



## IMPACT OF HERBS ON NUTRITIONAL AND ORGANOLEPTIC ATTRIBUTES OF NECTAR DEVELOPED USING BOTTLE GOURD (*LAGENARIA SICERARIA*)

Seerat Gupta, Monika Sood\*, Neeraj Gupta, Julie D. Bandral and Daman Preet Kour

Division of Post Harvest Management,

Sher-e-Kashmir University of Agricultural Sciences and Technology, Chatha, Jammu - 180 009, J&K, India.

\*Corresponding author E-mail : [monikasoodpht@gmail.com](mailto:monikasoodpht@gmail.com)

(Date of Receiving-26-12-2023; Date of Acceptance-04-03-2024)

### ABSTRACT

Nectar is a refreshing beverage consisting of 15°B TSS, at least 20% juice and not more than 1.5% acidity. Nectar is a ready-to-drink type of product which is prepared via pulp or juice of fruits, vegetables or both along with water and sugar. Present study was undertaken to evaluate various nutritive and organoleptic qualities of bottle gourd based herbal nectar, during 90 days of storage under ambient condition. Nine treatments were prepared by blending different percent of bottle gourd (100-75%), mint (5-20%), basil (5-20%) and lemon juice (5%). Nutritional value of nectar mostly showed positive inclination with the incorporation of mint and basil, at preparation day. Among treatments, T<sub>7</sub> (85:10:5:: Bottle gourd: Basil: Lemon juice) was adjudged as superior on the basis of flavour, taste and consistency. Thus, organoleptic evaluation revealed that nectar blended with 10% basil: 5% lemon juice along with 85% bottle gourd was most acceptable.

**Key words :** Nectar, Bottle gourd, Mint, Basil, Lemon.

### Introduction

One of the most popular cucurbitaceous crops of India that could be cultivated in various tropical and subtropical regions of the globe is *Lagenaria siceraria* which is commonly known as bottle gourd. It is a large sized fruit which consist of many seeds per fruit. Bottle gourd possess good bearing habits, low cultivation cost and has utility as a cooked vegetable (Koffi *et al.*, 2009). It is utilized for preparation of sweets, rayata, pickles etc. Different parts of bottle gourd plant consist of several medicinal properties (Jain *et al.*, 2018).

*Mentha piperta* is a common herbal plant that is cultivated in Europe and North America. Mint is used in both Eastern and Western traditions and is also considered as world's ancient medicinal herb. Herbs are commonly used for cooking purpose and in medicines by Ancient Greek, Roman and Egyptian cultures. Peppermint is considered important for treatment of non-obstructive

dyspepsia without any known side effects. Mint is considered as a good analgesic to be applied topically and is also utilized as coolant for the skin (Balakrishnan, 2015).

“*Ocimum*” is a generic name which originated from a Greek word “Okimon”, which means smell. *Ocimum sanctum* (basil) is an aromatic herb, which is widely branched and erect, having a height of about 75 cms (Tucker and De Baggio, 2000). Basil is a herb belonging to Lamiaceae family. It is an essential ingredient in numerous cooking traditions and practices. Basil is both morphologically and chemically variable and these variations are strongly influenced by ecological factors. *O. sanctum* possesses numerous properties for instance, antibacterial, antiviral and antifungal and is also useful in treating copious systemic diseases as well as localized infections. A decrease in blood and urinary uric acid level has been reported in albino rabbits because of the intake

of leaves and seeds of basil plant (Gupta *et al.*, 2018).

Citrus is an essential fruit tree crop in the globe. After orange and mandarin, the third most important citrus specie is *C. limon*. In lemon fruit (*C. limon*) plentiful chemical components, such as, nutrients, non-nutrients (vitamins, minerals, dietary fiber, essential oils and carotenoids) and phenolic compounds are present. Lemon fruits are enriched with flavonoids. Flavonoid acts as a crucial part of a balanced diet and plays an important role in prevention of diseases, such as diabetes, blood lipid lowering, obesity, cardiovascular diseases and cancer (Molina *et al.*, 2010). Lemon enhances the muscular tone and vascular resistance to inflammatory processes, such as rheumatic arthritis, chronic venous insufficiency etc. It possesses ample properties like anti-hemorrhoidal, antioxidant and anti-lipid peroxidation and moreover it protect against free radicals (Del Rio *et al.*, 2004).

### Materials and Methods

For the experiment fresh bottle gourd, mint, basil and lemon were collected from local market of Jammu region. Fresh raw materials were washed under running tap water to eliminate dirt and other irrelevant material. Bottle gourd was peeled and cut from top (20 mm) and bottom (15 mm). The bottle gourd fruits were sliced and later on blanched for about 3-4 min. at 80°C, followed by extraction of juice via mechanical juice extractor. The juice extracted was filtered using muslin cloth. The leaves of mint and basil were plucked from stalk, cleaned, then blanched for 2 min. and the juice were extracted by mechanical juicer followed by filtration. Lemons were cut into two halves, its seeds were removed and the juice was extracted by squeezing and strained using muslin cloth.

Bottle gourd, mint, basil and lemon juices were blended in distinct proportions as T<sub>1</sub> (control), T<sub>2</sub> (90:5:5::Bottle gourd: Mint: Lemon juice), T<sub>3</sub> (85:10:5::Bottle gourd: Mint: Lemon juice), T<sub>4</sub> (80:15:5::Bottle gourd: Mint: Lemon juice), T<sub>5</sub> (75:20:5::Bottle gourd: Mint: Lemon juice), T<sub>6</sub> (90:5:5::Bottle gourd: Basil: Lemon juice), T<sub>7</sub> (85:10:5::Bottle gourd: Basil: Lemon juice), T<sub>8</sub> (80:15:5::Bottle gourd: Basil: Lemon juice) and T<sub>9</sub> (75:20:5::Bottle gourd: Basil: Lemon juice). TSS and acidity of the nectar was maintained at 15°Brix and 0.3% with help of sugar and lemon/citric acid wherever necessary, then heated for 10 min. at 85°. Afterwards, in 250 ml of pre-sterilized glass bottles, the nectar was poured, keeping 1.5-2.0 cm head space. Later on the bottles were sealed airtight with crown caps by using crown corking machine. Then the bottles were pasteurized at 85° for 15 min.,

cooled to room temperature and labeled. The bottles were afterwards stored under ambient temperature for period of 90 days.

Vitamin C was estimated with 2,6-dichlorophenol indophenol dye and Sugars were determined by using Fehling solution as described by Ranganna (2014). The crude protein content was estimated by micro Kjeldhal method, by using factor 6.25 for converting nitrogen content into crude protein (Sadasiyam and Manickam, 2008). For calcium estimation, sample (1 ml) was titrated with standard EDTA (N/50) as described by Jaiswal (2003). Phosphorous content was estimated with the help of spectrophotometer by using Vandate-molybdate reagent (AOAC, 2012).

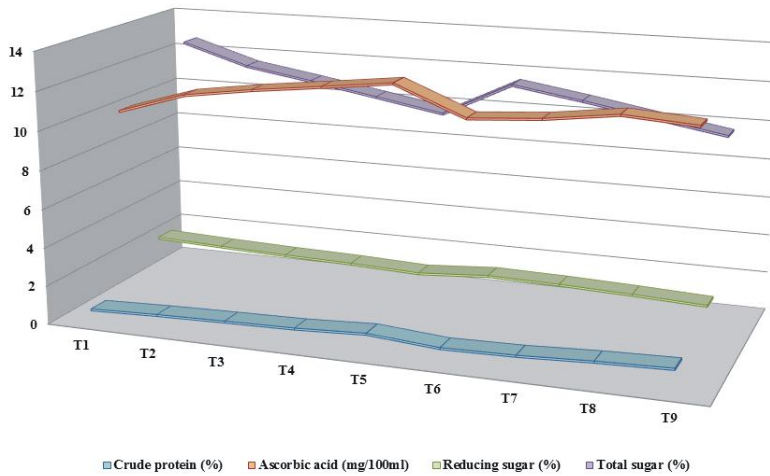
Total phenolic content of sample was estimated by Folin-Ciocalteu method (Ahmed and Abozed, 2015). The experiment for determining free radical scavenging activity was performed by using DPPH (1,1-diphenyl-2-picryl-hydrazyl) (Luo *et al.*, 2009). Organoleptic evaluation of blended herbal nectar was conducted by the panel consisting of 10 semi-trained judges using 9 point hedonic scale (scores assigned as 9 “like extremely” to 1 “dislike extremely”) (Amerine *et al.*, 1965). Statistical analysis was conducted (Gomez and Gomez, 1984) using completely randomized design for interpretation of results through analysis of variance at significant level ( $p \leq 0.05$ ).

### Results and Discussion

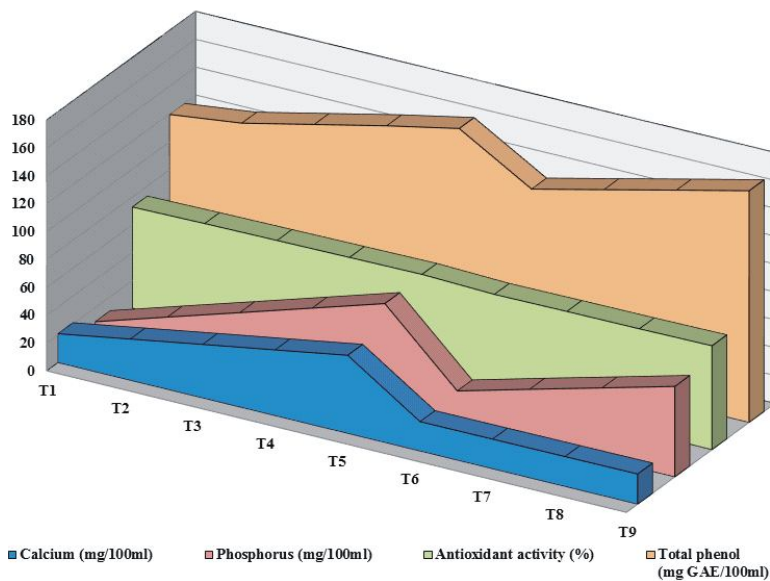
#### Nutritional evaluation of herbal nectar

The ascorbic acid and crude protein content (Fig. 1) of bottle gourd based herbal nectar increases with addition of mint and basil. In control and mint treatments, 23.95% and 69.84% increase was observed with addition of mint whereas, in control and basil treatments, 19.33% and 80.95% increase was observed with addition of basil, in ascorbic acid and crude protein content of the nectar, respectively. Significant difference among the treatment was observed with respect to ascorbic acid and crude protein content. Ascorbic acid and crude protein content of herbal nectar increased with the incorporation of mint and basil juice as compared to T<sub>1</sub> (control), this could be result of variation in ascorbic acid and crude protein content in raw materials added. Similar results for ascorbic acid were reported in whey based pineapple and bottle gourd mixed herbal beverage (Baljeet *et al.*, 2013).

Among control and mint treatments, 19.34% and 23.17% decline was recorded in reducing sugar and total sugar content of the nectar, with increase in mint concentration whereas, in control and basil treatments, 23.46% and 23.65% decline was recorded with increase



**Fig. 1 :** Ascorbic acid, crude protein, reducing sugar and total sugar of blended herbal nectar.



**Fig. 2 :** Calcium, phosphorus, total phenol and antioxidant activity of blended herbal nectar.

in concentration of basil, respectively (Fig. 1). With the incorporation of mint and basil juice in the bottle gourd based herbal nectar, reducing sugar and total sugar content decreased which might be due to their lower concentration in the raw materials added. Similar studies for reducing sugar were recorded in blended herbal beverage (Gupta *et al.*, 2022a). The results of total sugar were in accordance with findings of Tiwari and Deen (2015) in blended RTS from bael.

The incorporation of mint and basil lead to increases in phosphorus, calcium, phenols and antioxidant activity (Fig. 2) of bottle gourd based herbal nectar. From treatment T<sub>1</sub> to T<sub>5</sub>, 648.83, 170.19, 33.88 and 3.23% increase was recorded in phosphorus, calcium, phenol and antioxidant activity of the nectar with addition of mint whereas, among control and basil treatments, inclination of 560.43, 4.29, 38.91 and 2.54% was recorded with

addition of basil, respectively. The increase in mineral content with treatment could be attributed to the declining percent of bottle gourd with increasing level of mint and basil juice which are rich in minerals. The mint and basil have high phenol and antioxidant activity, so their incorporation in blended nectar increases the total phenolic content and antioxidant activity of the product. Similar findings for phenolic content were reported in bottle gourd blended drink (Gupta *et al.*, 2022b). The results of antioxidant activity reported similar findings in RTS beverages made from medicinal plants (Hirdyani, 2015).

### Organoleptic evaluation of herbal nectar

The different colour scores were obtained for different treatments developed. Diminishing trend was observed in colour score when blended with mint and basil juice which could be because of green colour contributed by the herbs. Percentage inclination among treatments from minimum mean colour score (6.72) to maximum mean colour scores (7.90) was 17.60% (Table 1). Kumari *et al.* (2011) and Majumder *et al.* (2018) recorded similar results in tulsi flavoured yoghurt and in bottle gourd blended herbal drink, respectively. With progress in storage period, the mean colour scores showed 9.39% decline which could possibly resulted from degradation of colour pigment and browning caused by copolymerization of organic acids of the product (Hamid and Thakur, 2017). Present findings are in accordance with the colour scores reported in herbal RTS beverage (Chauhan *et al.*, 2012).

The incorporation of mint and basil juice upto certain limits improve the flavour of nectar. Among treatments, 15.09% inclination was observed in lowest (6.89) and highest (7.93) mean flavour score (Table 1) of blended nectar. Similar findings were recorded in *Ocimum* based herbal RTS (Madhuri *et al.*, 2021) and in whey-banana blended herbal beverage (Yadav *et al.*, 2010). The decline in mean flavour score, during 90 days of storage was 9.31% in bottle gourd based herbal nectar, which might be because of certain enzymatic, physiological or biological changes. The decline in volatile aromatic compounds could be responsible for reduction in flavour scores during storage period (Yadav *et al.*, 2010). Similar decreasing pattern was observed by Sharma *et al.* (2009) in jamun-mango blended RTS beverage and *Ocimum*

**Table 1 :** Effect of treatment and storage period on colour and flavour (hedonic score) of blended herbal nectar.

Treatment	Colour scores				Mean (Treatment)	Flavour scores				Mean (Treatment)
	Storage period (Days)					Storage period (Days)				
	0	30	60	90		0	30	60	90	
T <sub>1</sub> (Control)	7.36	7.15	6.92	6.62	<b>7.01</b>	7.49	7.32	7.08	6.72	<b>7.15</b>
T <sub>2</sub> (90:5:5::BGJ:MLJ:LJ)	7.96	7.70	7.51	7.28	<b>7.61</b>	7.61	7.45	7.21	6.86	<b>7.28</b>
T <sub>3</sub> (85:10:5::BGJ:MLJ:LJ)	7.51	7.27	7.09	6.80	<b>7.17</b>	7.75	7.58	7.34	6.99	<b>7.41</b>
T <sub>4</sub> (80:15:5::BGJ:MLJ:LJ)	7.23	6.94	6.78	6.47	<b>6.86</b>	7.37	7.19	6.94	6.59	<b>7.02</b>
T <sub>5</sub> (75:20:5::BGJ:MLJ:LJ)	7.11	6.82	6.64	6.31	<b>6.72</b>	7.23	7.05	6.81	6.45	<b>6.89</b>
T <sub>6</sub> (90:5:5::BGJ:BLJ:LJ)	8.23	8.04	7.80	7.53	<b>7.90</b>	8.09	7.94	7.72	7.42	<b>7.79</b>
T <sub>7</sub> (85:10:5::BGJ:BLJ:LJ)	8.12	7.89	7.66	7.42	<b>7.77</b>	8.2	8.07	7.85	7.59	<b>7.93</b>
T <sub>8</sub> (80:15:5::BGJ:BLJ:LJ)	7.83	7.57	7.39	7.14	<b>7.48</b>	7.98	7.82	7.60	7.29	<b>7.67</b>
T <sub>9</sub> (75:20:5::BGJ:BLJ:LJ)	7.68	7.40	7.25	6.95	<b>7.32</b>	7.87	7.70	7.46	7.15	<b>7.54</b>
Mean (Storage)	<b>7.67</b>	<b>7.42</b>	<b>7.23</b>	<b>6.95</b>		<b>7.73</b>	<b>7.57</b>	<b>7.33</b>	<b>7.01</b>	
Effects C.D. (p≤0.05)										
	Colour	Flavour				BGJ	Bottle Gourd Juice			
Treatment (T)	0.02	0.03				MLJ	Mint Leaf Juice			
Storage (S)	0.01	0.02				BLJ	Basil Leaf Juice			
T x S	0.04	0.07				LJ	Lemon Juice			

**Table 2 :** Effect of treatment and storage period on taste and consistency (hedonic score) of blended herbal nectar.

Treatment	Taste scores				Mean (Treatment)	Consistency scores				Mean (Treatment)
	Storage period (Days)					Storage period (Days)				
	0	30	60	90		0	30	60	90	
T <sub>1</sub> (Control)	7.46	7.18	6.90	6.71	<b>7.06</b>	7.36	7.16	7.05	6.71	<b>7.07</b>
T <sub>2</sub> (90:5:5::BGJ:MLJ:LJ)	7.59	7.31	7.05	6.85	<b>7.20</b>	7.47	7.34	7.17	6.85	<b>7.21</b>
T <sub>3</sub> (85:10:5::BGJ:MLJ:LJ)	7.72	7.48	7.22	7.09	<b>7.38</b>	7.63	7.49	7.31	6.98	<b>7.35</b>
T <sub>4</sub> (80:15:5::BGJ:MLJ:LJ)	7.33	7.07	6.78	6.56	<b>6.93</b>	7.19	7.01	6.89	6.59	<b>6.92</b>
T <sub>5</sub> (75:20:5::BGJ:MLJ:LJ)	7.20	6.93	6.65	6.41	<b>6.80</b>	7.03	6.87	6.73	6.45	<b>6.77</b>
T <sub>6</sub> (90:5:5::BGJ:BLJ:LJ)	8.10	7.91	7.66	7.50	<b>7.79</b>	8.02	7.91	7.72	7.38	<b>7.76</b>
T <sub>7</sub> (85:10:5::BGJ:BLJ:LJ)	8.19	8.08	7.84	7.69	<b>7.95</b>	8.17	8.09	7.87	7.56	<b>7.92</b>
T <sub>8</sub> (80:15:5::BGJ:BLJ:LJ)	7.97	7.79	7.53	7.36	<b>7.66</b>	7.89	7.77	7.59	7.29	<b>7.63</b>
T <sub>9</sub> (75:20:5::BGJ:BLJ:LJ)	7.85	7.63	7.38	7.24	<b>7.52</b>	7.75	7.61	7.46	7.14	<b>7.49</b>
Mean (Storage)	<b>7.71</b>	<b>7.49</b>	<b>7.22</b>	<b>7.04</b>		<b>7.61</b>	<b>7.47</b>	<b>7.31</b>	<b>6.99</b>	
Effects C.D. (p≤0.05)										
	Taste	Consistency				BGJ	Bottle Gourd Juice			
Treatment (T)	0.04	0.02				MLJ	Mint Leaf Juice			
Storage (S)	0.02	0.01				BLJ	Basil Leaf Juice			
T x S	0.07	0.03				LJ	Lemon Juice			

based herbal RTS (Madhuri *et al.*, 2021).

Mint and basil juice enhanced the taste score significantly, when added upto 10% but its higher concentration degraded the taste. The percentage increase among treatments from lowest (6.80) to highest

(7.95) mean taste scores was 16.91% (Table 2). Similar studies were observed by Madhuri *et al.* (2021) in herbal RTS prepared using basil and by Baljeet *et al.* (2013) in herbal beverage blended with whey-based pineapple and bottle gourd. Significant decline of 8.69% was recorded



in mean taste score, during the storage period. The decrease in taste scores during storage might be due to loss of sugar-acid balance which is responsible for taste (Hamid and Thakur, 2017). The results were in correspondence to various studies that have reported similar findings such as blended RTS beverage with different proportions of sweet orange and pomegranate juice, during their storage period (Bhavyasree and Vanajalata, 2015).

Significant increase in consistency score was observed when mint and basil juice was added but their higher concentration (>10%) decreases the consistency of nectar (Table 2). Among treatments, 16.99% inclination in mean consistency score was recorded where, lowest and highest mean consistency score of blended nectar were 6.77 and 7.92, respectively. Majumder *et al.* (2018) reported similar results in bottle gourd blended beverage. During 90 days of storage, significant decrease of 8.15% in consistency scores was noted, in bottle gourd based herbal nectar. The decline in consistency scores could be due to phenols and protein interaction as well as development of cation complexes with phenols and pectin (Hamid and Thakur, 2017). Similar results were recorded by Gajera and Joshi (2015) while studying the quality of bottle gourd blended juice for 180 days of storage period and by Majumder *et al.* (2018) in bottle gourd blended beverage.

### Conclusion

Presently, vegetable beverages are gaining more popularity when compared to chemical drinks, due to their taste, flavour, appealing colour and higher nutritive value. The blended nectar showed enhanced nutritional and sensory characteristics in comparison to T<sub>1</sub> (control). The herbal nectar incorporated with 10% basil was highly acceptable. The study concluded that the blended herbal nectar possibly satisfies consumer's taste and was safe for consumption upto 90 days of storage period.

### References

Ahmed, Z.S. and Abozed S.S. (2015). Functional and antioxidant properties of novel snack crackers incorporated with *Hibiscus sabdariffa* by-product. *J. Adv. Res.*, **6**(1), 79-87.

Amerine, M.A., Paigborn R.M. and Rosesser E.B. (1965). *Principles of Sensory Evaluation of Food*, (New York: Academic Press), 23-45.

AOAC (2012). *Official Methods of Analysis*. 19<sup>th</sup> edition. Association of Official Analytical Chemists, Washington, D.C.

Balakrishnan, A. (2015). Therapeutic Uses of Peppermint – A Review. *J. Pharmaceut. Sci. Res.*, **7**(7), 474-476.

Baljeet, S.Y., Ritika B.Y. and Sarita R. (2013). Studies on development and storage of whey-based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage. *Int. Food Res. J.*, **20**(2), 607-612.

Bhavya Sree, K. and Vanajalata K. (2015). Studies on blending of sweet orange and pomegranate juice for RTS beverage. *Int. J. Trop. Agricult.*, **33**(2), 209-212.

Chauhan, D.K., Puranik V. and Rai G.K. (2012). Development of functional herbal RTS beverage. *Open Access Scientific Reports*, **1**(12), 541-545.

Del Rio, J.A., Fuster M.D., Gomez P., Porras I., Garcia-Lidon A. and Ortuno A. (2004). *Citrus limon*: a source of flavonoids of pharmaceutical interest. *Food Chem.*, **84**(3), 457-461.

Gajera, R.R. and Joshi D.C. (2015). Development and quality evaluation of bottle gourd, *Lagenaria siceraria* (Mol.) Standl. based blend juice. *Indian J. Nat. Prod. Resources*, **6**(3), 194-199.

Gomez, K.A. and Gomez A.A. (1984). *Statistical Procedure for Agricultural Research* (edn 2<sup>nd</sup>), A Wiley-Interscience Publication, John Wiley and Sons, New York. p 680.

Gupta, B.M., Gupta R., Agarwal A. and Goel S. (2018). *Ocimum Sanctum* (medicinal plant) research: A scientometric assessment of global publications output during 2008-17. *Int. J. Inform. Dissem. Technol.*, **8**(2), 67-73.

Gupta, S., Sood M., Bandral J.D. and Gupta N. (2022a). Effect of blending traditional herbs on physico-chemical changes in bottle gourd nectar. *J. Eco-Friendly Agricult.*, **17**(2), 413-419.

Gupta, S., Sood M., Bandral J.D. and Gupta N. (2022b). Chemical, microbiological and organoleptic characteristics of bottle gourd based herbal nectar. *Indian J. Agricult. Biochem.*, **35**(2), 163-166.

Hamid, H. and Thakur N.S. (2017). Development of appetizer (spiced squash) from mulberry (*Morus alba* L.) and its quality evaluation during storage. *J. Appl. Nat. Sci.*, **9**(4), 2235-2241.

Hirdyani, H. (2015). Development and quality evaluation of RTS (ready to serve) beverages made from traditional Indian medicinal plants. *J. Nutr. Food Sci.*, **13**, 1-4.

Jain, A., Singh S.P., Shukla R. and Sriom (2018). Evaluation on mean performance in bottle gourd (*Lagenaria siceraria* (Molina) Standl) genotypes. *Int. J. Curr. Microbiol. Appl. Sci.*, **7**(4), 2239-2243.

Jaiswal, P.C. (2003). *Soil, Plant and Water Analysis*, Kalyani Publishers, New Delhi, India. p 399.

Koffi, K.K., Anzara G.K., Malice M., Dje Y., Bertin P., Baudoin J.P. and Zoro Bi I.A. (2009). Morphological and allozyme variation in a collection of *Lagenaria siceraria* (Molina) Standl. from Cote d'Ivoire. *Biotechnol., Agron., Soc. Environ.*, **13**(2), 257-270.

Kumari, K., Verma A. and Neerubala (2011). Preparation of low fat tulsii flavoured yoghurt. *Food Sci. Res. J.*, **2**(2), 188-190.

- Luo, A.X., He X.J., Zhou S.D., Fan Y.J., He T. and Chun Z. (2009). *In vitro* antioxidant activities of a water soluble polysaccharide derived from *Dendrobium nobile* Lindl. Extracts. *Int. J. Biolog. Macromol.*, **45**, 359-363.
- Madhuri, M.L., Kumari S.S., Swami D.V., Giridhar K., Suneetha D.R.S. and Krishna K.U. (2021). Optimization and evaluation of physico-chemical parameters of *Ocimum* based herbal RTS. *The Pharma Innov. J.*, **10(6)**, 245-251.
- Majumder, S., Kishor K., Santosh and Singh A. (2018). Sensory tolerability of miscellaneous herbal nectar from bottle gourd, mint, lime, sugar syrup. *Int. J. Food Sci. Nutr.*, **3(6)**, 118-120.
- Molina, E.G., Perles R.D., Moreno D.A. and Cristina G.V. (2010). Natural bioactive compounds of *Citrus limon* for food and health. *J. Pharmaceut. Biomed. Anal.*, **51(2)**, 327-345.
- Ranganna, S. (2014). *Handbook of Analysis and Quality Control for Fruit and Vegetable Products* (2<sup>nd</sup> ed.), Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- Sadasivam, S. and Manickam A. (2008). *Biochemical Methods for Agricultural Sciences*, New Age International Publication Limited, New Delhi.
- Sharma, D.S., Kaul R.K., Sood M. and Gupta N. (2017). Studies on stability and quality of jamun-mango blended ready-to-serve beverage, *Indian J. Horticult.*, **74(2)**, 299-302.
- Tiwari, D.K. and Deen B. (2015). Preparation and storage of blended ready-to-serve beverage from bael and aloe vera. *The Bioscan*, **10(1)**, 113-116.
- Tucker, A.O. and De Baggio T. (2000). *The Big Book of Herbs: A Comprehensive Illustrated Reference to Herbs of Flavor and Fragrance* (Loveland, Colorado:Interweave Press).
- Yadav, R.B., Yadav B.S. and Kalia N. (2010). Development and storage studies on whey-based banana herbal (*Mentha arvensis*) beverage. *Am. J. Food Tech.*, **5**, 121-129.