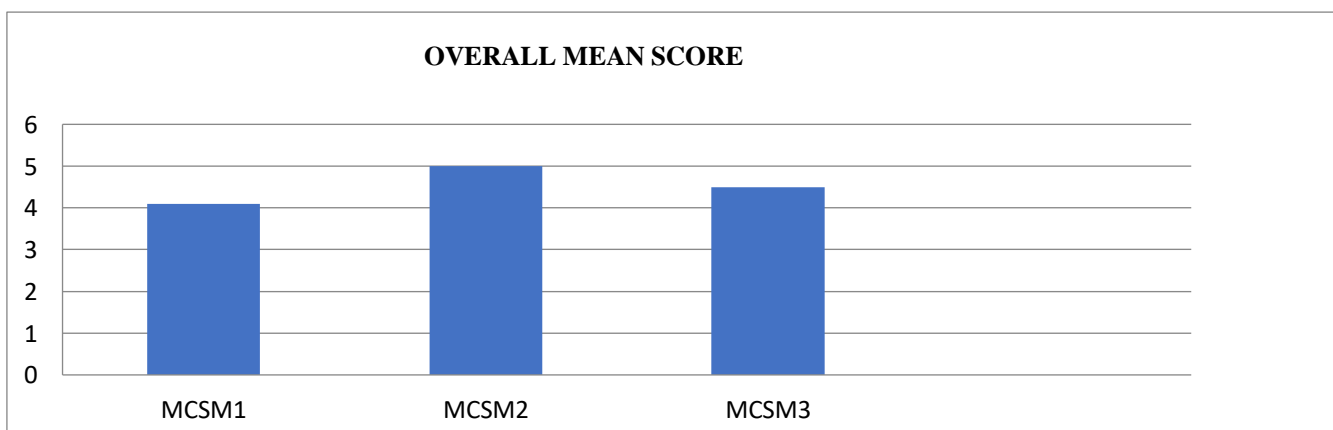


Figure 2

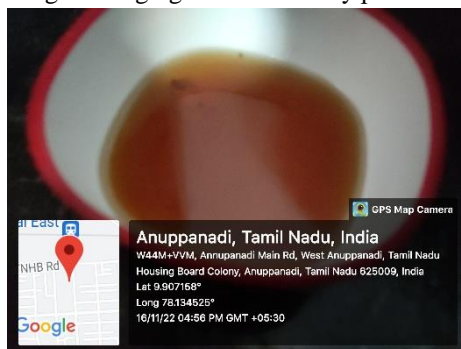
**RECOMMENDATIONS :**

This product helps to produce insulin and booting purpose by which diabetes can be controlled and also prevents breast cancer in women's , so this soup mix can be recommended to diabetic people and adult women's.

**SUMMARY AND CONCLUSION:**

Three different variations of products with different proportions of Athalakkai powder and nendran peel powder were prepared. The sensory outcome relived that among the developed products the overall mean score in MCSM-2 was highly acceptable.

Nutrient analysis result showed the developed product is rich in Dietary fibre, Pottasium, Calcium and Vitamin C. All age group people can consume it but this product helps to produce insulin and booting purpose by which diabetes can be controlled and also prevents breast cancer in women's , so this soup mix can be recommended to diabetic people and adult women's. Shelf life of product is BEST BEFORE 4 Months from packing. Packaging material for my product "Aluminum silver pouches" can be used.

**MCSM 2****REFERENCE :**

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