Comparative study of Banana figs prepared from two different varieties

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***Abstract*—** *The study was conducted to evaluate the sensory and physicochemical properties of banana products .The tests were undertaken to ascertain the suitability of the solutions for preservation of sweet bananas as added-value foods and to reduce post-harvest losses. Prepared banana figs of both varieties were presented to a panel of judges for evaluation of organoleptic attributed. The maximum total soluble solids (22.84 and 12.30), Titratable acidity (0.0148 and 0.0403), non reducing sugar (11.250), Ash (1.1144 and 1.9346) were showed by variety giant in banana fig, whereas, the variety dwarf showed maximum pH, Vitamin C content, total sugar and reducing sugar. On other hand the maximum (24.48°Brix) total soluble solids was observed in banana figs prepared after 90 days. The maximum total sugar (20.36%), non-reducing sugar (14.08%) Ash (1.12%) were showed by the banana figs prepared after 90 days. Sensory evaluations of banana figs revealed that they exhibited significant difference in the score of all attributes among the two with exception of consistency .The results showed that the 90 days produced good results for frying and drying of banana figs.*

***Keywords*— Banana figs, varieties, physiochemical properties, Sensory evaluations.**

I. INTRODUCTION

Banana is the common name for herbaceous plants of the genus Musa and for the fruit they produce. *Musa Spp.* which is commonly called banana is herbaceous plant of family *Musaceae*. It is known to have originated from the tropical region of Southern Asia (Anhwange *et al.,* 2009) and now cultivated throughout the tropics (Lesline, 1976). There are probably over 30 well known species and more than 700 varieties are within the genus *Musa*.It is one of the oldest cultivated plants (Kumar *et al.,* 2012). Banana *(Musa* sp.) is the fourth most important global food crop after rice, wheat and maize in terms of gross value of production. Total world *Musa* production is currently about 97 million tons annually (FAOSTAT, 2003), of which bananas cultivated for the export trade accounts for only 10%. The main variety produced is Dwarf Cavendish (locally "Basrai") which constitutes 98% of total produce while the rest comprises Giant Cavendish or Williams's hybrid variety. Bananas are highly perishable, with a significant proportion of the harvested crop being lost from the farm gate to the market place, owing to poor handling, storage and transportation of the fresh fruits. Additionally, no harvesting losses may occur in peak production periods when farmers do not harvest the entire of their production because of the bulk quantity rushes consumer market. Put together, an estimate of 35% loss of the production of bananas was reported for developing countries (FAO, 1987).With more than 349,000 hectares, Pakistan is a key player in the banana industry. It ranked on 42 positions around the world with 159,900 tonnes of production (FAO, 2009), 90% of this land lies in the Sindh province in the south-east of the country. The majority of banana farmers in this area are smallholders with less than 20 hectares. Banana is cultivated on 34.9 thousand hectares in Pakistan. More than 90% area under banana falls in Sind province, contributing 80% of the total production in the country. In Sindh, Thatta and Haripur districts occupy 50% of the banana cultivated area and contribute 52% of the total banana produced in Sindh. However, because of lack of controlled-atmosphere storage facilities and processing units, produce is wasted annually. So, to improve fruit economics and to eliminate the nutritional problems, banana can be used in food industry for example by producing banana cake, jam, chips and banana figs. Furthermore, the uses of banana products are one of the ways to commercialize a local resource to national and international market. Thus,

banana products can help to globalize the marketing system and improve farmer's income. Since very little or no work has been done on banana in Pakistan particularly in Sindh province where more than 80% of banana is being grown the area may serve potential for the productive research activity. Considering above mentioned facts, the research work has been designed to convert unripe banana of two different varieties into valuable products which can be commercialized and marketed not only to reduce post harvest losses but to also transfer these technologies to poor farmers for its conservation, preservation, value addition leading to poverty alleviation with subsequent economic benefits to the nation as whole. To evaluate physicochemical properties of banana figs. To determine the sensory properties of banana figs.

II. MATERIALS AND METHODS

The entire research work was carried out in the Institute of Food Sciences and Technology, Sindh Agriculture University, Tandojam, Pakistan during the year, 2012-2013.

2.1 Collection of samples

Banana varieties giant and dwarf was collected from near market and brought to the laboratories of Institute of Food Sciences and Technology.

2.2 Chemicals and glassware

All the chemicals used were of analytical grade. The glassware's used in present study were soaked in 0.1% Sodium hypochlorite for 8 to 10 hours to remove dust and debris. Glassware's were then properly washed with running tap water followed by rinsing with distilled water. They were then kept in an oven at 80°C for 24 hours to dry.

2.3 Preparation of figs

After sorting the fruit was washed and cleaned with running tap water followed by distilled water to remove dirt, dust and debris. The fruit was peeled with stainless steel knife in longitudinal slices of about 4-6 mm thick. Socked in for 24 hours in sugar syrup, after 24 hours drained and spread on stainless steel trays for drying in the dehydrator/sunlight until required moisture level (16-20%) was obtained.

2.4 Preparation of samples for chemical analysis

Green banana fruit was peeled with knife and cut into small pieces. Homogenous mixture was prepared by blending the flesh in juicer machine. The sample of homogenous mixture was used for each chemical analysis.

2.5 Total soluble solids (^{o}Brix)

The total soluble solids (TSS) were determined [12] using digital refractometer. After cleaning the prism of the refractometer, it was calibrated to set on 0 (^{0}Brix) by using distilled water. Few drops of sample were placed on the prism of the refractometer by covering the lid of digital refrectrometer and reading was recorded for the accurate results appeared on the screen of digital refractor meter was noted as total soluble solids in ^{0}Brix. The reading appeared on the screen of digital refractometer was noted as total soluble solids in ^{0}Brix. And noted. For each sample, the instrument was calibrated again and again by using distilled water.

2.6 Determination of sugars

Sugars (total sugar, reducing sugar and non-reducing sugar) determination was carried out through Lane and Eynon method [11].

2.7 Total sugars (%) and reducing sugar (%)

5 gram of (un-ripened banana pulp) sample was taken into a beaker and added 100 ml of warm water. The sample was stirred thoroughly until all the soluble matters were dissolved and filtered through Whatman filter paper No: 4 into a 250 volumetric flask. Pipetted 100 ml of the prepared sample into a conical flask, added 10 ml diluted HCl and boiled for 5 minutes. On cooling, neutralize the solution to phenolphthalein with 10% NaOH and make up to volume in a 250 volumetric flask. This solution was used for titration against Fehling's solution and reading was calculated as follow.

Total sugar % = (Factor (4.95) x dilution (250) ×2.5) / Titer x wt of sample × 10

Reducing sugar % = Factor (49.5) x dilution (250) / Titer x wt of sample× 10

2.8 Non-reducing (%)

Non–reducing sugar was estimated as the difference between the total sugar content and reducing sugar content on subtraction (total sugar-reducing sugar).

Non-reducing sugar = Total sugar - reducing sugar

2.9 Titratable acidity (%)

Titratable acidity (citric acid mg/100g) was determined according to the method given in [13]. 5g of each sample was taken and 25ml distilled water was added and stirred. The mixture was filtered through Whatman filter paper No 4. 10ml of filtrate was taken and 3-5 drops of phenolphthalein indicator was added and titrated against 0.1N NaOH. The volume of alkali used was noted and calculation was made by using the following formula.

Total acidity = (1 /10× Eq.Wt.of acid × Normality of NaOH × titer) / 10.

2.10 Vitamin C content (mg/100g)

Vitamin C was determined according to the method [14]. 5g of each sample was blended and added in 100ml oxalic acid and mixed. The mixture was filtered through Whatman filter paper No: 4. 5ml of filtrate was taken followed by addition of 10ml of oxalic acid and 3-5 drops of phenolphthalein indicator was added and titrated against indophenol dye till the pink color appeared. The volume of alkali used was noted and calculated using following formula.

Vit C (mg/100g) = dye equivalent x titer x dilutions.

2.11 Ash content (%)

Ash of samples was determined [15]. 5g of each sample was weighed in crucible char in muffle furnace (525^0C) for 5hrs. It was then transferred to desecrater for one hour and reweighed. Ash content was calculated by using following formula.

Ash content (%) = (Weight of ash sample × 100) / Weight of fresh sample

2.12 Sensory evaluation

Sensory analysis was performed by the staff members Institute of Food Sciences and Technology who was give marks on the scrod card for the banana figs and chips which was present in front of them the score was given by the assess on following the attributes such as color, flavor, taste, apppearence, and palatability of the product developed.

III. RESULTS AND DISCUSSION

The research was carried out to assess the suitability of green banana Figs and Chips during the year 2015 at the laboratory of Institute of Food Sciences and Technology. The results were gathered and elaborated as under.

3.1 Chemical analysis

Chemical analysis such as TSS (0Brix), pH, vitamin C, ash, total (reducing sugar and non-reducing sugar), moisture content and total acidity were carried out in order to assess the nutritional characteristics of prepared Banana figs and chips both varieties of banana.

3.2 Total soluble solids (TSS) (°Brix) of banana varieties (figs)

The results regarding total soluble solids (TSS) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety giant was observed maximum (22.84°Brix) total soluble solids in banana figs as compared to variety Dwarf which was observed minimum (19.69 °Brix) total soluble solids in banana figs. There were statistically significant differences in total soluble solids of banana varieties. The results revealed that the maximum (24.48°Brix) total soluble solids was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days which was recorded (23.25°Brix) total soluble solids. The results further showed that the banana figs prepared after 60, 45, 30, 15 and 1 day after drying was observed 22.30, 21.43, 20.23, 19.51 and 19.50 °Brix total soluble solids respectively. The results further indicated that the lowest (19.40°Brix) total soluble solids was observed under fresh banana after 0 days. The interactive effect of varieties x treatments for total soluble solids was also significant. The maximum (27.73°Brix) total soluble solids was observed from interaction of variety giant from banana figs prepared after 90 days whereas, the minimum (18.41°Brix) total soluble solids was recorded from variety giant in fresh banana after 0 days after drying. It is clear from the results that variety giant had more total soluble solids (°Brix) in banana figs prepared after 90 days after drying.

3.3 pH of banana figs

The results regarding pH of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety dwarf was observed maximum

(9.08) pH values in banana figs as compared to variety giant which was observed minimum (8.00) pH in banana figs. There were statistically significant differences in pH value of banana varieties. The results revealed that the maximum (10.21) pH was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days which was recorded (9.80) pH value. Banana figs prepared after 60, 45, 30, 15 and 1 day after drying was observed 9.37, 9.27, 8.48, 7.90 and 7.78 pH value respectively. The results indicated that the lowest (5.49) pH value was observed under fresh banana after 0 days. The interactive effect of varieties x treatments for pH value was also significant. The maximum (11.12) pH value was observed from interaction of variety dwarf from banana figs prepared after 90 days whereas, the minimum (5.25) pH value was recorded from variety giant in 0 day after drying of banana figs (fresh banana). It is clear from the results that variety Dwarf had more pH value banana figs prepared after 90 days of drying.

3.4 Vitamin C content (mg/100g) of banana figs

The results regarding vitamin C content (mg/100g) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety dwarf was observed maximum (10.75 mg/100g) vitamin C (mg/100g) content in banana figs as compared to variety giant which was observed minimum (7.55 mg/100g) vitamin C (mg/100g) content in banana figs. There were statistically significant differences in vitamin C content of banana varieties. The results revealed that the maximum (17.21 mg/100g) vitamin C (mg/100g) content was observed banana figs prepared after 0 days as compare to banana figs prepared after 1 day which was recorded (10.69 mg/100g) vitamin C(mg/100g) content. Banana figs prepared after 15, 30, 45, 60, 75 and 90 days was observed 10.16, 9.36, 8.19, 7.48, 5.78 and 4.34 vitamin C (mg/100g) content respectively. The interactive effect of varieties x treatments for vitamin C (mg/100g) content was also significant. The maximum (18.03 mg/100g) vitamin C(mg/100g) content was observed from interaction of variety dwarf from banana figs prepared after 0 days whereas, the minimum (1.31 mg/100g) vitamin C (mg/100g) content was recorded from variety giant in 90 days after drying of banana figs. It is clear from the results that variety Dwarf had more vitamin C (mg/100g) content of banana figs prepared after 0 day of drying.

3.5 Titratable acidity (%) of banana figs

The results regarding titratable acidity (%) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety giant was observed maximum (0.014%) titratable acidity (%) in banana figs as compared to variety dwarf which was observed minimum (0.012%) titratable acidity (%) in banana figs. There were statistically significant differences in titratable acidity (%) of banana varieties. The results revealed that the maximum (0.025%) titratable acidity (%) was observed banana figs prepared after 0 days as compare to banana figs prepared after 1 day which was recorded (0.017%) titratable acidity (%). Banana figs prepared after 15, 30, 45, 60, 75 and 90 days was observed 0.016, 0.012, 0.013, 0.014, 0.0069 and 0.0017 titratable acidity (%) respectively. The interactive effect of varieties x treatments for titratable acidity (%) was also significant. The maximum (0.030%) titratable acidity(%) was observed from interaction of variety giant from banana figs prepared after 0 day whereas, the minimum (0.0010%) titratable acidity (%)was recorded from variety giant in 90 days after drying of banana figs. It is clear from the results that variety giant had more titratable acidity (%) of banana figs prepared after 0 day of drying.

3.6 Total sugar (%) banana figs

The results regarding total sugar (%) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety dwarf was observed maximum (17.95%) total sugar (%) in banana figs as compared to variety dwarf which was observed minimum (17.04%) total sugar (%) in banana figs. There were statistically significant differences in total sugar of banana varieties. The results revealed that the maximum (20.36%) total sugar (%) was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days after drying which was recorded (19.61%) total sugar (%). Banana figs prepared after 0, 1, 15, 30, 45 and 60 days was observed 12.44, 16.52, 16.90, 17.28 and 18.19 total sugar % respectively. The interactive effect of varieties x treatments for total sugar was also significant. The maximum (20.38%) total sugar (%)was observed from interaction of variety dwarf from banana figs prepared after 90 day whereas, the minimum (11.67%) total sugar was recorded from variety giant in 0 day after drying of banana figs. It is clear from the results that variety dwarf had more total sugar (%) of banana figs prepared after 90 days after drying.

3.7 Reducing sugar (%) banana figs

The results regarding reducing sugar (%) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety dwarf was observed maximum (11.27%) reducing sugar (%) in banana figs as compared to variety giant which was observed minimum (8.37%) reducing sugar (%) in banana figs. There were statistically significant differences in total sugar of banana varieties. The results revealed that the maximum (13.42%) reducing sugar (%) was observed banana figs prepared after 90 days as compare to banana figs prepared after 0 days after drying (fresh banana) which was recorded (5.79%) reducing sugar (%). Banana figs prepared after 1, 15, 30, 45, 60 and 75 days was observed 8.25, 8.44, 9.48, 10.35, 11.05 and 11.78 total sugar respectively. The interactive effect of varieties x treatments for reducing sugar (%) was also significant. The maximum (14.36) reducing sugar (%) was observed from interaction of variety dwarf from banana figs prepared after 90 day whereas, the minimum (4.69%) reducing sugar was recorded from variety giant in 0 day after drying of banana figs. It is clear from the results that variety dwarf had more total sugar (%) of banana figs prepared after 90 days after drying.

3.8 Non-reducing sugar (%) banana figs

The results regarding non-reducing sugar (%) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety giant showed maximum (11.25%) non reducing sugar in banana figs as compared to variety dwarf with minimum (9.34%) non reducing sugar. There were statistically significant differences in non reducing sugar (%) of banana varieties. The results revealed that the maximum (14.08%) non reducing sugar was observed in banana figs prepared after 90 days as compared to banana figs prepared after 75 days after drying which was recorded (12.74%) reducing sugar. Banana figs prepared after 0, 1, 15, 30, 45, 60 and 75 days was observed 6.41, 8.33, 8.47, 9.37, 11.01 and 12.02 non reducing sugar (%) respectively. The interactive effect of varieties x treatments for non reducing sugar (%) was also significant. The maximum (15.57%) non reducing sugar (%) was observed from interaction of variety giant from banana figs prepared after 90 day whereas, the minimum (6.30) non reducing sugar (%) was recorded from variety dwarf in 0 day after drying of banana figs. It is clear from the results that variety giant had more non reducing sugar of banana figs prepared after 90 days after drying.

3.9 Ash (%) of banana figs

The results regarding Ash (%) of two varieties of banana figs are presented in Table-1. The results are statically significant among the varieties, treatments and their interaction. The results revealed that banana variety giant was observed maximum (1.11%) Ash in banana figs as compared to variety dwarf which was observed minimum (0.86%) Ash in banana figs. There were statistically significant differences in ash of banana varieties. The results revealed that the maximum (1.12%) Ash was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days after drying which was recorded (1.12%) Ash. Banana figs prepared after 0, 1, 15, 30, 45, 60 and 75 days was observed 0.46, 1.02, 1.03, 1.04, 1.07 and 1.086 Ash (%) respectively. The interactive effect of varieties x treatments for non reducing sugar (%) was also significant. The maximum (1.26%) Ash was observed from interaction of variety giant from banana figs prepared after 90 day whereas, the minimum (0.40%) Ash was recorded from variety dwarf in 0 day after drying of banana figs. It is clear from the results that variety giant had more Ash (%) of banana figs prepared after 90 days after drying.

3.10 Sensorial analysis

Prepared banana figs of both varieties were presented to a panel of judges for organoleptic attributed to be evaluated. For this, 9 points hedonic scale was used as per method [16].The panel members were selected on the basis of their familiarity with various parameters such as color, taste, palatability, texture and overall acceptability for the consumers. Before presentation of the coded banana figs to the panel of judges, they were briefed about the objectives of the study. The samples were coded and served to the panelists. The judges were provided with prescribed questionnaires to record their observation. The panelist's perceived the taste and rinsed mouth between samples. The experiment was repeated twice after each analysis. It is evident that slices stored in 40% sugar concentration greatly influences these attributes with a little loss in quality. The overall flavor impression is the result of the taste perceived by the taste buds in the mouth and the aromatic compounds detected by the epithelium in the olfactory organ in the nose the biochemical changes were slower and conversion of complex organic compound into esters, aldehydes, acids, alcohols, ketones and ethers that contribute significantly to the aroma/ flavor[17]. It was observed that storage time had no any significant effect on the color, flavor, taste, texture and palatability of banana fig.

TABLE 1

Ash (%),TSS (°Brix) of (%), pH, Vitamin C (mg/100g), Titratable acidity (%),Total sugar (%),Reducing sugar (%),Non- Reducing sugar (%) of Banana figs prepared from two different varieties

Treatments	Ash (%)	TSS 0f (°Brix) (%)	pH	Vitamin C (mg/100g)	Titratable acidity (%)	Total sugar (%)	Reducing sugar (%)	Non-Reducing sugar (%)
0 days (Fresh Banana)	0.4645 e	19.407 a	5.49 f	17.21 a	0.0258 a	12.440 h	5.797 h	6.413 g
After 1 day drying	1.0233 d	6.607 h	7.78 e	10.69 b	0.0179 b	16.523 g	8.250 g	8.333 f
After 15 days	1.0333 d	6.892 g	7.90 e	10.16 c	0.0161 bc	16.908 f	8.445 f	8.475 f
After 30 days	1.0450 cd	8.223 f	8.48 d	9.36 d	0.0129 d	17.288 e	9.482 e	9.370 e
After 45 days	1.0717 bc	9.187 e	9.27 c	8.19 e	0.0132 cd	18.192 d	10.355 d	11.012 d
After 60 days	1.0867 b	10.673 d	9.37 c	7.48 f	0.0143 cd	18.678 c	11.058 c	12.028 c
After 75 days	1.0917 ab	11.650 c	9.80 b	5.78 g	0.0069 e	19.617 b	11.783 b	12.747 b
After 90 days	1.1200 a	12.163 b	10.21 a	4.34 h	0.0017 f	20.360 a	13.425 a	14.018 a
LSD (P<0.05)	0.0322	0.2102	0.0830	0.0742	1.47003	0.1092	0.0809	0.0833
Varieties								
Giant	1.1144 a	12.300 a	8.00 b	7.55 b	0.0148 a	17.047 b	8.372 b	11.250 a
Dwarf	0.8696 b	8.901 b	9.08 a	10.75 a	0.0124 b	17.955 a	11.276 a	9.349 b
LSD (P<0.05)	0.0161	0.1051	0.1694	0.1516	3.00303	0.2229	0.1653	0.1700
T X V	**	**	**	**	**	**	**	**

Means in similar category of columns and rows with different alphabets differ significantly from each other at p<0.05 using LSD, **= Significant

TABLE 2

SENSORY ANALYSIS OF BANANA FIGS

Treatments	Day 1	Day 15	Day 30	Day 45	Day 60	Day 75	Day 90
Colour							
Figs(G)	8.50	8.26	7.98	7.92	6.45	6.24	6.05
Figs(D)	7.64	7.36	6.04	6.00	6.78	5.81	5.52
Flavor							
Figs(G)	8.81	8.60	7.95	7.85	7.98	6.80	6.65
Figs(D)	7.74	7.65	7.20	6.82	6.65	6.25	5.55
Taste							
Figs(G)	8.90	8.81	8.75	7.56	7.60	6.98	6.85
Figs(D)	7.88	7.74	6.55	6.70	5.98	5.82	5.68
Texture							
Figs(G)	8.82	8.75	7.88	7.75	7.62	7.54	6.88
Figs(D)	6.85	6.74	6.66	5.88	5.70	5.66	5.45
Palatability							
Figs(G)	8.99	8.80	8.75	7.88	7.79	7.65	7.55
Figs(D)	7.89	7.80	7.75	7.60	7.55	7.45	7.30

Note: 9 Points Hedonic Scale: [Like extremely-like very much= 8-10 scores], [like moderately-like slightly= 5-7 scores], [neither like nor dislike-dislike slightly-dislike moderately= 2-4 scores] and [dislike very much-dislike extremely= 0-1 score].

The results of the present investigation showed that banana variety giant recorded maximum total soluble solids in banana figs as compared to Dwarf variety of banana. Whereas the maximum total soluble solids in banana chips was recorded from variety Dwarf. On other hand the maximum total soluble solids was observed from banana figs prepared after 90 days followed by banana figs prepared after 75 days. However, the maximum total soluble solids noted from banana chips prepared after 90 days as compare to banana chips prepared after 75 days. The results are statistically significant at (P> 0.05) probability level. Similarly Akhter *et al.* (2012) they reported that the maximum TSS (19.89 %) content was observed in fruit

pulp. The results also indicated that the variety dwarf was observed maximum pH values in banana figs as compared to variety giant. However, the banana variety dwarf was observed maximum vitamin C in banana figs as compared to variety giant which was recorded minimum vitamin C. It is obvious from the results the maximum pH was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days pH value. However, the lowest pH value was observed under fresh banana after 0 days. Whereas, maximum pH value was observed banana chips prepared after 90 days as compare to banana chips prepared after 75 days. The results are statistically significant at (P> 0.05) probability level. Results are similar with the findings of Abbas et *al.* (2011) they studied the physicochemical properties of banana pulp and peel flours prepared from green and ripe fruits. Banana pulp and peel flour prepared from green and ripe Cavendish banana were assessed for physicochemical properties such as pH, total soluble solids (TSS). Out result are close to the findings of several scientist. They reported that the pH of Cavendish and Dream bananas was found 4.77and 4.63 respectively. Similar results in respect of pH content were also reported to be 4.62 to 5.023 (Suntharalingam and Ravindran, 1993; Abbas *et al.*, 2011 and Soltani, 2010). Abdullah *et al.* (2001) who showed that the range of pH values for banana fruits at the early stages of maturity was between 5.0 and 5.8, but decreased to between 4.2 and 4.8. According to Van and Lee (20003) they reported the ascorbic acid content increased two fold when bananas were ripened from the 'green, hard pulp' stage to the 'yellow,soft pulp with cream' stage, and this was related to the change in pH value.The variety dwarf was observed maximum vitamin C content in banana chips as compared to variety giant which was observed minimum vitamin C content. On other hand the higher vitamin C was observed banana figs prepared after 0 days as compare to banana figs prepared after 1 day. Whereas, the maximum vitamin C was observed banana chips prepared after 0 days as compare to banana chips prepared after 1 day. The variety giant was observed maximum titratable acidity in banana figs as compared to variety dwarf which was observed minimum titratable acidity (%). Whereas, the maximum titratable acidity (%) was observed banana figs prepared after 0 days as compare to banana figs prepared after 1 day. The results are statistically significant at (P> 0.05) probability level. The present findings agree with the findings where vitamin C content was found as 25 mg/100 g and 17.01 mg/100 g (Abdullah, *et al.* 2003). Akhtar *et al.* (2012) they studied that the maximum vitamin C (29.61 ml/100 g) were better in germplasm No. 6 (Seeded kola) and germplasm No. 5 (Kathali kola-1). The results support the findings whereas titrable acidity was found 3.14. Titrateble acidity of banana fruits at different level of ripeness was shown, on an average, as 3.529% (Soltani, 2010).It is seen from the results the variety giant was observed maximum titratable acidity (%) in banana chips as compared to variety dwarf which was observed minimum titratable acidity (%) in banana chips. However, the maximum titratable acidity (%) was observed banana chips prepared after 0 days as compare to banana chips prepared after 1 day. The results are statistically significant at (P> 0.05) probability level. Similarly Akhter *et al.* (2012) they observed that maximum titrable acidity (12.80 %) of fruit pulp were determined from germplasm No. 1 (Sagor kola-1). pH (5.140). The variety dwarf was observed maximum total sugar in banana figs as compared to variety dwarf which was observed minimum total sugar (%). However, the variety dwarf was observed maximum total sugar (%) in banana chips as compared to variety giant. It is observed from the results the maximum total sugar (%) was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days after drying total sugar. Whereas, the maximum total sugar was observed banana chips prepared after 90 days as compare to banana chips prepared after 0 days after frying (fresh banana). Similarly Chacon *et al.* (2003) mentioned the total reducing sugar in green and ripe bananas were 0.52% and 10.3%, respectively. Stratton and Loesecke (2005) reported that reducing sugar content increased progressively from 0.24% to 15.3%.The variety dwarf was observed maximum reducing sugar (%) in banana figs as compared to variety giant which was observed minimum reducing sugar (%). Whereas, the maximum reducing sugar (%) was observed banana figs prepared after 90 days as compare to banana figs prepared after 0 days after drying (fresh banana). The variety dwarf was observed maximum reducing sugar (%) in banana chips as compared to variety giant which was observed minimum reducing sugar (%) in banana chips. The maximum reducing sugar was observed banana chips prepared after 90 days as compare to banana chips prepared after 75 days after drying.The results indicated the variety giant was observed maximum non reducing sugar (%) in banana figs as compared to variety dwarf. However, the maximum non reducing sugar was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days after drying. The variety dwarf was observed maximum non reducing sugar in banana chips as compared to variety giant which was observed minimum non reducing sugar in banana chips. However, the maximum non reducing sugar was observed banana chips prepared after 90 days as compare to banana chips prepared after 75 days after frying. Abdullah *et al*. (2003) conducted an experiment on physicochemical changes during maturation and after ripening of banana and reported that total sugar content increased during ripening. Tripathi *et al*. (1981) also found the similar result. The variety giant was observed maximum ash content in banana figs as compared to variety dwarf which was observed minimum ash content. On other hand the maximum ash content was observed banana figs prepared after 90 days as compare to banana figs prepared after 75 days after drying. The variety giant was also observed maximum ash content in

banana chips as compared to variety dwarf which was observed minimum ash content in banana chips. However, the maximum ash content was observed banana chips prepared after 90 days as compare to banana chips prepared after 60 days after frying. Prepared Banana fig and chips of both varieties were presented to a panel of judges for organoleptic attributed to be evaluated. For this, 9 points structured hedonic scale was used to evaluat the sample described by Larmond (1977). The five trained panelist were selected on the basis of their familiarity with various parameters such as colour, taste, palatability, texture and overall acceptability for the consumers. Before presentation of the coded banana chips and figs to the panel of judges. The samples were coded and served to the panelists. The judges were provided with prescribed score card sheet to record their observation. The panelists expectorated the taste and rinsed mouth using water between samples. The experiment was repeated twice after each analysis. The overall flavor impression is the result of the taste perceived by the taste buds in the mouth and the aromatic compounds detected by the epithelium in the olfactory organ in the nose the biochemical changes were slower and conversion of complex organic compound into esters, aldehydes, acids, alcohols, ketones and ethers that contribute significantly to the aroma/ flavor (McWilliam, 1989). It was observed that storage time had some of significant effect on the color, flavor, taste, texture and palatability of both varieties of banana figs and chips

IV. CONCLUSION

The study was conducted to determine the physico-chemical characteristics of two banana varieties and to develop products. The banana figs and chips from (8 to 10 days) like very much and superior in term of taste, flavor, texture, palatability, color. So it was concluded that the 90 days produced good results for frying and drying of banana figs. All the traits, varieties, treatments and their interaction (varieties x treatments) were significant, Gaint variety of banana produced good results after 90 days of frying and drying of banana figs.

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