

Physicochemical and Sensory Evaluation of Pomegranate Spread

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Abstract-Pomegranate fruit has become more popular because of its health-promoting phytonutritional content. The results of studies made on three different types of spreads namely, product A₃, P₃ and C. A₃ pomegranate spread fortified with apple pulp, P₃ pomegranate spread fortified with papaya pulp and product C was control sample of strawberry spread. The project objective was to carry out product development on the pomegranate fruit juice to produce a shelf-stable pomegranate fruit spread, which retains the nutritional and aesthetic properties of the original fruit. This product was carried out six formulation first three were added with apple pulp and other three were added with papaya pulp. The addition of pulp in percentage as 25%, 50% and 75% respectively in all products. Total seven coded products, which were quantitatively sensory evaluated. The general physico-chemical parameters were estimated by relative standardized method. Turbidity.

Key words: Pomegranate, spread, formulation, physico-chemical parameter, turbidity.

I.INTRODUCTION

In present world economic scenario, emerging globalization, technology invention and growing consumer have changed the perception of food. There are considerable changes taking place in the liking of consumers due to change in life style, modernization, urbanization, increased women employment, increased per capita income, fast transportation and new marketing strategies. Most of the consumers demand convenience food, ready to eat snacks or food which add to bulk and satisfy their appetite. The diet consumed by a vast majority of people are deficient in proteins, minerals etc. Therefore, one of the great challenges today is to develop inexpensive foods that are nutritionally superior and at the same time highly acceptable to intended consumer.

Also today's consumers in the cosmetic, food and beverage market are interested in a trend of healthy lifestyles which has created demand for health oriented products. They have become health cautious and prefer low-calorie diets.

Pomegranate (*Punica granatum L*) is an important commercial fruit crop that is widely cultivated in parts of Asia, North Africa, the Mediterranean, and the Middle East (Sarkhosh et al. 2006). It is originated from south-east Asia. Pomegranates typically thrive well when grown in regions where the temperature is mild and where there is little humidity. Pomegranate fruit is round in shape, hard yellow and red colored outer skin, and by its unusual interior flesh that contains many small edible seeds. A semi-sweet pulp that can also be eaten surrounds each of these interior seeds. Additionally, both the seeds and pulp are embedded in a clear membrane. The principal antioxidant polyphenols in pomegranate juice include the ellagitannins and anthocyanins. Ellagitannins account for 92% of the antioxidant activity of pomegranate juice and are concentrated in the peel, membranes, and piths of the fruit. Punicalagins are the major ellagitannins in the whole fruit and can be hydrolyzed to ellagic acid (EA) and other smaller polyphenols. Commercial pomegranate juice obtained by pressing the whole pomegranate fruit and its peels contains significant amounts of the water-soluble punicalagins, and these levels are variable depending on the fruit cultivar, processing, and storage conditions.

Fruit spreads made with added pectin require less cooking and usually give a larger yield. Commercial pectin provides a complete set of directions for a variety of fruits. Follow these directions exactly to ensure a safe and quality product. Remember to purchase fresh pectin yearly to guarantee the best jelling action. To prevent mold growth, flavor loss, change of color, and surface darkening, all cooked fruit spreads must be heat processed. Due to the risk of harmful mold contamination, paraffin seals are not recommended. To heat process, place jars in water bath canner filled with hot water. Water should be 1 inch over jar tops. Heat to boiling, and then begin timing for the time indicated in the tested recipe. Do not reduce the processing time. Keep water boiling (212°F) during the entire processing time. If water evaporates, add boiling water to keep it at least 1 inch over the top of jars. Leave the lid on the canner. When processed for the recommended time, turn off the heat and remove the canner lid. Wait five minutes before removing the jars. This is a new recommendation and part of the heating time. (Sarah L. Francis; 2011).

Sugar helps gel formation and adds sweetness and firmness. About 65 to 68% of jams and jellies are sugar. If they have less than this the gel will be weak or runny. Sugar is important in determining the shelf life of fruit spreads. Low sugar fruit spreads will mold more easily than the standard kind. Honey, corn syrup, low-calorie sweeteners may not be substituted one for one for sugar in fruit spreads. If you plan to use these, be sure to use a tested and reliable recipe that uses these specifically. (Sarah L. Francis; 2011).

Commercial pectin can be used with any fruit, even those high in pectin can be used with any fruit. Too much pectin will give the jam or jelly a tough, rubbery consistency making it difficult to spread. There are two types of pectin –liquid (usually made from apple) and powdered (from citrus fruits or apples). (Sandra bastin; 2014)

Acid is needed for a gel to form as well as for flavor. Since the amount of acid in fruit varies and depends on ripeness, most fruits need added acid. Lemon juice is usually added; however a 1/8 teaspoon of citric acid can be substituted for each tablespoon of lemon juice if desired.

II. MATERIALS AND METHODS

A. Procurement of raw materials

Selected whole pomegranate, Papaya sand apple, Sugar, Lemon and Pectin used in pomegranate spread preparation. These raw materials procured from local market of Auranagabad.

B. Composition of various trials

Sample	Wt. of juice (gm)	Wt. of fruit pulp	Wt. of sugar (gm)	Wt. of lemon juice (gm)	Wt. of pectin (gm)	TSS of final product (^o Brix)	Yield of product (gm)
P ₁	225	275	165	7	7	62	307
P ₂	250	250	165	7	7	62	293
P ₃	275	225	165	7	7	62	301
A ₁	225	275	165	7	7	62	325
A ₂	250	250	165	7	7	62	312
A ₃	275	225	165	7	7	62	327

A₁- 25% Apple, A₂- 50% Apple, A₃- 75% Apple, P₁-25% Papaya, P₂-50% Papaya, P₃-75% Papaya.

C. Preparation of pomegranate spread

The pomegranate spreads were prepared according to the method described by [1]. Two types of fruit pulp were added with pomegranate juice like apple pulp and papaya pulp to obtain proper spread texture. In which A₁, A₂ and A₃ were added apple pulp and P₁, P₂ and P₃ were added papaya pulp with pomegranate respectively. The addition of pulp in percentage as 25%, 50% and 75% respectively in all products. In pomegranate spreads sugar (165g), lemon juice and pectin (7g),

First selection of fresh pomegranate, papaya and apple then peeling and grinding the fruit, preparing juice and pulp. The ingredients were weighed accurately. Pomegranate juice and apple pulp were put in saucepan, then

heated below 100 °C for 20 min. Continuously stirring was done, followed by addition of sugar and lemon juice. The spread was boil 1 min. then stir in pectin. Heating was removed and put into sterilized glass bottle then cooling at room temperature. The storage was done at refrigerated condition.

D. Sensory evaluation of pomegranate spread

Sensory evaluation of fresh samples was done by a panel of trained members, based on a 9-point hedonic scale (BIS- 1975), where in 9 denoted extremely desirable and 1 denoted extremely undesirable.

E. Physicochemical Analysis

The moisture content, ash content, titrable acidity, total soluble solid, pH content, turbidity, viscosity and texture were examined according to the methods of Association of Official Analytical chemists.

III RESULT AND DISCUSSION

Table2. Sensory evaluation of pomegranate spread

Sr.no.	Quality Attribute	A ₁	A ₂	A ₃	P ₁	P ₂	P ₃	C
1	Color	7.3	7.5	7.6	7.5	7.3	8	7.7
2	Appearance	7.4	7.1	7.9	7.4	7.4	7.8	8
3	Flavor	7.3	7.3	7.8	7.6	7.8	7.9	7.9
4	Taste	6.8	7.1	7.8	7.2	7.6	7.9	7.9
5	Texture	6.6	6.3	7.6	7.3	7	7.7	8.1
6	Overall Acceptability	7	7	7.8	7.3	7.3	7.9	8.2

A₁- 25% Apple, A₂- 50% Apple, A₃- 75% Apple, P₁-25% Papaya, P₂-50% Papaya, P₃-75% Papaya , C- Control sample

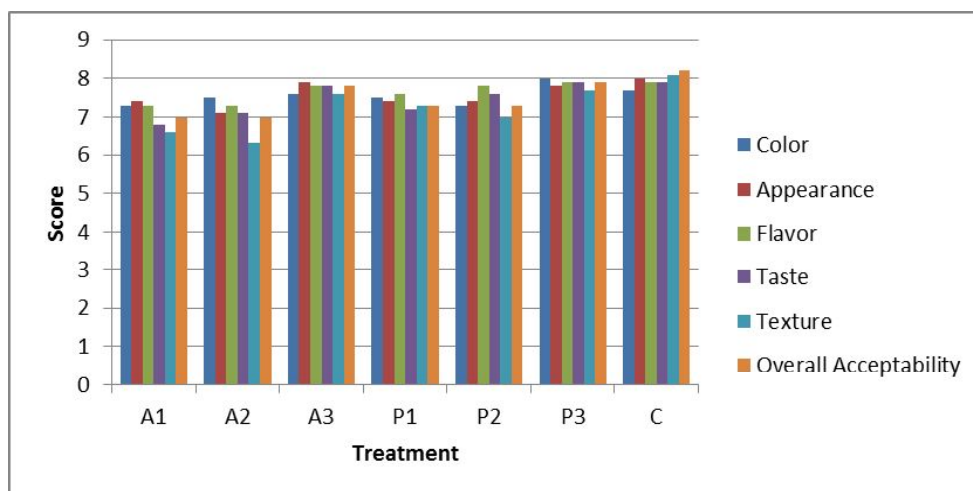


Fig. 1. Sensory evaluation of pomegranate spread

A₁- 25% Apple, A₂- 50% Apple, A₃- 75% Apple, P₁-25% Papaya, P₂-50% Papaya, P₃-75% Papaya , C- Control sample

A Sensory evaluation of pomegranate spread

From table 2. Showed that product A₃, P₃ have more acceptable than product A₁, A₂, P₁, P₂ and product C was control.

The average sensory attributes scores of prepared pomegranate spread were analyzed for variance among the spread prepared by different sample. Table.2. Shows that colour of spread prepared from Sample P₃ are the best than other samples. Sample P₃ got highest score (8) and Sample A₃ the lowest score (7.6), sample C (7.7).

In case of appearance spread prepared from Sample C is the best than other samples. Sample C got highest score (8) and Sample P₃ and A₃ the lowest score (7.9 and 7.8) respectively.

In case of flavor and taste spread prepared from Sample P₃ and C is the same score (7.9) than samples A₃. Sample A₃ got lowest score (7.8).

In terms of texture and overall acceptability there was highly significant difference among the prepared spread sample C got highest score (8.1 and 8.2) respectively than sample A₃ and P₃.

From above discussion we conclude that sample P₃ showed near about same score of sample C, than sample A₃. Sample C is market product and it is consider as control sample. Therefore sample P₃ got best result than sample A₃.

B. physico-chemical analysis

Table 4. physico-chemical parameter of raw material:

Test parameter	Pomegranate	Apple	Papaya
Moisture	85.4%	8.96%	24.59%
Ash	1.5%	0.26%	0.94%
Titration acidity	0.641%	0.46%	0.17%
Brix reading	14	13.3	13.8
Ph	3.32	3.84	5.7
Turbidity(NTU)	170	955	1013

Table 5. physico-chemical parameter of pomegranate spread:

Test parameter	A ₃	P ₃	C
Moisture	10.64%	7.88 %	8.04%
Ash	0.38%	2.2%	1.7%
Titration acidity	0.067%	0.075%	0.087%
Brix reading	62	62	60
Ph	4.0	3.41	3.58
Turbidity(NTU)	1255	1132	1012

The above, Table 4. and 5 summarizes physico-chemical parameters of raw material of all three types of pomegranate fruit spread – A₃, P₃, C. Descriptions of all samples show variation in moisture, ash, acidity, brix reading means TSS, Ph, and turbidity.

Final moisture content was found 10.64%, 7.88% and 8.04% in A₃, P₃ and spread respectively (Table 5.). But in raw material it was showed large difference in moisture content. In product A₃ and P₃, product P₃ contain near about same moisture content of control sample C.

The ash content in product A₃, P₃ and C was found same as moisture content as shown in table 4.1.6. The titration acidity in C is greater than product A₃ and P₃. Product A₃ and P₃ found 0.067% and 0.075% titration acidity respectively. The raw material also shows variation in titration acidity.

The final Brix of spread was observed 62 of product P₃ and A₃ and product C was observed 60 whereas pH observed 4.0, 3.41, and 3.58 of product A₃, P₃ and C. Farkas (1991) and Colin (1992) reported that texture of spread was a composite property related to a number of physical properties such as, pH, sugar concentration, viscosity and elasticity, and their relationship is complex.

Turbidity is caused by the presence of suspended matter in liquid as a dispersant. Turbidity of pomegranate juice, apple pulp, and papaya pulp was 170, 955, 1013 respectively. Papaya present more suspended particle than apple pulp and pomegranate juice. Turbidity of product A₃, P₃ and C was 1255, 1132 and 1012 respectively. But in product A₃ was found high turbidity than P₃.

IV CONCLUSION

Pomegranate fruit has recognized its utility as a base ingredient in various value added food products like jam, jelly ice cream, beverages, various product and so on. Therefore, the present investigation was undertaken to standardize a process for formulation and quality upgradation of pomegranate spread. The combination of papaya and pomegranate was obtained more acceptable result than combination of apple and pomegranate. Pomegranate was obtained higher amount of antioxidant activity therefore it was healthy fruit.

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