JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Quality Evaluation and Physico-Chemical Analysis of Diabetic Papaya Jelly

Shubhangi Nigam, Dheer Singh
Institute of Engg & Technology
Bundelkhand University, Jhansi,
U.P. India

The diabetic jelly is prepared from papaya. The product prepared was evaluated for its physico-chemical characteristics and sensory characteristics. The moisture, protein, fat, carbohydrate, pectin, total sugar, reducing sugar and ash in papaya pulp were 88.12, 0.43, 0.08, 10.68, 0.54, 8.20, 7.94 and 0.59 %, respectively. The total soluble solids (TSS), acidity and PH of papaya were 12.7 brix^{o}, 0.10 % and 4.62, respectively. Papaya pulp had 19.23, 13.36, 0.19 , 0.33 and 43.21 mg/100 gm of calcium, phosphorus, iron, beta –carotene and ascorbic acid, respectively. An acceptable quality of the jelly was obtained by adding amidated, LMP aspartame, citric acid, calcium lactate and sorbic acid/ benzoic acid @ 1.5, 0.5, 0.95, 0.06 and 0.05-0.10 percent, respectively, to papaya extract at 90^{0}C and setting occurred at 10^{0}C in 125-145 minutes. The moisture, protein, fat, carbohydrate, pectin, total sugars, reducing sugars and ash in diabetic papaya jelly were 87.50, 0.54, 0.005, 11.65, 1.83, 3.53, 3.26 and 0.31 percent, respectively. The total soluble solids, acidity and PH of the jelly were 12.4 brix, 1.08 percent and 3.08, respectively. The calcium, phosphorus, iron , beta – carotene and ascorbic acid content of jelly were 9.95, 7.12, 0.11, 0.16 and 20.36 mg/100 g, respectively. It may be concluded that diabetic jelly can be successfully prepared for from papaya by using amidated LMP, aspartame, citric acid, calcium lactate and preservation (sorbic acid / sodium benzoate) for consumption by diabetics.

Kye words- Jelly , Papaya Jelly, Diabetic Jelly

Introduction

Papaya is one of the major fruit crops cultivated in tropical and subtropical zones. Worldwide over 6.8 million tones of fruit were produced in 2004 on about 389990 Ha (FAO 2004). The ripe fruits of papaya are nutritious, delicious and an important source of nutrients for under developed countries . papaya fruits are also called as " protective foods ". Papaya is a power house of nutrients and is available throughout the year. It is a rich source of threes powerful antioxidant vit C, vit A & vit E, the minerals, magnesium and potassium, the B vit. Pantothenic acid and folate and fiber. In addition to all this, it contains a digestive enzyme-papaintha effectively treats causes of trauma , allergies and sports injuries. All the nutrients of papaya as a whole improve cardiovascular system, protect against heart diseases, heart attacks, strokes and prevent colon cancer. The fruit is an excellent source of beta carotene that prevents damage caused by free radicals that may cause some forms of cancer (Aravind G et al 2013).

The information regarding the preparation of diabetic papaya jelly is limited and therefore the present investigation, " Development of Diabetic Papaya Jelly" was undertaken with the following specific objectives.

1. **To develop a process for preparation of diabetic papaya jelly.**
2. **To study the physico- chemical and sensory characteristics of papaya extract and diabetic papaya jelly.**

Materials and Methods

This study was conducted in two phase :- product development and evaluation of final product.

Materials :-

Ingredients

Papaya extract	750ml
Pectin	15 gm
Water	225 ml
Aspartame	5 gm
Calcium lactate solution	0.95gm
Citric acid solution	0.06gm
Preservatives	0.05gm
Evaporation	114 ml
Final batch weight	**1000 ml**

Methods :-

Diabetic papaya jelly was prepared from ripened papaya fruits and the flow diagram for the preparation of diabetic papaya jelly is given. The selection and optimization of ingredients was carried out during product development studies.

- **Following step are used to prepare the jelly**

Ripened papaya

↓

Selection of fruits

↓

washing and peeling of fruits

↓

Removal of seeds and slicing of fruits

↓

Boiling with equal amount of water for 20 minutes.

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Filtering and keeping overnight to obtain clear extract

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Heat the extract to 90 °C.

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Add hydrated ← **hydration of pectin**

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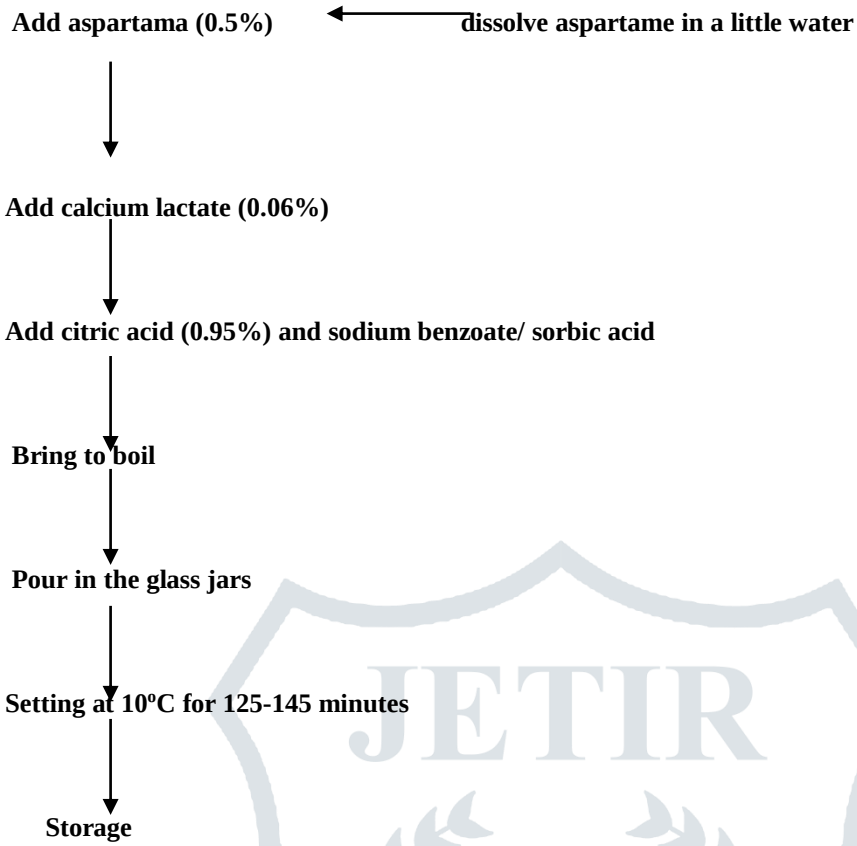


Analysis – Fresh papaya , papaya extract and papaya jelly were evaluated for moisture, protein, fat, ash, carbohydrate as per AOAC (1984) procedure, and calcium, phosphorus, iron , total sugar, pH, acidity etc detemined by (Ranganna, 1997, 2003) .

Sensory analysis- Diabetic papaya jelly sample were subjected to sensory evaluation by using untrained laboratory panel. The products were evaluated between 11.00 am to 12.00 noon or from 3.00 to 4.00 pm. The panelists were asked to evaluate the diabetic papaya jelly samples for different quality attributes namely, colour, appearance, setting, flavour, spreadability and overall acceptability on a nine –point hedonic scale using numerical values from 1 (dislike extremely) to 9 (like extremely) as described by Larmond (1970).

Results and discussion-

The present investigation was envisaged to develop a process for preparation of diabetic jelly from papaya. Ripened papaya pulp was studied for physico- chemical characteristics. The product was evaluated for physico- chemical characteristics. The product was also studied for its effect on blood sugar level of normal and diabetic subjects.

The proximate composition of papaya pulp in the present investigation is given in Table 4.1. Ripened papaya pulp had average value of 88.12 percent moisture, 0.43 percent protein , 0.09 percent fat, 0.59 percent ash and 10.68 percent carbohydrate content.

Table no- 4.1 Proximate composition of ripened papaya pulp

Moisture(%)	**88.12**
Protein (%)	**0.43**
Fat (%)	**0.09**
Ash (%)	**0.59**
Carbohydrate (%) by difference	**10.68**

The physico- chemical composition of ripened papaya pulp in the present investigation is given in Table -4.2. A total soluble solid of ripened papaya pulp was 12.7 brix^0. The acidity and pH were 0.10 percent and 4.62 percent, respectively. The total sugar was 8.20. The calcium, phosphorus and iron were 19.23, 13.36 and 0.19 mg/100 g, respectively. Ripened papaya pulp also

contained 0.33 mg/100g beta carotene and 43.21 mg/ 100g ascorbic acid 0.54 percent pectin (as percent calcium pectate) was presented in ripened papaya pulp.

Table 4.2 Physico-chemical composition of ripened papaya pulp

T S. S (brix^{o})	12.7
PH	4.62
Acidity (%)	0.1
Total Sugar (%)	8.2
Beta carotene (mg/100)	0.33
Ascorbic acid (mg/100)	43.21
Calcium (mg/100)	19.23
Phosphorus (mg/100)	13.36
Iron (mg/100)	0.19
Pectin (% calcium pectate)	0.54

Table 4.3 showed that the diabetic papaya jelly had average value of 87.50 moisture, 0.54 percent protein, 0.31 percent ash and 11.65 carbohydrates.

Table 4.3 Physico – chemical characteristics of diabetic papaya jelly

Moisture (%)	87.5
Protein (%)	0.54
Fat (%)	0.005
Ash (%)	0.31
Carbohydrate (%) by difference	11.65

Table 4.4 showed that the total soluble solids of diabetic papaya jelly was 12.4 brix^{o}. Acidity and pH were 1.08 percent and 3.08, respectively. Total reducing sugars was 3.53 percent. The calcium, phosphours and iron were 9.95, 7.12 and 0.11 mg/100g, respectively. Diabetic papaya jelly also contained 0.16 mg/100g beta – carotene and 20.36 mg/ 100g ascorbic acid, respectively. Pectin (as percent calcium pectate) was 1.83 percent .

Table 4.4 Physico-chemical characteristics of diabetic papaya jelly

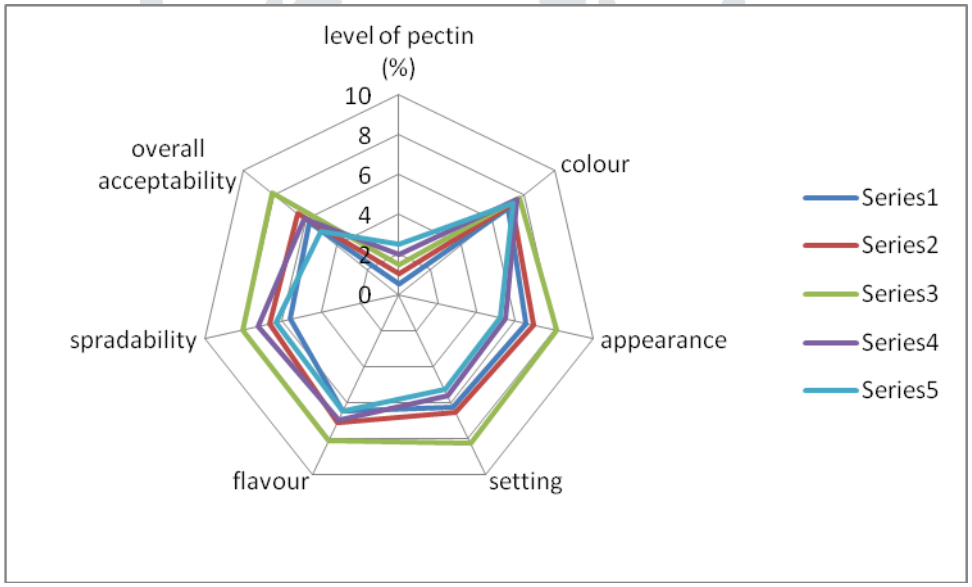
T S S (brix^{o})	12.4
PH	3.08
Acidity (%)	1.08
Total Sugar (%)	3.53
Beta carotene (mg/100)	0.16
Ascorbic acid (mg/100)	20.36
Calcium (mg/100)	9.95
Phosphorus (mg/100)	7.12
Iron (mg/100)	0.11
Pectin (% calcium pectate)	1.83

4.5 Optimization of pectin concentration in diabetic papaya jelly

The effects of pectin level on organoleptic characteristics of diabetic papaya jelly are shown in Table 4.5. Colour scores of the diabetic papaya jelly has increased from 6.95 at 0.5 percent level to 7.73 at 1.5 percent level of pectin and thereafter declined to 7.3 at 2.5 percent level of pectin. This may be due to the uniformity in the source of papaya extract for all samples. All other sensory attributes have improved significantly (P<0.05) upto 1.5 percent level of pectin and thereafter decreased. Diabetic papaya jelly containing 1.5 percent level of pectin has shown the highest scores for colour (7.73), appearance (8.12), setting (8.28) flavour (8.16), spreadability (8.02) and overall acceptability (8.13). on further increasing pectin concentration to 2.5 percent, jelly became less transparent, tough in set, gummy in texture, with poor spreadability and a tendency towards blandness in flavour. On the basis of sensory evaluation pectin level of 1.5 percent was found to be most suitable for formulation of diabetic papaya jelly. Glicksman (1984) reported that gal strength varies with pectin concentration.

4.5 Effect of pectin level on the sensory characteristics of diabetic papaya jelly

level of pectin (%)	colour	appearance	setting	flavour	spradability	overall acceptability
0.5	6.95	6.51	6.27	6.47	5.59	5.77
1	7.24	6.9	6.54	7.17	6.67	6.48
1.5	7.73	8.12	8.28	8.16	8.02	8.13
2	7.59	5.46	5.62	6.96	7.23	6.06
2.5	7.3	5.2	5.3	6.5	6.3	5.05
mean	7.36	6.43	6.40	7.05	6.76	6.29

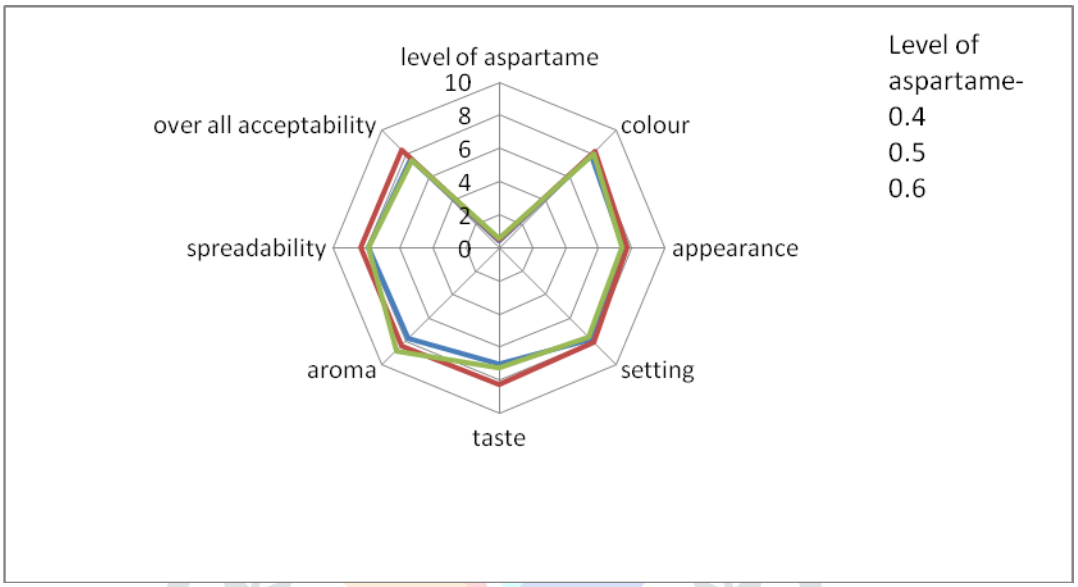


4. 6 Optimization of aspartame concentration in diabetic papaya jelly

The effect of concentration of diabetic papaya jelly is shown in Table 4.6. The diabetic papaya jelly containing 0.5 percent of aspartame shows the highest sensory scores for colour , appearance (7.70), setting (8.05), taste (8.24)), spreadability (8.38) and over all acceptability (8.34) . Score for colour , appearance , setting and spreadibilty show a non significant variation, thus it is clear that aspartame dose not play any role in colour, appearance, setting and spreadability of jelly as played by sugar in conventional jellies. In case of aroma, scores improved with increasing concentration of aspartame from 7.62 at 0.4 percent level to 8.76 at 0.6 percent level. On the basis of sensory evaluation, aspartame level of 0.5 percent was found to be optimum for formulation of diabetic papaya jelly.

4.6- Effect of aspartame level on the sensory characteristics of diabetic papaya jelly

level of aspartame	colour	appearance	setting	taste	aroma	spreadability	over all acceptability
0.4	7.87	7.49	7.78	7.02	7.74	7.92	7.62
0.5	8.21	7.7	8.05	8.24	8.33	8.38	8.34
0.6	8.02	7.41	7.63	7.22	8.76	7.89	7.48
mean	8.03	7.53	7.73	7.49	8.27	8.06	7.81



conclusion-

On the basis of above findings it may be conclude that acceptable quality of diabetic papaya jelly could be prepared from papaya extract, after adding appropriate amount of pectin, aspartame, calcium lactate citric acid and preservatives (sorbic acid/ sodium benzoate). The product thus prepared could be stored and consume for a minimum of 75 days. The diabetic jelly thus prepared has been found to be fit for consumption by diabetics as well as normal people. It can be used as a low – calorie substitute for consumption by weight watchers. . On the basis of sensory evaluation pectin level and aspartame level of 1.5 percent and 0.5 percent found to be most suitable for formulation of diabetic papaya jelly.

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