Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(3): 3281-3286
Received: 22-03-2019
Accepted: 24-04-2019

Karishma S Kamble
Department of Technology, Shivaji University, Kolhapur, Maharashtra, India

GV Mote
Department of Technology, Shivaji University, Kolhapur, Maharashtra, India

Dr. AK Sahoo
Department of Technology, Shivaji University, Kolhapur, Maharashtra, India

Correspondence
Karishma S Kamble
Department of Technology, Shivaji University, Kolhapur, Maharashtra, India

Process development of instant *Moringa* pod soup powder supplemented with herbs

Karishma S Kamble, GV Mote and Dr. AK Sahoo

Abstract
Considering the increasing demand to instant soup powder and nutritional, therapeutic value against many diseases of moringa pod and ashwagandha the present study was undertaken. In present work optimization of the levels of ingredients, process development and physicochemical analysis for processed product was carried out. Moringa pods powder, germinated horse gram and ashwagandha root powder were procured in tray dryer followed by pulverization and sieving. Prepared product was compared with the control sample and physical analysis was done. It reports that prepared product is rich source of protein, crude fiber, phenolic compounds and flavonoids. Mineral analysis of prepared product reports that Calcium, iron, potassium and zinc were 34mg/L,148.7mg/L,104mg/L and 13.39mg/L respectively. Consumers as a whole liked the product 'moderately' to 'very much' with an average score of 8.0 for all the sensory attributes.

Keywords: Therapeutic, Moringa pod, ashwagandha, horse gram, blanching, tray drying

Introduction
Convenience is a multifaceted concept and often listed as the most important factors that determine the food of choice apart from the cost, health, and sensory acceptability and related concerns [9, 12, 14, and 15]. Convenience also decides to a greater extent when, where, what and how to eat foods [2]. As a consequence, the demand of ready to eat or ready to cook minimally processed products has noticeably increased during the recent years. Instant soup mix is a type of mix that is developed to prepare soup with less time and less cooking preparations. Many soup powders are available in the market but are lacking in nutrition's. Dried soup powders have an advantage of protection from enzymatic and oxidative spoilage and flavor stability at room temperature over long periods of time (6–12 months). In addition, they are ready for reconstitution in a short time for working families, hotels, hospitals, restaurants, and institutional use as well as to military rations. Moreover, they exert light weight for shipping and availability at all time of the year [4]. A balanced nutrition is obtained by including whole cereals, vegetables and pulses in soup formulations [11].
The pods (fruits) of the *Moringa oleifera* tree are one of the most nutritive, rich in proteins and amino acids necessary for health and proper physical function and are high in calcium and potassium and useful due to a plethora of vitamins and micronutrients, well known for promoting good health and helping to alleviate a host of ailments. Moringa pods contain complex chemical compounds with antibiotic and antioxidant properties that can boost the body's own natural immune system. Ashwagandha possesses therapeutic value against a large number of ailments such as mental diseases, asthma, inflammation, arthritis, rheumatism, tuberculosis, infections, fever, male sexual disorders and a variety of other diseases including cancer. Horse gram is an underutilized pulse crop grown in wide range of adverse climatic conditions. It occupies an important place in human nutrition and has rich source of protein, minerals, and vitamins. Underutilized pulse, traditionally used for treating various disorders like kidney stones, diabetes and joint pain. Ashwagandha possesses therapeutic value against a large number of ailments such as mental diseases, asthma, inflammation, arthritis, rheumatism, tuberculosis, infections, fever, male sexual disorders and a variety of other diseases including cancer. Cinnamon cassia (*Cinnamomum aromaticum*) is effective in improving blood glucose control in patients with type 2 diabetes. Many soup mixes are available in the market but are lacking in nutrition's. Therefore the present work was undertaken to prepare instant soup mix with nutritional value. Black pepper is commonly referred as "The King of Spices". It is valued for its flavor, aroma, nutritional and medicinal uses making it an important commodity. Coriander is generally used in gastrointestinal complaints such as anorexia, dyspepsia, flatulence, diarrhea, griping pain and vomiting [8]. Corn flour has various applications in food

industry such as in bakery products, in snacks, soups, ready to eat food etc as a thickening agent.
As the instant soup powders available in the market lack in most of nutritional components, present work is planned for the development of instant moringa pod soup powder supplemented with herbs to avail the nutritional and health benefits

Materials and Methods

Materials

Moringa pods of sidhivinayak variety were procured from the local market of Kolhapur city. Ashwagandha roots were procured from local dealer of Ayurvedic herbs and medicines. Horse grams were procured from super market of Kolhapur city. Corn flour, cinnamon powder, black pepper powder, coriander powder and salt were procured from local market.

Methodology

Preparation of moringa pod powder

For the preparation of moringa pod powder fresh moringa pods of sidhivinayak variety were washed under running tap water followed by cutting into small pieces and blanching it for 10 min. Blanched pods were spread into tray dryer for 2hr at 76°C [3]. Then these dried pods were ground into home grinder and sieved properly. Prepared powder was stored into air tight container for further use.

Preparation of germinated horse gram powder:

Horse grams were soaked into water for 10 hrs and germinated for 36 hrs. After germination, all the grains were dehulled and ground into powder [6].

Preparation of ashwagandha root powder

Procured ashwagandha roots were dried into tray drier at 76 °C for 1hr followed with grinding and sieving properly. Prepared powder was stored into air tight container for further use

Preparation of spice powder

Spices used for soup powder were cinnamon, coriander, and black pepper. These spices were grinded into grinder to make spice mix for soup powder.

Preparation of instant soup powder

Instant soup powder was prepared as per the method for the preparation of instant soup powder from sprouted horse gram and radish leaves with slight modification (fig.1) [13]. Prepared powders of moringa pods, ashwagandha roots and germinated horse gram powder were mixed as per the formulation. To spice up this mix spice powder was added. Corn flour was added as a thickening agent and salt for taste. This mix was blended properly and allowed to cool. Prepared instant soup powder was packed into aluminum foil and LDPE. These packets were stored at room temperature.

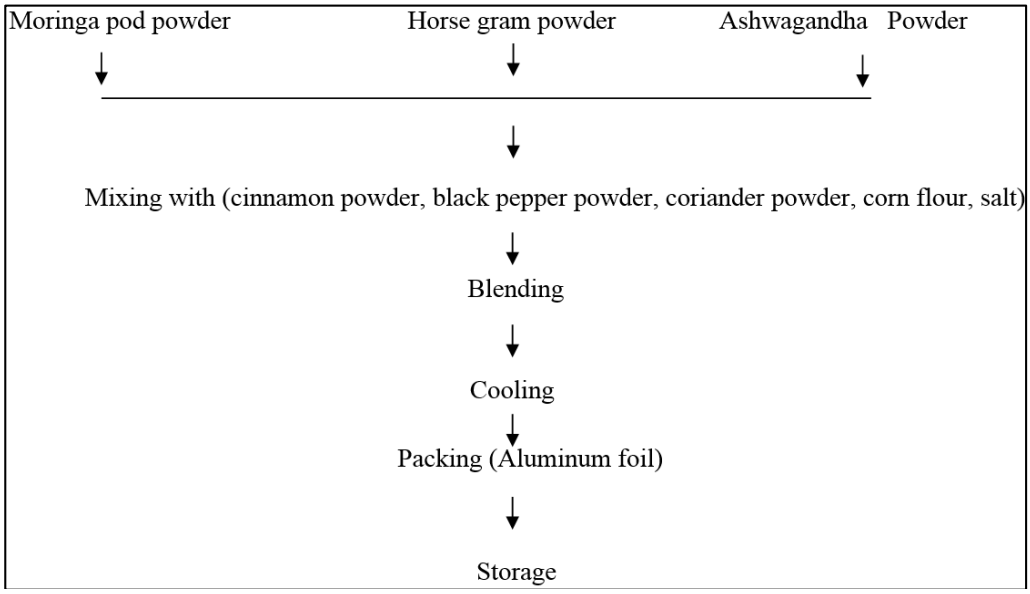

Fig 1: Preparation of instant moringa pod soup powder

Optimization of ingredients

Optimization of control sample

The optimization of control sample was carried out by making 10 g of powder and adding it into 95 ml of water. 5% water loss was considered during preparation of soup and total 100 ml of soup was prepared during each treatment. Control soup powder was prepared with varying proportion of corn flour, adding salt and spice mixture (i.e. cinnamon powder, black pepper powder and coriander powder). To prepare the control sample three treatments were taken. Treatments include1) T1 g of corn flour, 2 g of salt, 2 g of spice mix and 95 g of water 2) T_2-8g of corn flour, 2 g of salt, 2 g of spice mix and 93 g of water 3) T_3- 10 g of corn flour, 2 g of salt, 2 g of spice mix and 91 g of water (5% water loss is considered and total composition was made to 100g). Best sample was selected based on sensory evaluation.

Table 1: Optimization of control sample

Ingredients (g)	Treatments		
	T_1	T_2	T_3
Corn flour	6	8	10
Salt	2	2	2
Black pepper powder	0 .75	0.75	0.75
Coriander powder	0.75	0.75	0.75
Cinnamon powder	0.5	0.5	0.5
Water (g)	95	93	91

Optimization of moringa pod powder level for the preparation of instant soup powder

After preparation of control sample, optimization of moringa pod powder level for the preparation of instant soup powder was carried out. For this six treatment combinations were prepared and compared with control sample. Corn flour and

moringa pod powder level was varied during each treatment and total volume was made of 100 g. Six treatment combinations were as follows: 1) T_1-9 g of corn flour, 1 g of moringa pod powder,2 g of spice mix, 93 g of water 2) T_2-8 g of corn flour, 2 g of moringa pod powder,2 g of spice mix, 93 g of water 3) T_3- 7 g of corn flour, 3 g of moringa pod powder, 2 g of spice mix, 93 g of water 4) T_4-6 g of corn flour, 4 g of moringa pod powder, 2 g of spice mix, 93 g of water 5) T_5-5 g of corn flour, 5 g of moringa pod powder, 2 g of spice mix, 93 g of water 6) T_6-4 g of corn flour,6 g of moringa pod powder, 2 g of spice mix, 93 g of water. Based on sensory evaluation best sample was selected

Table 2: Optimization of moringa pod powder level

Ingredients(g)	Treatments						
	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Corn flour	10	9	8	7	6	5	4
Moringa pod powder	--	1	2	3	4	5	6
Spice mixture	2	2	2	2	2	2	2
Water (g)	93	93	93	93	93	93	93

Optimization of germinated horse gram powder for instant soup powder

Treatments were carried out with horse gram powder and germinated horse gram powder by varying proportion of both. Four different treatment combinations were prepared and compared with the control sample. The treatment combinations were as follows: 1) T_1-3 g of corn flour, 5 g of moringa pod powder and 2 gm of horse gram powder,2 g of spice mixture, 2 g of salt and 91 g of water 2) T_2-3 g of corn flour, 5 g of moringa pod powder and 2 gm of germinated horse gram powder,2 g of spice mixture, 2 g of salt and 91 g of water 3) T_3-1 g of corn flour, 6 g of moringa pod powder and 3 gm of horse gram powder,2 g of spice mixture, 2 g of salt and 91 g of water 4) T_3-1 g of corn flour,6 g of moringa pod powder and 3 gm of horse gram powder,2 g of spice mixture, 2 g of salt and 91 g of water. Best sample was selected based on sensory evaluation. Germination treatment reduces the ant nutritional factor and bitterness out of the product. Even though germination increases the processing cost it adds up the taste to the product.

Table 3: Optimization of germinated horse gram powder level

Treatments	Ingredients(g)					
	Corn flour	Moringa pod powder: Horse gram powder	Moringa pod powder: Germinated horse gram powder	Spice mixture	Salt	Water
T_0	10	--	--	2	2	91
T_1	3	5:2	--	2	2	91
T_2	3	--	5:2	2	2	91
T_3	1	6:3	--	2	2	91
T_4	1	--	6:3	2	2	91

Optimization of ashwagandha root powder for instant soup powder

Optimization of ashwagandha root powder was carried out by preparing two treatment combinations and comparing it with control sample. Two levels of ashwagandha root powders were selected for optimization as per the RDA value of ashwagandha i.e. 0.5g and 1g.The treatment combinations were as follows: 1) T_1-3 g of corn flour, 5 g of moringa pod powder 2 g of germinated horse gram powder, 0.5 g of ashwagandha root powder, 2 g of spice mix, 2 g of salt and 91 g of water. 1) T_2-2.5 g of corn flour, 5 g of moringa pod powder 2 g of germinated horse gram powder, 1 g of ashwagandha root powder, 2 g of spice mix, 2 g of salt and 91 g of water. Best sample was selected based on sensory evaluation.

Table 4: Optimization of ashwagandha root powder level

Ingredients (g)	Treatments		
	T_0	T_1	T_2
Corn flour	10	3	2.5
Moring pod powder: Germinated horse gram powder	--	5:2	5:2
Ashwagandha root powder	--	0.5	1.0
Spice mixture	2	2	2
Salt	2	2	2
Water	91	90.5	90.5

Formulation of instant soup powder

Formulation of instant soup powder was carried out by using the optimized level of moringa pod powder, germinated horse gram powder, ashwagandha root powder. Corn flour, spice mixture (i.e. cinnamon powder, black pepper powder and coriander powder) and salt. Total powder of 15 g was prepared from the optimized ingredients.

Table 5: Formulation of instant soup powder

Ingredients	Quantity(g)
Moringa pod powder	5
Germinated horse gram powder	2
Ashwagandha root powder	1
Corn flour	2.5
Spice mixture	2
Salt	2.5
Total	15

Physico-chemical analysis

Physico-chemical properties of raw material

Moringa pod powder**,** germinated horse gram powder and ashwagandha root powder.

Physical analysis

The analytical equipments included measuring cylinder, centrifuge, pH was estimated by using Oroion 3 star pH bench top pH meter according to the mentioned standard procedure Viscosity of prepared soup from instant soup powder was measured as method suggested by [1] with certain modification

by using Brookfield LVDVII + pro viscometer at 800 ºC with the help of spindle no: 2: RPM 100.

Chemical analysis

The product was analyzed for moisture, ash, protein, fat, crude fiber and carbohydrate as per the procedures given by (AOAC, 2000). HPLC analysis of methanolic extract of prepared soup powder was carried out for phenolic compounds and flavonoids [10]. Mineral contents such as calcium, iron zinc and potassium were analyzed by method described by [5].

Sensory evaluation

Sensory evaluation of instant soup mix samples were carried out by a semi-trained panel of judges from the staff of the department of technology, shivaji university, Kolhapur, by using 9- point Hedonic scale as described by [7]. For colour and appearance, taste, flavor, consistency and overall acceptability. Samples were served in coded number bowls. Water was given between two samples to cleanse the mouth.

Result and Discussion

Table 6: Sensory attributes for optimization of control sample

Sample code	Color and appearance	Taste	Flavor	consistency	Overall acceptability
T_1	6.5±0.07	6.4±0.04	6.4±0.04	6.2±0.04	6.3±0.02
T_2	7.3±0.04	7.3±0.07	7.3±0.03	7.1±0.04	7.1±0.02
T_3	7.8±0.04	8.2±0.02	8.4±0.04	7.9±0.04	7.9±0.02
CD (P<0.05)	0.19	0.17	0.13	0.17	0.08

Data are expressed as mean ± standard error of five replications (n=5)

Among treatment T_1, T_2 and T_3 treatment T3 has received maximum score in terms of all the sensory attributes. Sample T_3 contains 10 g of corn flour, 2 g of salt and 2 g of supplementary material (i.e. Cinnamon powder, black pepper powder and coriander powder).Based on sensory evaluation sample T_3 was selected as control sample for further studies.

Table 7: Sensory Evaluation for optimization of moringa pod powder for instant moringa pod soup powder

Sample code	Color and appearance	Taste	Flavor	Consistency	Overall acceptability
T_0	7.3±0.02	7.6±0.03	7.8±0.03	7.8±0.03	7.6±0.02
T_1	7.4±0.04	7.5±0.04	7.6±0.04	7.6±0.04	7.4±0.04
T_2	7.2±0.03	7.4±0.04	7.7±0.03	7.6±0.04	7.4±0.02
T_3	7.3±0.02	7.6±0.03	7.8±0.03	7.6±0.03	7.5±0.02
T_4	7.4±0.02	7.4±0.03	7.6±0.04	7.6±0.04	7.5±0.03
T_5	7.8±0.03	7.9±0.03	8.1±0.02	8.1±0.02	8.0±0.02
T_6	7.2±0.03	7.4±0.04	7.4±0.03	7.6±0.04	7.3±0.02
CD (P<0.05)	0.12	0.12	0.13	0.14	0.10

Data are expressed as mean ± standard error of five replications (n=5)

Sample containing 5 g of moringa pod powder and 5 g of corn flour has received maximum score for sensory evaluation (Table 7) this optimized level of moringa pod powder was used for further preparation of instant soup powder.

Table 8: Sensory Evaluation of instant soup powder by varying proportion of germinated horse gram powder

Sample code	Color and appearance	Taste	Flavor	Consistency	Overall acceptability
T_0	7.8±0.04	7.8±0.04	7.7±0.04	7.7±0.04	7.7±0.04
T_1	7.7±0.02	7.7±0.03	7.7±0.04	7.7±0.04	7.6±0.01
T_2	8.1±0.06	8.2±0.03	8.0±0.04	8.1±0.04	8.1±0.01
T_3	7.9±0.04	7.9±0.04	7.9±0.04	7.9±0.04	7.9±0.04
T_4	7.7±0.04	7.7±0.04	7.7±0.04	7.7±0.03	7.7±0.04
CD (P<0.05)	0.12	0.13	0.15	0.14	0.12

Data are expressed as mean ± standard error of five replications (n=5)

Sample T_2 has received the maximum score in terms of all the sensory attributes that contains 2 g of germinated horse gram powder and 5 gm of moringa pod powder. Samples with germinated horse gram have received maximum score than samples without germinations.

Table 9: Sensory Evaluation of instant soup powder by varying proportion of ashwagandha root powder

Sample code	Color and appearance	Taste	Flavor	Consistency	Overall acceptability
T_0	7.8±0.04	7.8±0.04	7.7±0.04	7.7±0.04	7.7±0.04
T_1	7.7±0.02	7.7±0.03	7.7±0.04	7.7±0.04	7.6±0.01
T_2	8.1±0.06	8.2±0.03	8.0±0.047	8.1±0.04	8.1±0.017
CD (P<0.05)	0.12	0.13	0.15	0.14	0.12

Data are expressed as mean ± standard error of five replications (n=5)

Based on sensory evaluation, sample T2 has received the maximum score (table 3.7) that contains 1 g of ashwagandha root powder, 5 g of moringa pod powder, 2 g of germinated horse gram powder, 2.5 g of corn flour. Spice mixture and salt was added.

Table 10: Physico-chemical properties of raw material

Parameter (%)	Moringa pod powder	Ashwagandha root powder	Germinated horse gram powder
Moisture	10.46±0.04	6.90±0.02	10.56±0.04
Ash	6.20±0.03	4.74±0.02	3.30±0.04
Protein	10.12±0.06	3.50±0.02	19.60±0.04
Fat	0.15±0.05	0.25±0.02	1.20±0.03
Crude fiber	7.05±0.05	32.15±0.03	5.7±0.03
Vit.C(mg/100gm)	301.2±0.02	05.60±0.01	9.30±0.02
Carbohydrates	72.5±0.02	52.75±0.01	59±0.01
pH	6.8±0.07	5.11±0.02	6.5±0.04

Data are expressed as mean ± standard error of five replications (n=5)

Table10. Gives the summary of the analysis of the three dried powder samples such as moringa pod powder, ashwagandha powder and germinated horse gram powder. The percentages of crude protein in moringa pod powder, ashwagandha powder, germinated horse gram powder and of values is 10.12%, 3.5% and 19.6 respectively. The protein content in germinated horse gram powder is higher than moringa pod powder and ashwagandha powder The presence of ascorbic acid in moringa pod powder, ashwagandha powder and germinated horse gram powder is indicated in above table 7.The moringa pod powder contains high amount of ascorbic acid as compare to ashwagandha powder and germinated horse gram powder as shown in above table 7.Ashwagandha powder and germinated horse gram powder contained less amount of vitamin C. As a result moringa pod powder is used as rich source of ascorbic acid content and protein after germinated horse gram powder

Table 11: Physical properties of control soup powder and instant soup powder

Sr. No	Parameters	Control instant soup powder	Instant soup powder
1	Appearance	whitish color	Partially Green color
2	Bulk density (g/ml)	0.82	0.82
3	Water absorption capacity(ml)	Min 80	Min 85
4	pH	6.3	6.5
5	Viscosity (cPs)	85	115
6	Angle of repose (˚)	57	55

Physical properties of control soup powder and instant soup powder are mentioned in above table.11 that reports about appearance, bulk density, water absorption capacity, pH, viscosity and angle of repose of both the control soup powder and instant soup powder. Table value shows that appearance of both varies in color and instant soup powder possess more water absorption capacity than control sample. Bulk density for both the samples was same. pH of samples is nearby same whereas viscosity for instant soup powder was higher than control sample. Angle of repose of control sample was quite higher than instant soup powder.

Table 12: Physicochemical properties of instant soup powder

Parameters	Composition
Moisture (%)	10.81±0.04
Crude fat (%)	1.2±0.07
Protein (%)	1.2±0.05
Crude fiber (%)	45±0.04
Ash (%)	9.18±0.05
Carbohydrate (%)	32.61±0.05
Calcium (mg/L)	34
Zinc (mg/L)	13.39
Iron (mg/L)	148.7
Potassium (mg/L)	104

Table 13: Total phenolic content and flavonoids content of prepared instant soup powder

Components (GAE mg/g)	Composition
Phenolic compounds	76.83
Flavonoids	529.805

Data presented in table 12 and 13 shows that the prepared instant soup mix has moisture content around 10.81% and it contains crude fibers around 45%, which indicated that the prepared product is rich source of crude fiber. Protein, ash and fat content of the product is around 1.2%, 9.18% and 1.2%. Mineral analysis of prepared instant moringa pod soup powder reveals that it is rich source of iron and potassium as moringa is rich source of protein. Iron content of product is 148.7mg/L and potassium is of 104 mg/L. The result in above table 3.9 expresses that the product has fair amount of calcium and zinc i.e. 34mg/L and 13.39 mg/L respectively. Prepared product has high amount of phenolic compounds and flavonoids i.e 76.83 and 529.805 GAE mg/g).

Conclusion

The present study on process development of instant moringa pod soup powder supplemented with herbs reports that product is prepared easily with the optimized level of ingredients and received good sensory attributes. Developed instant soup powder is considered as a rich source of protein, crude fiber based on physicochemical properties. HPLC

analysis for the developed instant soup powder shows that prepared product contains high level of phenolic compounds and flavonoids. As a result the developed instant moringa pod soup powder is used as rich source of nutrients and phytochemicals. Defeat for the Problem of malnutrition with the prepared product by means of low cost available instant soup powder is possible.

Reference

1. Bacon R, Vernet J, Borisiva E, Bouché N, Brinchmann J, Carollo M *et al*. MUSE commissioning. The Messenger, 2014; 157:13-16.
2. Costa LDF, Rodrigues FA, Travieso G, Villas Boas PR. Characterization of complex networks: A survey of measurements. Advances in physics. 2007; 56(1):167-242.
3. Dipen Mukundhai Shaha. A novel process for preparation of vegetable powder from drumstick, 2016. https://patents.google.com/patent/WO2016009441A1/en,
4. El Wakeel MA. Ultra structure and functional properties of some dry mixes of food (Doctoral dissertation, M. Sc. Thesis, Faculty of Agriculture, Ain Shams University, Cairo), 2007.
5. Gopalan C, Ramasastry BV, Balasubramanium SC. Nutritive value of Indian foods. (Revised and updated) National Institute of Nutrition, Hyderabad, 1999, 156.
6. Handa V, Kumar V, Panghal A, Suri S, Kaur J. Effect of soaking and germination on physicochemical and functional attributes of horsegram flour. Journal of food science and technology. 2017; 54(13):4229-4239.
7. Hue L, Rousseau GG. Fructose 2, 6-bisphosphate and the control of glycolysis by growth factors, tumor promoters and oncogenes. Advances in enzyme regulation. 1993; 33:97-110.
8. Jabeen Q, Bashir S, Lyoussi B, Gilani AH. Coriander fruit exhibits gut modulatory, Blood pressure lowering and diuretic activities. Journal of ethnopharmacology. 2009; 122(1):123-130.
9. Kremer JR, Mastronarde DN, McIntosh JR. Computer visualization of three dimensional image data using IMOD. Journal of structural biology. 1996; 116(1):71-76.
10. Othman A, Ismail A, Ghani NA, Adenan I. Antioxidant capacity and phenolic content of cocoa beans. Food chemistry. 2007; 100(4):1523-1530.
11. Pandey M, Abidi AB, Singh S, Singh R. Nutritional evaluation of leafy vegetable paratha. Journal of Human Ecology. 2006; 19(2):155-156.
12. Rappoport P, White EN. Was there a bubble in the 1929 stock market?. The Journal of Economic History. 1993; 53(3):549-574.
13. Mathangi Sudarshan S *et al.* Development and formulation of instant soup mix from sprouted horse gram and radish leaves, with international journal of homescience. 2017, 346-349
14. Scholderer J, Grunert KG. Consumers, food and convenience: The long way from resource constraints to actual consumption patterns. Journal of Economic Psychology. 2005; 26(1):105-128.
15. Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the food choice questionnaire. Appetite. 1995; 25(3):267-284.