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Chemical and Organoleptic Characteristics of Jam Prepared from Indigenous Varities of Apricot and Apple

[1]Imtiaz Hussain and [2]Iftikhar Shakir

[1]Department of Food Science and Technology,
Faculty of Agriculture Rawalakot, Azad Jammu and Kashmir, Pakistan
[2]Tamimi Global Co. Ltd. (TAFGA) KSA

Abstract: Many indigenous fruits are grown in Azad Kashmir. One of them is wild apricot "Hari", which is extensively grown in this area, but unfortunately due to sour taste and low shelf life of this variety is not properly utilized. Comparative study was conducted for the proper utilization of this wild apricot Varity by processing. For this objective mixed jam was prepared from indigenous apple and apricot with different formulation F_1 (100% apple) F_2 (75% apricot + 25% apple) F_3 (50% apple + 50% apricot) F_4 (25% apricot + 75% apple) and analyzed for the physiochemical properties as well as organoleptic attributes, also studied the effect storage on these characteristics. These formulations were stored for 60 days at ambient temperature and the chemical and organoleptic characters were evaluated by using their different parameters. The results showed that all the formulations were remains acceptable for 60 days storage at ambient temperature. It was conculated that F_4 (75% apple and 25% of apricot) formulation shows the maximum scores for organoleptic characteristics. This formulation can be successfully prepared and marketed due to good taste and attractive colour.

Key words: Jam · Chemical · Storage · Wild Fruit · Indigenous · Varieties · Organoleptic · Properties

INTRODUCTION

In Azad Kashmir many indigenous fruits are grown such as pear, peach, plums, fig and apricot etc. one of them is wild apricot called (Hari) which is extensively grown, but due to some characteristics like sour taste, it is not properly used. Pest and disease attack are not observed on this verity of apricot as compared to other varieties of apricot which are grown in this area. Therefore, it is the need of day to utilize this indigenous fruit for wealth of this area by processing. A rapid decrease of ascorbic acid in apricot jam sweetened with saccharin and xylitol during storage. Further there was no change in total soluble solids (T.S.S) of jam during storage, [1]. The preparation and evaluation of dried apricot date jam was prepared by incorporating a suitable combination of sorbitol cyelamate and aspartame. Treatments were analyzed for physico-chemical and sensory evaluation for two months. It was found that T.S.S. increase gradually in all treatments during storage, reducing sugar increase and pH decrease during storage, in orgonoleptic evaluation all treatments remain acceptable during 60 days of storage the sample containing sorbitol, aspartame and cyclamate in the ratio 8.5:7.5:7.5 and 80:10:10 respectively could be prepared successfully on commercial scale manufacturing [2]. This study was focused on the proper utilization of local war of apricot. Riaz *et al.* [3] prepared jam from Strawberry fruit and studied organoleptic as well as chemical analysis for 90 days of storage period. Ricardo *et al.* [4] studied the samples of guava jam purchased from the retail market. Ehsan *et al.* [5] prepared water melon jam with proportion and stored at ambient temperature samples were analyzed and an increase in T.T.S. and acidity were observed. Garcia *et al.* [6] analyzed anthocyanin and color stability of red raspberry jams made from two different varies evaluated the stability of three strawberry cultivars for changes in jam color quality during processing. Tremazi [7] evaluated the quality of peach jams with peach dietry fiber as thickener. Torezan, [8] studied two types of jam and compared them physically and chemically both formulation were within range. Garcia *et al.* [9] studied jams made from fruit and sugar mixed in proportions so that final product contains minimum fruit content. Girigelmo *et al.* [10] evaluated the quality of peach jam with peach dietary fiber. Jams were prepared from overripe fruits in different combinations and investigated for various characteristics. The use of different combinations

Corresponding Author: Imtiaz. Hussain, Department of Food Science and Technology Faculty of Agriculture Rawalakot, Azad Jammu and Kashmir Pakistan

of fruit pulps having different °Brix: acid ratios affected the yield of jams. The °Brix of jams varied, but was not affected either by storage or interactions of storage and fruit pulp (s) combinations in jams. Other biochemical characteristics varied as a result of storage and interactive effect in jams ($P < 0.01$), except for total sugars which did not change in storage. Color intensity of these jams ranged from 12.48 to 35.84. Color differences (as DE) were observed when fruit combinations (of 1, 2, 3 or 4 fruits) were present as compared to either of two single-fruit jams prepared in this study. Thus pulp combinations gave differences in natural colors of jams. [S. SINGH} Storage of jam at room temperature resulted in a significant decrease ($p < 0.05$) in ascorbic acid content over the storage period [11].

The present study aimed to utilize the local apricot (Hari) by processing for the prosperity of this area.

MATERIALS AND METHODS

Fully matured local apricot (Hari) and apple collected from local area and transported in wooden boxes to the laboratory of Food Science and Technology Department, Faculty of Agricultural University Azad Jammu and Kashmir.

Preparation of Jam Samples: After washing, sorting, peeling and coring the fruit pieces were made with the help of stainless steel knife and dipped in 0.2% citric acid solution already prepared to avoid browning. Fruit pulp was extracted and incorporated with different ratios for jam preparation F1 (100% apple) F2 (75% apricot + 25% apple) F3 (50% apple+ 50% apricot) F4 (25% apricot + 75% apple) according to the formula and procedure of Awan and Rehman [12]. The jam samples were cooked into the open steel kettles. The mixture was cooked till required (68 - 70 °brix). Fruit jam was allowed to cool and then packaged in sterilized glass jars. The samples were analyzed just after processing and at 15days intervals up to a storage period of 60days.

Physicochemical Analysis: Ascorbic acid content, acidity, moisture, reducing sugars, non reducing sugars and total soluble solids were analyzed by the standard method of AOAC [13] pH was determined with a Microprocessor Bench-top pH meter, Model H1817, Italy according to the instruction manual of the apparatus.

Organoleptic Evolution: The organoleptic attributes like colour texture taste and overall acceptability were determined by method described by Larmond [14].

Statistical Analysis: All the data regarding different parameters were statistically analyzed using Randomized Complete Block Design (RCBD) through M-Stat-C computer package. Means were separated by LSD test as recommended by Steel and Torrie [15].

RESULTS AND DISCUSSION

Jam is product of sugar and pectin contained fruits. It has characteristics of texture, colour and taste. It should be capable of storage for reasonable period after opening of bottle without risk of spoilage. All the prepared jam samples were analyzed for ascorbic acid content during an interval of 15 days up to two months. It was observed that ascorbic acid in all treatments decreased. There is gradual decrease in ascorbic acid content of all samples during storage. Ascorbic acid decreases because it is easily oxidized in presence of oxygen by both enzymatic and enzymatic catalyst. Assuming that glass containers are impermeable to oxygen, the principal causes of L-ascorbic acid destruction are oxidation by residual oxygen in the headspace followed by anaerobic decomposition and destructive influence of light [16]. In the presence of free oxygen (e.g., oxygen present in the headspace and dissolved in the jam) ascorbic acid would be oxidized to dehydro ascorbic acid (DHA) and this might be followed by ring cleavage and the formation of di ketogulonic acid (DKA). Once the free oxygen has been consumed by the chemical reactions, degradation of ascorbic acid might proceed anaerobically. Under anaerobic conditions, ascorbic acid degrades by several steps to form furfural [17]. Similar results were given by Singh [18]. Statistical analysis revealed that treatment and storage effect on all the samples were significantly different at ($p<0.05$). The maximum mean value was observed for F_4 (16.76) and minimum for F_1 (14.53). (Table-1). The maximum mean value recorded for overall acceptability during storage period at initial day (16.37) decreased at 60 days (15.39). These results were in agreement with Raiz *et al* [3] who observed decrease ascorbic acid content in strawberry jam 18 mg/100g. Torezan [8] also reported decrease ascorbic acid content in jam during storage. The formulated jam samples were also analyzed for acidity and maximum value was calculated for F_2 (0.746) and minimum for F_1 (0.646). The maximum mean value recorded for acidity during storage period at initial day (0.650) which increased at 60 days (0.743). Increase in acidity of fruit jams was reported earlier to be a result of ascorbic acid degradation or hydrolysis of pectin [19, 20]. The statistical analysis revealed that formulation and storage effect on samples were significant ($p>0.05$), (Table-2).

Table 1: Effect of Storage period and Treatments on the Ascorbic Acid Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	15	14.7	14.5	14.3	14.1	14.53e
2	F_2	16.5	16.1	15.9	15.7	15.4	15.92d
3	F_3	16.8	16.3	16.2	15.9	15.7	16.18c
4	F_4	17.2	16.9	16.8	16.6	16.3	16.76a
	Mean	16.37a	16.00ab	15.85c	15.62d	15.39e	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 2: Effect of Storage period and Treatments on the Acidity Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	060	0.62	0.64	0.67	0.70	0.646c
2	F_2	0.70	0.72	0.75	0.77	0.79	0.746d
3	F_3	0.66	0.68	0.71	0.73	0.75	0.706bc
4	F_4	0.64	0.66	0.68	0.71	0.73	0.684a
	Mean	0.650a	0.670b	0.695ab	0.720d	0.743c	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 3: Effect of Storage period and Treatments on the pH Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	4.4	4.1	3.9	3.8	3.6	3.96e
2	F_2	3..3	3..2	3.1	3.0	2.8	3.08d
3	F_3	3..5	3.4	3..2	3.1	3.0	3.24a
4	F_4	3.8	3.2	3.16	3.1	3.0	3.25b
	Mean	3.75e	3.47d	3.34de	3.25c	3.10b	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 4: Effect of Storage period and Treatments on the Reducing Sugars Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	33.6	34.7	35.1	35.2	35.4	34.73e
2	F_2	28.2	28.3	28.5	28.7	28.9	28.52d
3	F_3	31.3	31.6	31.6	31.8	32.3	31.72a
4	F_4	20.1	20.2	20.6	20.8	21.4	21.15b
	Mean	28.37a	28.62b	28.95c	29.80ab	29.41d	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 5: Effect of Storage period and Treatments on the Non Reducing Sugars Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	42.5	40.5	36.6	29.7	18.9	33.64a
2	F_2	44.1	42.1	37.7	30.5	16.8	34.24b
3	F_3	41.1	39.3	34.7	28.5	21.7	33.06c
4	F_4	45.1	40.5	34.3	30.6	20.5	34.20d
	Mean	43.20a	40.60b	35.82c	29.82ab	19.47d	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 6: Effect of Storage period and Treatments on the moisture Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	19.6	16.5	12	8	5.5	12.32a
2	F_2	8.7	6.5	4.8	3..9	3.5	5.48c
3	F_3	15	9.4	6..3	4..2	2.8	7.54d
4	F_4	21	17.5	12.4	9.9	5.4	13.24a
	Mean	16.08a	12.47b	8.87e	6.50d	4.30de	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 7: Effect of Storage period and Treatments on the Total soluble solids Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	65	67	68	71	72	68e
2	F_2	72	73	74	75	76	74a
3	F_3	68	69	72	73	74	71b
4	F_4	64	66	67	69	72	68e
	Mean	67a	69b	70c	72d	73e	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 8: Effect of Storage period and Treatments on the Colour Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	7.4	7.2	7.0	6.8	6.7	7.02a
2	F_2	7.2	7.0	6.9	6.7	6.5	6.86c
3	F_3	7.6	7.4	7.2	6.9	6.6	7.14b
4	F_4	7..9	7..6	7.4	7..2	6..9	7.40ab
	Mean	7.52a	7.30b	7.12c	6.90d	6.67e	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 9: Effect of Storage period and Treatments on the Taste Sugars Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	7.0	6.9	6.8	6.7	6.5	6.78a
2	F_2	6.9	6,8	6.7	6.5	6.3	6.64b
3	F_3	7.1	7.0	6.9	6.7	6.5	6.84d
4	F_4	6.8	6.7	6.6	6.5	6.3	6.58e
	Mean	6.95a	6.85b	6.75c	6.6d	6.40e	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 10: Effect of Storage period and Treatments on the Texture Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	7.8	7.6	7.4	7.2	7.0	7.40b
2	F_2	7.0	6.9	6.7	6.5	6.4	6.70d
3	F_3	7.4	7..2	7.0	6.8	6.9	7.02c
4	F_4	7.2	7..0	6..8	6.7	6.5	6.84e
	Mean	7.35a	7.17b	6.95c	6.80d	6.65e	

Values followed by different letters are significantly different ($p<0.05$) from each other

Table 11: Effect of Storage period and Treatments on the Over all acceptability Jam samples

		Storage Period (Days)					
S.No.	Treatments	Initial	15	30	45	60	*Mean*
1	F_1	8.4	8.3	8.1	8.0	7.9	8.14a
2	F_2	7.8	7.6	7.5	7.3	7.1	7.46c
3	F_3	8.2	8.1	8.0	7.8	7.6	7.94d
4	F_4	8.3	8.1	8.0	7.8	7.6	7.96e
	Mean	8.17a	8.02b	7.90cd	7.72d	7.55e	

Values followed by different letters are significantly different ($p<0.05$) from each other

The pH of jam is an important factor to obtain optimum gel condition. In the present study the pH of jam samples were observed maximum pH recorded for F_1 (3.96) minimum pH recorded for F_2 (3.08). The maximum mean value recorded for pH during storage period at initial day (3.75) which decreased at 60 days (3.10). During storage intervals pH decrease due to increase in acidity during storage. This may be due to the formation of acidic compounds. Similar results were showed by Lindorth [21]. The statistical analysis for pH revealed that formulation and storage effect on samples were significant at ($p>0.05$) level (Table-3). The sugars present in jam comprise natural and added sugars. In the present study maximum reducing sugar was observed for F_1 (34.73) the minimum mean value for reducing sugar recorded for F_4 (21.15) that was (34.73) and minimum mean value for reducing sugar was F_4

(21.15). The maximum mean value was recorded for reducing sugars during storage period at initial day (28.37) which day decreased at 60 days (29.41). Increase in reducing sugar may be due to prolong storage and hydrolysis of sugars with increase in acidity and decrease in pH. Similar results were reported by Pandit [22]. Results for non- reducing were showed that maximum non reducing sugars was recorded for F_2 (34.24) and minimum for F_3 (33.06). Storage effect shows that maximum non reducing sugar was recorded at initial day which was (43.20) and decreased at 60 days (19.47) The statistical analysis for reducing and non reducing sugars revealed that formulation and storage effect on samples were significant ($p>0.05$).The results are shown in (Tables-4and5). Moisture impact on the shelf life of products, the jam samples were also analyzed for moisture the maximum moisture mean value observed for F_3 (13.24) and minimum for F_2 (5.48). The maximum mean value recorded for moisture during storage period at initial (16.08) decreased at 60 days (4.30). The statistical analysis for moisture revealed that formulation and storage effect on samples were significant ($p>0.05$) level the results are presented in (Table-6). The maximum T.S.S. was observed for F_2(74) and minimum observes forF1 and F_4 (68). Similar results were reported by Ragab [1]. The maximum mean value recorded for T.S.S. during storage period at initial day (67) increased at 60 days (73). The statistical analysis for T.S.S. revealed that formulation and storage effect on samples were significant ($p>0.05$) as shown in table-7. Shakir *et al.* [23] reported decrees in ascorbic acid, pH and non reducing sugars while an increase was noted in acidity reducing sugars and T.S.S. for apple and pear mixed fruit jam during storage period of 90 days. The samples were evaluated organoleptic attributes for colour, taste, texture and overall acceptability. Colour is important sensor character on which the consumer preferences dependent.The maximum mean value recorded for colour for F_4 (7.40) and minimum for F_2 (6.86). The maximum mean value recorded for colour during storage period at initial day (7.52) decreased at 60 days (6.67). The statistical analysis for colour revealed that formulation and storage effect on samples were significant ($p>0.05$) the results for colour are presented in (Table-8). The maximum mean value for taste recorded for F_3 (6.84) and minimum for F_4 (6.58). The maximum mean value recorded for taste during storage period at initial day (6.95)decreased at 60 days (6.40). The statistical analysis for taste revealed that formulation and storage effect on samples were significant ($p>0.05$), (Table-9). The maximum mean value recorded for texture for F_1 (7.40) and minimum for F_2 (6.70). The maximum mean value recorded for texture during storage period at initial day (9.35) decreased at 60 days (6.65). The statistical analysis for texture revealed that formulation and storage effect on samples were significant ($p>0.05$), (Table-10). The maximum mean value recorded for overallaccetability for F_1 (8.14) and minimum for F_2 (7.46). The maximum mean value recorded for overall acceptability during storage period at initial day (8.17) decreased at 60 days (7.55). The statistical analysis for overall acceptability revealed that formulation and storage effect on samples were significant ($p>0.05$), (Table-11). Best results were obtained for F_4 (75% apple +25% apricot) and all the simples remain acceptable during 60 days of the storage. These results were similar with the finding of Shakir *et al* [24]. Who reported that a decrease in color and taste score was recorded, Texture of the samples also decreased during storage. Results regarding to overall acceptability showed a gradual decrease.

It was concluded that the mixed apricot and apple pulp jam (25%apricot and 75% apple) was successfully prepared and remain acceptable for 60 days.

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