

Standardization of physical characteristics of recipe for preparation of ready-to-serve beverage (RTS) from Mango (*Mangifera indica* L.) cv. KESAR

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ABSTRACT

The investigation is on Standardization of recipe for preparation of Ready-To-Serve (RTS) beverage from Mango (*Mangifera indica* L.) cv. Kesar. The experiment comprised of 12 treatments of recipe in Completely Randomized Design with three replications. Among various treatments tried in this investigation, the RTS beverage of 10% blended mango juice with lime and cardamom (10:2:0.006) + 12% TSS + 0.3% acidity retained significantly highest score for colour, taste, flavour, appearance, product setting at bottom and overall acceptance up to fourth month of storage. The sensory rating parameters showed decreasing trend throughout the storage period.

Key words : Mango, Lime, Cardamom, RTS beverage, Colour, Taste, Flavour and acidity

INTRODUCTION

The mango (*Mangifera indica* L.) belongs to family Anacardiaceae, is an important fruit crop of India and subtropical countries of the world. Being a useful and delicious fruit, besides fine taste, its high palatability, sweet fragrance, attractive colour and nutritional value, the fruit is considered to be a good source of vitamin A, B, C and β -carotene, nutritive minerals, digestible sugars and trace elements. Its taste, flavour and aroma are very fascinating to every one. Its kernel contains carbohydrates, carotene, riboflavin, thiamine, protein, fat and calcium also possesses medicinal values. India occupies 1.60 million hectares and produces 11.40 million tones of mango, being the largest producer accounting above 50 per cent of the world production. In Gujarat, mango is cultivated in 0.096 million hectares and production is about 0.77 million tonnes. The area under mango cultivation is increasing steadily, resulting in increased production and likely to create glut in the market during on season, which results meager prices to farmers for their produce as they have no capacity to retain it, being a highly perishable commodity with post harvest life of one week at ambient condition storage (Chadha, 1999), so it needs to be disposed immediately. At the peak harvest season, the availability of the fruits exceeds the demand and the market price becomes very low. Therefore, the value addition of Mango fruits becomes necessary in order to minimize the glut in the market during its peak season of production. The production of new products being necessary for the survival and growth of the processing industry would also

meet new tastes and demand in home as well as the export market. Hence, there is an urgent need to develop some suitable technology for the preparation of Mango beverages that could be economical and made available to a large population. In India, soft drinks have a good demand throughout the year. Looking to the demand of natural beverages, there is a great scope for the preparation of fruit juice and other fruit based beverages. For improving flavour, taste, palatability and nutritive value of mango, lime and cardamom may be blend as these fruits are valued very much for their refreshing juice with nutritional and medicinal properties. Therefore, an investigation on Standardization of recipe for preparation of Ready-To-Serve beverage from Mango (*Mangifera indica* L.) cv. KESAR was conducted with the objectives of standardize the recipe for preparation of RTS beverage of mango and to know the storages behaviour up to four months.

MATERIALS AND METHODS

The experiment on standardization of recipe for preparation of Ready-To-Serve beverage from Mango (*Mangifera indica* L.) cv. KESAR was carried out in the Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during the year 2007. The experiment was laid out in a Completely Randomized Design with three repetitions. The experiment comprises of 12 treatments consisting different recipes viz., (T₁) (8% Juice + 10% TSS + 0.3% acidity, (T₂) 10% Juice + 10% TSS + 0.3% acidity, (T₃) 12%

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Juice + 10% TSS + 0.3% acidity, (T₄) 8% juice + 12% TSS + 0.3% acidity, (T₅) 10% juice + 12% TSS + 0.3% acidity, (T₆) 12% juice + 12% TSS + 0.3% acidity, (T₇) 8% blended juice of mango, lime and cardamom (10:2:0.006) + 10% TSS + 0.3% acidity, (T₈) 10% blended juice of mango, lime and cardamom (10:2:0.006) + 10% TSS + 0.3% acidity, (T₉) 12% blended juice of mango, lime and cardamom (10:2:0.006) + 10% TSS + 0.3% acidity, (T₁₀) 8% blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3% acidity, (T₁₁) 10% blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3% acidity and (T₁₂) 12% blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3% acidity in this study. The 200ml bottles having 12 treatment combinations and 30 samples each have 10 numbers and 360 total number of bottles kept at ambient conditions. The techniques and materials used during the course of experimentation as, fresh fully ripened and uniform sized fruits of mango were purchased from the college farm and used for experimentation. They were immediately brought to the laboratory and sorted out. The unripe, diseased, damaged and off type fruits were discarded. Similarly, in case of lime and cardamom, fully ripe lemon yellow coloured uniform fruits, free from mechanical injury and disease were selected for the study. The selected fruit were thoroughly washed with tap water to remove dirt and dust particles adhering to the surface of fruit and were allowed to surface dry. The biochemical analysis is done with the method (A.O.A.C., 1995). The data were statistically analysed according to the analysis of variance techniques as suggested by Cochran and Cox (1950). The analysis of variance for different parameters and critical difference (CD) was calculated to access the significance, non-significance of difference between treatment mean, wherever it was found significant through 'F' test at 5 % level of significance.

RESULTS AND DISCUSSION

The data on physical and sensory rating of mango juice was recorded for colour, taste, flavour, appearance; product setting on bottom and over all acceptance of juice was 9.45, 9.15, 8.60, 9.20, 9.85 and 46.25, respectively. Sensory rating evaluation of mango RTS beverage in terms of colour, taste, flavour, appearance, product setting at bottom and overall acceptance is given in Table 1 and 2.

Colour:

The effect of recipe was found significant during storage period. The treatment T₁₁ recorded maximum (8.983) colour score on 0th month of storage, which was

at par with treatment T₅, whereas the minimum (7.002) score was recorded with treatment T₁, which was at par with treatment T₄, T₃, T₂, T₇ and T₉. On 1st, 2nd and 3rd month of storage, treatment T₁₁ recorded maximum (8.883, 8.683, 8.322, respectively) colour score, which was at par with T₅, whereas the minimum (6.850, 6.603, and 6.150, respectively) score was recorded with treatment T₁ which was at par with treatment T₄, T₃, T₂ and T₇. Treatment T₁₁ recorded significantly maximum score (7.997), on 4th month of storage, which was at par with T₅, whereas the significantly minimum (5.802) score was recorded with treatment T₁ that was at par with treatment T₂, T₄ and T₃. In general, the colour score was significantly decreased with advancement of storage period.

Colour acceptance varied significantly due to recipe. The highest initial colour value (8.983) was recorded at T₁₁ treatment and it was remain highest during entire period of storage (Table 1). On 4th month of storage the maximum colour value of 7.997 was recorded of T₁₁ treatment as compared to minimum of 5.802 at T₁. This might be due to blending of mango juice with lime juice and cardamom. The similar result was obtained by Deka *et al.* (2004) and Hariram (2007).

Taste:

In case of recipe, on 0th month of storage, treatment T₁₁ recorded the highest (9.111) taste score, while significantly minimum (6.003) taste score was found in T₁ treatment, which was at par with T₄ and T₃. On 1st month of storage, treatment T₁₁ exhibited significantly maximum (8.971) taste score, whereas the treatment T₁ recorded significantly minimum (5.800) taste score, which was at par with treatment T₄ and T₃. On 2nd month of storage, treatment T₁₁ showed the highest (8.720) taste score, whereas the treatment T₁ recorded significantly minimum (5.503) taste score, which was at par with treatment T₄ and T₃. On 3rd month of storage, treatment T₁₁ recorded the highest (8.452) taste score, whereas the treatment T₁ recorded significantly minimum (5.003) taste score, which were at par with treatment T₄ and T₃. On 4th month of storage, treatment T₁₁ recorded the highest (8.083) taste score, while significantly minimum (4.603) taste score was found in T₁ treatment and was found statistically at par with treatment T₄ and T₃. The highest initial taste value (9.111) was recorded at T₁₁ treatment (10 % blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3 % acidity) and it was remain highest during entire period of storage (Table 2). On 4th month of storage the maximum taste value of 8.083 was recorded of T₁₁ treatment as compared to minimum of 4.603 at T₁ (8 % juice of mango + 10 % TSS + 0.3 %

Table 1: Effect of recipe on colour, appearance and flavour (score) of mango RTS beverage during storage

Treatments	Storage period (months)														
	Colour					Appearance					Flavour				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
T ₁	7.002	6.850	6.603	6.150	5.802	6.950	6.890	6.733	6.423	6.280	6.617	6.417	6.117	5.520	5.110
T ₂	7.096	7.003	6.752	6.301	5.997	7.050	7.000	6.862	6.578	6.432	7.050	6.883	6.615	6.045	5.617
T ₃	7.092	7.005	6.703	6.321	6.050	7.033	6.983	6.843	6.549	6.410	6.947	6.750	6.453	5.907	5.653
T ₄	7.046	6.955	6.683	6.302	6.017	6.983	6.923	6.780	6.504	6.352	6.783	6.604	6.317	5.754	5.304
T ₅	8.723	8.627	8.404	8.102	7.701	8.097	8.053	7.907	7.644	7.504	7.903	7.752	7.540	7.030	6.705
T ₆	8.217	8.117	7.902	7.553	7.150	7.683	7.617	7.467	7.207	6.911	7.683	7.503	7.250	6.657	6.303
T ₇	7.317	7.127	6.902	6.481	6.317	7.283	7.183	7.080	6.829	6.539	7.217	7.043	6.717	6.025	5.673
T ₈	7.417	7.317	7.117	6.721	6.413	7.450	7.350	7.249	7.001	6.710	7.453	7.303	7.093	6.652	6.110
T ₉	7.313	7.174	7.023	6.602	6.302	7.083	7.017	6.924	6.672	6.373	7.083	6.883	6.653	6.143	5.839
T ₁₀	8.583	8.490	8.290	7.873	7.557	8.200	8.132	8.000	7.747	7.627	8.117	7.950	7.750	7.257	6.907
T ₁₁	8.983	8.883	8.683	8.322	7.997	8.517	8.350	8.247	8.070	7.920	8.320	8.147	7.977	7.501	7.150
T ₁₂	7.633	7.517	7.317	6.941	6.607	7.517	7.417	7.322	7.072	6.777	7.553	7.350	7.107	6.608	6.244
S.E. ±	0.116	0.105	0.115	0.119	0.117	0.100	0.113	0.114	0.115	0.106	0.110	0.104	0.108	0.097	0.086
C.D. (P=0.05)	0.337*	0.305*	0.335*	0.346*	0.341*	0.293*	0.328*	0.333*	0.336*	0.311*	0.321*	0.303*	0.314*	0.282*	0.250*
C.V. %	2.600	2.380	2.700	2.940	3.040	2.320	2.630	2.710	2.840	2.700	2.570	2.490	2.670	2.600	2.450

* indicates significance of value at P=0.05

Table 2 : Effect of recipe on taste, product setting at bottom and overall acceptability (score) of mango RTS beverage during storage

Treatments	Storage period (months)														
	Taste					Product setting at bottom					Overall acceptability				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
T ₁	6.003	5.800	5.503	5.003	4.603	7.283	7.183	6.880	6.480	6.280	33.855	33.140	31.836	29.576	28.075
T ₂	6.511	6.363	6.121	5.675	5.302	7.917	7.817	7.572	7.193	7.007	35.624	35.066	33.922	31.792	30.355
T ₃	6.254	6.050	5.802	5.307	4.901	7.650	7.550	7.280	6.857	6.660	34.976	34.338	33.071	30.891	29.674
T ₄	6.103	5.902	5.601	5.153	4.853	7.483	7.383	7.100	6.707	6.527	34.398	33.767	32.481	30.420	29.053
T ₅	8.321	8.170	7.882	7.433	7.184	9.12	9.040	8.803	8.510	8.321	42.164	41.642	40.536	38.719	37.448
T ₆	8.002	7.852	7.602	7.157	6.807	8.683	8.583	8.307	8.027	7.807	40.268	39.672	38.528	36.601	34.978
T ₇	7.153	6.950	6.652	6.153	5.797	8.150	8.050	7.752	7.350	7.152	37.120	36.353	35.103	32.838	31.478
T ₈	7.453	7.250	7.015	6.550	6.157	8.350	8.250	8.004	7.643	7.470	38.123	37.470	36.478	34.567	32.860
T ₉	6.754	6.550	6.257	5.800	5.302	8.017	7.917	7.627	7.204	6.975	36.250	35.541	34.484	32.421	30.791
T ₁₀	8.617	8.472	8.217	7.803	7.483	9.300	9.220	9.007	8.699	8.650	42.817	42.264	41.264	39.379	38.224
T ₁₁	9.111	8.971	8.720	8.452	8.083	9.683	9.593	9.393	9.093	8.850	44.614	43.944	43.020	41.438	40.000
T ₁₂	8.017	7.872	7.624	7.271	6.821	8.550	8.460	8.207	7.782	7.657	39.235	38.616	37.277	35.674	35.106
S.E. ±	0.120	0.132	0.121	0.108	0.099	0.133	0.142	0.134	0.134	0.138	0.431	0.440	0.449	0.447	0.410
C.D. (P=0.05)	0.351*	0.387*	0.354*	0.314*	0.288*	0.389*	0.413*	0.392*	0.391*	0.404*	1.258*	1.285*	1.311*	1.306*	1.197*
C.V. %	2.830	3.190	3.040	2.910	2.800	2.770	2.970	2.910	3.040	3.220	1.950	2.020	2.130	2.240	2.140

* indicates significance of value at P=0.05

acidity).

The taste and overall quality were found to improve significantly by blending with apricot pulp, apple juice and apple juice concentrate as component to sand pear juice (control) and the blend with plum pulp. In the overall quality, the sand pear juice and apricot juice blend of 80:20 was

adjudged the best due to better taste (Attri *et al.*, 1998). Similar, beneficial effect of blending of aonla and lime juice (lime 95% + aonla 5%) was recorded by Deka *et al.* (2004), which support the finding of the present study. The taste and overall quality were found to improve significantly by blending juice of sapota with lime by

Hariram (2007).

Flavour:

The flavour value of RTS decreased as the storage period increased. A perusal of data (Table 1) revealed that the flavour value of RTS was significantly affected by recipe treatments from 0th to 4th month of storage. The flavour value reduced with advancement of storage period in all the recipe treatment. However, on 0th month of the storage the maximum flavour value (8.320) was observed in T₁₁ treatment, which was found statistically at par with T₁₀, while the minimum (6.617) flavour value was recorded in treatment T₁, which was found statistically at par with T₄. On 1st, 2nd, 3rd and 4th month of the storage, the maximum flavour value (8.147, 7.977, 7.501 and 7.150, respectively) was found in T₁₁ treatment, which was at par with treatment T₁₀, while the treatment T₁ showed the minimum score (6.417, 6.117, 5.520 and 5.110, respectively) flavour value, which was found statistically at par with T₄. The highest initial flavour value (8.320) was recorded at T₁₁ treatment. Among the various recipe treatments the highest retention of flavour was recorded at T₁₁ treatment (10 % blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3 % acidity).

Blending of different juice affected the quality of the product. According to Hariram (2007), the blends containing Rangpur lime and acid lime were rated higher both the flavour and consistency. Tiwari (2000) concluded that blending 30 per cent of papaya juice with 70 per cent guava juice improved the nutritional value and flavour of RTS beverage, which strongly support the present findings.

Appearance:

Different recipe treatments significantly affected the appearance score during storage. The appearance of product decreased with the advancement of storage period in all the recipe treatments. On 0th month of storage, treatment T₁₁ recorded the maximum (8.517) test score while the treatment T₁ recorded the minimum (6.950) test score and it was found statistically at par with T₄, T₃, T₂ and T₉ treatments. On 1st month of storage, significantly highest (8.350) test score was observed in the treatment T₁₁, which was at par with treatment T₁₀ and T₅, whereas treatment T₁ recorded the lowest (6.890) test score which was found statistically at par with T₄, T₃, T₂, T₇ and T₉ treatments. Then after, on 2nd and 3rd month of storage the maximum (8.247 and 8.070, respectively) score was observed in T₁₁ treatment, which was found statistically at par with T₁₀, whereas the treatment T₁ recorded the minimum (6.733 and 6.423, respectively) test score which

was found statistically at par with T₄, T₃, T₂ and T₉ treatments. On 4th month of storage, treatment T₁₁ recorded the maximum (7.920) test score, which was at par with treatment T₁₀, while the treatment T₁ recorded the minimum (6.280) test score and it was found statistically at par with T₄, T₃, T₂, T₇ and T₉ treatments. The present study significantly affected the reduction of appearance value of the product during storage of 4 months. On the last month of storage the maximum appearance value (7.920) was record at T₁₁ treatment (10 % blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3 % acidity) (Table 1).

The better retention of appearance of guava RTS beverage blending with lime juice is supported by finding of Attri *et al.* (1998) who observed that the yellow and red colour of the blended juice of pear with plum and apricot were improved. These finding are in conformity with those of Deka *et al.* (2001) for blending of lime, aonla, grape, pineapple and mango, Wasker (2000) for blending pomegranate and kokum and Hariram (2007) for blending sapota.

Product setting at bottom:

The product setting at bottom of mango RTS beverage was significantly influenced by different recipe treatments. It is clear from the data (Table 2) that score of product setting at bottom of mango RTS beverage was decreased as the storage period increased in all the recipe treatments. On 0th and 1st month of storage, significantly maximum (9.683 and 9.593, respectively) value of product setting at bottom was observed in T₁₁ treatment which was found statistically at par with T₁₀, whereas significantly minimum (7.283 and 7.183, respectively) value of product setting at bottom was observed in treatment T₁ which was found statistically at par with T₄ and T₃. On 2nd month of storage, product setting at bottom score was found highest (9.393) in treatment T₁₁, which was at par with T₁₀, whereas the lowest (6.880) in treatment T₁, which was at par with T₄. Then after, on 3rd and 4th month of storage the maximum (9.093 and 8.850, respectively) score was observed in T₁₁ treatment and it was at par with treatment T₁₀, whereas the treatment T₁ recorded the minimum (6.480 and 6.280, respectively) test score which was found statistically at par with treatment T₄ and T₃.

Minimum reduction in value of product setting at bottom was record at T₁₁ treatment *i.e.* 9.683 to 8.850. However, T₁ treatment exhibited highest reduction of value of product setting at bottom *i.e.* 7.283 to 6.280. It might be due to the less particle suspension in T₁₁ recipe treatment and more particles suspension in T₁ recipe

treatment. Similar reports akins made by Bhuvaneswari and Dorayappa Gowda (2006) who reported that the RTS with grape blended juice. Hariram (2007) also found that the RTS with sapota blended juice with lime.

Overall acceptance:

The overall acceptance of mango RTS was also significantly influenced by different recipe treatments. It is clear from the data (Table 2) that overall acceptance of mango RTS beverage was decreased as the storage period increased in all the recipe treatment. On 0th, 1st and 2nd month of the storage, the maximum overall acceptance value (44.614, 43.944 and 43.020, respectively) was found in T₁₁ treatment, while the treatment T₁ showed the minimum (33.855, 33.140 and 31.836, respectively) overall acceptance value which was at par with T₄ and T₃ treatments. Then after, On 3rd and 4th month of the storage, the maximum overall acceptance value (41.438 and 40.000, respectively) was found in T₁₁ treatment, while the treatment T₁ showed the minimum (29.576 and 28.075, respectively) overall acceptance value which was at par with T₄ treatments. In the present study, the minimum reduction in overall acceptance was record at T₁₁ treatment (10 % blended juice of mango, lime and cardamom (10:2:0.006) + 12% TSS + 0.3 % acidity) *i.e.* 44.614 to 40.00. However, T₁ treatment (8 % juice of mango 10 % TSS + 0.3 % acidity) exhibited

highest reduction of overall acceptance *i.e.* 33.855 to 28.075. A similar report has been made by Rao *et al.* (1979). They reported that the blends containing Rangpur lime and acid lime (15:10 and 20:5) were resulted higher both for flavour and consistency. Tiwari (2000) concluded that blending of 30 per cent papaya juice with 70 per cent guava juice improved the nutritional quality and overall acceptance of RTS beverages.

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