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DEVELOPMENT OF MILK PAAN SHOT (*PIPER BETEL* LEAVES) AND IT'S EVALUATION

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Abstract

The Betel (*piper betel*) which belongs to the *piperaceae* family is grown in worldwide. The fresh leaves of betel vine are popularly known as paan in India. It also contains several nutritive compounds such as vitamin C, thiamine, niacin, riboflavin, carotenes and great source of calcium. The study was undertaken to produce stable and organoleptically preffered paan shot (paan drink) with five different combinations of betel leaves juice and milk masala i.e. S_1 (70% juice + 30% milk masala), S_2 (60% juice + 40% milk masala), S_3 (50% juice + 50% milk masala), S_4 (40% juice + 60% milk masala). The milk masala is prepared with combination of milk and ingredients such as gulkand, tutti-frutti, cardamom, cherry, funnel seeds, desiccated coconuts. The sensory properties of paan shot was evaluated by a semi trained pannelist members. Sodium benzoate is used as a preservative .The result shown the colour, flavour, sweetness, consistency, mouthfeel and overall acceptability of sample number 3 containing 50% of juice and 50% milk masala got high score and other sample were moderately acceptable. The storage potential of paan shot was observed. After 12 weeks S_1, S_2, S_3 and S_4 were slightly change in TSS and acidity. Minimum physiochemical quality attributes were deterioted in paan shot due to addition of preservatives. Paan shot (Paan drink) was found completely free from spoilage due to antibacterial properties of betel leaves and effective processing of the product.

Key words: **Thiamine, TSS, Consistency, Vine, Sensory Properties.**

I. INTRODUCTION:

The scientific name of betel leaves vine is *piper betel* L. belongs to the family *piperaceae*, i.e. the black pepper family. *Piper betel L* (Paan) is one of the most popular medicinal plants that has been using for therapeutic as well as traditional purpose. *Piper betel* or Betel vine deep green heart shaped very famous leaves reach in nutrients, minerals, vitamins and antioxidants. Leaves are rich in many nutrients like water, energy, protein, fat, fiber, calcium and iron etc., and the antioxidants present are flavonoids, tannins, saponins alkaloids, terpenoids etc (Dwivedi and Tripathi., 2014 and Sengupta and Banik., 2013). The aroma of betel leaf is due to the presence of essential oils, consisting of phenols and terpenes (Bajpai V *et al*., 2010).

The essential oil isolated from the leaves is supposed to be useful in treating respiratory catarrhs and as an anti-septic (Satyavati GV *et al*., 1897). Betel leaf is traditionally used as a mouth ulcer medicine, sore throat, cough medicine, eyewash medication, leucorrhoea, bleeding in the nose, accelerate wound healing, eliminate bad breath, and treat toothache (Hariyanto S., 2012). Betel leaf has a typical aroma as it contain essential oils of 1-4.2%, water protein, fat, carbohydrate, calcium, phosphorus, vitamin A,B,C iodine sugar and starch (Yuniarti T., 2008). *Piper betel* leaves extract contains large number of bioactive compound molecules (Devjani Chakraborty., 2013). *Piper betel* contains a wide variety of biological active compounds whose concentration depends on the variety of the plant, session and climate. Pharmacological profile has shown antiplatelet, anti-inflammetrory effects as well as immuno modulatory, gastro protective and antidiabetic activity (Satish A bhaleraol., 2013). They have high content of potassium nitrate (0.26-0.42%). The sugar identified in betel leaves into glucose, fructose, maltose and sucrose. The average contain of free reducing sugars in different types of betel leaves varies from 0.38-1.46%. It also contains the enzymes like diastase and catalase (Chaurasia *et al*., 2011).

Piper betel is one of the invaluable medicinal plant were it leaves have been used for many medicinal purpose. The fresh leaves of betel leaves have been wrapped together the areca nut, minerals slaked lime, catechu, flavoring substance and spice are chewed since the ancient time (P Guha., 2006). Betel leaves contain fatty acid, hydroxyl fatty acids, esters and hydroxyl chavicol which is reported to exhibit antimicrobial properties (Pauli., 2002). Fresh juice of betel leaves is also used in many ayurvedic preparations. Betel leaves have long been studied for their divers pharmalogical actions (Sarker *et al*., 2008). It has been proved that betel leaves extract showed a wide array of activities such as antibacterial, anti-oxidative and anti-hemolytic (Chakraborty and Shah., 2011)

Nutritional composition

The proximate analysis of the leaves of piper betel contains macro and micro nutrients as shown in table no 1 (Verma S *et al*., 2010).

Table No 1: Nutritional composition of betel leaves

Sr. No	Constituents	Approximate
1	Water	85-90 %
2	Protein	3.3-5 %
3	Fat	0.4-1 %
4	Minerals	2.3-3.3 %
5	Carbohydrate	0.5-6.10 %
6	Energy	44 cal/100g

II. MATERIALS AND METHODS

The raw materials for preparation of paan shot i.e. betel leaves, cardamom, milk, trutti-frutti, cherry, gulkand, funnel seeds, desiccated coconut and preservatives were collected form a local market of Shrigonda. The study was carried out in at the Department of Food Process Technology, in SCFT, Ghargaon, Ahmednagar (MH), India.

Composition for making the 100 gm of milk masala is as follows,

Table No 2: Composition of Milk Masala

Sr. No	Ingredients	Composition
1	Milk	100 gm
2	Cherry	20 gm
3	Gulkand	40 gm
4	Funnel seeds	11 gm
5	Desiccated Coconut	10 gm
6	Cardamom	1 gm
7	Trutti-Frutti	18 gm

Preparation of milk masala

The all ingredients such as milk, cardamom, gulkand, trutti-frutti, funnel seeds, cherry and desiccated coconut was used for extraction of milk masala. The all ingredients was weighed and juice was extracted using grinder and juice was filtered by muslin cloth.

Preparation of betel juice

Betel leaves was used for extraction of juice. The betel leaves was weighed and juice was extracted using electric juicer. Then juice was filtered by muslin cloth and betel juice was prepared. During preparation of paan shot the standard preservative sodium benzoate was used. The paan shot was prepared with different combination of betel juice and milk masala as shown in table no 3.

Table No 3: Formulation of Paan Shot

Sr. No	Ingredients	Sample No	Formulation
1	Juice+Milk Masala+Preservative	1	70 % Juice+30 % Milk Masala
2	Juice+Milk Masala+Preservative	2	60 % Juice+40 % Milk Masala
3	Juice+Milk Masala+Preservative	3	50 % Juice+50 % Milk Masala
4	Juice+Milk Masala+Preservative	4	40 % Juice+60 % Milk Masala

Sensory Evaluation

Quality of paan shot was evaluated for sensory characteristics (color, taste, flavour, mouthfeel and overall acceptability) during storage on hedonic rating scale by a semi trained pannelist members.

Pasteurization of Paan Shot (Paan Drink)

Pasteurization method is done in high temperature short time. The Paan shot samples were heated to 85ºC at 15-20 sec. For the final product, preservative sodium benzoate 350 ppm was added to prevent the spoilage during the storage period. The prepared paan shot was poured into pre-sterilized PET bottles of 100 ml capacity and sealed airtight. Then the product was sterilized in boiling water for 20 min and cooled immediately. Bottles were stored at room temperature (18-25ºC) for further observation.

Physico-Chemical analysis

The physio-chemical attributes like pH, acidity and total soluble solids were analysed to assess the quality of paan shot. The total soluble solid (TSS), titratable acidity and pH was determined by the standard method of AOAC (2010).

Microbiological Evaluation

Microbiological analysis of paan shot was performed by following the method of Harrigan (1998). The samples were prepared by 10 fold serial dilution and the total viable count was estimated by using nutrient agar as medium. The colonies were manually counted by colony counter.

III. RESULT

The research was conducted to study the quality parameter of paan shot by physico-chemical and sensory parameter during storage period. The paan shot was prepared with different combination of juice and milk masala

Sensory Analysis

Table No 4: Sensory Attributes of paan shot

Sample	Sensory Attributes					
	Color	**Flavour**	**Consistency**	**Taste**	**Mouth Feel**	**Overall Acceptability**
S_1	6.8	7.2	7.0	7.0	7.2	7.0
S_2	7.0	7.4	7.2	7.4	8.0	7.4
S_3	8.2	8.4	7.8	8.2	8.0	8.1
S_4	7.4	7.8	7.2	7.8	8.2	7.6

The five samples of paan shot were judged by a semi trained panelist of 10 judges. The mean score for colour, flavour, consistency, mouthfeel, taste, overall acceptability of the sample were evaluated and the mean score of the responses are presented in the table no 4.

Sample 3 has shown the better colour and acceptability than other paan shot (Table No.4). The flavour of sample 3 was most preferred than other samples. In comparison of flavour, sample 3 and sample 4 were better than sample1 and sample 2. Among all samples, flavour of sample 1 was less acceptable. Consistency of sample 2 was most preferred and significantly different than other samples. The mouth feel of sample 3 and S_4 were significantly better than other samples. The S_1 has shown less mouth feel and acceptability among sample. Among all samples, taste of S_3 and S_4 were most preferred than other sample.

Overall acceptability of S_3 (Containing 50% Juice and 50% milk masala) has was most preferred and significantly different than other S_1, S_2, and S_4. The sample S_1 and S_2 had shown least satiety when compared with other samples.

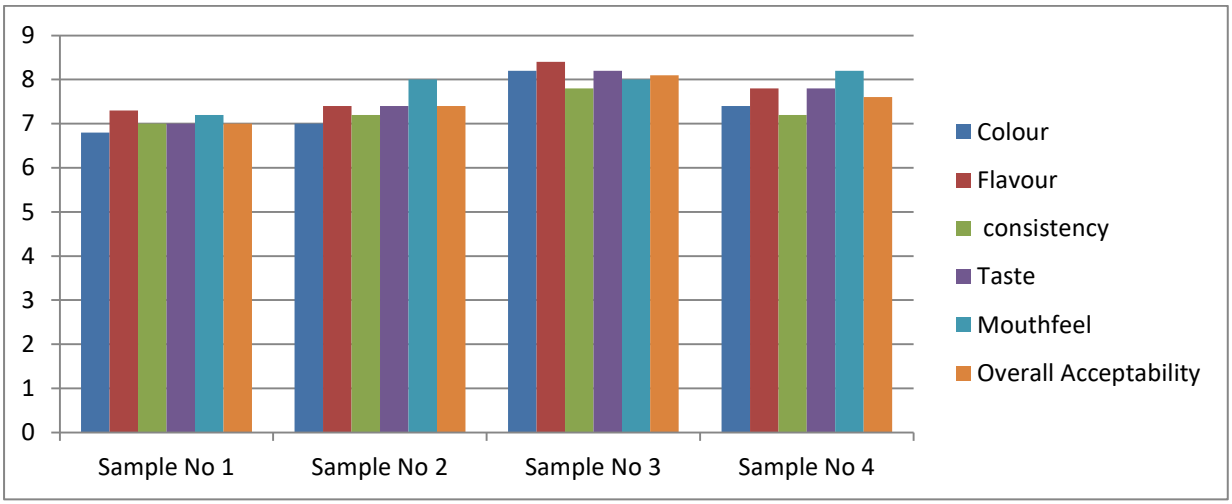

Figure No 2: Sensory Evaluation of Paan Shot

Nutritional Analysis

Sample 3 (Containing 50% Juice and 50% milk masala) has got high ratings during sensory evaluations, so only sample no 3 was taken for a nutritional analysis. The result of nutritional analysis is as shown in table no 05.

Table No 5: Nutrient Information of Paan Shot

Sr. No.	Test Parameters	Results	Units
1.	Moisture	77.31	g/100gm
2.	Ash	0.47	g/100gm
3.	Total Fat	0.05	g/100gm
4.	Protein	0.19	g/100gm
5.	Carbohydrates	22.05	g/100g
6.	Energy Value	89.41	Kcal/100gm

Table No 6: The storage study on the chemical analysis of Paan Shot

		Storage Period (Days)					
Parameter	**Samples**	**0**	**15**	**30**	**60**	**90**	**Mean**
°Brix	S_1	14.05	14.56	14.78	14.98	15.04	**14.68**
	S_2	14.56	14.67	14.81	14.99	15.35	**14.87**
	S_3	14.44	14.69	14.88	15.01	15.46	**14.89**
	S_4	14.09	14.34	14.57	14.77	15.02	**14.55**
	Mean	**14.24**	**14.52**	**14.74**	**14.90**	**15.17**	
Acidity(% Lactic Acid)	S_1	0.178	0.174	0.171	0.169	0.167	**0.171**
	S_2	0.182	0.181	0.179	0.175	0.173	**0.178**
	S_3	0.181	0.179	0.176	0.174	0.171	**0.176**
	S_4	0.183	0.181	0.179	0.176	0.174	**0.178**
	Mean	**0.181**	**0.179**	**0.177**	**0.174**	**0.172**	
PH	S_1	6.47	6.54	6.59	6.67	6.75	**6.61**
	S_2	6.41	6.81	6.84	6.86	6.90	**6.76**
	S_3	6.46	6.51	6.55	6.57	6.61	**6.54**
	S_4	6.48	6.71	6.75	6.77	6.79	**6.70**
	Mean	**6.45**	**6.63**	**6.67**	**6.70**	**6.81**	

Brix

The total soluble solid of paan shot increased during storage (table no 5). This might be due to increase in total soluble solid sugar produced during hydrolysis of polysaccharides like starch, cellulose and pectin substance into simpler substance. Maximum increase in TSS was noticed in sample 3 (50% juice + 50% milk masala) i.e. 14.44 to 15.46 ºbrix. Minimum increased TSS was observed in the sample 2 (60% juice + 40% milk masala) i.e. 14.56 to 15.35 ºbrix.

Titratable acidity

The Acidity of paan shot was decrease with duration of storage period was observed in all samples. The acidity % decrease with increase in pH as shown in table no 5. The maximum decrease in acidity was noticed in sample no 4 (40 % juice + 60 % milk masala) i.e. 0.183 to 0.174%. The minimum decrease in acidity was noticed in sample 2 (60% juice + 40% milk masala) i.e. 0.182 to 0.173%. The acidity of sample 4 were more acidic than sample 1, sample 2 and sample 3.

pH

Initially, the increase in pH of paan shot was observed during 90 days of storage period. The relationship between pH and acidity is interrelated (Nehe K.B *et al*., 2022). The lower the acidity, higher the pH was observed. The maximum increase in

pH were notices in sample 2 (60 % juice + 40 %milk masala) i.e. 6.41 to 6.90. During storage period at room temperature S_2 and S_4 has higher pH than S_3 and S_1 as shown in table no.5

Microbiological Analysis

Table No 7: Microbial Analysis of Paan Shot

	Storage period (Week)	SPC (log cfu/g)	Coliform (log cfu/g)	Yeast and Mold (log cfu/g)	TPC (log cfu/g)
S_1	0	2.98	Absent	Absent	Absent
	2	3.02	Absent	Absent	Absent
	4	3.03	Absent	Absent	Absent
	8	3.05	Absent	Absent	Absent
	12	3.08	Absent	Absent	Absent
S_2	0	2.96	Absent	Absent	Absent
	2	2.99	Absent	Absent	Absent
	4	3.04	Absent	Absent	Absent
	8	3.06	Absent	Absent	Absent
	12	3.07	Absent	Absent	Absent
S_3	0	2.97	Absent	Absent	Absent
	2	2.99	Absent	Absent	Absent
	4	3.03	Absent	Absent	Absent
	8	3.05	Absent	Absent	Absent
	12	3.09	Absent	Absent	Absent
S_4	0	2.98	Absent	Absent	Absent
	2	2.99	Absent	Absent	Absent
	4	3.02	Absent	Absent	Absent
	8	3.03	Absent	Absent	Absent
	12	3.06	Absent	Absent	Absent

The result shown that the storage period of 12 weeks was highly significant on the microbial count of paan shot. The microbial status of the paan shot showed value of viable count of S_1 (3.08 log CFU/g), S_2 (3.07 log CFU/g), S_3 (3.09 log CFU/g) and S_4 (3.06 log CFU/g) respectively. The storage period on the microbial count of the paan shot revealed that the microbial count gradually increased with increment in storage period. However, lower microbial load was observed in sample 4 (40 % juice, 60 % milk masala) i.e. 2.98 to 3.06 log CFU/gm . There is no growth in coliform, yeast, mold and TPC. The result clearly indicated the presence of antimicrobial potential due to addition of preservatives.

IV. DISCUSSION

In general, total soluble solids of paan shot increased during storage (Table no 6). Maximum increase in TSS was noticed in sample 3 (50 % juice + 50 % milk masala) i.e. 14.44 to 15.46 ºbrix. Paan shot show increase in pH during storage period. Maximum increase in pH was noticed in sample 2 (60% juice + 40% milk masala) i.e. 6.41 to 6.90. Minimum increase in pH was noticed in sample 3 (50 % juice 50 % milk masala) i.e. 6.46 to 6.61. The increase in pH of paan shot during storage could be attributed to acid hydrolysis of polysaccharides and non-reducing sugars to hexose sugars (reducing sugars) or complexing in the presence of metal ions as reported in aonla juice (Gajanana, 2002). As the pH increases the acidity decreases, the minimum decrease in acidity was noticed in the sample 4 (40% juice + 60 % milk masala) i.e. 0.183 to 0.174 and maximum decrease in acidity was noticed in the sample 1 (70% juice + 30% milk masala) i.e. 0.178 to 0.167 during 90 days of storage period. Paan shot prepared with four different combination of betel juice and milk masala was found completely free from spoilage due to total soluble solids and effective processing of the product.

So from the Quality evaluation of paan shot it was observed that betel juice preserve the quality and shelf life of paan shot for the storage period of 90 days. The minimum physico-chemical quality attributes were deteriorated in the paan shot prepared due to the addition of preservative.

V. CONCLUSION

It can be concluded from the present experiment that we can utilize the paan shot as ready to serve drink. The preparation of paan shot with the sample 3 consisting 50% betel juice and 50% milk masala was significantly best over the rest treatment and can be stored successfully for 3 months at ambient condition.

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