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Optimisation and quality evaluation of legume based instant puran mix

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Abstract
In the present investigation attempts have been made to formulate Legume based Instant Puran Mix. The ingredients were selected on account of their nutritional and functional characteristics. The formulation of legume based Puran mix at 40g Bengal gram, 10g Green gram, 25g Sugar and 25g Jaggery accepted as best formulation. Sensory evaluation carried out by semi trained panel to find consumer acceptability for the product. Chemical and physiochemical analysis carried out to determine nutritional content of the prepared Puran mix. After analysis it has been found that the Puran mix has high protein content, high carbohydrate, low fat content and low Moisture content. Texture analysis of prepared reconstituted Puran balls carried out to determine the texture profile of the sample.

Keywords: instant, puran mix, analysis, nutritional, physiochemical

1. Introduction
Instant mixes are comes in the category of Convenience food. Due to the changing lifestyle and modernisation convenience food achieved important role in Food sector [1]. The main advantage of the Instant mixes is reduction in time and the easy methods of preparation. At present in the Indian market different instant mixes are available. It includes the traditional mixes such as instant kadhi mix, instant upma mix, instant sooji halwa mix, instant khichadi mix, instant soup mix, instant pulav mix and instant doosa mix [2]. Puran Poli is a signature traditional Maharashtrian sweet dish. Puran Poli is nothing but paratha that is stuffed with a mixture of jaggery and Bengal gram and is served with spicy curry, Milk or thick Mango juice. The inner stuffed material is known as the Puran [3].
Cereal grains are deficient in some amino acids such as lysine and certain other amino acids. Legumes on the other hand, are higher in proteins (18 to 24%) than cereal grains and can be used to support certain amino acids such as lysine, tryptophan [4]. Puran is legume based product having thick consistency, sweet taste and it is good source of protein, vitamins, minerals and calories that are essential in human health and nutrition. Puran contains more than 50% sugar so it provide large amount of energy and sweetness [5].
Bengal gram (*Cicer aritinum L.*) is also known as chickpea [6]. It is rich source of protein and used as supplementary food with cereals to increase the nutritional content. Bengal gram is a valuable anti-diabetic food as having the low glycaemic index. Consumption of Bengal gram helps in reducing protein malnutrition. Green gram (*Vigna radiata*) is called Mung bean [7]. Like other legumes it is a source of non-animal protein. It is a rich source of dietary fiber and other nutrients. Jaggery is concentrated juice of sugarcane and used as sweetener. The carbohydrate content of Jaggery is 98%. It is rich source of energy as it provides 38 calories per 10g. Sugar delivers a quick energy boost, as it is rapidly absorbed in the bloodstream. Sugar is 100% carbohydrate and contains no vitamins, minerals or fatty acids.
The spices like Cardamom (*Elettaria cardamomum*), Fennel seeds (*Foeniculum vulgare*) and Nutmeg (*Myristica fragrans*) are used for the seasoning and flavour purpose. Cardamom is a good source of minerals like potassium, calcium, and magnesium. It is most effective remedies for the proper digestion including heartburn, intestinal spasms, irritable bowel syndrome (IBS), diarrhea, constipation, liver and gallbladder complaints, and loss of appetite. [8]. Fennel seeds are use as medicinal values, has many health benefiting nutrients, essential compounds, antioxidants, dietary fiber, minerals, and vitamins. Nutmeg is a good source of minerals like copper, potassium, calcium, manganese, iron, zinc and magnesium. Also rich in vitamin those are essential for optimum health.
The main objective of this study was to develop and standardise the formulation of an instant Puran mix, and study of different analysis which includes Sensory, Physicochemical and Texture profile analysis for the acceptance of product.

2. Methodology
2.1 Raw materials
The required ingredients for the preparation of Puran i.e. Bengal gram, Green gram, Jaggery, Sugar, Cardamom, Nutmeg, and Fennel seeds were procured from the Sarda super market, Loni Kalbhor Pune. All chemicals used were of analytical reagent grade and procured from reputed companies and used as such.

2.2 Methods

2.2.1 Production of Instant Puran Mix

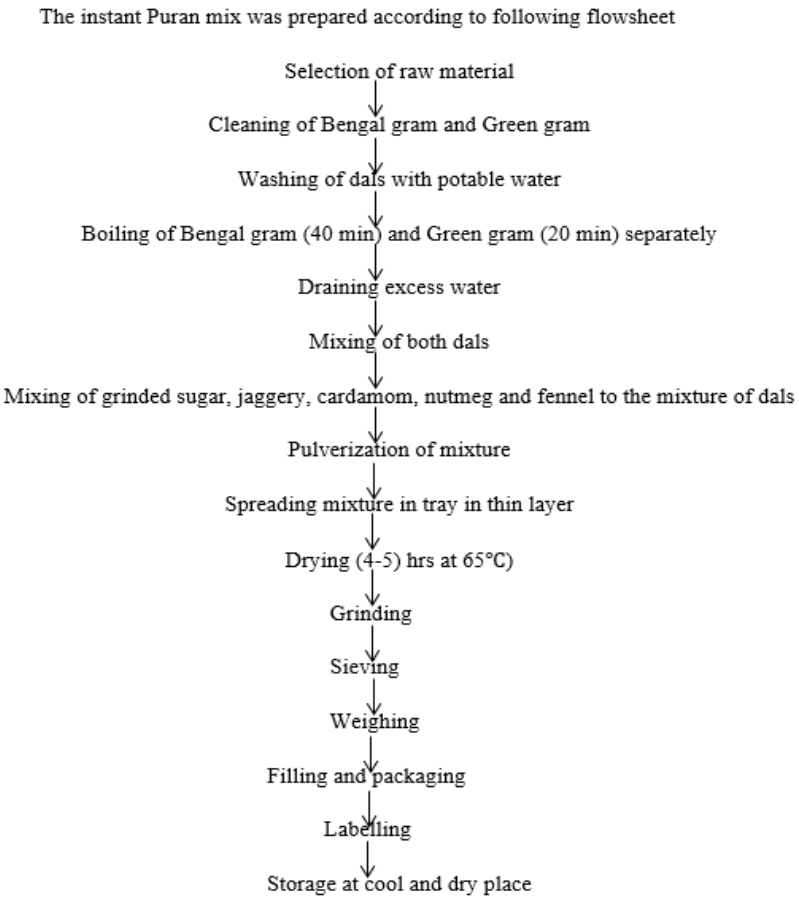

Fig 1: Process flow chart of Instant Puran Mix

The four combinations of instant Puran mixes were formulated by changing the ingredient composition with compare to the standard formulation and according to that products were prepared (Table No. 1).

Table 1: Formulations

Sr. No.	Ingredients	Combination 1 Quantity (g)	Combination 2 Quantity (g)	Combination 3 Quantity (g)	Combination 4 Quantity (g)
1	Bengal gram	50	30	40	40
2	Pigeon pea(Tur dal)	-	10	10	-
3	Green gram (Mung dal)	-	10	-	10
4	Sugar	25	25	25	25
5	Jaggery	25	25	25	25
6	Cardamom	3	3	3	3
7	Fennel	3	3	3	3
8	Nutmeg	3	3	3	3

The ingredients, bengal gram and green gram were cleaned to remove the foreign matter. After that the both dals were washed with using potable water to remove the dust and adhere matter. Boiling of bengal gram for 40 minutes and green gram for 20 minutes was carried out in different vessels on the medium flame of the gas. At the same time Cardamom, Nutmeg and Fennel seeds were mixed with sugar and grinded to fine powder using mixer and jiggery was crushed. After the boiling the excess water was removed. The boiled dals were mixed with powdered sugar and crushed Jaggery. The prepared mixture is then pulverised. The homogeneous mixture was spread about 0.5cm thickness in the tray. After that the spread mixture was dried at 65℃ for 4-5hrs in the cabinet drier. Completing the drying the dried mixture was grinded and sieved using 36 BSS mesh sieve. The prepared instant Puran Mix 300gm was filled in the HDPE zip lock pouch and stored at dry and room temperature condition.

2.2.2 Reconstitution of Instant Puran Mix

100g of Puran mix powder added into the lukewarm water in the ratio of 1: 0.5 (Puran mix: water). This ratio is obtained after the several trials. After addition of water the product is stirred for 5 min and then kneaded with hands until the final consistency obtained [9].

2.2.3 Analysis

2.2.3.1 Sensory Evaluation

The sensory evaluation of the prepared Puran of different variations with compare with standard is carried out by semi

trained panel members using nine point Hedonic scale (1–4 dislike extremely to slightly, 5 neither like nor dislike, and 6–9 like slightly to extremely) [10, 11].The average score are considered for the selection of final combination.

2.2.3.2 Physicochemical analysis

The main objective of chemical analysis is to determine the proximate constituents of food. These constituents include parameters such as energy, proteins, fats, carbohydrates, dietary fibers, calcium, ash and moisture content. The moisture content of the sample was determined by oven-dry method [12]. The ash, carbohydrate, crude fibre, protein and fat content of the Instant Puran mix sample was determined by the standard procedure as given in AOAC [13, 14, 15]. Analysis was conducted in Food Chemistry and Nutrition laboratory at MIT College of Food Technology, Pune.

2.2.3.3 Texture Profile Analysis

The texture analysis of prepared reconstituted Puran balls each of 25g weight measured using Digital Texture Analyser (TA–Hdi, Microsystem, UK) with load cell of 50 kg. The probe selected for the analysis was P/36 R with 36mm cylindrical radius. In the sequence menu pre-test speed (1mm/sec), Test speed (5mm/sec) and post-test speed (5mm/sec) are adjusted while doing the texture analysis.

3. Result and discussion

3.1 Sensory evaluation

The acceptability of the product was determined by the sensory evaluation. Sensory evaluation of Puran in respect of Colour, appearance, texture, taste, flavour and overall acceptability were carried out by semi trained panellists. The data obtained from the table no. 2 for the sensory score revealed that the combination of 80% Bengal gram and 20% Green gram Puran was more acceptable than other combinations. The Puran poli has old and fixed consumer preferences but the results shown in fig. 1 it was found that the bleand of Bengal gram and green gram has positive responses. The result showed that with the addition of the Green gram (Mung dal) there was improvement in the colour. As the amount of green gram is increasing the color is positively influenced. The obtained average results of sensory evaluation were presented by spider plot graphical representation (Fig. no. 1) [16].

Table 2: Sensory analysis of Puran Poli

Sample	Colour	Appearance	Texture	Taste	Flavour	Overall Acceptability
Combination 1	8.5±0.1	8.0±1.36	7.5±2.31	7.8±1.0	7.8±1.36	7.7±1.21
Combination 2	7.5±2.1	7.3±1.24	7.7±1.0	7.1±1.65	7.2±0.14	7.4±1.23
Combination 3	7.9±1.6	7.7±1.25	8.0±2.1	7.4±1.25	7.8±2.03	7.8±0.25
Combination 4	8.2±2.3	7.8±1.34	8.1±1.25	7.9±1.34	8.0±1.27	8.1±1.32

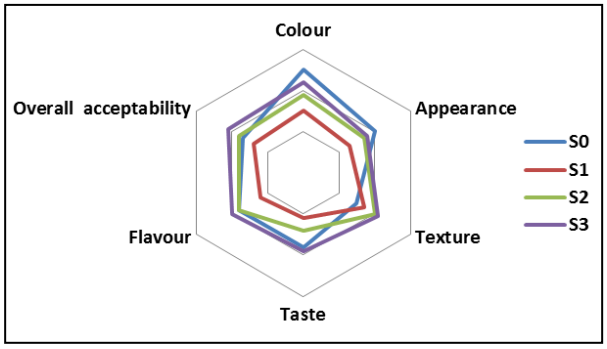

Fig 1: Graphical representation of average sensory score

3.2 Physiochemical analysis:

The chemical composition **(Table 3)** revealed that the Puran mix was rich in carbohydrate (56.43± 0.22g) and Protein (19.55± 0.12g). The calorific value (425.65 ± 0.29 Kcal per 100 g.) of Puran mix was calculated by formula method the conversion used was 4 kcal g^{-1} protein, 4 kcal g^{-1} carbohydrates, 9 kcal g^{-1} fat [17]. As the legumes are rich source of the fiber it was observed that the fiber content of the final product was (2.105± 0.07g). The obtained result showed that the Calcium and Iron content of the Puran mix was (75.24± 0.78mg) and (10.34± 0.28mg) respectively.

The physiochemical parameters of the Puran mix i.e. density, specific gravity, pH, Acidity and Water Absorption capacity were studied. According to the data obtained from (Table no. 4) it was found that density (0.625g/ml), specific gravity (0.680), pH(6.28), Acidity (300mg/lit) and Water Absorption capacity (473%) of Puran Mix respectively.

Table 3: Chemical analysis

Sr. No.	Parameters	Values/100g
1	Energy value (kcal)	367.77± 1.66
2	Moisture	3.14± 0.02
3	Carbohydrate	56.43± 0.22
4	Protein	19.55± 0.12
5	Fat	7.09± 0.14
6	Ash	2.87± 0.04
7	Fiber	2.105± 0.07
8	Ca (mg)	75.24± 0.78
9	Fe (mg)	10.34± 0.28

*Each value is average of three determinations

Table 4: Physiochemical analysis

Sr No.	Parameter	Values
1	Density	0.625g/ml
2	Specific gravity	0.680
3	pH	6.28
4	Acidity	300mg/lit
5	Water Absorption Capacity	473 %

3.3 Texture Profile Analysis

Textural characteristics of Puran mix ball such as hardness, Springiness, Cohesiveness, Gumminess and Chewiness were measured using Digital Texture Analyser. Each Puran ball was placed on the loading cells and compressed as per the standard procedures. The graph (Fig. no. 2) obtained showing the results are plotted as Force (g) verses Time (sec). The textural parameters: hardness (maximum height of the force peak on the first compression cycle), springiness (ratio of the time elapse between the end of first

Bite and the start of second bite), cohesiveness (ratio of the positive force areas under the first and second compressions), gumminess (product of hardness and cohesiveness) and chewiness (product of gumminess and springiness) were determined [18]. Texture score (Table no.5) was observed that the Hardness of the sample 1821.15± 276.887g, Springiness 0.147±0.007, Cohesiveness 0.209±0.007, Gumminess 381.192±65.085 and Chewiness 55.735± 8.138 respectively.

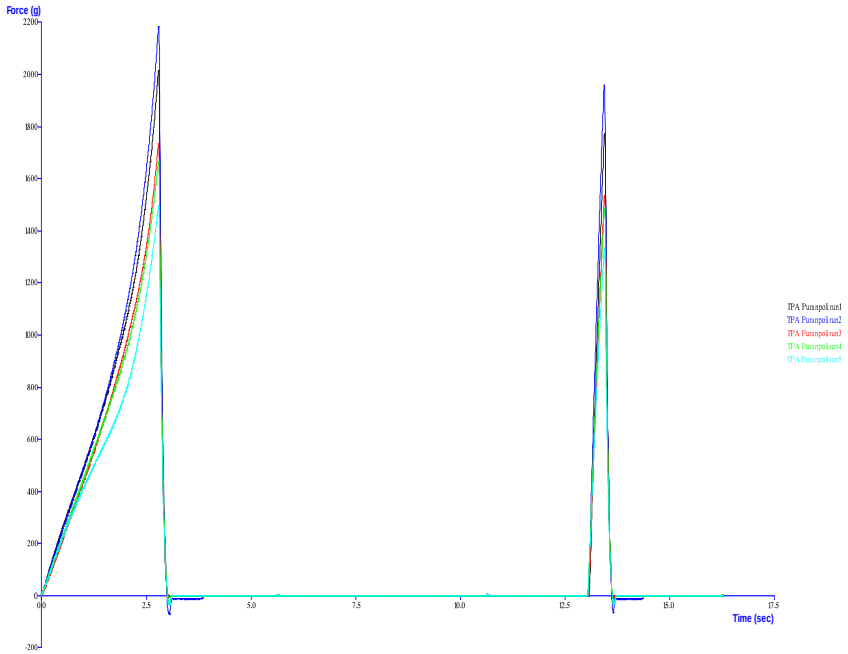

Fig 2: Graphical representation of average Texture analysis score

Table 5: Texture analysis score

Sr. No.	Test ID	Hard-ness	Springi-ness	Cohesive-ness	Gummi-ness	Chewi-ness
1	Replicate 1	2016.506	0.138	0.203	409.774	56.671
2	Replicate 2	2186.297	0.144	0.22	480.627	69.026
3	Replicate 3	1736.933	0.144	0.202	351.186	50.436
4	Replicate 4	1668.607	0.156	0.209	348.565	54.386
5	Replicate 5	1497.409	0.152	0.211	315.807	48.155
	Average	1821.15	0.147	0.209	381.192	55.735
	SD	276.887	0.007	0.007	65.085	8.138

4 Conclusion

The optimised ingredient composition of Puran Mix was Bengal gram (40g), Green gram (10g), Sugar (25g) and Jaggery (25g). The sensory studies shown that the formulation of 80% Bengal gram and 20% Green gram i.e. (80:20) was more acceptable. The proximate composition of Instant Puran Mix was Carbohydrate (56.43± 0.22g), Protein (19.55± 0.12g), Fat (7.09± 0.14g), Fiber (2.105± 0.07g), Ca (75.24± 0.78mg), Fe (10.34± 0.28mg) and Energy (425.65 ± 0.29 kcal). The texture studies revealed that the prepared balls of Puran were soft and smooth in the texture. This study has shown that Bengal gram and Green gram has a good potential for preparation of Instant Puran Mix which is leading to enhance its nutritional quality.

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