Development and Evaluation of Instant Ridge Gourd Peel Soup Mix

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Abstract —**A plethora amount of waste is engendered along the entire spectrum of food production in form of peel and other inedible sources, which can be utilized for edible purpose after suitable processing. Even though many processed products are available, the punters prefers dehydrated products. In view of this preference an attempt has been made to develop an instant soup mix from ridge gourd peel to trim down the difficulty in the preparation of soup. 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 antioxidant and minerals. The drying temperature for the preparation of ridge gourd peel has been optimized through proximate analysis. Ridge gourd peel powder and other ingredients should be added in, to get the finest soup mix of desired health benefits without compromising on taste and odour. The soup samples were concocted with 3 different variation by differing the quantities of key ingredients. The sensory analysis of soup was done and the finest was optimized. The physiochemical and proximate analysis for the final soup mix was ascertained. Preparation of this soup mix is so easy that it can be characterized as convenient salubrious soup mix.**

Keywords - Ridge gourd, peel, drying, physiochemical, proximate analysis.

I. INTRODUCTION

The recession and pressure of today's modern life has changed the consumer eating behavior and the world experience a food habit transitions in terms of food preparation and consumption of nutrient deficient food [1]. Consumption of these low nutritive foods eventually directs to dietary deficiency and related ailment. To overcome this issue and in order to provide convenience to the consumer various ready to cook and ready to eat food are available in the country. One among the ready to cook (RTC) food is instant dry soup mix whichplay a vital role in nutrition of the people as they fulfill the present and future social punters requirement [2]. Instant soup are comfort food and delicious with chock full of nutrient dense vegetables which meet out the adequacy of energy and nutrient required by the body [3]. Among all dehydrated products instant mixes gained popularity in the recent years among the folks, by way of providing convenience, hygienic, extensible shelf life and portable. The other benefits are protection from enzymatic and oxidative spoilage and flavor stability at room temperature over long periods of time (6–12 months) [4], [5], [6].

A popular vegetable of Asia and few African countries, ridge gourd scientifically known as *Luffa acutangula* L. Roxb is a annual climber belongs to cucurbitaceae family. It is dark green in colour and has a tapering end [7]. It was notably used in Indian traditional system of medicine and the whole plant is used for the treatment of ulcers and sores [8]. Both the soft pulp and skin of ridge gourd are used in making a number of recipes, especially in South Indian cuisine. It is loaded with many phytochemicals and acts as an appetizer. The peels of ridge gourd is a rich source of dietary fiber, minerals. An amino acid analysis of ridge gourd peel revealed the highest content of Carnosine followed by aspartic acid and aminoadipic acid [9]. Due to fibrous and tough texture the use of peel is limited. The objective of present research work aimed to curtail wastage and extend usage of peel by formulating a salubrious value added product from ridge gourd peel. The proximate and sensory quality of ridge gourd soup mix was evaluated to provide the country people a regular wholesome diet.

II. MATERIALS AND METHOD

A. Collection of sample

The fresh ridge gourd, tomato, onion, garlic, green chilli, coriander, mint leaves were procured from koyambedu market, Chennai and other thickening agents(coconut milk powder, green gram flour,corn flour) and spices and herbs (Italian herbs, dill, cumin seeds) were obtained from local supermarket in kancheepuram.

B. Standardization of Ridge Gourd Peel Incorporated Soup Mix

The ridge gourd peel incorporated soup mix was standardized using three different variations of ridge gourd peel powder and randomly coded as S1E (15g), S2E (5g), and S3E (10g). The soup mix was assessed for other

ingredients and quantity are standardized to ensure consistency in the quality and quantity of product. Soup powder was replicated three times. Each time the yield and acceptability of the product were noted for bringing about any change

C. Formulations of Instant Ridge Gourd Peel Soup Mix

1) *Drying of ridge gourd peel*: The peel were washed under running water thrice to remove any dirt and debris present on surface of skin and are cut into medium sized strips using stainless steel knife. The peels are dried in cabinet drier at 60ºC for 9- 11 hrs. The dried peels was then cooled in dessicator and powdered in a food processor, sieved and packed in laminated aluminium foil pouches.
2) *Drying of Other Ingredients:* Onion, garlic, mint, coriander, green chilli, green gram were dehydrated at 60°C and tomato dried at 80°C at different interval of time for each ingredient, powdered separately and packed in aluminium foil pouches.
3) *Preparation of Dried Soup Mix:* The other composition in the soup mix namely spice mix (onion powder, garlic powder, tomato powder, mint powder, coriander powder, cumin seed powder, dill, Italian herbs, green chilli powder, black salt and table salt), thickening agent (corn flour, green gram powder, coconut milk powder) were mixed in different combination and proportion as given in table I. To study the effect of ridge gourd peel powder in soup mix three different concentration of ridge gourd peel powder was used along other dried adjuncts to develop a instant soup mix and are subjected to sensory evaluation.

D. Organoleptic Evaluation

The resultant soup samples were organoleptically evaluated by mixing the soup samples of 15g with 300ml of water and heated for 7-10 minutes for its sensory characteristics in terms of appearance, aroma, texture/mouth feel, taste and over all acceptability using 9 point hedonic scale from least to most preferred.For each sample panelists graded their likings. The scores represented the following: 1-dislike extremely,2-dislike very much, 3-dislike moderately, 4- dislike slightly, 5-neither like nor dislike, 6-like slightly, 7-like moderately, 8-like very much and 9-like extremely. Then to have a composite and stable value of each characteristic, all values of 25 panelist are averaged and reported in TableII.

E. Quality Evaluation of Developed Ridge Gourd Peel Soup Mix

Quality parameters with respect to physical, chemical and nutritional characteristics of the product were ascertained.

1) *Physiochemical Characteristics of Instant Soup Mix:*Moisture content, water activity, bulk density, tapped density, hausner ratio, Carr's index, pH of the finest ridge gourd peel soup mix based on sensory analysis were determined using standard methods. The moisture content and water activity assess the stability of the soup mix in terms of microbial growth. The tapped and untapped volume influence the flowability of powder. From the tapped volume and untapped volume the hausner ratio and Carr's index are evaluated. The pH value decipher whether soup mix is acidic or alkaline.
2) *Nutrient Composition:* The proximate analysis of the final products namely carbohydrate, fat, protein, dietary fiber, vitamin and minerals were determined according to standard procedures [10]. The carbohydrate was determined by difference method.
3) *Calories Analysis of Ridge Gourd Peel Instant Soup Mix :* For calculating total calories of instant ridge gourd peel soup mix standard James formula [11] is used, which is given below in equation 1.

$$\text{Total calories} = \text{total carbohydrates} \times 4 + \text{total fat} \times 9 + \text{total protein} \times 4 \quad \text{— Equation 1}$$

III. RESULT AND DISCUSSION

A. Formulation of Ridge Gourd Peel Soup Mix

The instant ridge gourd peel soup mix is a blend of spice mix, thickening agent and ridge gourd peel powder at different proportion as shown inTable I and are randomly coded as S1E, S2E, and S3E. Since vegetable peels lacks protein and fat to recompense it green gram flour and coconut milk powder are added as thickening agent to enrich the nutritive power of soup mix. To bring about Indo Italian style in soup mix Italian herbs and Indian spices are added that endows richness for the mix.

TABLE I

Formulation of Instant Ridge gourd Peel Soup Mix

Ingredient	S1E (%)	S2E (%)	S3E (%)
Spice mix	38	48	40
Thickening agent	30	35	32
Peel powder	32	17	28

B. Sensory Quality of Instant Ridge Gourd Peel Soup Mix

The developed product was evaluated for the sensory attributes like appearance, flavor, taste, mouth feel and overall acceptability by the selected Panel members. It is clear from Table II that the formulated product S2E gained a higher score compared to the other two mixtures. The sample S1E and S3E contained higher amount of peel powder which affected the taste of the product. Hence S2E was picked out as the finest soup mix with the overall acceptability mean score. Hence, S2E was analyzed for further nutritional and storage studies.

TABLE II
Sensory Evaluation of Formulated Soup Mix

Atrributes	S1E	S2E	S3E
Appearance	6.96±1.43	7.16±1.39	6.24±1.41
Aroma	7.16±0.8	7.4±0.86	6.84±1.02
Taste	7±1.05	7.56±0.89	6.88±1.11
Texture/mouth feel	6.92±1.15	7.52±1.00	6.72±0.93
Overall acceptability	6.96±1.05	7.72±0.84	6.44±0.82

C. Quality Evaluation of Instant Soup Mix (ISM)

The physiochemical characteristics assessed for instant soup mix were moisture content, bulk density, tapped density, water activity, pH. It is clear fromTable III that the moisture content and water activity was found to be low which inhibit the growth of microbes and eventually meliorate the quality of the product. From the pH value it was found that the soup mix will be slightly acidic. Since the hausner ratio lies in the range of 1.19-1.25 and the Carr's index in the range of 16-20 the soup mix has a fair powder flow property.

TABLE III

Physiochemical Characteristic of Instant Soup Mix

Physiochemical characteristic	Values
Moisture content(%)	9.7±0.1
Bulk density(g/ml)	0.441±0.02
Tapped density(g/ml)	0.526 ±0.02
Hausner ratio	1.19±0.03
Carr's index	16.16±0.03
Water activity(a_w)	0.513 ±0.01
Ph	5.16 ± 0.02

D. Chemical/Nutrient Composition

Among the three formulation, the coded sample S2E was taken for nutrient analysis namely carbohydrate, protein, fat, crude fiber, vitamin A, vitamin C, various mineraland total calories. T.Devi *et al* developed and

evaluated a ridge gourd peel incorporated pasta [12] in comparison to pasta, the ridge gourd peel soup is a amalgamation of all vital nutrient and minerals which makes it a balanced soup mix and the nutrient content were higher compared to pasta developed from ridge gourd peel. The proximate composition of the ridge gourd peel soup mix are tabulated in Table IV.

TABLE IV

Proximate Composition of Finest Instant Ridge gourd Peel Soup Mix

Component	Amount present in 100g
Carbohydrate (g)	45.95
Total fat (g)	6.97
Protein (g)	11.72
Crudefibre (g)	8.72
Ash content	17.67
Vitamin A (IU)	123
Vitamin C (mg)	1.86
Calcium (mg)	307
Iron (mg)	10
Magnesium (mg)	345
Phosphorous (mg)	764
Potassium (mg)	254
Energy (Kcal)	293.41

E. Author Profile

Shanthini.N, a denizen of a beautiful seatown of Tamilnadu, India and a high minded damsel of 20th century. Graduated basically as a Pharmaceutical technocrat from Anna university (BIT –Campus), Trichy. As I progressed through my graduation I had line of thought outside the pillbox about the famous quote of Hippocrates which fathomed me that dietic measures can be the safest and most powerful form of medicine. After completing a demanding degree I feel entitled to learn more about a discipline that I am passionate about. To master in food processing and engineering sector I kick start my post-graduation in food science and nutrition biotechnology at SRM Institute of Science and Technology. Development of new products which make the country people to meet out theirnutritional requirement in this modern world was major interest of mine, the interest ultimately lead to development of salubrious soup mix for the wellbeing of mankind.

S.Sasikala born in Coimbatore, India. Graduated bachelor and master degree from Tamil Nadu Agricultural University, Coimbatore, India, 2006. In 2006 I joined as lecturer in Kongu engineering college where I received the award for “Best faculty” in the department. After few years of experience in 2012 joined as Assistant professor in Department of Food Process Engineering, SRM Institute of science and technology, Kancheepuram, TamilNadu, India. I have publication 26 articles in reputed journals.

Dr. K.A. Athmaselvi, is an Associate Professor and Head, Department of Food Process Engineering, at SRM University, I have 17 years of teaching and research experience. I have published several papers in National and International Journal. I have completed 2 funded project. I have visited University of Nottingham, in Erasmus Mobility Scheme.

IV. CONCLUSION

This study concludes that the development of instant soup mix from ridge gourd peel is an exceptional value added product and is also seen to have acceptability with respect to all parameters like appearance, aroma, taste and texture. The nutrient profile of the product was also appealing from health point of view. The ridge gourd peel can be further explored for its other culinary and functional applications. The soup mix being a novel one holds good commercialization potential.

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