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Study on development, quality attributes and shelf life of mix vegetable jam

Pooja Gajanan Dahikar and KL Bala

Abstract

Jams are highly liked and nutritious foods in human diet. The aim of this research behind the nutritive value of vegetables and to study their acceptability of these jam as a vegetable product. The jam was prepared according to 3 treatments. The treatments were T0, T1, T2 and T3. The samples were fill in the PET container and evaluation was carried out for total period of 28 days. Treatment was prepared by different formulation were adding with (Pumpkin, bottle gourd, tomato, sugar, pectin and citric acid). The Physico-chemical characteristics of mix vegetable jam (ash content, moisture content, acidity, pH, TSS.) sensory characteristics (color, texture, test and flavor,) and study shelf life of mix vegetable jam. The result of these study says that the highest ash content 0.91% for T3 and the lowest 0.88% for T1, highest moisture content 32.95% for T1 and the lowest 29.03% for T2, highest acidity content 1.4% for T1 and the lowest 0.72% for T3, Highest pH content 4.70% for T1 and the lowest 3.87% for T3, Highest TSS content 67.25% for T3 and the lowest 66.12% for T1. And the overall acceptability average rating of different sample of mix vegetable jam was found to be 7.3, 7.5, 7.8 and 6.9. Jam is a nutrition food for children's. Jam prepared from those vegetables which are mostly dislikes by children's nowadays. The prepared jam is nutritious, healthy as well as economically sound to consumers. It does not have fat and cholesterol which helps to gain a healthy weight. The results of this investigation are in line with previous research on the benefits of vegetables and their beneficial health effects of lowering risks for chronic conditions such as cardiovascular disease. This study provides some support for the benefits of including vegetables in the regular diet.

Keywords: Nutritive value, shelf life, pumpkin, bottle guard, tomato, cholesterol, health effect, cardiovascular diseases

Introduction

Jams are highly liked and nutritious foods in human diet. Jam is made by boiling of vegetables puree with sufficient sugar reasonably thick consistency, firm enough hold vegetables tissue in position. India stands second in the production of fruits and vegetables, hardly five percent of the produce is processed. (APEDA) Pumpkin, bottle gourd, tomato are used to making jam. Jam contain 0.5% acid and sugar should not be more than 50% and T.S.S 68%. Jams were prepared from overripe fruits and vegetables in different combinations and investigated for various characteristics. The different jam combinations differed significantly among each other and had acceptable microbial and organoleptic qualities. Singh *et al.*, (2007) ^[20].

Pumpkin is a popular vegetable rainy season crop in India. Pumpkin belong to "cucurbitaceae" family and it grow extensively during kharif season. Health benefits of Pumpkin are Eating pumpkin is good for the heart. The fibre, potassium and vitamin C content in pumpkin all support heart health. The antioxidants vitamin C, vitamin E, and beta-carotene have been supports eye health and prevent degenerative damage.

Bottle gourd is easy growing and low investment vegetable with high yield in short period of time. Bottle gourd is rich in dietary fiber, it promotes weight loss, Apart from the iron content it is also rich in vitamin B and C, and helps in anti-oxidative actions. Bottle gourd is also an excellent vegetable for people with hypertension.

The tomato is the edible, often red, fruit of the plant. Tomato is consumed in diverse ways, including raw, as an ingredient in many dishes, sauces, salads, and drinks Tomato is excellent source of vitamin C and other antioxidants. Tomato is good for heart health. Tomatoes are a rich source of lycopene, lutein and beta-carotene, powerful antioxidants.

Materials and Method

Procurement of raw material

Fresh, mature undamaged vegetables was purchased from the local market of Prayagraj.

Preparation of sample

First of all the jam was prepared from fresh vegetables (flow diagram 1). Then the puree is formed with the help of grinder, cooked the puree on high flame, addition of sugar, when sugar dissolved completely, citric acid was added and stirred, after stirring pectin was added. Then the jam is ready when bubbles form at the sides of the vessel. Then the hot jam was poured in clean, dry, wide-mouthed jars or bottles and cooled well.

Preparation of Mix Vegetable Jam

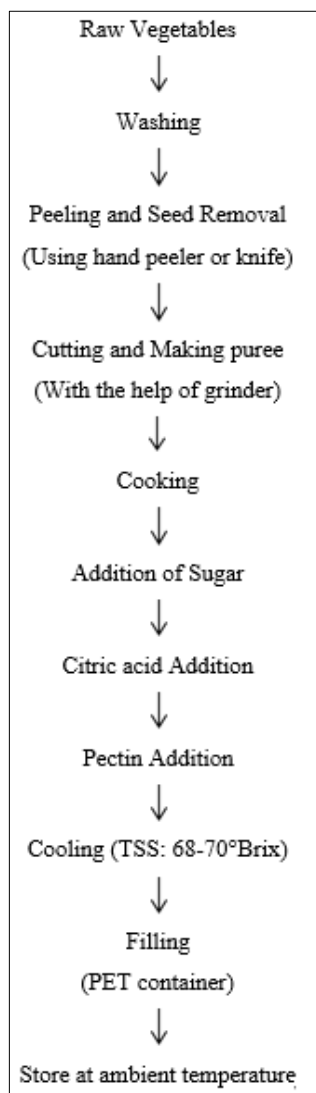


Fig 1: Flow sheet for mix vegetable jam

Physico-Chemical analysis

The Ash content, moisture content, Titrable acidity, pH, and TSS of mix vegetable jam were determined according to the standards of AOAC (2010).

Sensory evaluation

Mix vegetable jam was evaluated by a panel of ten untrained judges for the sensory attributes of color, texture, aroma and overall acceptability using a nine point structured hedonic scale. It scores was 9 = extremely liked, 8 = very much liked, 7 = Moderately liked, 6 = Slightly liked, 5 = neither liked nor disliked, 4 = Slightly disliked, 3 = Moderately disliked, 2 = Very much disliked and 1 = Extremely disliked.

Statistical analysis

Data were analyzed using analysis of variance. The mean scores were analyzed using analysis of variance (ANOVA) method and difference separated using F- test. Significance was accepted at $p \leq 0.05$.

Result and Discussion

Development of mix vegetable jam

The characteristics of mix vegetable jam were influenced by packaging material, storage of environmental condition. Mix vegetable jam was packed in PET container and stored at Room temperature. The storage studies were conducted at the interval of 7 days up to 28 days. Different formulation samples were prepared by adding with (Pumpkin + bottle gourd + tomato + sugar + pectin + citric acid).

Table 1: Levels for experimental design of mix vegetable jam

Treatment	Pumpkin (gm.)	Bottle gourd (gm.)	Tomato (gm.)	Sugar (gm.)	Citric Acid (gm.)	Pectin (gm.)
T1	25	20	12	41.5	0.5	1
T2	20	25	15	38.5	0.5	1
T3	20	20	20	38.5	0.5	1

Physicochemical characteristics of mix vegetable jam

The proximate analysis of mix vegetable jam prepared by using different levels of vegetables and sugar was carried out for ash, moisture, acidity, pH, TSS and effect on nutritional quality of treatments. The product quality depends upon the state, quality and composition of raw materials. So, it is necessary to mention the nutritional composition of major ingredients of mix vegetable jam.

Highest ash content% observed was 0.91 for treatment T3 and the lowest ash content% observed was 0.88 for treatment T1. Highest moisture content% observed was 32.95% for treatment T1 and the lowest moisture content% observed was 29.03% for treatment T2. Highest acidity content% observed was 1.4% for treatment T1 and the lowest acidity content% observed was 0.72% for treatment T3. Highest PH content% observed was 4.70% for treatment T1 and the lowest pH content% observed was 3.87% for treatment T3. Highest TSS content% observed was 67.25% for treatment T3 and the lowest TSS content% observed was 66.12% for treatment T1.

Table 2: Nutritional composition of mix vegetable jam

Treatments	Ash Content (%)	Moisture content (%)	Acidity (%)	pH (%)	TSS (°Brix)
T1	0.88	32.95	1.4	4.70	66.12
T2	0.90	29.03	0.97	4.14	66.72
T3	0.91	31.10	0.72	3.87	67.25
F- test	S	S	S	S	S
S. Ed. (±)	0.003	0.582	0.236	0.299	0.401
C. D. (P = 0.05)	0.005	1.233	0.501	0.635	0.849

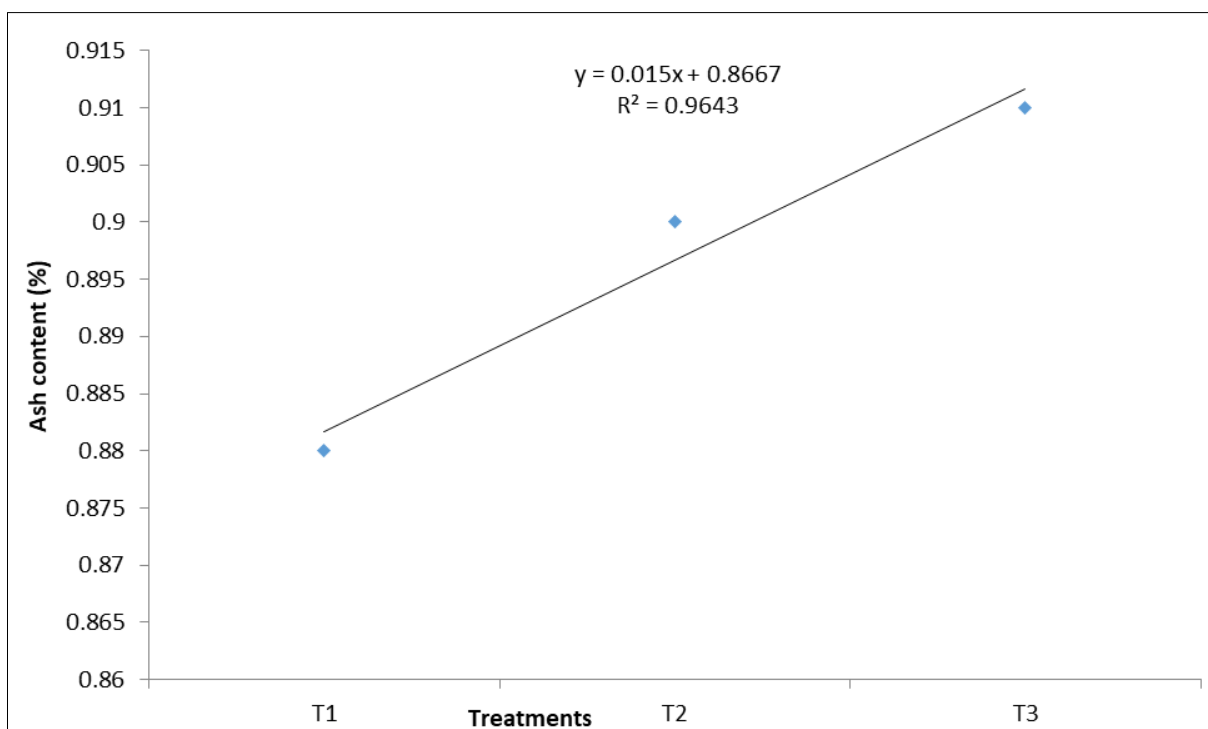


Fig 2: Analysis of treatment on ash content (%) of mix vegetable jam

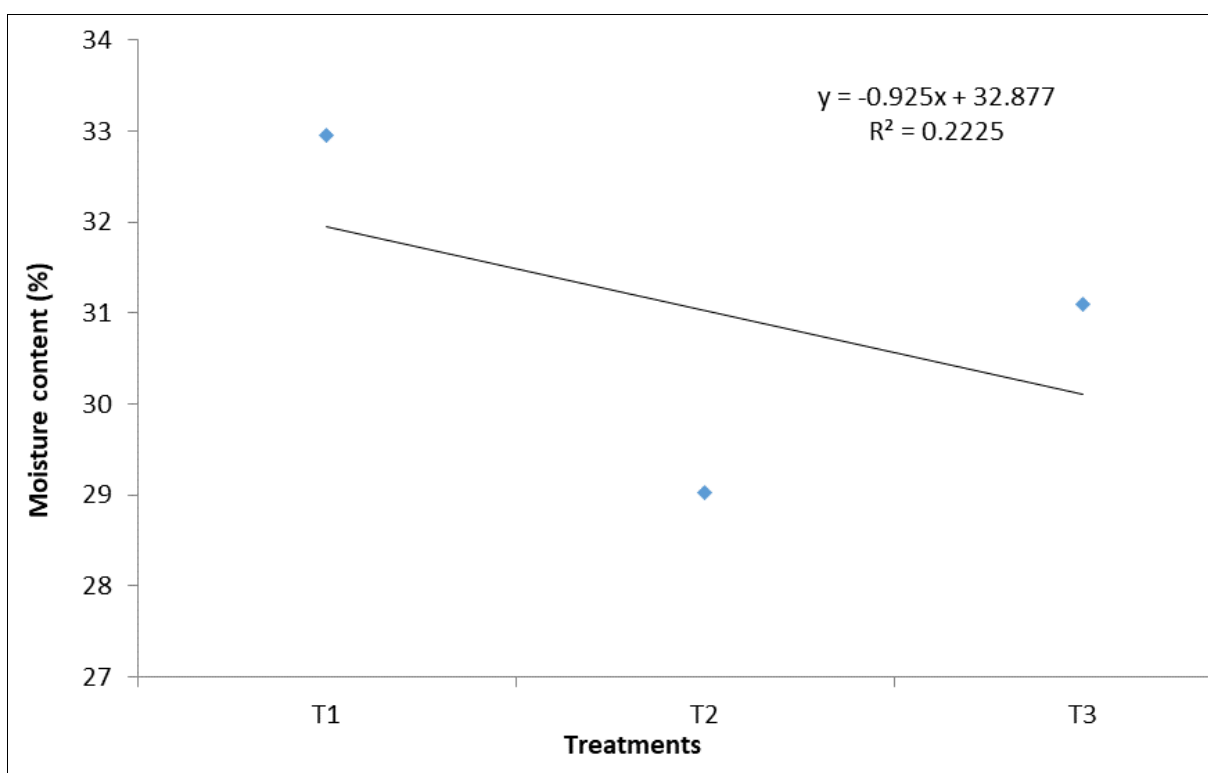


Fig 3: Analysis of treatment on moisture content (%) of mix vegetable jam

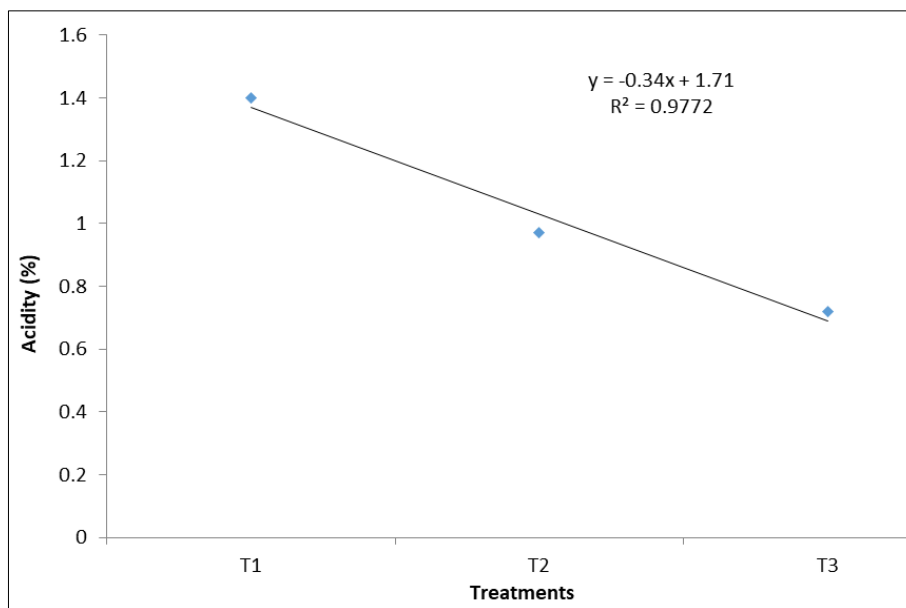


Fig 4: Analysis of treatment on Titrable acidity (%) of mix vegetable jam

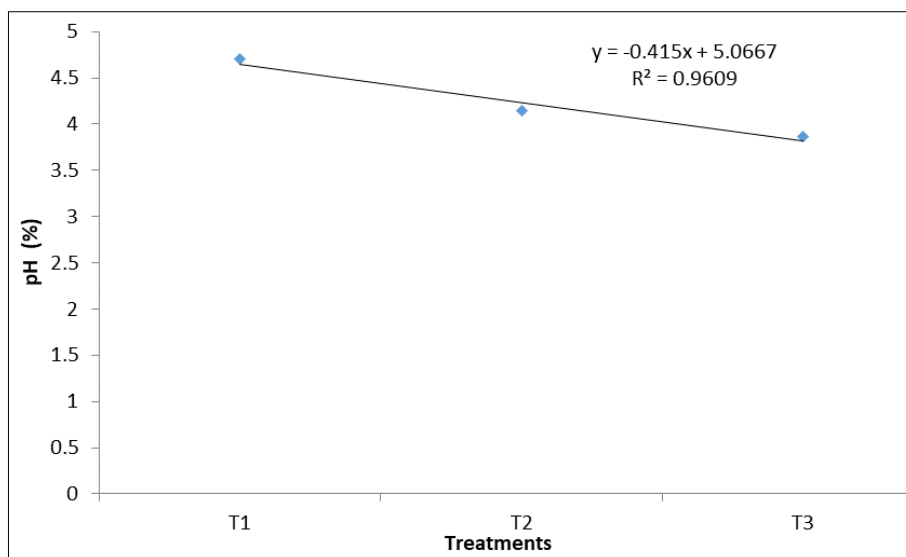


Fig 5: Analysis of treatment on pH (%) of mix vegetable jam

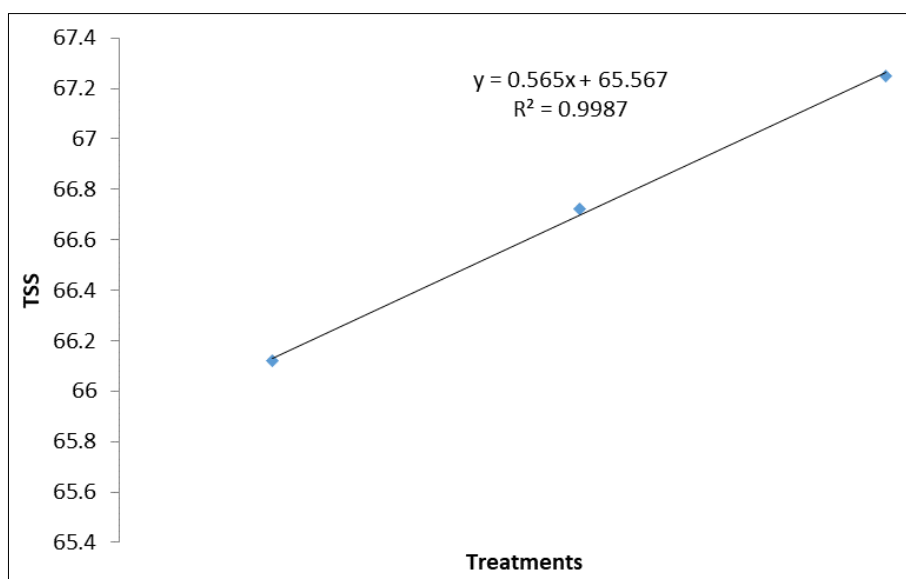


Fig 6: Analysis of treatment on TSS (%) of mix vegetable jam

Sensory analysis of mix vegetable jam

Sensory evaluation of any consumable product is the best method of judging the acceptability of the product by the consumers. The assessment was done by studying the characteristics like color, texture, taste and flavor and overall acceptability of the product by the panel of judges. Sensory attribute of mix vegetable jam were influenced by storage period packed in PET were evaluated 7days interval up to 28 days of room temperature storage. Nine point hedonic rating

test method was used for the evolution of different sample of mix vegetable jam. The data presented in (table 4.2) and (figure 7) indicate that the average rating for color, texture, taste, flavor, of mix vegetable jam was found that T0, T1, T2 and T3 respectively. The average study says that the flavor of mix vegetable jam was high in treatment T3, due to higher concentration of vegetables, the result of these study says that the concentration of T3 was more acceptable. Similar results were also discussed by Khan *et al.* (2015) [8].

Table 3: Effect of Sensory Attributes of mix vegetable jam during Storage

Attribute	Color				Texture				Taste				Flavor			
	T0	T1	T2	T3	T0	T1	T2	T3	T0	T1	T2	T3	T0	T1	T2	T3
0 day	7.4	7.5	7.7	7.9	7.0	7.6	7.8	8.0	7.5	7.3	7.5	7.7	7.5	7.6	7.8	8.0
7days	7.3	7.4	7.6	7.9	6.9	7.4	7.7	7.8	7.3	7.2	7.4	7.5	7.4	7.4	7.5	7.8
14 days	7.1	7.4	7.5	7.7	6.9	7.3	7.5	7.6	7.1	6.9	7.2	7.3	7.2	7.2	7.2	7.5
21 day	6.9	7.3	7.3	7.6	6.8	7.1	7.3	7.4	6.9	6.7	6.8	7.0	6.8	7.0	7.1	7.2
28 days	6.7	7.1	7.2	7.4	6.6	6.9	7.1	7.1	6.7	6.5	6.6	6.8	6.7	6.7	6.8	6.7
	Result	S.Ed. (±)	C.D. at 5%		Result	S.Ed. (±)	C.D. at 5%		Result	S.Ed. (±)	C.D. at 5%		Result	S. Ed. (±)	C.D. at 5%	
Due to days	S	0.04	0.09		S	0.06	0.12		S	0.03	0.07		S	0.06	0.14	
Treatment	S	0.05	0.10		S	0.06	0.14		S	0.03	0.07		S	0.07	0.16	

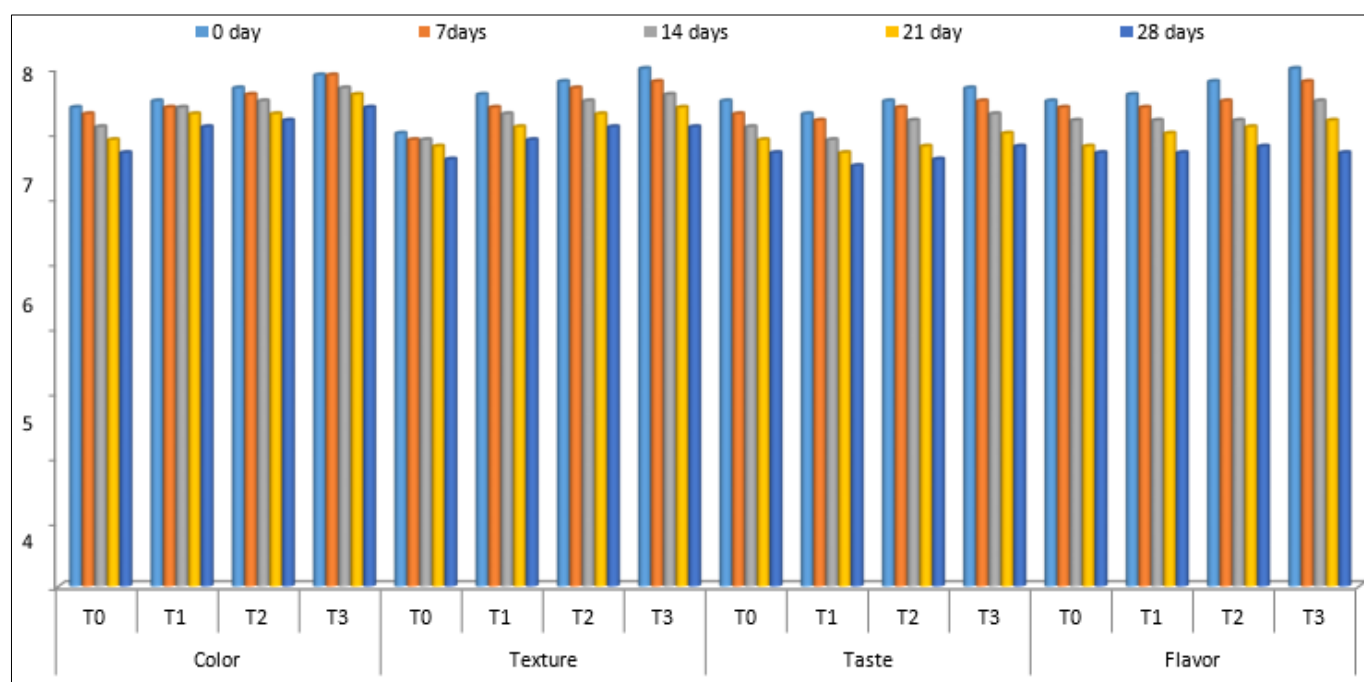


Fig 7: Effect of sensory attributes of mix vegetable jam during storage

Shelf life of mix vegetable jam

Effect of storage on Ash Content% of mix vegetable jam

The effect of different treatment and storage periods on percent ash content of T₀, T₁, T₂, and T₃. The data clearly indicates that the effect of different treatment and storage periods on percent ash content of sample T₀, T₁, T₂, and T₃ There was slight increase during storage. Similar results were

also discussed by Khan *et al.*, (2015) [8]. On evaluation of result it was observed that the increased ash content was due to high percentage of mineral content after oxidation of sample. Therefore there was significant difference between samples. This results was in accordance with the observation mentioned by habiba *et al.*, (2007) [5].

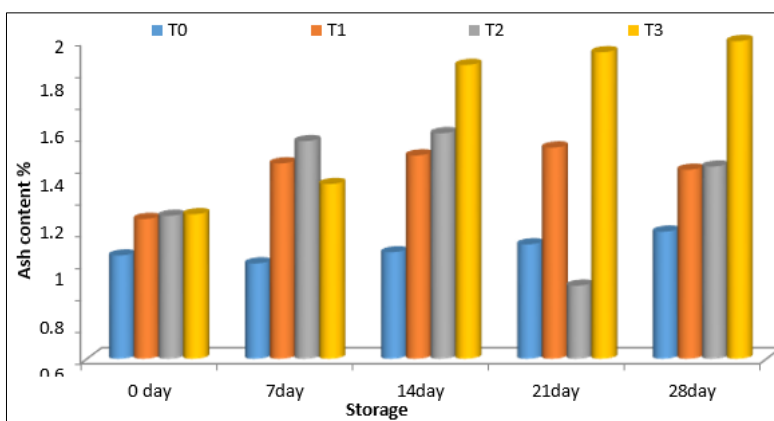


Fig 8: Effect of Storage on Ash Content% of mix vegetable jam

Effect of Storage on Moisture Content (%) of mix vegetable jam

The effect of different treatment and storage periods on percent moisture content of T₀, T₁, T₂, and T₃. The data clearly indicates that the effect of different treatment and storage periods on percent moisture content of sample T₀, T₁, T₂, and T₃. There was slight decrease during storage. This results was in accordance with the observation mentioned by habiba *et al.*, (2007) [5] on evaluation of result it was observed that the

decreased moisture content was due to removal of water content present in jam. Therefore there was significant difference between samples. Similar results were also discussed by Khan *et al.*, (2015) [8]. The moisture content variation observed might be because of the heating process involved in processing. Water removal during the processing in the jam resulted in a change in the concentration of food nutrient. Singh *et al.*, (2007) [20] reason behind this Moisture content has a greater impact on the self-life of product.

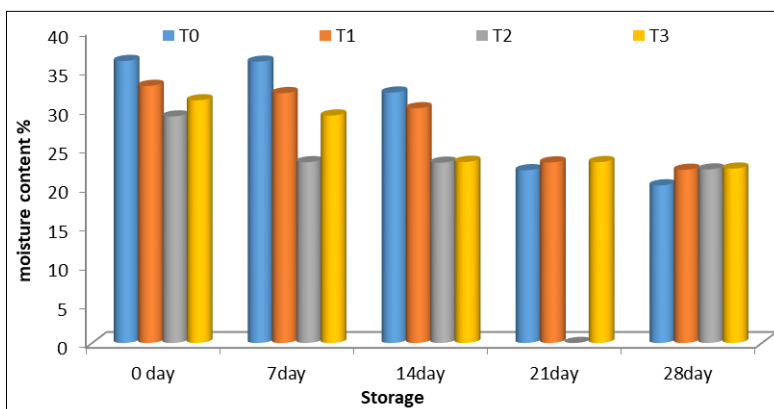


Fig 9: Effect of different treatments on moisture%content of mix vegetable jam

Effect of Storage on Titrable Acidity (%) of mix vegetable jam

The effect of different treatment and storage periods on percent Treatable acidity of T₀, T₁, T₂, and T₃. The data clearly indicates that the effect of different treatment and storage

periods on percent total acidity of sample T₀, T₁, T₂, and T₃. was increase during storage. Similar results were also discussed by Khan *et al.* (2015) [8]. This results was in accordance with the observation mentioned by habiba *et al.*, (2007) [5].

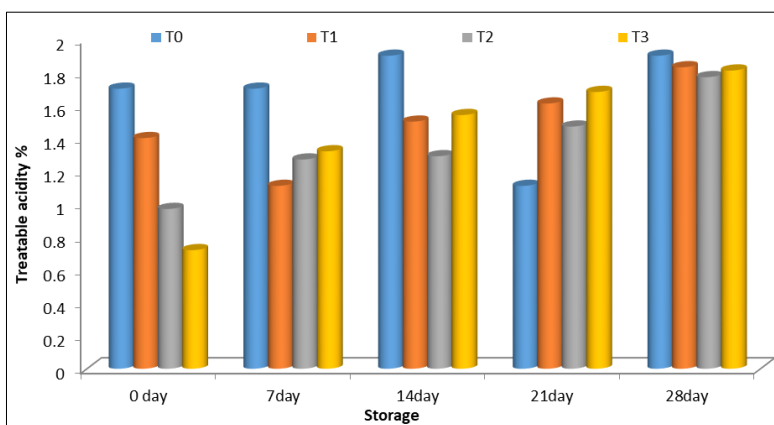


Fig 10: Effect of storage on Treatable acidity content% of mix vegetable jam

4.4.4 Effect of Storage on pH of mix vegetable jam

The effect of different treatment and storage periods on percent pH content of T₀, T₁, T₂, and T₃. The data indicates that the effect of reducing sugar quantity of jam sample gradually

rise with prolonged storage period. It was observed that rising of reducing sugar level for the samples stored under room temperature. Similar results were also discussed by Khan *et al.* (2015)^[8].

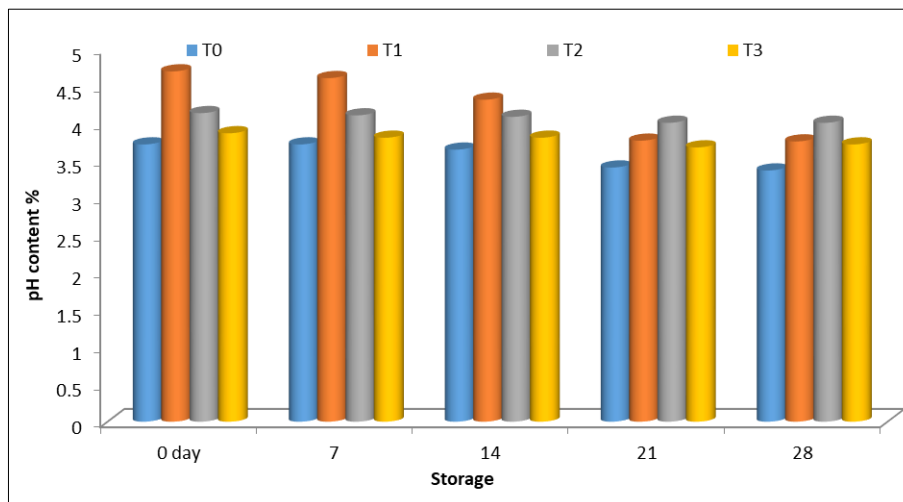


Fig 11: Effect of storage on pH content of mix vegetable jam

Effect of storage on Total Soluble Solid (°Brix) of mix vegetable jam

The effect of different treatment and storage periods on percent TSS content of T₀, T₁, T₂, and T₃. The data indicates that the effect of different treatment and storage periods. The possible cause of rising of TSS due to the formation of mono

and disaccharides resulted from hydrolysis polysaccharides. An increase TSS during storage stability evaluation was reported by several works such as Khan *et al.* (2015)^[8]. The °Brix of jam varied, but were not affected significantly either by storage or interaction of storage Singh *et al.*, (2007)^[20].

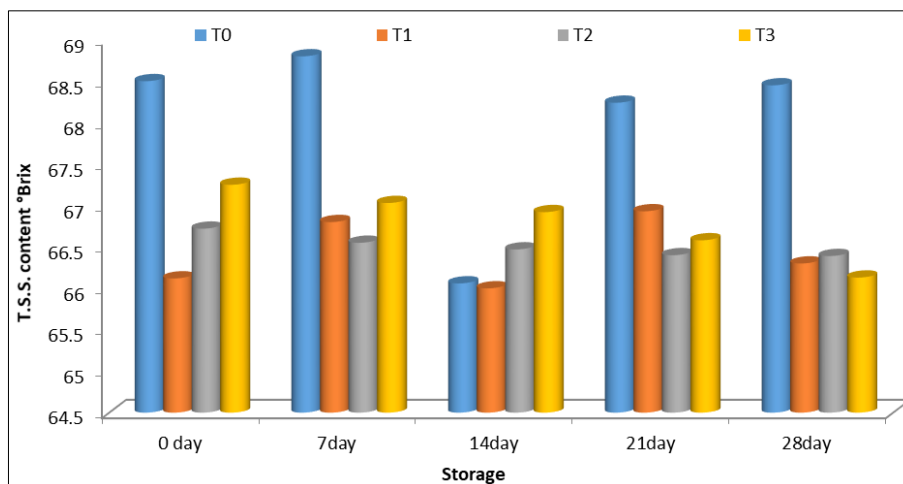


Fig 12: Effect of storage on T.S.S. °Brix content of mix vegetable jam

Overall Acceptability

The mix vegetable jam were analyzed for overall acceptability as a sensory parameter. The data indicate that the average rating for overall acceptability of different samples mix

vegetable jam was found to be 7.3, 7.5, 7.8 and 6.9 respectively. It shows that the rating for overall acceptability of sample T₂ was highest i.e. 7.8.

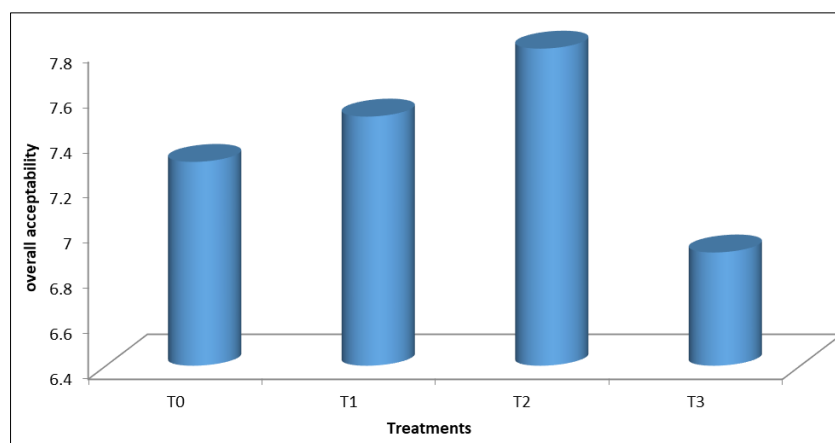


Fig 13: Score for overall acceptability of different samples of mix vegetable jam

Conclusions

The preparation of mix vegetable jam various vegetables are used, it helps to select appropriate better taste of jam. The physico-chemical characteristics of mix vegetable jam the data indicate that the average rating for ash, Moisture, acidity, pH, TSS of mix vegetable jam was found that to have significant effect on treatments. Based on sensory scores average rating for colour, texture, taste, and flavour of mix vegetable jam was found that due to higher concentration of vegetables, the result of these study says that the T3 was more acceptable. On the basis of shelf life of mix vegetable jam treatments were T0, T1, T2 and T3. The samples were fill in the PET container and evaluation was carried out for total period of 28 days. The significant effect of treatments during shelf life study. Based on overall acceptability shows that the rating of treatment T2 was highest i.e. 7.8.

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