Formulation And Standardization of Pearl Millet Mullu Murungai Incorporated Cookies

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Abstract*—This study was conducted to add additional nutrients content to the wheat noodles by incorporating the powders of Coleus amboinicus (Oma valli leaves), Mentha (mint leaves) and Erythrina Indica (Kalyana murungai leaves). Oma valli leaves is used in curing cough, cold, stomach problems, indigestion etc. Kalyana murungai leaves is useful for treating cough, cold and is very good for women as it treats many ailments that women regularly face. People use to crush these leaves and eat in the normal mouth or boiled these leaves in the water and from cold, cough or fever. But not everyone like to have this. So, we have incorporated these flavours in noodles. This noodle is prepared with the composition of 55% wheat flour, 15% omavalli powder, 15% mint powder and 15% kalyana murugai powder. Mosquito immature third instar larval, *Anopheles stephensi,* and *Culex quinquefasciatus* have been exposed to different concentrations of 50-250 μg/ml. Totally, larvae were death rate 98.2% (significant value 0.001^{b}) from methanol extract and it is significant toxicity against larvae of *An. stephensi* and *Cx. quinquefasciatus* with LC_{50}/LC_{99} values were 157.69/339.55 μg/ml and 137.67/297.33 μg/ml, respectively. FT-IR analysis in the functional groups such as alcohol, amines, amides, alkenes, 1^{*} amines, aromatic amines, aliphatic amines, $1^{*},2^{*}$ amines, and alkyl halides searched the identity of secondary metabolites, which may act as 12-Octadecenoic acid, methyl ester compound and clearly indicates being phytochemical. Chemical constituents of twenty-five compounds were identified in the methanol extract.

***Index Terms*—Pearl millet, Mullu murungai cookies strong medicinal properties. Analysis Mullu murungai. Sensory Evaluation.**

I. INTRODUCTION

Mullu Murungai is a traditional plant found in the rural regions of South India, especially in Tamil Nadu. It is a wild variety of the commonly known Murungai(drumstick tree), but is easily distinguished by its thorny branches—hence the name "Mullu" which means thorn in Tamil. The botanical name of this plant is Moringa con canensis or Moringa tubulosa. Mullu Murungai is well-known for its strong medicinal properties and is used in traditional Ayurvedic and Siddha medicine to treat various ailments such as inflammation, indigestion, and infections. The leaves, flowers, and pods of this plant are edible and rich in nutrients like vitamin A, vitamin C, calcium, and iron. In Tamil cuisine, it is often used in dishes like poriyal, sambar, and rasam. Besides its health benefits, Mullu Murungai is also valued for its ability to grow in dry and tough soil conditions, making it an important plant in drought-prone areas. Its thorny nature also makes it useful as a natural fence in farmlands. Pearl millet (botanical name: Pennisetum glaucum) is one of the oldest and most widely grown types of millet in the world. Known as "Kambu" in Tamil and "Bajra" in Hindi, it is a hardy, drought-resistant grain mainly cultivated in arid and semi-arid regions of Africa and India. Pearl millet is highly valued for its nutritional content, being rich in iron, fiber, protein, and essential minerals, making it a healthy alternative to rice and wheat. In Indian cuisine, it is commonly used to make traditional dishes such as kambu koozh (fermented porridge), rotis, and dosas. Apart from its health benefits, pearl millet is also important for sustainable agriculture, as it improves oil health and requires fewer resources to cultivate.

II. MATERIALS AND METHODS

2.1. Raw Materials

Ingredients: Pearl millet flour, Mullu murungai powder, Sugar powder, Vegetable fat, Dry papaya. Optimisation: Different concentrations of Mullu

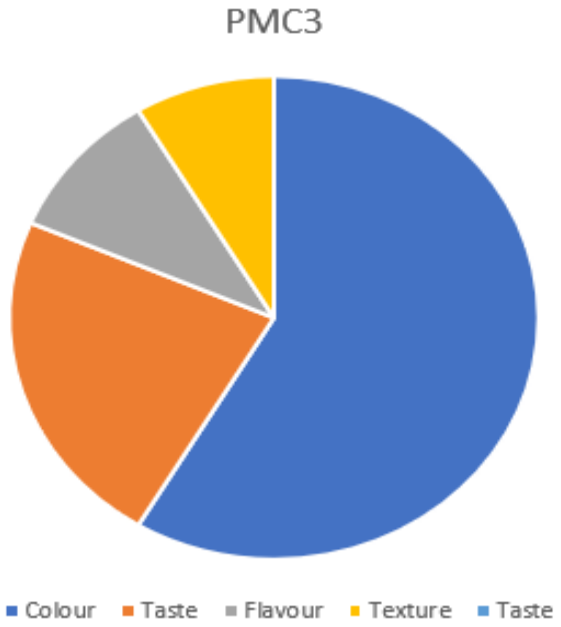
murungai powder (5%, 10%, 15%) tested for taste and texture.

2.2. Standardisation and Formulation

Three formulations were developed:

- PMC1: 5% Mullu murungai powder
- PMC2: 10% Mullu murungai powder
- PMC2: 15% Mullu murungai powder

Sensory evaluation of the Sample C



2.3. Sensory Evaluation

The samples were assessed on appearance, colour, flavour, texture, taste, and overall acceptability by a semi-trained panel of ten people using a five-point hedonic scale (1 = Dislike very much, 5 = Like very much).

2.4. Nutrient Analysis

Using standard AOAC (2010) procedures the development and evaluation of were subjected to nutrient analysis namely Energy, Protein, Fat, Fibre, Carbohydrate, Calcium, Phosphorous, Iron, Carotene, Thiamine Riboflavin, Niacin, Folic acid, Vitamin C, Vitamin A, Zinc, Megnesium, Selenium, Chlorine, Moisture using NIN value of Indian foods.

Nutritional value for Palak beet mixture per 100g:

Nutrients	Nutritive value
Energy (kcal)	317.58
Carbohydrates (g)	55.77
Protein (g)	10.59
Fat (g)	8.98
Fiber (g)	1.97
Calcium (mg)	198.58
Phosphorous (mg)	112.03
Iron (mg)	3.98
Vitamin C (mg)	18.43
Carotene(mg)	119.15
Riboflavin(mg)	0.28
Folic acid free(mg)	11.11
Folic acid total(mg)	25.56
Niacin (mg)	0.96
Moisture(g)	88.5
Minerals(g)	1.68
Zinc	10.875
Selenium	0.4
Megnesium	0.725
Vitamin A(mg)	0.0125
Thiamine(mg)	0.17

2.5. Cost Analysis

The cost analysis of PMC incorporated Cookies were analysed by taking into account the fixed and variable cost include during the course of processing and production. The cost of the developed PMC incorporated Cookies is Rs.85. Already existing Product of Rs110. per 100g. The cost of ingredients and packaging was used to determine the production cost per 100 g.

III. RESULTS

Acceptability of Mullu murungai incorporated cookies and its variation

The sensory evaluation revealed that standardized Mullu murungai incorporated cookies showed higher overall acceptability compared to variations. Scores for colour, flavour, taste, texture, and appearance were significantly satisfactory. Moderate incorporation levels were most preferred, as higher levels slightly affected taste and texture, while still remaining within acceptable sensory limits. Increased incorporation slightly reduced taste and texture scores, yet all variations remained within acceptable sensory limits

among panel members, reflecting good overall consumer preference during the acceptability trial conducted.

IV. DISCUSSION

Sample PMC 3 showed the highest acceptability score (5.0), indicating optimum Mullu murungai incorporation. Vitamin C content increased to 15 mg, improving nutritional quality. Use of pearl millet high in nutritional content for rich in iron. The product remained acceptable during storage and was economical (₹110/100 g). Hence, Mullu murungai, pearl millet is a healthy and acceptable for foods.

V. CONCLUSION

Mullu Murungai, a lesser-known variant of the drumstick plant, holds immense value in traditional medicine and rural nutrition. Its leaves, pods, and roots are rich in nutrients and have been used for generations to treat various ailments such as inflammation, joint pain, and digestive disorders. The plant's resilience in dry climates also makes it an ideal crop for sustainable agriculture in arid regions. Despite its thorny nature, its health benefits outweigh the inconvenience of handling it. Mullu Murungai has the potential to gain wider recognition and use in both culinary and medicinal contexts.

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