

## Development and Evaluation of Salubrious Soup Mix Incorporated with Ridge Gourd Peel Powder

P. Nanjundeswari<sup>1</sup> and S. Parameshwari<sup>2\*</sup>

<sup>1</sup>Department of Nutrition and Dietetics, Periyar University, Salem-11, Tamil Nadu, India.

### ABSTRACT

A surplus amount of waste is engendered along with the entire gamut of food production industries in the form of skin or peel, which can be utilized for human consumption after suitable processing. Ridge gourd peel is an edible bio waste which is not used due to high dietary fiber content and a rough texture. The peel is healthy and contains good amount of fiber, vitamins, antioxidant and minerals. Copious types of processed food products are available in the markets, but the majority of consumers prefer instant products only. Based on this inclination, an attempt has been made to develop ridge gourd peel powder incorporated soup mix. The different variations of soup mix were prepared by using ridge gourd peel powder, spice powder and thickening agents. The sensory evaluations were done in all variations of the prepared soup mixes, and nutritional analysis and antioxidant property for the accepted variation of the final soup mix were ascertained. The drying temperature for the preparation of ridge gourd peel has been calculated through proximate analysis. It was observed that the ridge gourd peel powder incorporated instant soup mix was rich in fiber, vitamin C, calcium, potassium and iron and significantly reduced in carbohydrate, protein, fat and sodium content compared to control soup mix. The cost calculation for 100g of developed (Ridge gourd peel powder added) soup mix was 35.24 rupees. It was evident that the prepared soup mix was more economical and affordable when compared with commercial soup mixes available in the market.

**KEY WORDS:** SENSORY EVALUATION, SOUP MIX, VALUE ADDED, VEGETABLE PEEL POWDER.

### INTRODUCTION

The Ridge Gourd is a popular vegetable in the Asian, African and the Arabic countries. The vegetable is popular in India, China and Vietnam. In Tamil Nadu, the ridge gourd is called Peerkangai. In Kerala, it is called Peechinga. Ridge gourd (*Luffa acutangula* L. Roxb), belongs to the genus *Luffa*, family Cucurbitaceae. It is popularly called as an angled gourd, angled loofah. *Luffa* is also known as Patola (Filipinos), angled or ribbed *Luffa*, silk gourd,

dishcloth gourd, silk squash, and Chinese okra, Sin qua, etc. (Jaysingrao and Sunil 2012). Ridge gourd acts as an appetizer, and contains a good amount of fiber, vitamins. Ridge gourd has a sweet taste, cooling in nature and easy to digest. They form a low-calorie diet, hence considered good for diabetes. Both the soft pulp and skin of ridge gourd are used in making various recipes, especially chutneys in South Indian cuisine. (Manikandaselvi et al., 2016). Ridge gourd peel has high nutrients value and is often called a nutrition powerhouse because of its affluent and varied nutrient contents. It is also rich in vitamin C, flavonoids, calcium, potassium, sodium and essential amino acids. The peel contains glycerides of palmitic, stearic and myristic acids (Kandoliya et al., 2016, Vassilios et al., 2019).

Ridge gourd peel powders, as well as their various solvent fractions, were evaluated for anti-oxigenic activity using different methods. Ridge gourd peel powders at 2% level and their ethanol/water-soluble extracts exhibited intense

### ARTICLE INFORMATION

\*Corresponding Author: [sparameshwari2009@gmail.com](mailto:sparameshwari2009@gmail.com)  
Received 10th July 2020 Accepted after revision 18th Sep 2020  
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal



NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)  
A Society of Science and Nature Publication,  
Bhopal India 2020. All rights reserved  
Online Contents Available at: <http://www.bbrc.in/>  
DOI: <http://dx.doi.org/10.21786/bbrc/13.3/72>

anti-oxygenic activity in stored at 37°C. Ridge gourd peel powders, as well as their extracts, were evaluated for their anti-oxygenic activity using linoleic acid peroxidation,  $\beta$ -carotene-linoleic acid bleaching methods. Ethanol/water extracts from ridge gourd peel showed highest anti-oxygenic activity followed by water extracts, while the petroleum ether extract showed moderate anti-oxygenic activity. The phenolic compounds may contribute directly to the antioxidant action; therefore, it is necessary to investigate total phenolic content (Swetha and Muthukumar 2016). Ridge gourd peel powder and its extracts showed slightly higher anti-oxygenic activity than ridge gourd pulp powder and its extracts. It may be attributed to the presence of higher amounts of phenolics and flavonoids, which have been reported as potential antioxidants (Vyas et al., 2015). The objective of this study aimed to reduce the wastage and extend the usage of ridge gourd peel by developing a nutritious value-added soup mix.

## MATERIAL AND METHODS

The ingredients required for the preparation of ridge gourd peel powder incorporated soup mix viz. fresh ridge gourd (*Luffa acutangula*), and ingredients for the development of spice powders and thickening agents were procured from the local supermarket, Krishnagiri, Tamil Nadu, India. The ridge gourds were washed thoroughly to take away of debris present on the surface of the skin and peel the skin and cut into medium-sized strips. The peels were shadow dried for 3 to 4 days. The dried peels were then powdered, sieved and packed in laminated aluminium foil pouches. Other Spice mix ingredients were dehydrated at 60°C, tomato dried at 80°C and dried and powdered thickening agents were packed in aluminium foil pouches. Three different variations of soup mixes were prepared by using ridge gourd peel powder, spice mix and thickening agents. Ridge gourd

peel powder soup mixes were replicated three times. The developed soup mixes were subjected to sensory analysis and accepted variation of soup mix was then analyzed nutritional composition and antioxidant activity.

## RESULTS AND DISCUSSION

**Development of the ridge gourd peel powder incorporated soup mixes:** The soup mix blended with ridge gourd peel powder in different variations viz. V1, V2 and V3 and other spice mix and thickening agents also measured in different quantity and added in variations separately. The composition of ingredients used for developing soup mixes of different variations are shown in Table – 1.

**Sensory evaluation of the ridge gourd peel powder incorporated soup mixes:** Sensory evaluation was done for all the formulated ridge gourd peel powder incorporated soup mixes. By using these soup mixes, different variations of soups were prepared, and sensory evaluation was done in all the developed variations of prepared soups by semi- trained panel members using 9 points hedonic rating scale.

The results of the above table revealed that the mean score obtained for colour of V1 and V2 were found to be maximum ( $8.15 \pm 0.14$  and  $6.12 \pm 0.22$ ) than control and V3. Mean score of texture was high ( $7.22 \pm 0.54$ ) in V1 compared to control and other variations. The results revealed that the mean score obtained for the flavour of V1 was found to be superior ( $8.37 \pm 0.22$ ) compared to control and other variations. Variation I had the maximum mean scores for taste ( $7.22 \pm 0.47$ ) compared to control and other variations. The overall acceptability was highly acknowledged in Variation I ( $6.13 \pm 0.81$ ) and variation II ( $6.41 \pm 0.53$ ). Based on the overall result, Variation 1 was highly accepted and selected for further analysis.

Table 1. Composition of ingredients for ridge gourd peel powder incorporated soup mix

Ingredients (gm)	Variation -1(g)	Variation-2 (g)	Variation-3(g)
Ridge gourd peel powder	18	25	31
Spice mix:			
Onion powder	5	6	7
Garlic powder	5	6	7
Tomato powder	5	6	7
Mint powder	5	6	7
Coriander powder	8	8	7
Cumin powder	10	10	7
Green chilli powder	5	6	7
Table salt	2	2	2
Spice mix	45	50	52
Thickening agent:			
Corn flour	18	12	7
Green gram flour	19	13	10
Thickening agent	37	25	17

Table 2. Statistical Analysis of Sensory Evaluation of the Developed Soup Mixes

Sensory attributes	Control	Variation I	Variation II	Variation III
Appearance	3.13 ± 0.64 <sup>a</sup>	6.13 ± 0.72 <sup>a</sup>	6.22 ± 0.51 <sup>ab</sup>	5.12 ± 0.71 <sup>cd</sup>
Color	3.21 ± 0.64 <sup>ac</sup>	8.15 ± 0.14 <sup>cd</sup>	6.12 ± 0.22 <sup>a</sup>	4.13 ± 0.34 <sup>bc</sup>
Texture	3.25 ± 0.46 <sup>ab</sup>	7.22 ± 0.54 <sup>bc</sup>	6.11 ± 0.71 <sup>a</sup>	3.13 ± 0.68 <sup>a</sup>
Flavour	3.42 ± 0.53 <sup>a</sup>	8.37 ± 0.22 <sup>cd</sup>	4.56 ± 0.27 <sup>cd</sup>	4.84 ± 0.89 <sup>bc</sup>
Taste	3.13 ± 0.64 <sup>a</sup>	7.22 ± 0.47 <sup>bc</sup>	5.22 ± 0.64 <sup>c</sup>	5.43 ± 0.51 <sup>cd</sup>
Overall Acceptability	3.38 ± 0.52 <sup>bc</sup>	6.13 ± 0.81 <sup>a</sup>	6.41 ± 0.53 <sup>ab</sup>	5.55 ± 0.22 <sup>cd</sup>

Values are mean ± SD of triplicate determination. Samples with different superscripts within the same column were significantly (p≤0.05) different.

Results on Duncan Multiple Range test showed that there was a significant difference (p- value 0.05) between control and the different variations of soup on colour, texture, flavour, mouthfeel, taste, and overall acceptability. Consumers are the judges of a product's fate and welfare in the market as their preference is of vital significance. Therefore, specific sensory properties of a product, along with its composition, may comprise a key for its uniqueness and support (Vassilios et al., 2019). Nutritional composition of accepted variation

of the ridge gourd peel powder incorporated soup mix: After sensory evaluation, the panel members agreed and gave good remarks about the 18g ridge gourd peel powder incorporated (variation-1) soup mix. Based on the sensory evaluation of the developed soup mixes, 18% of ridge gourd peel powder included soup mix (Variation 1) was more acceptable. Hence the further analyses were done for variation 1 soup mixes. Nutritional compositions of accepted variation of the soup mix are shown in table 3.

Table 3. Nutritional Composition of Accepted Variation of the Soup Mix

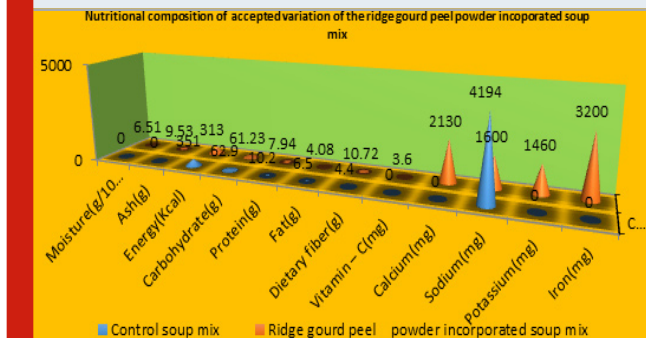
S. No	Nutrients	Control soup mix	Ridge gourd peel powder incorporated soup mix (variation-1)	Deficient or excess
1	Moisture(g/100g)	-	6.51	+6.51
2	Ash(g)	-	9.53	+9.53
3	Energy (Kcal)	351	313	-38
4	Carbohydrate(g)	62.9	61.23	-1.67
5	Protein(g)	10.2	7.94	-2.26
6	Fat(g)	6.5	4.08	-2.42
7	Dietary fiber(g)	4.4	10.72	+6.32
8	Vitamin - C(mg)	-	3.6	+3.6
9	Calcium(mg)	-	2130	+2130
10	Sodium(mg)	4194	1600	-2594
11	Potassium(mg)	-	1460	+1460
12	Iron(mg)	-	3200	+3200
13	Flavonoids	-	++	++

The moisture content of the ridge gourd peel powder incorporated soup mix was 6.51g/100g, and the ash content was 9.53g, and control soup mix had no moisture and ash content. Compared to the control soup mix, the energy and carbohydrate content were reduced in the accepted variation of the developed soup mix. There is a slight change in the protein, fat content between the ridge gourd peel powders incorporated soup mix and control soup mix. The dietary fiber content of the ridge gourd peel powder incorporated soup mix was 10.72g/100g which is higher than the control, as ridge gourd peel contains high fiber content which will aid digestion.

The vitamin C content of the ridge gourd peel powder soup mix was 3.6 mg/100g, but no vitamin C found in control soup mix. Calcium in developed soup mix was 2130 mg, but control soup mix had no calcium. The presence of high calcium content helps to improve bone health. The potassium content of the ridge gourd peel powder incorporated soup mix was 1460 mg/100g, but no potassium was present in control soup mix. The high potassium content helps to reduce Hypertension. The Iron content of the ridge gourd peel powder incorporated soup mix was 3200 mg/100g but in control soup mix had no Iron content. Iron in soup mix helps

to improve hemoglobin level in blood. Flavonoids are qualitatively present in the developed ridge gourd peel powder incorporated soup mix which helps to enhance antioxidant activity.

Figure 1: Nutritional Composition of Accepted Variation of the Ridge Gourd Peel Powder Incorporated Soup Mix.



**Cost calculation of accepted variation of the developed soup mix:** The cost calculation for the production of 100g of the developed soup mix was Rs.35.24 by incorporating ridge gourd peel powder, spice mixes and thickening agents. It was evident that the prepared soup mix was more economical and affordable when compared with commercial soup mixes available in the market.

## CONCLUSION

Ridge gourd is one of the nutritious vegetables gifted by nature to human beings. Ridge gourd peel is usually considered as the waste or byproduct of ridge gourd. Still, they are rich sources of nutrients, especially dietary fiber, vitamin-c, calcium, potassium, iron and flavonoids. This study concluded that the development of soup mix from ridge gourd peel powder is a stupendous value-added liquid food. The nutrients profile of the soup mix was also appealing from the health point of view. Ridge gourd peel consumption provides several health benefits, and it acts as a natural protector against diseases. The developed ridge gourd peel powder added soup mix is a novel one that holds good commercialization potential.

## ACKNOWLEDGEMENTS

The authors are highly thankful to the Department of Nutrition and Dietetics, Periyar University, Salem and Nutri Science Research Laboratory Pvt. Ltd., (NABL Accredited Laboratory), Salem for provided necessary facilities and support to carry out this research work.

**Conflict of Interests:** The authors declare that they have no conflict of interest.

## REFERENCES

- Jaysingrao, J.S., and Sunil, C.N., (2012). Fatty acid profile of fruits of *Luffa acutangula* Amarac.b. Clarke, Global, J Res Med plant Ind med, Volume 1, Issue 8, Pages 323-327.
- Kandoliya, U.K., Marviya, G.V., Bodar, N.P., Bhadja, N.V., and Golakiya, B.A., (2016). Nutritional and Antioxidant Components of Ridge Gourd (*Luffa acutangula* L. Rox b) Fruits of Promising Genotypes and Varieties, Scholars Journal of Agriculture and Veterinary Sciences, Volume 3, Issue 5, Pages 397-401.
- Manikandaselvi, Vadivel, P, and Brindha, (2016), Review on *Luffa acutangula* L.: Ethnobotany, Phytochemistry, Nutritional Value and Pharmacological Properties, International Journal of current Pharmaceutical Review and research, Volume 7, Issue 3, Pages 151-155.
- Swetha, M.P., and Muthukumar, S.P., (2016), Characterization of nutrients, amino acids, polyphenols and antioxidant activity of Ridge gourd (*Luffa acutangula*) peel, Journal of Food Science and Technology, Volume 53, Issue 7, Pages 3122-3128.
- Vassilios, Raikos, Viren, and Ranavana (2019), Challenges, Recent development and future prospects: Springer international publishing, Ed (1), Pages 12-318.
- Vyas, V.G., Kandoliya, U.K., Vidhani, S.I., Parmar, H.J., Bhalani, V.M., and Golakiya, B.A., (2015) Heavy metal deposition and Phytochemical characterization of Curry leaves (*Murraya koenigii*), Int. J. Curr. Microbiol. App. Sci. 4(10), 839-843.