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Assessment of Storage Stability of *Tinosporacordifolia (*Giloy*)* Based Squash

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Abstract:
Tinosporacordifolia (Giloy) is enriched in nutritional and therapeutic values, consumed by the people hardly in the form of decoction to cure certain ailments. There is an urgent need for recognition of medicinal properties of giloy. The plants are well known for their phyto-chemical constituents. Results of the study revealed that Giloycontainsgood amount of crude fibre (12.73) and ash content (8.35%) respectively and also enrich in various minerals, especially calcium and iron (9.41 & 9.29 mg/100g) respectively. Presently, it was attempted to utilize giloy stem samples for preparation of RTS. The prepared products were assessed for chemical, nutritional and sensory parameters. These parameters were analyzed in fresh samples as well as after the storage of 30, 60, 90 and 120 days. The beverage prepared from giloy was acceptable up to 120 days and blending of kinnow further improved the sensory quality as well. However, a slight decline in various constituents like pH, ascorbic acid and non-reducing sugars was observed during storage. In the present scenario, where lot of emphasis is being laid on the consumption of healthy foods, development of such products might help the consumers to harness the nutritional and medicinal properties of such unexploited locally available herb.

1. Introduction

Since the past decade, the therapeutic use of herbal medicine is gaining considerable momentum in the world. Due to toxicity and side effects of allopathic medicines, there is an increased trend on use of herbal medicines in the field of medical sciences. Approximately, 80 per cent of the population of our country use traditional medicines for their primary health care. So there is a great need for the recognition of the medicinal and economic benefits of flora and fauna grown in the lap of Himalayas.

Tinosporacordifoliabelongs to the family Menispermaceae and is commonly known as Giloy, a Hindu mythological term that refers to the heavenly Elixir. Giloy is used in the traditional medicinal system since ages. Mainly the stem and roots are used as herbal remedies. The plant is a large, glabrous, deciduous climbing shrub and distributed throughout tropical Indian sub-continents, extending from the Himalayas down to the southern part of Peninsular India. The stem is bitter in taste and stimulates bile secretion, stomachic, diuretic and cures jaundice. It is a best remedy for children suffering from upper respiratory tract infections (Vedavathy and Rao 1991). The crude extract of dry stem of Tinosporacordifolia enhanced immune responses (Manjrekar et al. 2009).The extract of cordifoliahas an anti- hyperglycemic property (Rajalakshmi et al. 2009). It might increase the leucocytes and phagocytic cells (Dikshit et al. 2000).

So far, not much work has been reported on the estimation of quality attributes and product development of Giloy. Traditionally people are consuming in the crude form as a remedial measure in certain ailments. So, keeping in view its therapeutic as well as nutritional values, the present study was envisaged with the objective of the development and evaluation of value added product by using Giloystems

2. Materials and Methods

The present investigation was conducted in the Department of Food Science, Nutrition and Technology, College of Home Science, CSK HPKV, Palampur. The raw material was procured from nearby, villages. The stems were cleaned, washed properly to remove any dust and debris. The juice was extracted as explained under Figure 1.

3. Development of Beverage (Squash) by using *Giloy* Stems

Preliminary work was done to standardize the recipe for beverages by using various blends of juices (*Giloy*and Kinnow). The prepared samples were offered to judges to know the best level of proportion of fruits with plant juices. The treatments and sub treatments are described in Table 1.

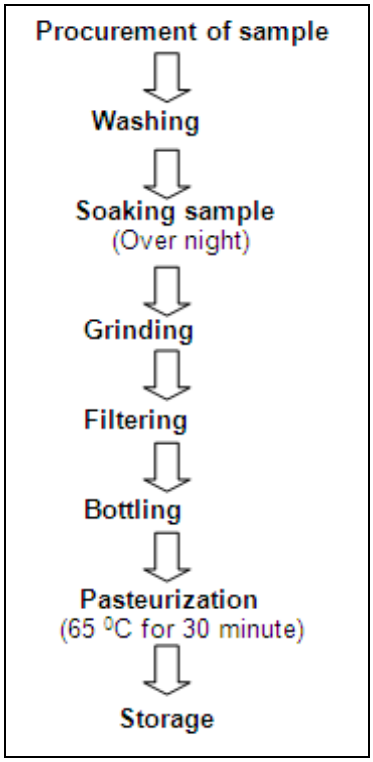

Figure 1: Unit operations for the extraction of juice

Treatment		**Subtreatments**	
100%Giloy	T_0	0 days	S_0
75G:25Kinnow	T_1	30 days	S_1
50G:50Kinnow	T_2	60 days	S_2
25G:75Kinnow	T_3	90 days	S_3
100%K innow	T_4	120 days	S_4

Table 1: Treatments, Sub treatments, & Interations

Interactions				
S_0T_0	S_1T_0	S_2T_0	S_3T_0	S_4T_0
S_0T_1	S_1T_1	S_2T_1	S_3T_1	S_4T_1
S_0T_2	S_1T_2	S_2T_2	S_3T_2	S_4T_2
S_0T_3	S_1T_3	S_2T_3	S_3T_3	S_4T_3
S_0T_4	S_1T_4	S_2T_4	S_3T_4	S_4T_4

The stored juice was used for the preparation of squash as per FSSAI specification. The prepared samples were evaluated for nutritional and organoleptic evaluation by using standard techniques.

3.1. Plate 1Nutritional evaluation of Giloysquash

Figure 2: 100:0 per cent Giloysquash

Figure 3: 25:75 per cent Kinnow:

Figure 4: 50:50 per cent Kinnow:

Figure 5: 75:25 per cent Kinnow:

Figure 6: 100:0 per cent

3.2. Evaluation of Products during Storage

3.2.1. Physical Evaluation

The colour and shape of the samples were observed from their physical appearance through visual perception. Whereas weight was recorded by taking ten cut pieces of equal sized stem of *Giloy* in triplicate were randomly selected and weighed on an electrical weighing balance. The length was measured by using ten cut pieces of equal sized stem of *Giloy* in triplicate were taken up randomly and the length was measured by scale and the circumference was measured by taking ten cut pieces of equal sized stem of *Giloy* in triplicate selected randomly to measure diameter with the help of a vernier caliper and circumference thus obtained by dividing the diameter by two.

3.2.2. Chemical and Nutritional Evaluation

The proximate composition is done by using standard methods as prescribed by AOAC,1990 whereas, ADF and NDF were estimated by the method given by Soest and Wine,1967.The various nutritional parameters viz. pH, TSS, Per cent acidity, Ascorbic acid, Minerals and Sugars were estimated by following the methods given by Rangana,1995.

3.2.3. Organoleptic Evaluation

The organoleptic evaluation was done as per method suggested by Gould (1978). The sensory attributes like colour, flavor, taste, consistency and over all acceptability of the products were evaluated. A minimum of 10 judges were selected at random. The judges were required to record their preferences and acceptability of products on the evaluation sheets.

3.2.4. Results and Discussion

The results thus obtained are described as follows under pertinent heads and discussed appropriately.

3.2.5. Physical Evaluation

*Giloy*stem was evaluated physically in terms of colour, shape, length, weight and circumference.

The colour of the *Giloy*stem was found light brown. Shape of the test species was delineated in the Plate 1. The shapes of the plants were found to be cylindrical. The Table 2 shows the mean length 4.50 cm of the *Giloy*stem. The weight of the *Giloy*stem was found to be 1.71 g. The circumference of *Giloy*stem was established as 0.40. Raoof and Siddiqiui (2012) reported the length 8.32±0.13 cm in

*Giloy*stem. However, a slight variation found in parameters might be due to varietal differences, agro climatic conditions, maturity and the time of the harvesting.

Sample	Length (cm)	Weight (g)	Circumference (cm)	Color	Shape
Giloy	4.50	1.71	0.40	Light brown	Cylindrical

Table 2: Physical parameters of selected samples

3.2.6. Chemical Evaluation

The data pertaining to proximate composition is depicted in the Table (3) On perusal of data in table, per cent moisture, protein and fat contents in *Giloy*stems were observed as 10.63, 2.13 and 1.92, respectively. Ash gave insight of the mineral composition and the value in the Table revealed the ash content and which came out to be 6.35 cent in case of *Giloy*stem.

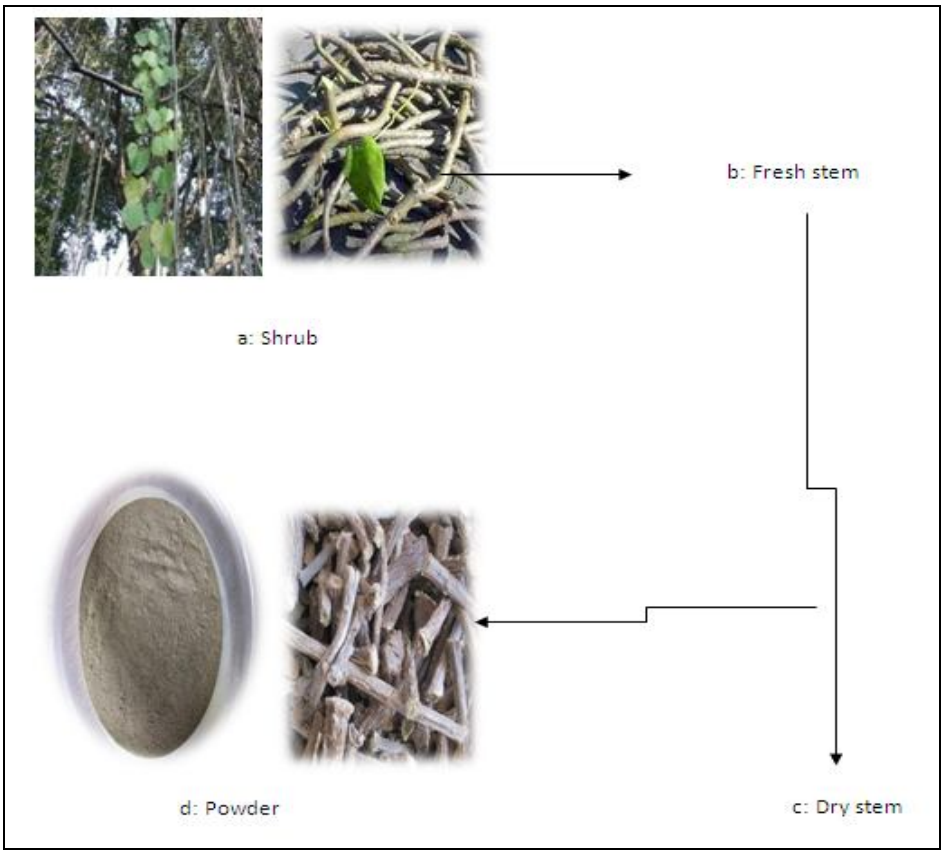

Figure 7: Plate 1 Physical appearance of Giloy

The values for the crude fibre were calculated as 5.72 per cent in the same sample. Whereas, NDF and ADF was attained as stem 24.80 & 33.80 percent respectively. Nile and Khobragade (2009) reported the values for ash (12.40 %), moisture (18.34 %), crude fat (3.10 %) crude protein (4.50%) and crude fibre (15.90%) of *Giloy*stem. Though the results were closer to some of the values reported in the literature. However, a slight variation was found in some of the parameters which might be due to varietal differences, agro climatic conditions, maturity and the time of the harvesting.

Parameters	*Giloy* (In per cent)
Moisture Content	10.63
Protein	2.13
Fat	1.92
Ash	6.35
Crude Fibre	5.72
NDF	24.80
ADF	25.20

Table 3: Proximate composition of Giloy

Each value representing the mean of three values.

3.2.7. Nutritional Evaluation of *Giloy* and Kinnow

The value of nutritional parameters in respect of *Giloy*stem and Kinnow respectively are represented in the Table 4. The value for TSS in case of *Giloy*stem and Kinnow were found to be 3.00 and 4.00 ^{0}Brix respectively. Whereas, the values for the pH and per cent acidity in the same series of the samples were calculated as 7.20, 2.30 and 0.13,1.28 respectively. The values for ascorbic acid were found as 3.60, 18.00 mg/100g in case of *Giloy*stem and Kinnow respectively. The total sugars, reducing sugars and non reducing sugars were calculated as 2.84, 7.50; 0.36, 5.40; 2.34 and 1.99 per cent in case of *Giloy*stem and Kinnow respectively.

Parameters	***Giloy***	**Kinnow**
TSS ^{0}Brix	3.00	4.00
pH	7.20	2.30
Acidity (%)	0.13	1.28
Ascorbic acid (mg/100g)	3.60	18.00
Total sugars (%)	2.84	7.50
Reducing sugars (%)	0.36	5.40
Non-reducing sugars(%)	2.34	1.99

Table 4: Nutritional parameters of Giloyand Kinnow

Each value representing the mean of three values.

3.2.8. Mineral Evaluation

*Giloy*stem were evaluated for different mineral constituents. The value for the Calcium, Iron, Copper, Manganese, Zinc, Sodium and Potassium in case of *Giloy*stem were calculated as 9.41, 0.29, 0.05, 0.01, 0.12, 0.45, 0.84 mg/100g respectively and reported in Table 5. On the contrary, Nile and Khobragade (2009) reported the mineral content on the lower side. This might be due to agro-climatic conditions or varietal differences.

Elements	***Giloy* (mg/100g)**
Calcium	9.41
Iron	0.29
Copper	0.05
Manganese	0.01
Zinc	0.12
Sodium	0.45
Potassium	0.84

Table 5: Mineral Content of Giloy

Each value representing the mean of three values.

*3.2.9. Giloy*Squash

An effort was made to prepare the *Giloy* squash blended with the kinnow not only to improve the taste but also to improve the appearance and the nutritional values.

The products were kept in the storage to check the shelf- stability of the products. Evaluation was done after every 30 days interval for nutritional chemical and organoleptic parameters. The results are discussed as follows.

3.2.10. Nutritional parameters

Following nutritional parameters were evaluated.

3.2.11. Total soluble solids

The data in the Table6depicted the values for the total soluble solids and showed the effect of storage on the TSS. The values varied significantly within treatments and there was a significant increase in total soluble solid with the storage. The mean values of the squash were ranged from 44.07 to 45.01^{0}Brix. There was a non-significant increase when the product was analysed after the 30 days period the values observed for 0 and 30 days were 44.90, 44.91, 44.55, 44.05, 45.00; 44.92, 44.91, 44.56, 44.05, 45.00 0Brix for T_o, T_1, T_2, T_3, T_4, respectively. The values of 60, 90 and 120 days were observed as 44.94, 44.93, 44.57, 44.05, 45.01; 44.94, 44.96, 44.60, 44.08, 45.02; and 44.96, 44.98, 44.62, 44.08, 45.03, respectively. The increased total soluble solid was due to hydrolysis of polysaccharides like starch, pectin and cellulose substance into simple substances. Analogous observations were also recorded by Gajanana (2007) in amla juice.

Storage Days Treatments	Fresh	30	60	90	120	
T_0	44.90	44.92	44.94	44.94	44.96	44.93
T_1	44.91	44.91	44.93	44.96	44.98	44.94
T_2	44.55	44.56	44.57	44.60	44.62	44.58
T_3	44.05	44.05	44.05	44.08	44.08	44.07
T_4	45.00	45.00	45.01	45.02	45.03	45.01
	44.68	44.69	44.70	44.72	44.73	

Table 6: Effect of storage intervals on TSS (%) of Giloy squash

CD ($P \leq 0.05$)
A= NS B= NS A x B = 2.09

3.2.13. pH

The Table7 describes the data of pH of squash and effect of storage on the pH. The data showed that significant difference between the treatments and significant decrease in pH values. The reading of the fresh samples were 5.66, 5.76, 4.72,3.60, 2.28 for the T_o, T_1, T_2, T_3, T_4., respectively. The mean values of the pH were 5.59, 5.66, 5.64, 3.51, 2.20 for T_o, T_1, T_2, T_3, T_4, respectively. This decrease in pH value might be due to chemical reactions between the chemical constituent of juice induced by temperature influencing the enzymatic reaction. The results are in line with the work of Sriniwas et al. (2007) . Jain et al. (1986) alsoobserved the same on *Phalsa, Kaphal* and *Litchi* squashes.

Storage Days Treatments	Fresh	30	60	90	120	
T_0	5.66	5.63	5.59	5.56	5.52	5.59
T_1	5.76	5.69	5.65	5.61	5.57	5.66
T_2	4.72	4.68	4.65	4.61	4.57	4.65
T_3	3.60	3.56	3.51	3.45	3.42	3.51
T_4	2.28	2.24	2.21	2.16	2.13	2.20
	4.40	4.36	4.32	4.28	4.24	

Table 7: Effect of storage intervals on pH of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B= 0.02 A x B = NS

3.2.14. Acidity

The per cent titrable acidity was determined in terms of citric acid. The Table 4.64reported the data related to acidity and storage study. The data showed that there was a significant difference in the treatments and significant

Storage Days Treatments	Fresh	30	60	90	120	
T_0	0.31	0.35	0.41	0.46	0.55	0.41
T_1	0.46	0.49	0.51	0.54	0.56	0.51
T_2	0.72	0.75	0.78	0.81	0.84	0.78
T_3	1.06	1.09	1.14	1.18	1.23	1.14
T_4	1.50	1.52	1.55	1.59	1.61	1.56
	0.81	0.84	0.88	0.92	0.96	

Table 8 : Effect of storage intervals on Acidity (%) of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B= 0.02 A x B = NS

Increased acidity. The values for fresh samples were observed as 0.31, 0.46, 0.72, 1.06, 1.50 for T_o, T_1, T_2, T_3, T_4., respectively and the mean values of the acidity was observed 0.41, 0.51, 0.78, 1.14, 1.56 for T_o, T_1, T_2, T_3, T_4, respectively. The increase in acidity might be due to hydrolysis of polysaccharide and non-reducing sugars where acid is utilized for converting hexose sugars in the presence of metal ions. Same results were reported by Gajanana (2007) in amla juice.

3.2.15. Ascorbic Acid

The effect of storage on ascorbic acid was reported in Table 9. The Table showed that there wasa significant difference between the treatments and significant decrease in ascorbic acid during the storage. The values for fresh samples were observed as 2.49, 3.83, 4.51, 5.45, 8.96 mg/100g for the T_o, T_1, T_2, T_3, T_4., respectively. The mean values of the ascorbic acid were observed as 2.39, 3.71, 4.42, 5.35, 8.87 for T_o, T_1, T_2, T_3, T_4, respectively. The values of 30 day were observed as 2.44, 3.76, 4.46, 5.41, 8.93 respectively and the

value for the 60, 90 and 120 days were observed as 2.39, 3.76, 4.42, 5.35, 8.87; 2.36, 3.62, 4.39, 5.29, 8.83,4.89 and 2.32, 3.56, 4.31, 5.24, 8.78 mg/100g respectively. The decreased ascorbic acid might be due to the fact that ascorbic acid easily oxidized by the light, heat and oxygen the similar results reported by Choudhary et al. (1984) and Reman et al. (1964).

Storage Days Treatments	Fresh	30	60	90	120	
T_0	2.49	2.44	2.39	2.36	2.32	2.39
T_1	3.83	3.76	3.76	3.62	3.56	3.71
T_2	4.51	4.46	4.42	4.39	4.31	4.42
T_3	5.45	5.41	5.35	5.29	5.25	5.35
T_4	8.96	8.93	8.87	8.83	8.78	8.87
	5.05	5.00	4.96	4.89	4.84	

Table 9 : Effect of storage intervals on Ascorbic acid (mg/100) of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B= 0.02 A x B = NS

3.2.16. Total sugars

The data presented in the Table10 showed the effect of storage on the total sugars. There was a significant difference found in the treatments but non-significant increase in the total sugars. The mean values of the total sugars 31.59, 31.42, 30.09, 31.37, 31.01 for T_o, T_1, T_2, T_3, T_4, respectively. The values for total sugars for fresh samples were 31.58, 31.39, 30.08, 31.36, 31.00^0 Brix and the values for the 30 days were 31.59, 31.43, 30.08, 31.36, 31.01^0 Brix for T_o, T_1, T_2, T_3, T_4., respectively and the values for the same on 60, 90, 120 were observed as 31.58, 31.43, 30.09, 31.37, 31.01^0 Brix; 31.59, 31.44, 30.09, 31.37, 31.02 and 31.60, 31.45, 31.10, 31.38, $31.03,^0$ Brix respectively. The slight increased total sugars might be due to hydrolysis of the polysaccharides during the storage. The same results were reported by the Reddy and Chikkasubbanna (2008) in lime blended aonla squash.

Storage Days Treatments	Fresh	30	60	90	120	
T_0	31.58	31.59	31.58	31.59	31.60	31.59
T_1	31.39	31.43	31.43	31.44	31.45	31.42
T_2	30.08	30.08	30.09	30.093	30.10	30.09
T_3	31.36	31.36	31.37	31.37	31.38	31.37
T_4	31.00	31.01	31.01	31.02	31.03	31.01
	31.08	31.09	31.09	31.10	31.11	

Table 10: Effect of storage intervals on Total sugars (%) of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B=0.02 A x B = NS

3.2.17. Reducing Sugars

The data in the Table11 depicted the values for reducing sugars and the effect of storage on the reducing sugars. The Table showed that there was significant difference between the treatments and significant increase in the reducing sugars. The mean values of the reducing sugars were observed as 11.14, 11.05, 11.38, 11.08, 11.12 for T_o, T_1, T_2, T_3, T_4 respectively. Reducing sugars of fresh samples were observed as 11.11, 11.01, 10.95, 11.05, 11.07 and the values for the 30 and 60 days were observed as 11.13, 11.03, 11.96, 11.06, 11.09; 11.13, 11.04, 11.98, 11.08, 11.11 for T_o, T_1, T_2, T_3, T_4, respectively. The values for 90 and 120 days were 11.16, 11.08, 10.99, 11.10, 11.16 and 11.17, 11.09, 11.01, 11.11, 11.16, respectively. The increased reducing sugars might be due to conversion of sucrose into glucose. The results are in evident with Das (2009) and Roy et al. (1997). This gives credence to the present findings.

Storage Days Treatments	Fresh	30	60	90	120	
T_0	11.11	11.13	11.13	11.16	11.17	11.14
T_1	11.01	11.03	11.04	11.08	11.09	11.05
T_2	10.95	11.96	11.98	10.99	11.01	11.38
T_3	11.05	11.06	11.08	11.10	11.11	11.08
T_4	11.07	11.09	11.11	11.16	11.16	11.12
	11.04	11.25	11.27	11.09	11.11	

Table 11: Effect of storage intervals on Reducing sugars (%) of Giloy squash

CD ($P \leq 0.05$)
A= 0.05 B= 0.05 A x B = NS

3.2.18. Non-Reducing Sugars

The data in the Table12depicted the values for the non-reducing sugars and the effect of the storage on the reducing sugars. The Table shows that there was a significant difference between the treatments and there were significant decreased in non-reducing sugars during the storage. The mean values of the reducing sugars were observed as 21.52, 21.45, 20.51, 21.35, 20.93 for the T_o, T_1, T_2, T_3 and T_4, respectively. The values for fresh samples were observed as 21.45, 21.48, 20.13, 21.37, 20.97 and the values were observed as 60 and 120 days were 21.52, 21.46, 20.11, 21.35, 20.49 and 21.50, 21.43, 21.09, 21.33, 20.91 for T_o, T_1, T_2, T_3, T_4, respectively. The significant decreased non-reducing sugars might be due to the hydrolysis of non-reducing sugars into reducing sugars. The results are in line with Shivani (2011) and Das (2009).

Storage Treatments	fresh	30	60	90	120	
T_0	21.54	21.53	21.52	21.50	21.50	21.52
T_1	21.48	21.470	21.46	21.43	21.43	21.45
T_2	20.13	20.12	20.11	21.10	21.09	20.51
T_3	21.37	21.36	21.35	21.33	21.33	21.35
T_4	20.97	20.96	20.94	20.88	20.91	20.93
	21.09	21.08	21.08	21.25	21.25	

Table 12: Effect of storage intervals on Non-reducing sugars (%) of Giloy squash

CD ($P \leq 0.05$)
A= 0.04 B= 0.04 A x B = NS

3.2.19. Effect of storage on Organoleptic parameters of *Giloy* squash

One of the objectives of the present investigation was to seek consumers' acceptability of the *Giloy* based squash. And the organoleptic scores obtained for different attributes are described in Table 13

3.2.20. Colour

Visual stimuli of colour is an important organoleptic appraisal. The Table13 depicted the data for the colour of squash. It showed that there was a significant difference between the treatments and significant decreased colour while storage. The best colour was found in T_2 treatment and the treatments which got the lowest score was the T_0 treatment. The Table clearly depicted that there was significant decreased colour and this decrease might be due to certain chemicals reaction which might have taken place during storage. It might be attributes to the loss of ascorbic acid which acted as anti-oxidant, SO_2 and also the increase of tannins which might be lead to darkening of the product. This was also supported by the findings of Sood (2000).

Storage Days Treatments	Fresh	30	60	90	120	
T_0	7.03	6.77	6.42	6.04	5.67	6.39
T_1	7.05	6.82	6.54	6.28	5.94	6.53
T_2	8.15	7.83	7.47	7.13	6.76	7.47
T_3	7.54	7.12	6.86	6.54	6.18	6.85
T_4	8.05	7.73	7.46	7.15	6.72	7.42
	7.56	7.25	6.95	6.63	6.25	

Table 13: Effect of storage intervals on Colour of Giloy squash

A= 0.02 B= 0.02 A x B = NS

3.2.21. Taste

The Table 14 depicted the data for the taste of squash. The Table showed that there was a significant difference between the treatments and significant decreased taste of squash with the increased storage time. The mean values for the taste were observed as 5.44, 5.73, 6.53, 6.81, 7.15 for the T_o, T_1, T_2, T_3 and T_4 treatments respectively. The significant decreased taste might be due to loss of flavour component during storage. The results are in line with Sethi (1993).

Storage Days Treatments	Fresh	30	60	90	120	
T_0	6.12	5.76	5.42	5.16	4.73	5.44
T_1	6.57	6.19	5.74	5.32	4.80	5.73
T_2	7.21	6.77	6.42	6.15	6.11	6.53
T_3	7.64	7.26	6.74	6.33	6.05	6.81
T_4	7.95	7.54	7.16	6.74	6.38	7.15
	7.09	6.70	6.29	5.94	5.62	

Table 14: Effect of storage intervals on Taste of Giloy squash

CD ($P \leq 0.05$)
A= 0.09 B= 0.09 A x B = NS

3.2.22. Flavour

The Table15 depicted that values for the flavour, the data showed that significant difference was found between the treatments and also significant decreased flavour with the increased storage period. The mean values of the flavour were 5.66, 6.05, 6.36, 6.81, and 7.16 for the S_oT_o, S_oT_1, S_oT_2, S_oT_3, S_oT_4, respectively. The decreased flavour might be due to loss of volatile aromatic substances.

Storage Days Treatments	Fresh	30	60	90	120	
T_0	6.23	5.92	5.67	5.43	5.04	5.66
T_1	6.67	6.35	6.03	5.76	5.42	6.05
T_2	7.04	6.76	6.32	6.06	5.63	6.36
T_3	7.53	7.16	6.83	6.47	6.04	6.81
T_4	7.87	7.43	7.17	6.86	6.45	7.16
	7.07	6.72	6.40	6.12	5.72	

Table 15: Effect of storage intervals on Flavour of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B= 0.02 A x B = NS

3.2.23. Consistency

The Table16 depicted the value for the consistency. The data showed that there wasa significant difference between the treatments and also significant decrease in the consistency during the storage. The mean values for the squash were 6.89, 7.19, 7.23, 7.59, 7.46 for the T_o, T_1, T_2, T_3, T_3 and T_4 treatments respectively. The decreased consistency was due to losses of soluble solids.

Storage Treatments	fresh	30	60	90	120	
T_0	7.60	7.26	6.88	6.54	6.17	6.89
T_1	7.66	7.32	7.15	6.98	6.87	7.19
T_2	7.63	7.45	7.21	7.03	6.82	7.23
T_3	7.83	7.63	7.71	7.57	7.25	7.59
T_4	7.80	7.65	7.42	7.31	7.12	7.46
	7.70	7.46	7.27	7.09	6.85	

Table 16: Effect of storage intervals on Consistency of Giloy squash

CD ($P \leq 0.05$)
A= 0.02 B= 0.02 A x B = NS

Figure 8

4. Conclusions

Giloy has immense nutritional and therapeutic values as recorded in literature for the treatment of various liver disorder, inflammatory diseases, digestive ailments, respiratory disorder, diabetes and heart disorders. But due to its bitter taste, it is not possible to consume in a raw form. Beverage prepared by using this plant is not explored commercially, which may help to enhance its utilization. It was attempted to prepare herbal beverage viz. Squash. Further, the samples were blended with kinnow at varying proportions to improve the overall colour, taste, and nutritional properties. Simultaneously, an assessment of storage stability was also made. From storage study, it was found that the beverage can be kept beyond 120 days without any degradation. The standard protocols were used to analyze the nutritional parameters for the fresh samples analysis as well as value added product.

Beverage namely Squash was made and analyzed for their storage stability for four months and it is found that control beverages i.e. 100 per cent Giloy have the best consistency and storage stability when compared with other blend ratio.

The value added products prepared from Giloy could be exploited commercially in order to add variety, improve overall health and can be good alternatives for the health conscious persons.

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