The Pharma Innovation Journal 2021; 10(11): 1680-1684

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(11): 1680-1684
© 2021 TPI
www.thepharmajournal.com
Received: 03-08-2021
Accepted: 13-10-2021

Leena Thakur
Research Scholar, Department of Horticulture, Pt. K.L.S. College of Horticulture and Research Station, IGKV, Raipur, Chhattisgarh, India

SP Sharma
Scientist, Department of Horticulture, Pt. K.L.S. College of Horticulture and Research Station, IGKV, Raipur, Chhattisgarh, India

Dipesh Kumar
Research Scholar, Department of Horticulture, Pt. K.L.S. College of Horticulture and Research Station, IGKV, Raipur, Chhattisgarh, India

Yogendra Chandel
Research Scholar, Department of Horticulture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
Leena Thakur
Research Scholar, Department of Horticulture, Pt. K.L.S. College of Horticulture and Research Station, IGKV, Raipur, Chhattisgarh, India

Standardization and quality evaluation of carrot RTS blended with lime and mahua

Leena Thakur, SP Sharma, Dipesh Kumar and Yogendra Chandel

Abstract
The experiment comprised of 8 treatment having 3 replications each following completely randomized design (CRD), for RTS. The RTS of carrot was made up of 10% of pulp in which carrot was decreased and lime was increased each by 10% along the treatments while other factors such as mahua 10%, TSS was 15 0Brix and acidity 0.3% was constant as T1 (Carrot 80% + Lime 10%), T2 (Carrot 70% + Lime 20%), T3 (Carrot 60% + Lime 30%), T4 (Carrot 50% + Lime 40%), T5 (Carrot 40% + Lime 50%), T6 (Carrot 30% + Lime 60%), T7 (Carrot 20% + Lime 70%) and T8 (Carrot 10% + Lime 80%). Analysis of various physico-chemical characteristics such as total soluble solids, pH, acidity, ascorbic acid, reducing sugar, and total sugar during the storage period of 90 days each at 15 days of interval. Also sensory attributes (colour, appearance, flavour, taste and overall acceptability) were analysed at 0 day.

Keywords: Blended, carrot, RTS

Introduction
Carrot (*Daucus carota* L.) belonging to the family Apiaceae is one of the most important root vegetable crop cultivated throughout the country particularly during winter season. Afghanistan is considered as primary centre of origin of carrot. The carrot cultivation has been traced in Asia Minor in the 10th and 11th centuries. Carrot is an important cool season root vegetable cultivated in temperate countries mainly during spring and summer season while in tropical region during winter season. The most eaten part of a carrot is the taproot, while the greens are also eatable (Verma *et al*., 2018). Carrots that are cultivated have mostly orange reddish, purple, back, or yellow roots (Ahmad *et al*., 2019) [1].

Carrot roots are generally used in salads and soups and can be commercially converted into nutritionally rich processed products such as juice, concentrate, dried powder, canned products, etc. (Sharma *et al*., 2012) [6]. Carrot juice is one of the most popular healthy vegetable juices and is a rich source of natural β- and α-carotene (Marx *et al*, 2003). Carrot juice and its blends are the most popular non-alcoholic beverages, and a constant increase in carrot juice consumption has been reported from various countries (Sharma *et al*., 2012) [6].

Lime scientifically known as *Citrus aurantifolia* (*Christm*.), belongs to Rutaceae family. It is well-known as a cure for scurvy, a disease which is caused due to deficiency of vitamin-C. Lime juice and its natural oils are very beneficial for skin when consumed orally or applied externally. Raw lime juice contains 83.88% moisture, 1.0% fat, 9.96% carbohydrates, 1.3% crude fibre, 1.18% ash and 12.2 mg/ 100 gm vitamin C (Waghaye *et al*., 2019) [8]. Also it is an excellent source of vitamin C, Vitamin B, proteins, phosphorous, dietary fiber, phenolic components, and flavonoids. Lime fruits have citric acid which acts as a natural preservative in foods.

Lime is proved to have potential health promoting properties which includes weight loss, skin care, good digestion, relief from constipation, eye care, and treatment of scurvy, piles, peptic ulcer, respiratory disorders, gout, gums, urinary disorders, etc.(Hariharan *et al*., 2016) [3].

Madhuca Indica J.F. Gmel. of family Sapotaceae is an indigenous tree to the Indian subcontinent. It is a deciduous tree abundantly distributed in various states of India. Constituents Moisture 19.8%, Protein 6.37%, Fat 0.5%, Reducing Sugar 50.62%, Total Inverts 54.24%, Cane Sugar 3..43%, Total Sugar 54.06%, Ash 4.36%, Calcium 8%, Phosphorus 2%, are nutritional properties of mahua flower (Kureel *et al*., 2009) [4].

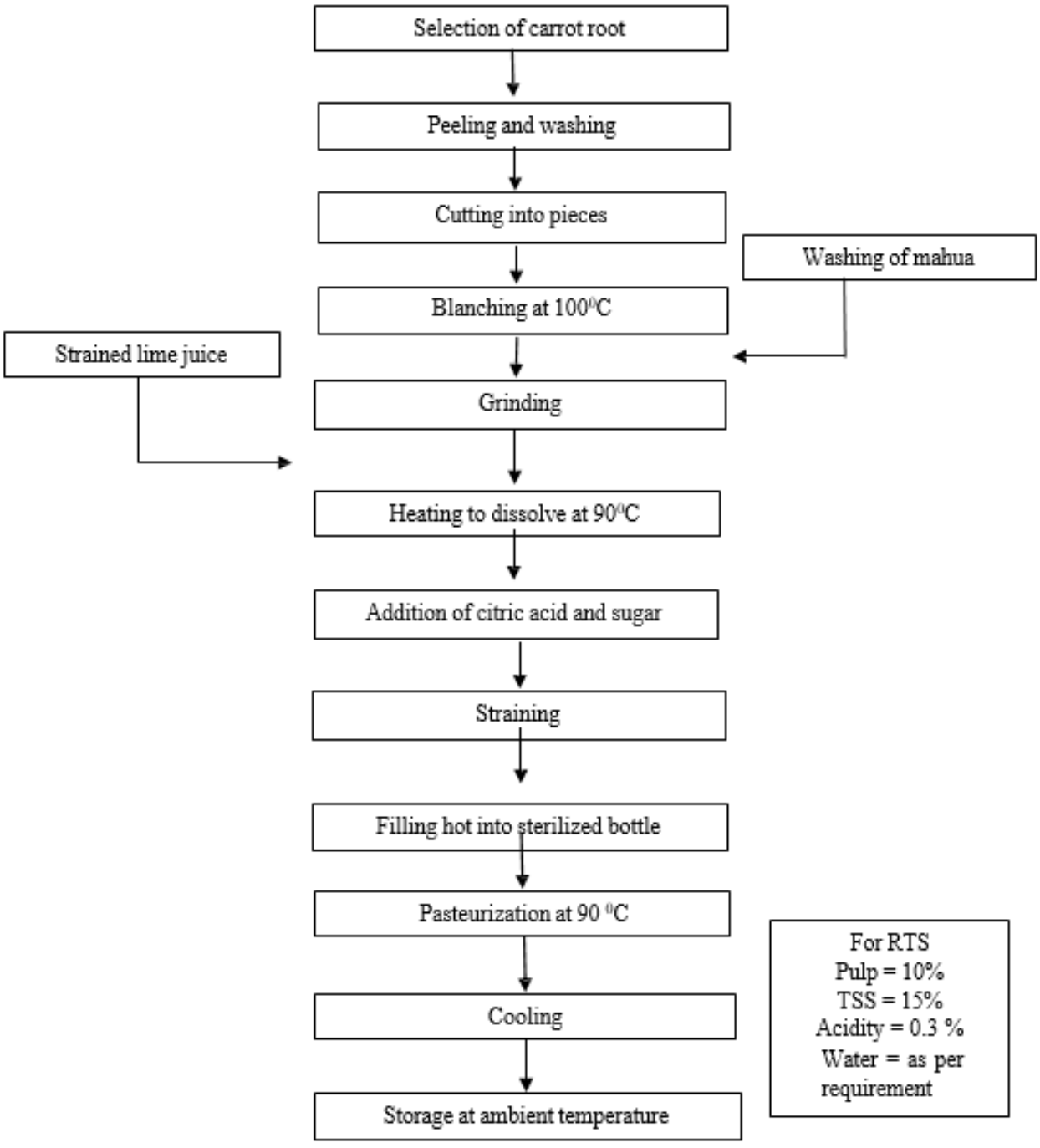
Mahua flowers are rich source of natural sugars (glucose, fructose, sucrose, etc.) and are used for liquor production by tribal as alcoholic 'mahua daru' besides various food products. Sinha *et al*., (2017) reported that fresh flower juice is concentrated and used as liquid sweetener in

bakery and confectionary products. Fresh flowers are also utilized for making puree and sauces by crushing the flowers, while the pulp of ripe flowers can be used to make intermediate moisture foods (IMF) like jam, jelly, and marmalade.

Juice blending is one of the best methods to improve the nutritional quality of the juice. It can improve the vitamin and mineral content depending on the kind and quality of fruits and vegetables used (De Carvalho *et al*., 2007) [2]. Apart from nutritional quality improvement, blended juice can be improved in its sensory and flavour characteristics according to their raw materials.

Preparation of RTS

After peeling, both the end of carrot was removed. Carrot was cut in small pieces, blanched at 750C- 800C and were ground with the help of mixer-grinder to find the pulp. In case of lime, it was cut into two halves and squeezed to extract juice through muslin cloth. Mahua after washing was soaked in water for a while and then grounded with the help of mixer grinder to obtain the pulp. After the pulp/juice extraction, 10 and 20 per cent pulp/juice of carrot, lime and mahua was taken as per the treatments for RTS preparation. The preferable per cent of TSS and 0.3 per cent acidity were maintained by addition of sugar, citric acid and water for all the treatments. The prepared nectar beverages were again filtered through a muslin cloth to obtain a uniform consistent product. The product was poured hot, into sterilized bottles of 200 ml capacity and sealed airtight by crown-corking machine. The filled bottles were pasteurized till the temperature of product reaches 80□C in boiling water. To attain required temperature it took about 15-20 minutes.



Flow chart of carrot RTS blended with lime and mahua

Result and Discussion

TSS: Total soluble solids (TSS) value of the RTS was estimated with the help of hand refractometer. The highest TSS was noted of treatment T8 with value ranging from 15.23 to 17.23 and least was obtained by treatment T1 with values ranging 15.03 to 17.00 from 0 to 90 days. At 0 day the result was non-significant but with the increment of storage, significant increase in the TSS value was observed. Increase in TSS might be due to conversion of insoluble polysaccharides into reducing sugars. Another possible reason for the rapid increment in soluble solid contents may be due to hydrolysis of sucrose to invert sugars. Increase in TSS during storage might be due to breakdown of complex carbohydrates into simple soluble carbohydrates.

Table 1: Outcome of various recipe treatment on TSS of RTS during storage

Treatment	TSS						
Storage period in days							
	0	15	30	45	60	75	90
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.03	15.30	15.60	15.96	16.23	16.66	17.00
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.10	15.36	15.63	16.00	16.30	16.70	17.03
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.10	15.40	15.66	16.03	16.33	16.73	17.06
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.20	15.43	15.73	16.06	16.36	16.76	17.10
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.16	15.46	15.83	16.10	16.43	16.80	17.13
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.16	15.50	15.86	16.16	16.53	16.83	17.16
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.20	15.53	15.90	16.16	16.60	16.93	17.20
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	15.23	15.56	15.93	16.20	16.63	17.00	17.23
CD at 5%	N/A	0.133	0.107	0.08	0.107	0.118	0.08
S.Em	0.055	0.044	0.035	0.026	0.035	0.039	0.026
CV	0.632	0.495	0.388	0.283	0.373	0.403	0.267

Acidity

Estimation of total acid content in percent was estimated by titrating 10 ml of beverage sample against 0.1 N NaOH by using indicator like 3-4 drops of phenolphthalein with appearance of pink colour. The highest acidity value was procured by treatment T8 ranging from 0.32 -0.69 and least was calculated by treatment T1 from 0.31 to 0.66 upto 90 days. At 0 days acidity was non-significantly but with advancement of course of storage it showed significant increase. Gradual increase in titrable acidity during storage, irrespective of treatments may be due to high storage temperature at ambient temperature which is responsible for increasing acidity. The oxidation or degradation of reducing sugars or pectic body‘s breakdown into pectinic acid causes the formation of acidic compounds.

Table 2: Outcome of various recipe treatment on acidity of RTS during storage

Treatment	ACIDITY						
Storage period in days							
	0	15	30	45	60	75	90
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.31	0.33	0.4	0.4	0.52	0.58	0.66
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.31	0.34	0.40	0.47	0.53	0.59	0.66
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.31	0.34	0.41	0.47	0.54	0.59	0.66
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.32	0.35	0.42	0.48	0.54	0.6	0.66
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.32	0.35	0.42	0.49	0.55	0.60	0.67
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.32	0.36	0.43	0.49	0.55	0.61	0.67
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.32	0.36	0.43	0.49	0.56	0.62	0.68
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	0.32	0.37	0.44	0.50	0.56	0.63	0.69
CD at 5%	N/A	0.012	0.012	0.011	0.01	0.01	0.011
S.Em	0.003	0.004	0.004	0.004	0.003	0.003	0.004
CV	1.807	1.912	1.675	1.26	1.05	0.954	0.96

pH

pH value of RTS of carrot was evaluated with the help digital pen type pH meter. The maximum pH from 4.96 to 3.90 was noted for the treatment T1 and minimum value obtained from 4.91 to 3.79 by treatment T8 from 0- 90 days. There was significant decrease in the pH value of carrot RTS blended with lime and mahua. This decrease in pH was attributed to the formation of acidic compounds by degradation of reducing sugars during the passage of storage time.

Table 3: Outcome of various recipe treatment on pH of RTS during storage

Treatment	pH						
Storage period in days							
	0	15	30	45	60	75	90
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.96	4.9	4.75	4.56	4.35	4.17	3.90
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.94	4.88	4.74	4.54	4.33	4.14	3.89
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.93	4.87	4.71	4.53	4.31	4.11	3.89
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.93	4.85	4.69	4.52	4.29	4.11	3.87
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.92	4.85	4.69	4.51	4.28	4.09	3.85
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.92	4.83	4.68	4.5	4.28	4.05	3.84
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.91	4.82	4.66	4.49	4.26	4.03	3.81
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.91	4.80	4.64	4.46	4.24	3.99	3.79

CD at 5%	0.019	0.028	0.028	0.032	0.028	0.038	0.038
S.Em	0.006	0.009	0.009	0.011	0.009	0.013	0.012
CV	0.225	0.336	0.337	0.409	0.368	0.532	0.559

Ascorbic acid

According to Ranganna (1997) [5] ascorbic acid of beverages was determined. Principle is that the dye which is blue in alkaline solution and red in acid solution is reduced by ascorbic acid to a colourless.

It is proved from the observations that ascorbic acid content of RTS of carrot blend with lime and mahua showed significant decreasing pattern during the storage from 0-90 days at room temperature with a definite variation between the observations of treatments during the storage period. The highest value was obtained by treatment T8 ranged from 5.12 to 3.84 and the least value was from 4.37 to 2.77. Gradual decrease in ascorbic acid during storage may be due to the fact that ascorbic acid being sensitive to oxygen, light and heat was easily oxidized in presence of oxygen by both enzymatic and non-enzymatic catalyst.

Table 4: Outcome of various recipe treatment on ascorbic acid of RTS during storage

Treatment	Ascorbic ACID						
	Storage period in days						
	0	15	30	45	60	75	90
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.37	4.37	3.84	3.41	3.30	3.09	2.77
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.48	4.37	3.94	3.62	3.41	3.2	2.88
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.58	4.48	4.05	3.62	3.62	3.41	3.09
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.69	4.58	4.16	3.73	3.73	3.41	3.30
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	5.01	4.69	4.26	3.84	3.84	3.52	3.30
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.90	4.8	4.37	4.05	3.84	3.62	3.41
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	5.01	4.90	4.48	4.16	4.05	3.73	3.62
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	5.12	4.90	4.48	4.16	4.16	3.84	3.84
CD at 5%	0.395	0.342	0.361	0.323	0.323	0.255	0.279
S.Em	0.131	0.113	0.119	0.107	0.107	0.084	0.092
CV	4.74	4.223	4.918	4.828	4.931	4.197	4.878

Sugar (%)

According to Lane and Eynon by Ranganna (1997) [5] sugars were determined. Standard invert sugar solution was taken 25 ml and 50 ml distilled water was added, phenolphthalein indicator was added to few drops in flask and then neutralized with 20% NaOH till it turns pink colour. With 1N HCI it was then acidified till pink colour disappears. Up to the mark the volume was made with distilled water.

A. Reducing sugar

Invert sugar reduces the copper to insoluble cuprous oxide in Fehling's solution which turns to red, is the principle used. The sample's sugar amount is found by determining the volume of the unknown sugar solution to completely reduce a measured volume of Fehling's solution.

The maximum value was found to be of treatment T8 i.e. from 4.54 to 6.48 and minimum value was of treatment T1 from 4.26 to 6.13.The observations proved that reducing sugar of RTS of carrot blend with lime and mahua showed significant increasing pattern during the storage from 0-90 days at room temperature with a definite variation between the observations of treatments during the storage period. The increase in the reducing sugar for the specific samples may be attributed to the fact that in unprocessed juice during storage complex carbohydrates were converted into simple sugars due to the elevated microbial activities.

Table 5: Outcome of various recipe treatment on reducing sugar of RTS during storage

Treatment	Reducing Sugar						
	Storage period in days						
	0	**15**	**30**	**45**	**60**	**75**	**90**
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.26	4.48	4.78	5.07	5.39	5.69	6.13
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.28	4.53	4.81	5.19	5.41	5.73	6.19
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.36	4.57	4.90	5.23	5.43	5.81	6.22
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.34	4.6	4.92	5.25	5.50	5.86	6.27
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.39	4.65	5.00	5.31	5.55	5.94	6.30
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.42	4.69	5.03	5.35	5.62	6.00	6.36
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.48	4.73	5.05	5.42	5.66	6.05	6.45
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	4.54	4.79	5.09	5.44	5.71	6.05	6.48
CD at 5%	0.108	0.087	0.104	0.088	0.109	0.118	0.09
S.Em	0.036	0.029	0.034	0.029	0.036	0.039	0.03
CV	1.412	1.08	1.201	0.953	1.123	1.144	0.816

B. Total sugar

The total sugar was estimated by taking 50 ml aliquot of clarified and deleaded solution was transferred to a conical flask of 250 ml. HCI of 5 ml was added to it and was kept undisturbed to stand at room temperature (200 C or above) for a day.

The highest value was obtained by the treatment T8 as 10.84 at 0 day and 11.90 at 90th day, whereas the lowest was found of treatment T1 with 10.71 and 11.68 at 0 and 90 days respectively It is proved from the observations that total sugar of RTS of carrot blend with lime and mahua showed increasing pattern during the storage from 0-90 days at room

temperature with a definite variation between the observations of treatments during the storage period. The increase in total sugars might be due to the hydrolysis of polysaccharides such as pectin, cellulose and starch and their conversion into simple sugars.

Table 6: Outcome of various recipe treatment on total sugar of RTS during storage

Treatment	Total sugar						
	Storage period in days						
	0	15	30	45	60	75	90
T1: Pulp 10% (Carrot 80% + Lime 10% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.71	10.8	10.95	11.04	11.18	11.37	11.68
T2: Pulp 10% (Carrot 70% + Lime 20% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.7	10.81	10.97	11.06	11.2	11.4	11.72
T3: Pulp 10% (Carrot 60% + Lime 30% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.73	10.85	10.99	11.08	11.22	11.41	11.75
T4: Pulp 10% (Carrot 50% + Lime 40% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.75	10.87	11.00	11.10	11.22	11.43	11.79
T5: Pulp 10% (Carrot 40% + Lime 50% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.79	10.89	11.05	11.12	11.24	11.49	11.81
T6: Pulp 10% (Carrot 30% + Lime 60% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.80	10.89	11.07	11.15	11.30	11.52	11.84
T7: Pulp 10% (Carrot 20% + Lime 70% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.83	10.93	11.09	11.16	11.32	11.54	11.88
T8: Pulp 10% (Carrot 10% + Lime 80% + Mahua 10%) + TSS 15% + Acidity 0.3%	10.84	10.95	11.09	11.18	11.36	11.55	11.90
CD at 5%	0.098	0.072	0.099	0.077	0.074	0.098	0.078
S.Em	0.032	0.024	0.033	0.026	0.025	0.032	0.026
CV	0.519	0.378	0.515	0.398	0.379	0.488	0.377

Conclusion

The recipe containing pulp 10% (Carrot 70% + Lime 20% + Mahua 10%), 0.3% acidity and 15% TSS was found suitable for preparation of carrot RTS blended with lime and mahua. The recipe comprising of pulp 20% (Carrot 70% + Lime 20% + Mahua 10%), 0.3% acidity and 20% TSS was found suitable for preparation of carrot nectar blended with lime and mahua. The treatment T8 having combination carrot 10% + lime 80% + mahua 10%of both RTS and nectar shows the highest value of total soluble solids, acidity, reducing sugar and total sugar. The treatment T1 having recipe carrot 80% + lime 10% + mahua 10% of both RTS and nectar shows the highest value of ascorbic acid, non-reducing sugar, TSS: acid ratio and pH. The colour, flavor, appearance, taste and overall acceptability shows diminishing pattern with passage of course of time for 90 days.

Reference

1. Ahmad, Tanveer, Cawood, Maria, Iqbal, Qumer *et al*. Phytochemicals in *Daucus carota* and their health benefits—review article. Foods 2019;8(424).
2. De-carvalho JM, Maia GA, De-figueiredo RW, De-brito ES, Rodrigues S. Development of a blended non-alcoholic beverage composed of coconut water and cashew apple juice containing caffeine. Journal of Food Quality 2007;30:664- 681.
3. Hariharan G, Mahendran T. Imperial physico-chemical, sensory and microbial evaluation of ginger-lime ready-to-serve (RTS) functional beverage, sweetened by palmyra sugar candy. Journal of Interdisciplinary Research., 2016;2(5).
4. Kureel RS, Kishor R, Dutt Dev, Ashutos P. Mahua – a potential tree born oilseeds. National oilseed and development board. Ministry of agriculture Govt. of India, Gurgaon 2009, 1-27.
5. Ranganna S. Handbook of Analaysis and Quality Control for Fruit and Vegetable Products. Tata McGraw Hill, New Delhi 1977.
6. Sharma KD, Karki S, Thakur NS, Attri S. Chemical composition, functional properties and processing of carrot- A review. Journal of Food Science and Technology 2012;49(1):22-32.
7. Sinha, Jyoti, Singh, Vinti, Singh, Jyotsana *et al*. Phytochemistry, ethnomedical uses and future prospects of mahua (*Madhuca longifolia*) as a food: A Review. Journal of Nutrition & Food Sciences 2017;7(1).
8. Waghaye SY, Kshirsagar RB, Sawate AR, Shareef, Mohammed. Studies on physical and chemical composition of lime (*Citrus aurantifolia* L.) 2019;7(2):1098-1100.