



Preparation and Properties of Herbal Extract Blended Pineapple Ready to Serve

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ABSTRACT

Aqueous extracts of ginger, cumin, lemongrass, mint and Holy basil were blended to Pineapple Ready to Serve (RTS) beverages at 5%, 10%, 15% and 20% concentrations and quality parameters and sensory attributes of the products were analyzed. RTS blended with 5% extracts had the highest TSS, titratable acidity and preferable pH. T5 (5% Cumin extract) recorded the highest TSS (13.2° Brix) and acidity (0.20 %). The colour indices showed that, the normal light yellow colour of the pineapple RTS had changed to various grades of greenish yellow to brownish yellow by the addition of the herbal extracts at different concentration. In the sensory evaluation, T10 (10% Lemon grass extract) recorded the highest overall acceptance followed by T9 (5% Lemon grass extract) and T5 (5% Cumin extract). Addition of cumin and lemon grass extracts at lower concentration to Pineapple RTS can form a novel beverage with improved physico-chemical properties and consumer acceptance.

KEYWORD

Herbal extracts, pineapple, Ready to Serve (RTS), colour, parameters sensory

INTRODUCTION

Medicinal and aromatic herbs are a group of multifunctional plants. They are exclusively used for their unique curing properties or extraction of secondary metabolites. Some of them have its usage as vegetables, spices or food additives. Secondary metabolites derived from these plants or its analogues are the base of modern medicines. In most parts of the world, traditional plant based system for treatments are followed till date. Most of these plants are rich in anti oxidants and daily consumption of them in the form of salads or herbal tea can improve general health and well being. But people, especially children may not like to consume them due to bitterness and astringency. Blending of herbal extracts to regular fruit beverages can be a viable solution for this. It will create flavoured herbal-fruit beverages with goodness of both medicinal herbs and fruits.

The curative and protective properties of medicinal and aromatic plants are well known from the time immemorial. Ginger (*Zingiber officinales*) is a common medicinal plant which is used in fresh as well as dried forms. It has anti bacterial, anti inflammatory, anti diabetic and gastro protective properties. Fresh ginger contains 80.9% moisture, 2.3% protein, 0.9% fat, 1.2% minerals, 2.4% fibre and 12.3% carbohydrates. The rhizome of ginger can control bacterial, viral, fungal and parasitic diseases in humans, poultry and aquaculture owing to its antimicrobial, antioxidant, and growth promoting and in immune stimulant properties (Shakya, 2015).

Cumin (*Cuminum cyminum*) seeds are used in culinary purposes. It is a rich source of iron and helps in reducing cholesterol and weight loss. It can also cure mild digestive disorders, diarrhea, dyspepsia flatulence, dyspeptic headache and bloating (Johri, 2011). Lemon grass (*Cymbopogon citrates*) oil is used in aroma therapy and it has high anti oxidant content. Aqueous extracts of lemongrass has high DPPH scavenging and super oxide scavenging activities even at low concentrations (Kannat *et al.*, 2014).

Mint (*Mentha arvensis*) can reduce irritable bowel disorders, gastric problems and indigestion and aids in respiratory disorders. Its essential oils have antifungal, antibiophilic and cytotoxic activities (Stringaro *et al.*, 2018). Holy basil (*Ocimum sanctum*) is a familiar medicinal plant grown in almost every household. It is used for the religious rituals and it has very good remedy for cold, cough and bronchial disorders. Tulsi is known as the 'Queen of herbs' and it can act as a potent adaptogen (Cohen, 2014). All these plants are good sources of anti oxidants and have proven anti microbial properties too. Daily intake of these plants in various forms is good for health.

Addition of herbal extracts can also improve shelf life and quality of the fruit beverages (Anderson *et al.*, 2014). In Goa and Konkan coast, pineapple is commonly cultivated in hilly slopes as well as in coconut and arecanut gardens as an intercrop. It is consumed mostly as a fresh fruits and also widely used for the preparation of beverages due to its high moisture content (86%) (USDA, 2018). 'Giant Kew' is one of the most familiar cultivar of Goa, locally known as 'Raja'. Due to its high yield and fruit quality, farmers prefer this variety. The objective of this study was to prepare herbal extracts blended pineapple ready to serve beverage using familiar medicinal plants and check the quality parameters and consumer acceptance.

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MATERIALS AND METHODS

Preparation of pineapple RTS

Fully ripened 'Giant Kew' pineapple fruits were selected for RTS preparation. Fruits were washed, peeled and chopped to small pieces for the extraction of the juice. Sugar syrup was prepared by boiling 500 g sugar in 2.5 L water. Citric acid (10 g) was added to the syrup and strained. After cooling, extracted pineapple juice was added to it.

Addition of herbal extracts

Extracts were prepared from fresh rhizomes of ginger (*Zingiber officinales*), dry seeds of cumin (*Cuminum cyminum*), freshly cut leaves of lemon grass (*Cymbopogon citrates*), pepper mint (*Mentha argnkrvensis*) and holy basil (*Ocimum sanctum*) by 1:1 (w/v) proportion of distilled water. These were added to the RTS in 5%, 10%, 15% and 20% concentrations. Sodium benzoate (0.1%) was used as a preservative and the RTS was pasteurized at 80°C before bottling.

Estimation of quality parameters

Total soluble solids (TSS)

Hand refractometer (Erma, Japan) of 0-32 scale was used to measure the TSS and the values were expressed in °Brix.

Titrateable acidity (TA)

Titrateable acidity of the blended RTS was estimated by titration using Sodium hydroxide. 25 ml of the RTS beverage was made up to 100 ml using distilled water. From this, 50 ml was taken in a 250 ml conical flask and added with 50 ml of distilled water. This was titrated against 0.1 N NaOH after adding two drops of phenolphthalein indicator. The end point was the formation of the pink colour in the solution.

% Citric acid = (T.V. x .00064 x 100) / wt. of sample

Table 1: Physicochemical parameters of blended pineapple RTS

Treatments	TSS (° Brix)	Acidit (%)	pH
T1: 5 % Ginger extract	13.10 ^a	0.20 ^a	3.71 ^d
T2: 10 % Ginger extract	12.20 ^b	0.20 ^a	3.88 ^b
T3: 15 % Ginger extract	12.00 ^{bc}	0.10 ^d	3.88 ^b
T4: 20 % Ginger extract	11.00 ^e	0.15 ^c	3.93 ^a
T5: 5 % Cumin extract	13.20 ^a	0.20 ^a	3.84 ^c
T6: 10 % Cumin extract	12.00 ^{bc}	0.20 ^a	3.99 ^a
T7: 15 % Cumin extract	11.90 ^{bc}	0.20 ^a	4.04 ^a
T8: 20 % Cumin extract	11.60 ^{cd}	0.18 ^b	4.12 ^a
T9: 5 % Lemon grass extract	13.00 ^a	0.20 ^a	3.74 ^c
T10: 10 % Lemon grass extract	12.00 ^{bc}	0.15 ^c	3.84 ^c
T11: 15 % Lemon grass extract	11.30 ^{de}	0.15 ^c	3.90 ^a
T12: 20 % Lemon grass extract	11.00 ^e	0.15 ^c	3.95 ^a
T13: 5 % Mint extract	12.90 ^a	0.18 ^b	3.73 ^c
T14: 10 % Mint extract	12.00 ^{bc}	0.18 ^b	3.8 ^c
T15: 15 % Mint extract	11.20 ^{de}	0.15 ^c	3.85 ^b
T16: 20 % Mint extract	11.00 ^e	0.18 ^b	3.85 ^b
T17: 5 % Holy basil extract	12.20 ^b	0.20 ^a	3.88 ^a
T18: 10 % Holy basil extract	12.00 ^{bc}	0.18 ^b	3.80 ^c
T19: 15 % Holy basil extract	11.20 ^{de}	0.18 ^b	3.85 ^b
T20: 20 % Holy basil extract	9.00 ^f	0.15 ^c	3.88 ^b
CD 5 %	0.588	0.011	0.194

pH

pH of the RTS beverages was measured using the pH meter (Oakton, USA) after calibrating it using the phosphate buffers (4 and 7).

Colour measurements

Appearance and colour plays an important role in the acceptance of any fruit beverages. Blending of flavoring agents, especially, spices and medicinal plant extracts can change the original light yellow colour of the pineapple RTS. The colour of these flavoured RTS were measured by L*a*b* coordinates using Hunterlab miniscan XE Plus colouri meter.

L* measures the darkness (black, 0 to white, 100)

a* measures range of color from -a*(greenness) to +a*(redness)

b* measures range of colors from blueness (-b*) to yellowness (+b*)

Hue angle (h*) = $\tan^{-1}(b^*/a^*)$

Chroma = $\sqrt{(a^{*2}+b^{*2})}$

Colour difference = a*/b*

Sensory evaluation

A scoring panel of 6 members of different age groups evaluated the blended RTS using the 9 point hedonic scale (9- Liked extremely, 8- Liked very much, 7- Liked moderately, 6- Liked slightly, 5- Neither liked nor disliked, 4- Disliked slightly, 3- Disliked moderately, 2- Disliked very much, 1- Disliked extremely). The characters selected for the analysis were appearance, taste, aroma, sweetness, sourness, colour and overall acceptance.

Statistical analysis

The experiment was designed in Completely Randomized Design (CRD) with three replications and statistically analyzed in ANOVA using the statistical package WASP 2.0 of ICAR-CCARI, Goa.

RESULTS AND DISCUSSION

The colour, flavour and physicochemical parameters of the pineapple RTS were changed after the addition of herbal extracts. Physicochemical parameters of the flavoured RTS like Total soluble solids (TSS), Titrateable acidity and pH of pineapple RTS, herbal extracts and the herbal blend pineapple RTS were estimated.

Total soluble solids (TSS)

The basic pineapple RTS had 13° Brix TSS immediately after preparation. Among the pure herbal extracts, Cumin extract had the highest TSS (2.8° Brix) followed by ginger (1.7° Brix) and mint (1.2° Brix). Lemon grass and Holy basil extracts had 1° Brix TSS. After blending the herbal extracts at 5%, 10%, 15% and 20% concentration to the pineapple RTS, all the treatments except T9 had changes in TSS (Table 1). T1 and T5 had increased the TSS of the basic RTS and all other treatments decreased the TSS of the final product.

The highest TSS of 13.20° Brix was recorded in T5: 5 % Cumin extract which was on par with all other 5% herbal extract treatments (T1: 5% Ginger extract, T9: 5% Lemon grass extract

and T13: 5% Mint extract except T17: 5% Holy basil extract) which was on par with T2 : 10% Ginger extract. According to [Sonker *et al.*, 2018](#), Pineapple juice blended with Amla juice in 80:20 proportion along with 0.5 % Giloy satva was found ideal for consumption with a TSS of 12.07^o Brix, acidity 0.36 percentage, pH 3.0, ascorbic acid 11.61mg/100g. The physico chemical analysis of the RTS prepared in the present study also gives similar results.

Titrateable acidity (TA)

Pineapple fruit has an acidity range of 0.6-1.2% citric acid. The basic RTS prepared had an acidity of 0.30% citric acid. After adding the extracts, the acidity values of all the treatments were reduced. The highest acidity (0.2 %) in T1: 5 % Ginger extract, T2: 10 % Ginger extract, T5: 5 % Cumin extract, T6: 10 % Cumin extract, T7: 15 % Cumin extract, T9: 5 % Lemon grass and T17: 5 % Holy basil extract. The lowest acidity (0.10 %) was recorded in T3: 15 % Ginger extract. Acidity of the RTS was supposed to increase due to the addition of citric acid. But blending with the beverages has reduced the titrateable acidity. Acidity was estimated on the day of preparation of the RTS. There may be periodic increase in the acidity as reported by [Harsha and Aarti, 2015](#).

pH

pH is an important quality parameter of the quality of any fruit beverage. Mostly all the fruit beverages will have pH below 7 due to the presence of organic acids in them. In pineapple, citric acid is the major acid. Among the 20 treatments, T8: 20 % Cumin extract had the highest pH (4.12) which was on par with T7, T6, T12, T4, T11 and T17. The pH ranges of the beverages were similar to the results of [Amaravathi *et al.* \(2014\)](#). Mango-herbal (lemon grass) beverage had a TSS of 15.27^o Brix, acidity 0.19 per cent and pH 4.38 ([Sahu *et al.*, 2005](#)).

Colour indices

Colour of the end product is a very important factor that determines the consumer acceptance. 'Giant Kew' variety of pineapple is a member of smooth cayenne group which has a pale yellow flesh colour. Aqueous herbal extracts had changed the pale yellow colour of the pineapple RTS to different grades based on its concentration. The colour was read by the L* a* and b* coordinates.

The changes in color parameter of L*, a* and b* coordinates may due to the changes in particle size in the juice as suggested by [Valero *et al.* \(2007\)](#). Colour of the final product also depends on many factors including the extraction process. Difference in colour of homemade orange juice and industrial were highly contributed by extraction process that modified the pulp structure ([Stinco *et al.*, 2012](#)).

Among all the flavoured RTS preparations, T1: 5 % Ginger extract had the lightest colour (L*: 39.93) followed by T3: 15 % Ginger extract (L*: 38.28). The darkest colour was observed in T16: 20 % Mint extract (L* 14.30). T19: 15 % Holy basil extract (a*: 13.78) followed by T20: 20 % Holy basil extract (a*: 10.27) had the highest a* values which indicated the redness of the beverage ([Table 2](#)). Among all the 20 flavoured RTS

preparations, T16: 20% Mint extract and T18: 10 % Holy basil extract recorded negative a* values which indicated the greener colour. Positive b* values indicates the yellowness of the beverages.

All the 20 treatments showed the positive b* values and among them, T6: 10 % Cumin extract had the highest b* value (39.10) followed by T7: 15 % Cumin extract (36.99) and T11: 15 % Lemon grass extract (36.90). The highest h* value was observed in T5: 5% Cumin extract (27.04). The lowest h* was in T19: 15 % Holy basil extract (1.13). In the case of herbal extract blended pineapple RTS lower h* values were preferable. Similar results were observed in this study also. According to [Zaman *et al.* \(2016\)](#), the hue angle increase with increase in pineapple juice ratio from 30P:70M>50P:50M> 70P:30M in pineapple mango blended juice. Chroma is the purity of saturation of the colour. Chroma value was recorded highest in T6: 10 % Cumin extract (39.57) followed by T7: 15 % Cumin extract (37.43) and T11: 15 % Lemon grass extract (37.12). Colour difference was highest for T19: 15 % Holy basil extract (0.47) followed by T20: 20 % Holy basil extract (0.37).

Sensory evaluation

Blended fruit juices and RTS beverages are more acceptable than the pure forms in the market. Many consumers like to relish the new flavours and taste new flavored products. [Sindhumathi \(2002\)](#) had reported that flavoured (ginger +

Table 2: Colour indices of the herbal extract blended pineapple RTS

Treat-ments	L*	a*	b*	h*	Chroma	Colour differ-ence
T1	39.93 ^a	1.72 ^l	15.71 ^m	1.46 ^g	15.80 ^k	0.11 ^k
T2	37.09 ^{bc}	0.10 ^{nop}	17.44 ^l	1.51 ^d	17.47 ^j	0.06 ^m
T3	38.28 ^b	1.21 ^{mn}	16.98 ^{lm}	1.50 ^e	17.02 ^{jk}	0.07 ^l
T4	33.12 ^f	3.48 ^j	23.06 ^k	1.42 ^h	23.32 ^h	0.15 ^j
T5	34.89 ^e	0.85 ^{op}	27.03 ^{hi}	1.54 ^a	27.04 ^g	0.03 ^q
T6	28.99 ^g	6.10 ^f	39.10 ^a	1.42 ⁱ	39.57 ^a	0.16 ⁱ
T7	28.3 ^{gh}	5.71 ^g	36.99 ^b	1.42 ⁱ	37.43 ^b	0.15 ^j
T8	25.85 ^{ij}	8.05 ^e	34.65 ^{cd}	1.34 ^l	35.57 ^c	0.23 ^f
T9	35.12 ^{de}	0.43 ^{im}	30.39 ^f	1.53 ^b	30.42 ^f	0.05 ^{op}
T10	31.94 ^f	2.39 ^k	33.47 ^{de}	1.50 ^f	33.56 ^{de}	0.07 ^l
T11	26.86 ^{hi}	4.03 ⁱ	36.90 ^b	1.46 ^g	37.12 ^b	0.11 ^k
T12	24.41 ^j	6.15 ^f	34.42 ^{cd}	1.39 ^j	34.97 ^{cd}	0.18 ^h
T13	32.23 ^f	6.24 ^f	25.78 ^{ij}	1.33 ^m	26.52 ^g	0.24 ^e
T14	25.61 ^{ij}	8.92 ^c	32.53 ^e	1.30 ⁿ	33.73 ^d	0.27 ^d
T15	27.55 ^{gh}	6.06 ^f	18.21 ^l	1.25 ^{op}	19.19 ⁱ	0.33 ^c
T16	14.30 ^m	4.96 ^h	22.82 ^k	1.36 ^k	23.35 ^h	0.22 ^g
T17	36.50 ^{cd}	0.31 ^{mn}	24.68 ^j	1.52 ^c	24.71 ^h	0.05 ⁿ
T18	25.95 ⁱ	8.58 ^d	35.26 ^c	1.33 ^m	36.29 ^{bc}	0.24 ^e
T19	20.17 ^k	13.78 ^a	29.10 ^{fg}	1.13 ^r	32.20 ^e	0.47 ^{op}
T20	18.36 ^l	10.27 ^b	28.07 ^{gh}	1.22 ^q	29.89 ^f	0.37 ^b
CD 5%	1.488	0.305	1.436	0.002	1.467	0.003

cardamom) papaya blended RTS were more acceptable than the plain papaya RTS beverage. Among all the flavoured pineapple beverages, lemon grass flavoured pineapple RTS has recorded the highest overall acceptance (7.4). The highly preferred treatment, T10: 10% Lemon grass extract had scored highest mean values for appearance (7.6), aroma (7.2), colour (7.4), sweetness (7.4), and sourness (6.4). But taste wise along with T10, T9: 5 % Lemon grass extract and T5: 5 % Cumin extract had highest hedonic points.

Among all the flavoured beverages, lemon grass flavoured pineapple RTS has recorded the highest overall

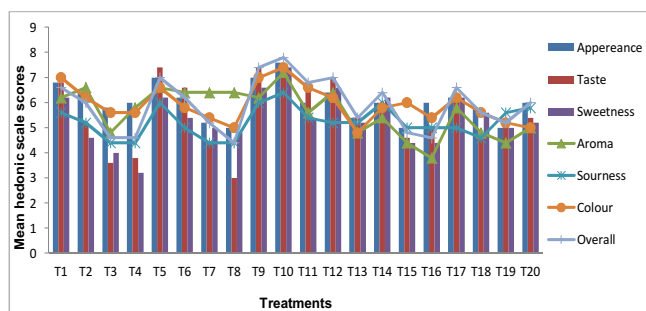


Fig. 1: Sensory parameters of the herbal extract blended pineapple RTS

REFERENCES

- Amaravathi T, Vennila P, Hemalatha G and Parimalam P.2014.Spiced Pineapple Ready-To-Serve Beverages. *Indian Journal of Science and Technology* 7(11): 1827–1831.
- Anderson MY, Chatigre O, Elleingad E, Koni Pascal and Koffi Earnest. 2014. Analysis of quality attributes of banana juices blended with aqueous extracts of ginger. *African Journal of Food Sciences* 8(5):260-263.
- Cohen MM. 2014. Tulsi -*Ocimum sanctum*: A herb for all reasons. *Journal of Ayurveda and Integrative Medicine* 5(4):251-259.
- Harsha H and Aarti S. 2015. Quality Evaluation of Herbal Juice Developed from Traditional Indian Medicinal Plants Using Citrus limetta as Base. *Journal of Nutrition and Food Sciences* 5(5) DOI: 10.4172/2155-9600.1000396.
- Johri RK. 2011. *Cuminum cyminum* and *Carum carvi*: An update. *Parmacognacy Review* 5 (9): 63–72.
- Kanatt RS, Chawla SP and Sharma A. 2014. Antioxidant and radio-protective activities of lemon grass and star anise extracts. *Food bioscience* 6: 24-30.
- Sahu C, Patel S, and Choudhary PL. 2005. Technology for manufacture of whey based mango-herbal (lemon grass) beverage. *J. Food Sci. Technol.* 42 (5): 421-424.
- Shakya SR. 2015. Medicinal uses of ginger (*Zingiber officinale* Roscoe) improves growth and enhances immunity in aquaculture. *International Journal of Chemical Studies* 3(2): 83-87.
- Sindhumathi G. 2002. Standardization of blended and flavoured papaya RTS (ready-to-serve) beverages. M.Sc. Thesis. Department of Food Science and Nutrition, Home Science College and Research Institute, Madurai.
- Sonker S, Chaudhary AK, Chauhan AK, Alsebaei MA. 2018. Fortification of functional value of pineapple Ready-to-Serve (RTS) beverage by the addition of Amla and Giloy. *International Journal of Food Science and Nutrition* 3(1): 48-51.
- Stinco CM, Fernández-Vazquez R, Escudero-Gilete ML, Heredia, FJ, Meléndez-Martínez AJ and Vicario IM. 2012. Effect of orange juice's processing on the color, particle size, and bioaccessibility of carotenoids. *Journal of Food Agricultural and Food Chemistry* 60: 1447-1455.
- Stringaro A, Colone M and Angiolella L. 2018. Antioxidant, Antifungal, Antibiofilm, and Cytotoxic Activities of Mentha spp. Essential Oils. *Medicines*. 5(112):1-15.
- USDA 2018. National Nutrient Database for Standard Reference Release 1 April, 2018 Full Report (All Nutrients) October 03, 2018 03:11 EDT.
- Valero M, Recrosio N, Saura D, Munoz N, Marti N and Lizama V. 2007. Effect of ultrasonic treatment in orange juice processing. *Journal of Food Engineering* 80: 509-516.
- Zaman AA, Shamsudin KR and Mohd Adzahan N. 2016. Effect of blending ratio on quality of fresh pineapple (*Ananas comosus* L.) and mango (*Mangifera indica* L.) juice blends. *International Food Research Journal* 23(Suppl): S101-S106.

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