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Effect of Recipes and Cultivars on Storage of Guava RTS

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A B S T R A C T

The fruits of Lucknow - 49, Red fleshed variety and Apple guava were collected from the orchard of the College of Agriculture Jabalpur (M.P.).The fruits from the winter season crop(2007). Fully matured fruits were picked up and sorted, washed, cutting into pieces, mixing with water (1:1) then Passing through pulper to get guava pulp preparation after that guava pulp mixing with strained syrup solution (sugar+ water +acid heated to just to dissolve according to recipe), homogenization, cooling (at 40°C addition of sodium benzoate 750 ppm), filter, bottling, crown corking, pasteurization (82°C for 15 min), cooling for RTS product. physical - chemical characters sensory quality characters(color, flavor, Taste, overall acceptability), Total Soluble solids, pH, Percent Acidity, Ascorbic acid content (mg/100mg) for $0^{th,}$ 30^{th}, 60^{th} days observation were recorded. For acceptability of RTS Hedonic rating of colour was done by panel of 10 judges on 9 point hedonic scale. RTS was recorded. In experiment recipe 1 was 10% pulp, 11% T.S.S, 0.3% Acidity. Recipe 2 was 10% pulp, 11% T.S.S 0.4% Acidity. And recipe 3 was 10%pulp, 12% T.S.S,0.3% Acidity., recipe 4 was 10% pulp,12% T.S.S, 0.4 % Acidity., recipe 5 was 10% pulp,13 % T.S.S 0.3 % Acidity., recipe 6 was 10% pulp,13%T.S.S,0.4% Acidity was used. At shown that overall acceptability of RTS was highest in score(7.86) and recipe 1(10% pulp,11% T.S.S, 0.3% Acidity)followed by score(7.83)and recipe 2(10% pulp,11% T.S.S,0.4% Acidity) Highest Ascorbic Acid content at recipe1 (10% Pulp,11% T.S.S,0.3% Acidity).it was further observed At 0^{th} days for good for storage variety was Lucknow-49(8.10)followed by Apple guava(7.78) followed by(7.40).At 30^{th} days was also lucknow-49 (7.60)followed by apple guava(7.28)followed by red fleshed guava(7.10).at 60^{th} days was lucknow-49(7.28)followed by apple guava(7.15)followed by red fleshed guava(6.83).

Introduction

Guava (*Psidium guajava L.*) is one of the most nutritious fruit. It is richer source of vitamin" C" than Ber, Citrus, and Apple. Guava is grown commercially in North India because it's higher yielding capacity and good economic returns. In India Uttar Pradesh the largest grower produces best quality of Guava Bihar, Madhya Pradesh, Andhra Pradesh, Tamilnadu, West Bengal, Punjab, Assam, Karnataka, Maharashtra are chief producers of quality guava.

India occupies nearly 150.9 lakh hectares of area with a production of 1710.6 million tonnes and with a productivity of 10.77 tonnes fruit per hectare per year (Yadav

2002). However highest productivity recorded in M.P. 20.1 tones/ha.

Guava is an important fruit in international trade and domestic economy of several countries because of its easy cultivation under variable soils and climatic conditions (Menzel 1985). Fruits of guava are important ingredients in the human dietaries, due to their high nutritive value. Guava makes significant nutritional contribution to human being and cheaper source of the protective foods.

Guava has earned the popularity as "Poor man's apple" available in plenty to every person at a very low price during the season. It is no way to inferior to apple for its nutritional values. The fruit(berry) is an excellent source of vitamin 'c' (6300mg/100g) and protein 1% content and has about dry matter (17%) and moisture (83%). The fruit is also rich in mineral like phosphorous (23-37 mg/100g), calcium (14-30 mg/100gm) and iron (0.6 – 1.4 mg/100g) as well as vitamin like niacin, penthotenic acid, thiamine riboflavin and Vitamin" A" (Bose, 1999). Guava is normally consumed fresh as dessert fruit. It emit a sweet aroma which is pleasantly sweet and refreshing acidic in flavor. The whole fruit is edible along with skin. It is considered as one of the most delicious, luscious fruits, excellent salads, Pudding, jam, jelly, cheese, canned fruit, RTS, nectar, Squash and ice-creams and toffees can be made from guava fruit.

In central India especially in M.P guava grower generally takes Mrig bahar crops so seasonal glut occurs very often and sold at throw way prices. The storage of fruit is very difficult for longer period because of its perishable nature especially under tropical conditions. It is common experienced that 20-25% of the fruit is completely damaged and spoiled before it reaches to the consumers Yadav (1997). Therefore it is necessary to develop technology for better utilization of such a perishable fruit. In the state also it is grown on large scale and often it causes glut in the local market. The fruit grower does not have adequate facilities for extending shelf life of guava fruits hence most of the produce does not fetch good price. To overcome these problems there is need to find out suitable low cost processing techniques.

Therefore to utilize the produce at the time of glut and to save it from spoilage the development of low cost processing technology of guava fruit is a need of time. It will also generate enough opportunities of self - employment by starting small scale processing unit or cottage industry which will be remunerative to the growers. Thus the preparation of guava R.T.S beverage has a great scope.

Materials and Methods

The fruits of Lucknow-49, Red fleshed guava, Apple guava were collected from the orchard of the college of Agriculture J.N.K.V.V (M.P.). The fruits were collected from the winter season crop (2007) fully matured fruits were picked up and sorted out for the preparation of RTS. fruits were cut into small pieces, it can be sieved pulp, small pieces of guava mixing with water 1:1 and straining pulp, pulp was taken and dissolved with water after that TSS (11,12 and 13° brix) and acidity (0.3 and 0.4 percent) was maintained with help of sugar and citric acid as per recipe.

Results and Discussion

Colour

Data presented in table at 0th days was found in colour of RTS was maximum scored given in R_5 (8.13) followed by R_1 (8.10)and lowest score observed in R_6 (7.83). With respect to

varieties highest score was given by V_1 Lucknow-49 (8.50) followed by V_2 Apple guava (7.76) and Lowest recorded V_3 Red fleshed (7.71). As regards the combination maximum score recorded R_1V_1 (8.84) followed by R_2V_1 (8.80) and lowest score observed in R_5V_3 (7.00) in RTS. The data presented in table at 30 day observation was in colour maximum score recorded in R_5 (7.46) followed by R_6 (7.26) lowest observed in R_3 (7.16). With respect to varieties maximum score recorded in V_1 (7.53) followed by V_2 (7.24) and lowest recorded in V_3 (7.10) as per combination maximum score observed in R_2V_1, R_3V1, R_6V_1 (7.60) followed by R_5V_2 (7.50) lowest observed in R_3V_3 (7.00).

0^{th} day that the colour rating of RTS decreased with increasing sugar content at after 30 days. At 0^{th} day observed that the RTS color rating was higher recipe R_5 at13 percent TSS which might be due to quite sugar and pulp ratio. At 30^{th} day observed colour rating was higher in recipe R_5 decreasing color rate. The RTS prepared from Lucknow-49 was rated best for colour at 0^{th} day and 30 day also second best apple guava lowest in Red fleshed guava (Harisimart and Dhawan, 1998).

Flavor

At 0^{th} day observation flavor was found in maximum scored in R_1 (8.00) followed by R_5 (7.86) and Lowest score observed in R_3 (7.70). With respect to varieties maximum score observed in V_1 (8.46) followed by V_2 (7.70) lowest score recorded in V_3 (7.28). As regards the combination for maximum score recorded in R_2V_1 (8.80) followed by R_5V_1 (8.70) and lowest recorded in R_4V_3 (7.10) in RTS. At 30^{th} day observation was maximum flavor recorded in R_1 (7.56) followed by R_2 (7.53). Lowest recorded in R_5 and R_6 (7.30) with respect to varieties maximum score observed in V_1 (7.61) followed by V_2 (7.35) lowest recorded in V_3 (7.23). As per combination the flavor of RTS maximum score R_3V_3 (7.90) followed by R_2V_1 (7.80) lowest recorded in R_2V_2 (7.10), R_6V_3.

Flavor rating of RTS decreased with increasing of sugar content (TSS) at 0^{th} day followed by 30^{th} day and at 0^{th} day recipe R_1 showed highest flavor followed by Recipe R_2 and lowest flavor in recipe R_3 this is due to higher pulp and sugar ratio with adequate acidity level. At 30^{th} day show recipe R_1 show highest flavor followed by recipe R_2 this might due to inadequate sugar pulp and acidity ratio similar result was obtained Pandey and Singh (1999). Among the cultivars Lucknow-49 was rated best at 0^{th} day followed by 30 day for flavors over apple guava and red fleshed RTS due to their varietal character (Pandey *et al.,* 1997).

Taste

At 0^{th} day observation flavor was found in maximum scored in R_1 (8.00) followed by R_5 (7.86) and Lowest score observed in R_3 (7.70). With respect to varieties maximum score observed in V_1 (8.46) followed by V_2 (7.70) lowest score recorded in V_3 (7.28). As regards the combination for maximum score recorded in R_2V_1 (8.80) followed by R_5V_1 (8.70) and lowest recorded in R_4V_3 (7.10) in RTS. At 30^{th} day observation was maximum flavor recorded in R_1 (7.56) followed by R_2 (7.53) Lowest recorded in R_5 and R_6 (7.30) with respect to varieties maximum score observed in V_1 (7.61) followed by V_2 (7.35) lowest recorded in V_3 (7.23). As per combination the flavor of RTS maximum score R_3V_3 (7.90) followed by R_2V_1 (7.80) lowest recorded in R_2V_2 (7.10) R_6V_3 (7.10).

Flavor rating of RTS decreased with increasing of sugar content (TSS) at 0^{th} day followed by 30^{th} day and at 0^{th} day recipe R_1

showed highest flavor followed by Recipe R_2 and lowest flavor in recipe R_3 this is due to higher pulp and sugar ratio with adequate acidity level. At 30^{th} day show recipe R_1 show highest flavor followed by recipe R_2 this might due to inadequate sugar pulp and acidity ratio similar result was obtained Pandey and Singh (1999). Among the cultivars Lucknow-49 was rated best at 0^{th} day followed by 30 day for flavors over apple guava and red fleshed RTS due to their varietal character (Pandey *et al.,* 1997).

At 0^{th} day observation taste was found in maximum scored in R_1 (7.86) followed by R_2 (7.83) and lowest score observed in R_6(7.60).With respect to varieties maximum score observed in V_1 (8.10) followed by V_2 (7.78) and lowest observed in V_3 (7.40). As regards the combination was highest score R_2V_1 (8.30) and followed by R_1V_1 (8.20) and lowest recorded as R_5V_3 (7.20). At 30^{th} day observation was in Taste maximum recorded in R_2 (7.46) followed by R_1 (7.43) and lowest observed in R_3 (7.20).

With respect to varieties maximum score recorded was in V_1 (7.60) followed by V_2 (7.40) and lowest in V_3 (7.15). With regards combination maximum score recorded in R_1V_1 (7.90) followed by R_2V_1 (7.80) Lowest score observed in R_2V_3 (7.00), R_3V_3 (7.00). 0^{th} day observation obtained that recipe R_1 round to best rating. At 30^{th} day observation obtained that recipe R_2.

The highest test rating RTS due to addition or sugar in the pulp after 30^{th} day increase in quantity of sugar in RTS also reduce the taste rating. This is due to higher TSS value because of higher TSS reduced the colour and flavor of RTS ultimately reduce taste of RTS Jain *et al.,* (1997). Among the cultivars it was found that RTS from Lucknow-49 was rated to best taste in 0^{th}, 30^{th} day. The next best apple guava show RTS taste rating in Red fleshed. These finding are in conformity with those at Harisimrat and Dhawan (1998).

Overall acceptability

At 0^{th} day overall acceptability observation maximum score was found in R_1 (7.86) followed by R_2 (7.83) and lowest recorded in R_6 (7.66). With respect to varieties V_1 (8.10) given maximum score followed by V_2 (7.78) and lowest score observed in V_3 (7.40). As per combination R_2V_1 (8.30) followed by R_1V_1 (8.20) and lowest score recorded in R_4V_3 (7.20). At 30^{th} day observation was in overall acceptability maximum score was observed in R_1 (7.46) followed by R_2 (7.43). Lowest observed in R_3 (7.26). With respect to varieties maximum score observed V_1 (7.60) followed by V_2 (7.28) Lowest observed in V_3 (7.10). With regards to combination maximum score followed by R_1V_1 (7.90) followed by R_1V_2 (7.80) and lowest in R_3V_3 (7.00).

At 0^{th} day recipe R_1 was on rating colour, flavor, taste followed by 30^{th} day reduced rating of overall acceptability at 0^{th} day was reported that by Pandey and singh (1999). This is due to better colour excellent flavor good taste and attractiveness. The higher score from overall acceptability of RTS was found in Lucknow-49 at 0thdays followed by 30^{th} day. Next best apple guava RTS showed high overall acceptability followed Red fleshed guava.

Among storage period 0^{th}, 30^{th} of RTS overall acceptability of RTS decreased slightly with increase in storage decreased slightly with increase in storage period. Recipe R_1 show highest score for overall acceptability followed by recipe R_2 and R_3. This is due to loss of colour and flavor of RTS which are responsible to change in overall acceptability (Pandey and Singh, 1999).

Table.1 Effect of recipes, cultivars and their interaction on storage of Guava RTS at 30th day

			0th days				0th Days	
	Colour	Flavour	Taste	Overall	TSS	%Acidity	pH	Ascorbic
FACTOR A				ACCEPTABILITY				ACID
R_1	8.10	8.00	7.86	7.86	12.31	2.00	3.50	19.86
R_2	8.06	7.83	7.83	7.83	13.36	2.10	3.58	18.01
R_3	7.83	7.70	7.80	7.80	13.43	2.20	3.65	20.03
R_4	8.03	7.76	7.70	7.70	11.14	2.40	3.55	15.29
R_5	8.13	7.86	7.73	7.73	12.31	2.50	3.57	17.25
R_6	7.90	7.73	7.60	7.66	12.30	2.30	3.61	15.26
MEAN	8.00	7.81	7.76	7.76	12.46	2.20	3.56	17.60
SEM±	0.001	0.003	0.004	0.100	0.001	0.005	0.004	0.100
CD AT 5%	0.003	0.010	0.001	0.003	0.004	0.009	0.001	0.288
FACTOR B								
V_1	8.50	8.46	8.10	8.10	12.68	2.41	3.70	17.76
V_2	7.76	7.70	7.78	7.78	12.50	2.21	3.59	16.25
V_3	7.71	7.28	7.40	7.40	12.22	2.20	3.40	17.76
MEAN	18.83	23.44	18.35	18.35	29.25	5.35	8.42	39.93
SEM±	0.0017	0.0047	0.0054	0.1419	0.0020	0.0064	0.0089	0.1419
CD AT 5%	0.0049	0.0014	0.0016	0.1419	0.0559	0.0130	0.0018	0.407.19
AXB								
R_1V_1	8.84	8.60	8.20	8.20	12.54	2.30	3.68	21.30
R_2V_1	8.80	8.80	8.30	8.30	13.62	2.30	3.70	19.05
R_3V_1	8.00	8.20	8.00	8.00	13.70	2.50	3.72	21.30
R_4V_1	8.70	8.30	8.00	8.00	11.30	2.50	3.71	16.89
R_5V_1	8.50	8.70	8.10	8.10	12.54	2.50	3.70	19.25
R_6V_1	8.60	8.20	8.10	8.10	12.54	2.40	3.71	16.80
R_1V_2	7.90	7.80	7.90	7.90	12.40	2.20	3.64	19.09
R_2V_2	7.80	7.50	7.80	7.80	13.48	2.00	3.64	20.30
R_3V_2	7.50	7.60	7.80	7.80	13.40	2.00	3.65	18.00
R_4V_2	7.70	7.90	7.70	7.70	11.12	2.40	3.65	20.30
R_5V_2	8.10	7.40	7.90	7.90	12.40	2.40	3.36	15.00
R_6V_2	7.60	8.00	7.60	7.60	12.25	2.00	3.63	17.76
R_1V_3	7.70	7.60	7.50	7.50	12.00	2.10	3.20	18.00

R_2V_3	7.60	7.20	7.40	7.40	13.00	2.20	3.40	17.00
R_3V_3	8.00	7.30	7.60	7.40	13.20	2.40	3.60	18.00
R_4V_3	7.70	7.10	7.40	7.20	11.00	2.10	3.30	14.00
R_5V_3	7.00	7.50	7.20	7.30	12.00	2.20	3.40	16.00
R_6V_3	7.80	7.00	7.30	7.40	12.00	2.20	3.50	14.00
SEM±	0.00297	0.00158	0.00543	0.245831	0.00354	0.011066	0.0089	0.245831
CD AT5%	0.0085	234	0.0027	0.008133	0.01016	0.02244	0.003128	0.705081

Table.2 Effect of recipes, cultivars and their interaction on storage of Guava RTS at 30th day

			30 Days					
	Colour	Flavour	Taste	Overall Acceptability	TSS	pH	%Acidity	Ascorbic Acid
Factor A								
R1	7.20	7.56	7.43	7.46	14.25	2.53	1.73	13.43
R2	7.23	7.53	7.46	7.43	14.94	2.70	1.80	11.58
R3	7.16	7.26	7.20	7.26	15.34	2.90	2.00	9.76
R4	7.20	7.43	7.30	7.30	13.08	2.56	2.23	13.15
R5	7.46	7.30	7.40	7.20	13.17	2.66	2.20	12.47
R6	7.26	7.30	7.30	7.36	14.90	2.80	2.00	10.03
MEAN	7.24	7.39	7.34	7.32	14.27	2.69	1.99	11.70
SEM±	0.006	0.001	0.007	0.004	0.002	0.004	0.003	0.096
CD AT 5%	0.002	0.003	0.002	0.001	0.005	0.001	0.007	0.028
FACTORB								
v1	7.53	7.61	7.60	7.60	14.63	3.21	2.08	14.62
v2	7.24	7.35	7.40	7.28	14.27	2.63	1.88	12.98
v3	7.10	7.23	7.15	7.10	13.90	2.23	2.03	10.98
MEAN	17.14	17.37	17.38	17.25	33.53	6.58	4.64	31.26
SEM±	0.0084	0.0014	0.0064	0.0060	0.0042	0.0011	0.0036	0.1397
CD AT 5%	0.0024	0.0041	0.1837	0.0017	0.0070	0.0011	0.0010	0.4007
AXB								
R1V1	7.50	7.80	7.90	7.90	14.40	3.30	1.90	17.30
R2V1	7.60	7.60	7.80	7.80	15.54	3.20	1.90	16.00
R3V1	7.60	7.70	7.63	7.60	15.62	3.20	2.00	15.05
R4V1	7.40	7.40	7.50	7.50	13.26	3.10	2.40	14.20
R5V1	7.50	7.60	7.20	7.20	13.30	3.20	2.30	12.80
R6V1	7.60	7.60	7.60	7.60	15.70	3.30	2.00	12.39

R1V2	7.20	7.60	7.40	7.40	14.25	1.90	1.70	15.30
R2V2	7.23	7.10	7.50	7.50	14.40	2.80	1.80	14.00
R3V2	7.16	7.30	7.30	7.20	15.40	3.00	2.10	13.00
R4V2	7.20	7.70	7.60	7.10	13.08	2.60	2.20	13.00
R5V2	7.46	7.40	7.40	7.30	13.17	2.70	2.30	11.00
R6V2	7.26	7.60	7.50	7.20	14.90	2.80	2.10	11.39
R1V3	7.20	7.60	7.10	7.10	14.27	2.40	1.60	14.00
R2V3	7.10	7.30	7.00	7.00	14.12	2.10	1.80	13.00
R3V3	7.00	7.90	7.00	7.00	14.90	2.50	1.90	12.00
R4V3	7.10	6.80	7.00	7.30	15.00	2.00	2.10	12.00
R5V3	7.10	7.20	7.30	7.20	13.00	2.10	2.00	10.30
R6V3	7.20	7.10	7.30	7.30	14.90	2.30	1.90	10.30
SEM±	0.001462	0.002487	0.011091	0.001041	0.00421	0.001143	0.00624	0.023628
CD AT5%	0.004194	0.007133	0.31812	0.002987	0.00121	0.00328	0.001789	0.06776

TSS

At 0^{th} day observation was found in TSS maximum scored in R_3 (13.43) followed by R_2 (13.36) lowest observed in R_4 (11.14). With respect to varieties V_1 (12.68) recorded found that maximum score observed in R_2V_1 (13.62) followed by R_2V_2 (13.48) lowest recorded in R_4V_3 (11.00). At 30 days observation was TSS maximum score in R_3 (15.34) followed by R_6 (14.90) lowest observed in R_4 (13.08) with respect to varieties maximum scored observed in V_1 (14.63) followed by V_2 (14.27) lowest score observed in V_3 (13.90). As per combination maximum score observed in R_6V_1 (15.70) followed by R_3V_1 (15.62) and lowest observed in R_5V_3 (13.00). At 0^{th} days recipe R_3 show higher TSS content (13.43) which have lower pulps: sugar ratio and acidity followed by 30^{th} day observation recipe R_3.

At 0^{th} days recipe R_3 show higher TSS content (13.43) which have lower pulps: sugar ratio and acidity followed by 30^{th} day observation recipe R_3 higher TSS content, recipe R_1 show higher TSS content in RTS as increase in TSS of the RTS beverage may possibly be due to conversion of polysaccharides into sugar (Ashrat 1987 and Rabbani,1992).

It was further observed that the TSS value of different cultivars also affected the TSS content of the recipes significantly. The highest TSS observed in 0^{th}, 30^{th} day in RTS prepared with Lucknow-49 followed by apple guava and lowest in Red fleshed guava this was also due to varietal characters.

Acidity

At 0^{th} day observation was found Acidity maximum recorded in R_5 (2.50) followed by R_4 (2.40) and lowest observed in R_1 (2.00). With respect to varieties maximum scored in V_1 (2.41) followed by V_2 (2.21) lowest in V_3 (2.20). As per combination maximum scored observed R_3V1 (2.50), R_4V_1 (2.50), R_5V_1 (2.50) followed by R_6V_1 (2.40). Lowest recorded in R_2V_2 (2.00), R_3V_2 (2.00). At 30 day observation in percent acidity maximum score observed in R_4 (2.23) followed by R_5 (2.20) lowest score observed in R_1 (1.73). With respect to varieties maximum scored observed in V_1 (2.08) and followed by V_3 (2.03) lowest observed in V_2 (1.88). As per combination maximum score R_4V_1 (2.40) followed by R_5V_1 (2.30) and Lowest observed in R_6V_3 (1.90) in RTS.

At 0^{th} day observation maximum acidity showed at recipe R_5 and minimum acidity showed at recipe R_1.30^{th} day observation maximum acidity shows at recipe R_3, recipe R_6, followed by recipe R_2. It clearly indicates that increase in TSS of RTS reduced the acidity of RTS (Baramanray, 1996).

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