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Research Paper

Utilization of Jujube Berries (Dry) and Oranges (Fresh) for the Preparation of Nutritious Jam.

Engineering

KEYWORDS : Jujube berries and oranges, Acceptability; Nine-point Hedonic Scale.

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ABSTRACT

Many people consume fruits in just raw form or the dried form. Apart from that it can be consumed in different ways with other flavouring ingredients spicing up the nutrient contents and taste of the fruit. Keeping this in view, the study was undertaken to introduce the utilization and popularization of jujube berries. In this study, Jams were made by incorporation of jujube powder and orange pulp. To check their acceptability, jams with different treatments T1, T2 and T3 respectively and along with control T0 were prepared. The products were organoleptically evaluated for the colour and appearance, body and texture, taste and flavour and over all acceptability using Nine point Hedonic scale. On the basis of findings, with regard to Nutritive Value, jams were rich in Vitamin C and Calcium content. Sensory evaluation outcomes of jams depict that jujube powder and orange pulp can become suitable for preparing nutritious jam.

Introduction

Jujube has a long history of usage as a fruit and remedy. The main biologically active components are vitamin C, phenolics, flavonoids, triterpenic acids, and polysaccharides. Recent phytochemical studies of jujube fruits have shed some light on their biological effects, such as the anticancer, anti-inflammatory, anti obesity, immunostimulating, hepatoprotective, antioxidant and gastrointestinal protective activities and inhibition of foam cell formation in macrophages. (**Gao *et al.,* 2013**) Jujube fruit in the Mediterranean region have been reported to possess unique nutritional and organoleptic characteristics (**Akbolat *et al.*, 2008**). Additionally, these fruits have been commonly used in traditional Chinese medicine for liver troubles, asthma, fever, nausea, vomiting, abdominal pains, wounds, gout and rheumatism (**Morton *et al.*, 1987**).

Oranges were historically used for their high content of vitamin C, which prevents scurvy. Scurvy is caused by vitamin C deficiency, and can be prevented by having 10 milligrams of vitamin C a day. An early sign of scurvy is fatigue. If ignored, later symptoms are bleeding and bruising easily. British sailors were given a ration of citrus fruits on long voyages to prevent the onset of scurvy, hence the British nickname of Limey. Limes and lemons as well as oranges and grapefruits are among the highest in this level. **(Morgan *et al.*, 2011)** There is much biomedical interest in citrus fruits because consumption of them appears to be associated with lower risk of colorectal esophageal **(Levi *et al.,* 2000)**. Citrus fruits also appear to be associated with improved blood lipid profiles **(Kurowska *et al.,* 2000)**, and improved survival in the elderly **(Fortes *et al.,* 2000)**. The objective of the study was to prepare jams of jujube powder and orange pulp by value addition and evaluate the prepared product depending upon the sensory characteristics and to determine the nutritive value of the prepared product.

Methods and methodology

Procurement of raw materials: The fresh jujube fruit was collected from the researchers own garden in Assam and sun-dried for two weeks. The oranges and other ingredients needed for the preparation were purchased from the local market of Allahabad, U.P.

Preparation of jujube powder: The fresh jujube fruit was collected and sun-dried for approximately two weeks (Average of 4 hours per day). It is then grinded into powder and stored it in a container with a tight fitting lid.

Method of preparation of jam with details of treatments: Jam was prepared with the incorporation of jujube powder and orange pulp. Two value added treatments i.e. incorporation with dry jujube powder and orange pulp at 5percent, 10percent and 15percent levels (jujube powder) and 15percent, 20percent and 25percent levels (orange pulp) were referred to as T_1,T_2 and T_3 treatments respectively for the product developed. The basic recipe was standardized and served as control (T_0). Details of control and treatments combination with basic recipe are given in **Table 1.**

Method:

1. **1.** Wash, peel, core and dice the apples.
2. **2.** Grind them in a mixer grinder to make the pulp.
3. **3.** In a heavy bottomed pan, combine the apple pulp and sugar and cook until a thick consistency.
4. **4.** Stir occasionally to prevent scorching.
5. **5.** The jams should be thick and easily spreadable. When it is done, add lemon juice and mix very well.
6. **6.** Switch off the flame and let it cool completely.
7. **7.** Store in a sterilized jar in the refrigerator.
8. **Source:http://www.blendwithspices.com/2011/11/how-to-make-apple-jam-at-home-homemade.html?m=1**

10. **Sensory evaluation:** Jam was freshly prepared and evaluated organoleptically by a panel of judges selected from Ethelind School of Home Science, SHIATS, Allahabad. The judges were requested to score the products with the help of score cards based on the nine point hedonic scale **(Srilakshmi, 2007)**. The products were judged for the qualities such as colour and appearance, body and texture, taste and flavour and overall acceptability. For this three replications were done. The mean scores for each product and each treatment were calculated. The data obtain from sensory evaluation were statistically analyzed by using analysis of variance (ANOVA) technique. Significant difference between the treatments was determined using CD (critical differences) test. Standard error of each treatment replicated was also calculated **(Gupta *et al,* 2002).**

Determination of nutritive value of prepared jam: The nutritive value of prepared jam was calculated by using the value of per 100 grams of each raw ingredient. **(Gopalan *et al,* 2009).** The Analysis values were obtained by comparing the control and the best treatment using t-test. **(Gupta *et al.*, 2002).**

Results and discussion

Sensory evaluation: The developed recipes were analyzed for organoleptic acceptability. The data of mean score was tabulated

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and analyzed statistically and the results are presented in **Table: 3:** The mean scores of Jam in relation to overall acceptability indicate that the treatment T_3 (8.7 ± 0.03) scored maximum followed by treatment T_2 (8.1 ± 0.03), T_0 (7.6 ± 0.05) and T_1 (7.5 ± 0.00) respectively. It is seen that addition of 15% jujube powder and 25% orange pulp in the treatment T_3 improved overall acceptability of Jam.

Nutritive value of the prepared product: Table: 4: Indicates the nutritive value of Jam with and without incorporation of jujube powder and orange pulp at different levels. Result revealed that Energy content was highest in T_0 (258 g) and lowest in T_3 (246 g). Similarly, T_0 contained maximum amount of CHO (63.1 g), fats (0.5 g) and potassium (75 mg) respectively followed by T_1, T_2 and T3. Proteins was highest in T_3 (0.34g) and lowest in control T_0 (0.25g). Similarly, T_3 contained maximum amount Vitamin C (9.9mg), calcium (56.6mg) and phosphorous (18.1mg). The control, T_0 contained the least amount of these nutrients in comparison. Therefore it can be concluded that with increase in amount of jujube powder and orange pulp in Jam the percentage of protein, vitamin C, calcium and phosphorous increased. In comparison between nutrient content of control and best treatment of Jam by using (t) test in **Table: 5:** a non significant difference between the nutrient content of the control and the best treatment as the calculated value of "t" which is found to be 2.88 for fat content is less than the tabulated value of "t" which is 4.303 at 5% level indicating that there is non- significant difference between the nutrient content of control and best treatment with regard to fats. However, there is significant difference between the nutrients content of control and best treatments with regard to moisture, energy, CHO, protein, vitamin C, calcium, phosphorous and potassium.

Conclusion

Results obtained from the present study revealed that incorporation of jujube powder and orange pulp in prepared Jam are well accepted based on sensory evaluation. With regard to Nutritive Value, there is increased in Protein, Vitamin C, Calcium and Phosphorous in comparison with control, due to incorporation with Jujube powder and Orange pulp. These products can also be helpful for providing variety in the daily dietaries in addition to their nutritional benefits and the sundried jujube powder can be used in off season as well.

Tables and figures

Table: 1: Details of control and treatment combinations

Ingredients	T_0 (gm)	T_1 (gm)	T_2 (gm)	T_3 (gm)
Apple pulp	100	80	70	60
Jujube powder	-	5	10	15
Orange pulp	-	15	20	25
Sugar	50	50	50	50
Lemon juice	1tsp	1tsp	1tsp	1tsp

Table: 2: 9-point Hedonic Score Graduation Table

Sl.No	Grade	Score
1	Like extremely	9
2	Like very much	8
3	Like moderately	7
4	Like slightly	6
5	Neither like nor dislike	5
6	Dislike slightly	4
7	Dislike moderately	3
8	Dislike very much	2
9	Dislike extremely	1

Table: 3: Average sensory scores of different parameters in control and treated sample.

Parameters	T_0	T_1	T_2	T_3
Colour and appearance	7.2 ± 0.24	7.9 ± 0.05	8.1 ± 0.15	8.8 ± 0.13
Body and texture	8 ± 0.06	7.6 ± 0.16	8.4 ± 0.17	8.6 ± 0.06
Taste and flavour	7.6 ± 6.28	7.2 ± 0.14	8.1 ± 0.10	8.9 ± 0.06
Overall acceptability	7.6 ± 0.05	7.5 ± 0.00	8.1 ± 0.03	8.7 ± 0.03

Table: 4: Average nutrients content in control and treated samples.

NUTRIENTS	CONTROL T_0	TREATMENTS		
		T_1	T_2	T_3
Moisture (%)	84.8	81.69	78.21	74.89
Energy (kcal)	258	253	249	246
CHO (g)	63.1	62.02	61.26	60.46
Proteins (g)	0.25	0.31	0.33	0.34
Fats (g)	0.5	0.43	0.39	0.35
Vitamin C (mg)	1	5.9	7.9	9.9
Calcium (mg)	16	30.6	43.6	56.6
Phosphorous(mg)	14.5	16.1	17.1	18.1
Potassium (mg)	75	61.39	54.37	46.35

Table: 5: Comparison between nutrient content of control and best treatment by using (t) test.

NUTRIENTS	T_0	T_3	Difference (T_0-T_3=D)	T(cal)	T(tab)	Results
Moisture (%)	84.8	74.89	9.91	190.71	4.303	S
Energy (kcal)	258	246	12	20.78	4.303	S

CHO (g)	63.1	60.46	2.64	50.80	4.303	S
Proteins (g)	0.25	0.34	-0.09	9.0	4.303	S
Fats (g)	0.5	0.35	0.15	2.88	4.303	NS
Vitamin C (mg)	1	9.9	-8.9	18.05	4.303	S
Calcium (mg)	16	56.6	-40.6	78.13	4.303	S
Phosphorous(mg)	14.5	18.1	-3.6	41.19	4.303	S
Potassium (mg)	75	46.35	28.65	50.12	4.303	S

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