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Development of Ready to Serve Beverage with the Inclusion of Herbal Components

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Abstract - "RTS Herbal Drink", has come up in the market as a ready to serve drink having some nutritional and functional benefits. The proposed herbal drink which has been developed as a product containing mosambi, lime, herbal extracts of tulsi, mint and ginger, along with honey and sugar. The tulsi, also known as holy basil is a rich source of eugenol which has anti-inflammatory effects. Moreover, mosambi and lime are very good sources of antioxidants like Vitamin C. Mint and ginger also have some functional values upon health. The drink has a proportion of 10% fruit juice with mosambi and lime in the ratio of 7:3. The extracts of tulsi, mint and ginger has been incorporated in the ratio of 5: 3: 3 on parentage basis. The honey and sugar maintained the brix of the final drink at 16o. The chemical and organoleptic test that has been carried out on this drink shows the overall acceptability of the drink. The tests were done at an interval of 15 days and shelf life was about 2 months. The drink would provide energy of 65.48 kcal/100g and also provides varied amounts of different vitamins like Vitamin C, B1, B3, B3, B6 and also minerals like Na, K, Ca, and Fe. This drink can target to the overall improvement of health.

Keywords - herbal drink, herbal extracts, ready to serve drink, vitamin C, tulsi, mint, ginger, antioxidant

I. INTRODUCTION

The idea of health-promoting foods is not new: Hippocrates wrote 2400 years ago "Let food be thy medicine and medicine be thy food". Functional Beverages are one of its kinds which are tapping into consumer interest in health and wellness. People are now more health conscious and they want all the good benefits in one drink. These drinks are non-alcoholic in nature having unique compositions in themselves with various ingredients mixed together to get the desired results. Various ingredients have their powerful effect on the well being of the drink. The tulsi (*Ocimum sanctum)* has various health benefits. The researchers have proved that its beneficial effects are found across quite a few categories of medicinal activities, including anti-stress, anti-lipidemic, antidiabetic and glycaemic lowering properties. The FDA, of United States of America has granted the Holy Basil as "Generally Recognized as Safe" (GRAS) status, Dr. Beverly Yates *et al*. The mint (*Mentha spp.)* belongs to the is a herb of the Labiatae family, Choudhury *et.al*. (2006). The beneficial effects of the mint leaf in treatment of many gastro-intestinal disorders have been pre-reported, Rokaya *et al*., (2010). Moreover, the anti-microbial, anti- inflammatory and anti-tumoral properties of mint have been researched by Pearson *et al*., (2010); Zu *et al*., (2010); Hussain *et al*., (2010); Chaudhari, S**.** *et al*., (2015). The ginger has effects that can reduce cholesterol and pain. Also, the drink has a moderate quantity of Vitamin C in it that has been contributed by the mosambi and lime which are good sources of this vitamin. The antioxidant property of this vitamin has been researched and proven by many scientists. These kinds of drinks are mainly popular because of their health benefits; they are popular among every age group because of their refreshing nature. Each ingredient targets different health concerns and work on them to provide the consumer a healthy life. They serve to fight the

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deficiencies in human body. The drink has ingredients in dissolved form so that it can be easily absorbed by the body and can be utilised at ease.

The developed product will act as an energy booster for them because of its immense nutritional values. All the natural ingredients that is present in this drink have their medicinal effects on human beings and the taste is refreshing in itself. The main aim of making this drink is to enhance the vitamin C content because this is a major antioxidant, which helps to boost the immune system. The other elements like ginger, tulsi has been used since the Vedic Ages in Ayurveda for curing human ailments. And mint gives freshness to the drink.So this drink not only gives freshness but also helps to keep the consumer healthy.In tropical country like India, this drink would be a boon for the consumers. Freshness as well as health benefits. All in one pack. The juice was made in accordance to the FPO (Fruit Product Order by Indian Legislation) regulations (10% raw fruit juice, 16° Brix and acidity 0.3%).

II. RESEARCH METHODOLOGY

1. Materials

Raw materials used for the process are mosambi, lime, ginger, mint, tulsi, honey, sugar

A. Extractive from Tulsi, Mint & Ginger

The fresh Tulsi, Mint and Ginger were bought from the market and were properly washed. Then a paste was made of all the 3 ingredients separately and was dried in tray drier at 70^{o} C and powered and sieved through 250 mesh and stored in polyethylene packs. Later they were they each ingredient was mixed in distilled water in a ratio of 10:1 (water: powdered ingredient) and kept in shaker for 1 hour and then filtered using vacuum funnel.

B. Extraction of Mosambi & Lime Juice

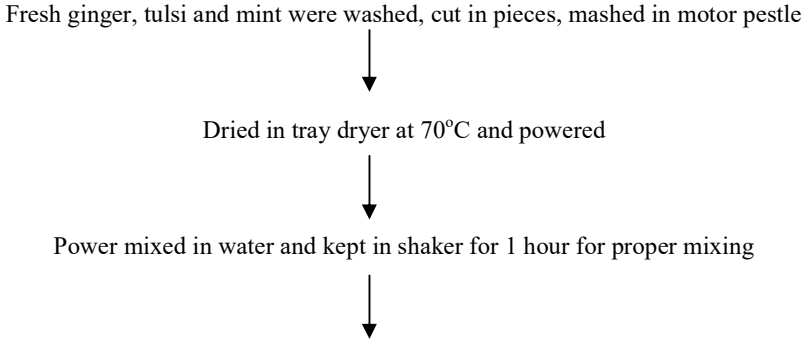
Both the lemons were separately washed and the juice was extracted and strained to remove seeds and fibres using cheese cloth. A trial was done were in one sampling the mosambi and lime was used in the ratio of 6:4 and the other sampling had the ratio as 7:3.

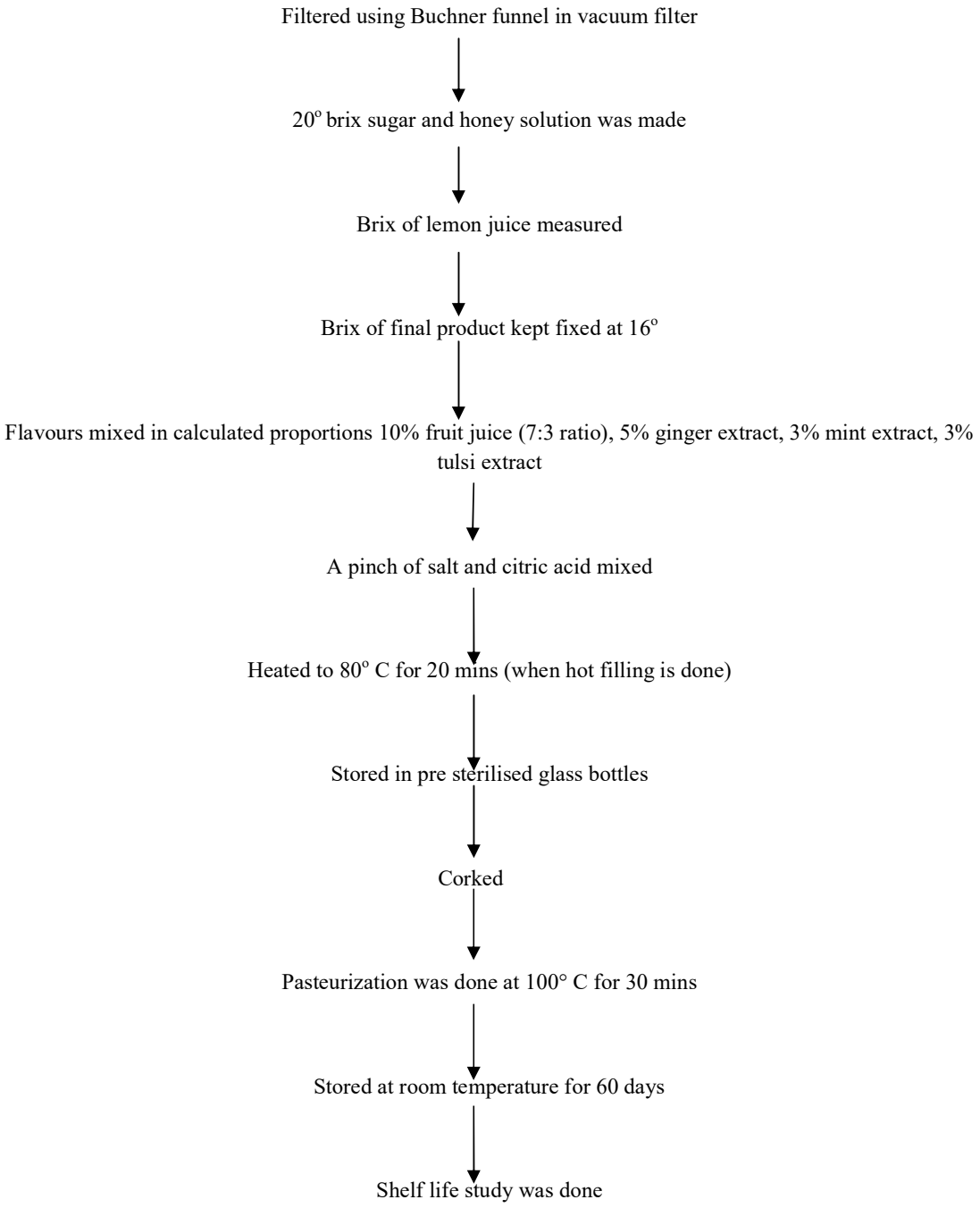
C. Preparation of Sugar & Honey Mix

Sugar was powered for easier mixing and honey was diluted in distilled water. The final brix was maintained at 16^{o} brix.

2. Flowsheet for preparation of RTS Herbal Drink

The final formulation was made after going through rigorous mix and matches of flavours. The sensory analysis showed that flavour retention was desirable.





3. *Analysis*

A. Microbial Test

The test of Total Plate Count (TPC) was done using peptone, beef extract and agar, keeping the incubation temperature at 37° C for 48 hours.

B. *Sensory Evaluation*

Sensory evaluation of the Lemon based RTS was carried out by 5 panellists. The panellists rated the sample for colour, flavour, taste and over all acceptability using 9-point hedonic rating test method (1=dislike very much, 9=like very much) as recommended by (Ranganna, 1995).

C. Storage Studies

Lime based RTS beverages were subjected to storage studies at room temperature for a period of five months by drawing samples at one month interval to evaluate changes in biochemical, microbiological and organoleptic parameters.

D. TSS & pH Studies

The TSS study was done using a hand refractometer. For the TSS, the test liquid was placed on the refractometer and the reading was noted. For the pH measurement, pH meter of Systronics India made was used.

E. Antioxidant Activity

Antioxidant capacity was measured with respect to Vitamin C content.

III. FINDINGS

This RTS drink has been prepared by mixing mosambi and lime juice along with extracts of tulsi, mint and ginger. The physicochemical properties of the RTS are given in the Table 1 below.

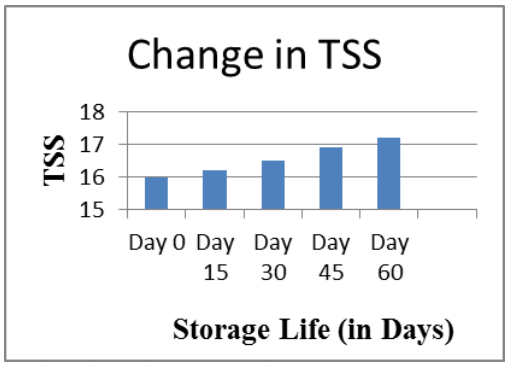
Sl. No.	Particulars	Mosambi+ Lime	Final RTS Drink
1	Colour	Yellowish	Yellowish
2	Brix	10	16
3	Acidity	-	0.3
4	pH	2.8	4.5

Table 1: Characterisation of the RTS beverage

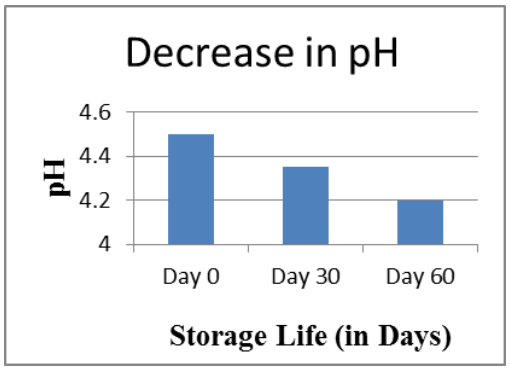
A. TSS & pH

The total soluble solids (TSS) initially adjusted in the final formulations showed a negligible change throughout the 60 days of storage period at room temperature (25-35°C). The initial TSS recorded of the drink which was bottled, was found to be 16° Brix. During the storage of 60 days, the TSS was found to have increased to 17.2° Brix (as shown in the Graph 2). This might be due to the breakdown of the complex carbohydrate into simpler soluble sugar during the storage, also explained by Mehta and Bajaj,(1983). This explains the little change in the TSS during storage in Graph 1. Similar trend in results was observed by Deka *et al.,* (2004); Chaurasiya *et al.,* (2007). Similar type of finding was also observed in the preparation of Tulsi and Arugampul herbal extract by C. Thamilselvi *et al*., (2015).

The pH of the drink showed a decrease during the storage period. This trend was seen because there was an increase in the acidity of the drink. The reading was taken at an interval of 30 days (Graph 2) This trend of decreasing of the pH was also reported by Sandhu *et al.,* (2001); Chauhan *et al*., 1:12 (2012); Tandon DK *et al.,* (1983).



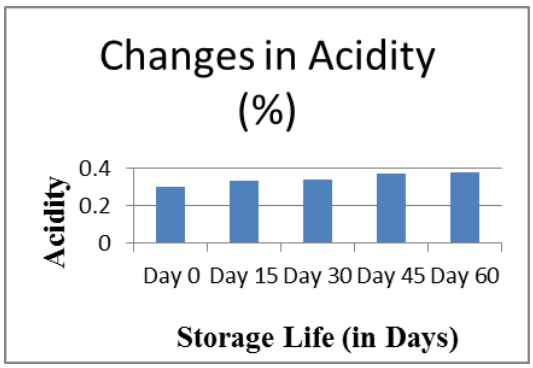
Graph 1: Changes in TSS w.r.t. time



Graph 2: Changes in pH w.r.t. time

B. Acidity

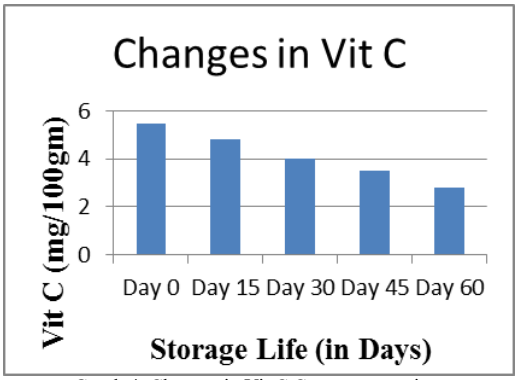
The titratable acidity of the sample was calculated on basis of citric acid at a regular interval of 15 days for a period of 60 days. The values observed are given in the table below. During this period of time the acidity has increased slightly. The initial acidity of the drink was 0.30% and by the end of 60 days it increased to 0.38%. The FPO says that any fruit drink should have an acidity of 0.3%. The increase in acidity may be because of release of H+ ions. Due to oxidation of some components in the drink the H+ ion release has taken place and has thereby increased the acidity, this has also been reported by Akubor*, et al*., (1996) and Saeed Akhtar *et al*., (2013). This increasing trend in acidity was also observed by some previous researchers like Chauhan *et al*., 1:12 (2012); Kalra and Revathi (1981) and Sandhu *et al.,* (2001). The Graph 3 shows the values.



Graph 3: Changes in Acidity w.r.t. time

C. Antioxidants

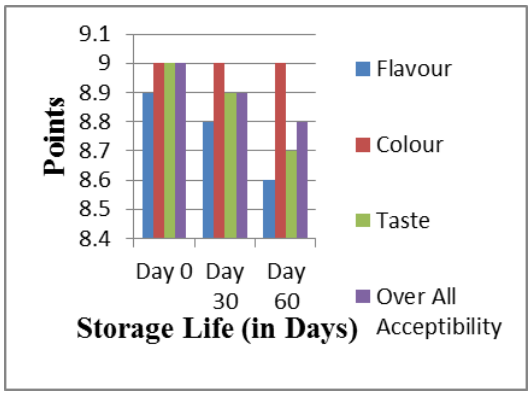
The concentration of water soluble Vitamin C in the drink was mainly contributed by the mosambi and lime. These fruits are rich sources of Vitamin C which is a major antioxidant in nature. Vitamin C is not very stable in nature and the exposure of the drink to light; heat and other atmospheric conditions have further reduced the proportion of Vitamin C in the drink. It is highly sensitive to oxidation and leaching into water-soluble media during storage as seen in researches made by Davey *et al*., 2000; Franke *et al*., 2004; V.O. Ajibola *et al*., 2009. The quantity of Vitamin C in the first day of storage was found to be 5.5 mg/100 gm and on the 60th day, the reduced value of Vitamin C was found to be 2.8 mg/100 gm. The Graph 4 shows the variation of Vitamin C during the period of 60 days.



Graph 4: Changes in Vit C Content w.r.t. time

D. Sensory Evaluation

The RTS Herbal Drink was kept at room temperature for 60 days. The 5 member panel, who reviewed the drink found no difference in the colour of the drink after 60 days, the flavour was slightly acidic and that was due to the increase in acidity and the taste of the drink suffered minimum variation. The scoring was done using the 9 point hedonic rating test method (1=dislike very much, 9=like very much) as recommended by (Ranganna, 1995). The sensory analysis was done at an interval of 30 days. The following Graph 5 shows the changes in the sensory evaluation.



Graph 5: Sensory Analysis

E. Microbial Testing

This test was conducted once in the beginning of the storage and once at the end of the 60 day period. The microbial test revealed that no growth of microbes was observed on Day 0, in nutrient agar condition. Whereas there was insignificant growth of microbes, even after Day 60. This study shows the proper method of sterilisation was taken care of. The drink was acidic in nature and this might be a cause for the hindrance of microbial growth. The following observation was recorded (Table. 2). Similar observation was recorded by C. Thamilselvi *et.al*, (2015). As the bacterial count was found to be BPL (Below Predictable Limit), the CFU/ml value could not be evaluated through this microbial analysis.

Sl. No.	Days	Bacterial Count (upon serial dilution)
1	Day 0	Below Predictable Limit (BPL)
2	Day 60	BPL

Table 2: Microbial growth during storage

F. Storage Study

The RTS Herbal Drink was stored in a pre-sterilised glass bottle and was corked. The bottles were labelled and kept at room temperature for 60 days. At every 15 days interval, bottles were open and the sample was used for determination of acidity, microbial testing and the organoleptic evaluations.

COMPARISION (Between market and developed product)

Sl. No.	Categories	Units (Per 100 gm)	Market Drink of mosambi juice (without herbs)	A drink with herbs (mint, tulsi)*	RTS, Developed Herbal Drink**
1	Carbohydrate	gm/ 100g	13.1	2.66	**7.71**
2	Energy	Kcal/100g	53	20.6	**65.48**
3	Protein	gm/ 100g	-	2.37	**2.54**
4	Fat	gm/ 100g	0	0.052	**-**
5	Sodium	mg/ 100g	2	-	**27.9**
6	Potassium	mg/ 100g	116	-	**26.7**
7	Calcium	mg/ 100g	-	-	**6.8**
8	Iron	mg/ 100g	-	-	**<0.5**
9	Vitamin C	mg/ 100g	3	-	**<5.0**
10	Vitamin B1	mg/ 100g	-	-	**<0.5**
11	Vitamin B2	mg/ 100g	-	-	**<0.5**
12	Vitamin B3	mg/ 100g	-	-	**<0.5**
13	Vitamin B6	mg/ 100g	-	-	**<0.5**

Table 3: Drink Comparison

*The information of the herbal drink has been obtained from a research paper by Chaudhari, S, Naik, R., Pathan, A and Nikam, M on the topic Physico-Chemical and Nutritional Analysis of Herbal Beverage formulated using holy basil, mint and wheatgrass (2015).

** The developed RTS drink was sent for a clinical analysis to the Vimta Labs which is a NABL (National Accreditation Board for Testing & Calibration Laboratories as per ISO/IEC 17025, ISO 15189:2007) accredited lab and the result of the tests conducted by Vimta Labs has been represented in the comparison table.

From the above table, it can be observed that the RTS Herbal Drink is complete pack of health with benefits of all the essential elements in limited proportions.

IV. CONCLUSION

The study of the Ready to Serve Herbal Drink based on mosambi, lime and herbal extracts revealed that this drink is palatable and acceptable throughout its storage period. There were insignificant changes in acidity and TSS of the drink but the final product was accepted by the panellists. The drink showed retention of the water soluble antioxidant even after processing. No preservative was added to increase the shelf life of the drink and the natural herb extracts present in the developed drink have contributed in keeping the bacterial count at bare minimum level. The added herbs increased the nutritional and medicinal properties of the drink and made the drink more acceptable to the consumers. This drink is a blend of various essential vitamins and minerals. So instead of consuming various products, this one drink would be sufficient to replenish the needs of the body.

REFERENCE

[1] Ranganna, S. (1995). Handbook of analysis and quality control for fruits and vegetable products. First edition. Tata–McGraw-Hill Publishing Company Limited, New Delhi, India.

[2] AOAC.(2006).Official Method 967.21e Ascorbic Acid in Vitamin Preparations and Juices: 2, 6-Dichloroindophenol Titrimetric Method. Official Methods of Analysis of the Association of Official Analytical Chemists

[3] Chauhan DK, Puranik V, Rai GK (2012) Development of Functional Herbal RTS Beverage

[4] Chaurasiya, A., Prasad, K.J., Vishwanath, A., and Tiwari, S. (2007). Preparation and preservation of litchi (*chinensis sonn*) ready-to-serve (RTS) Beverage. *Beverage and Food World* 34 (11): 67- 68.

[5] Deka, B.C., Senthi, V., Suneja, P., and Srivastava, V.K. (2004). Physico-chemical changes of Lime- aonla spiced beverage during storage. *Journal of Food Science and Technology*, 41 (3): 329-332.

[6] New Trends in Beverage Packaging Systems: A Review Marina Ramos, Arantzazu Valdés, Ana Cristina Mellinas and María Carmen Garrigós * (2015)

[7] Kalra SK, Revathi G (1981) Storage studies on guava pulp. *Indian food packer* 37: 29-33.

[8] Sandhu KS, Singh M, Ahluwalia P (2001) Studies on processing of guava into pulp and guava leather. *J Food Sci Technol* 38: 622-624

[9] Chauhan DK, Puranik V, Rai GK (2012) Development of Functional Herbal RTS Beverage. 1:541 doi:10.4172/scientificreports.541

[10] Mehta, U., and Bajaj, S. (1983). Effect of storage and methods of preservation on the physico-chemical characteristics of citrus juices. *Indian Food Packer*, 37 (4): 42-51.

[11] Majumdar TK, Wadikar DD, Vasudish CR, Premavalli KS, Bawa AS (2011) Effect of Storage on Physico-Chemical, Microbiological and Sensory Qualityof Bottlegourd-Basil Leaves Juice. *American Journal of Food Technology* 6:226-234.

[12] Tandon DK, Kalra SK, Kulkarni JK, Chadha KL (1983) Chemical and microbialevaluation of stored guava pulp in PVC container. *J Food Sci Technol* 20: 118-120.

[13] Davey, M.W., M. Van Montagu, D. Inze, M. Sanmartin and A. Kanellis *et al*., 2000. Plant L-ascorbic acid: Chemistry, function, metabolism, bioavailability and effects of processing. *J. Sci. Food Agric*., 80: 825-860.

[14] Franke, A.A., L.J. Custer, C. Arakaki and S.P. Murphy, 2004. Vitamin C and flavonoid levels of fruits and vegetables consumed in Hawaii. *J. Food. Compos. Anal*., 17: 1-35.

[15] V.O. Ajibola, O.A. Babatunde and S. Suleiman, 2009. The Effect of Storage Method on the Vitamin C Content in Some Tropical Fruit Juices. *Trends in Applied Sciences Research, 4: 79-84.*

[16] Tulsi - *Ocimum sanctum*: A herb for all reasons Marc Maurice Cohen (2014)

[17] Dr. Beverly Yates, Holy Basil (Ocimum sanctum) An Overview of the Research and Clinical Indications

[18] Hussain AI, Anwar F, Nigam PS, Ashraf M, Gilani AH (2010). Seasonal variation in content, chemical composition and antimicrobial and cytotoxic activities of essential oils from four Mentha species. *J. Sci. Food. Agric*., 90(11): 1827-1836.

[19] Zu Y, Yu H, Liang L, Fu Y, Efferth T, Liu X, Wu N (2010). Activities of ten essential oils towards Propionibacterium acnes and PC-3, A-549 and MCF-7 cancer cells. Molecules, 15(5): 3200-3210

[20] Pearson W, Fletcher RS, Kott LS, Hurtig MB (2010). Protection against LPS-induced cartilage inflammation and degradation provided by a biological extract of Mentha spicata. BMC Complement. Altern. Med., 10: 19

[21] Akubor, P.I., 1996. The suitability of African bush mango juice for wine production. Plant Foods Hum Nutr., 49: 213-219.

[22] Saeed Akhtar, Javid Ali, Bilal Javed and Farhat Ali KhanStudies on the Preparation and Storage Stability of Pomegranate Juice Based Drink *Middle-East Journal of Scientific Research* 16 (2): 191-195, 2013