IJFANS
International Journal of Food And Nutritional Sciences

Volume 4, Issue 5, Oct-Dec 2015, www.ijfans.com e-ISSN: 2320-7876

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

IMPACT FACTOR ~ 1.021

Official Journal of IIFANS

IJFANS International Journal of Food And Nutritional Sciences

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

e-ISSN 2320 –7876 *www.ijfans.com*
Vol.4, Iss.5, Oct-Dec, 2015

Research Paper *Open Access*

EFFECT ON PH, TSS, ACIDITY, ASCORBIC ACID AND SENSORY ATTRIBUTES DURING STORAGE PERIOD OF RTS MADE FROM BEETROOT, ORANGE AND GINGER JUICE

Dambalkar V. S.[1], Rudrawar B. D.[2*] and Poojari V. R.[3]

[1]K. K. Wagh College of Food Technology, Nashik, Maharashtra, India,[2]Department of Food Science and Technology, K. K. Wagh College of Food Technology, Nashik, Maharashtra, India,[3]Department of Food and Industrial Microbiology, K. K. Wagh College of Food Technology, Nashik, Maharashtra, India.

[*]Corresponding Author: rudrawar1989@gmail.com

Received on: 7th September, 2015 **Accepted on: 29th December, 2015**

ABSTRACT

A juice of Beetroot (*Beta vulgaris*), Orange (*Citrus sinensis*) and Ginger (*Zingiber officinale*) was optimised and blended into an RTS which was stored and studied for 90 days in glass bottles (200 ml capacity) at refrigerated temperature. Beetroot juice was blended with orange and ginger juice for increasing nutritional and functional value of RTS beverages. A marginal change was observed in pH, TSS, acidity and vitamin C. The acidity and TSS of product was increased while, pH and ascorbic acid of beverage decreased progressively during storage at refrigerated temperature over a period of 90 days. This may be due to the excessive fermentation and presence of lactic acid reducing micro-organism. The study revealed that blend of beetroot: orange: ginger juice (50:30:20) was most effective juice blend for minimum change in TSS (12 to 12.9 ^{0}Brix), acidity (0.30 to 0.45), vitamin C (21.454 to 12.021 mg) & pH (4.39 to 3.98). The population of bacteria was (1.7 X 10^{3}) at the end of storage of 90 days. So, the product was microbiologically safe during 90 days of storage with good acceptability.

Keywords: Ready to serve, Ascorbic acid, Storage, Sensory evaluation, Functional.

INTRODUCTION

Fruits and vegetables are important constituents of the diet and provide significant quantities of nutrients, especially vitamins, sugars, minerals and fiber (Sindumathi *et al.*, 2013). Daily consumption of fruits and vegetables reduce the risk of cancer, heart disease, premature aging, stress and fatigue primarily due to the integrated action of oxygen radical scavengers such as β- carotene and ascorbic acid plus calcium and dietary fiber (Sindumathi *et al.*, 2013). Fruit and Vegetable based beverages are relished when served chilled, particularly during summers. It has been reported that the organoleptic quality of RTS beverage prepared from juice could be increased by the addition of spice extracts of ginger, black pepper, mint, cardamom and cumin etc. (Sindumathi *et al.*, 2013). These spices apart from their appetizing properties also possess medicinal and therapeutic values, which have a profound effect on human health, since they affect many functional processes (Sindumathi *et al.*, 2013). The advantage of RTS beverage is that there is no need to dilute it whereas squash, syrup, cordial, crush are diluted with water before use. Ready-to-serve beverages are made out of juice, sugar and water and consumed as such. The fruits like pineapple, orange, lime, banana, litchi, passion fruit, and other local fruits can be used for RTS preparations.

The beetroot (*Beta vulgaris*) is the taproot portion of the beet plant, also known as the table beet, garden beet, red or golden beet or informally simply as the beet. In recent years increased attention has been focused on utilization of healthy foods. The beetroot (*Beta vulgaris*) being an alkaline food with pH from 7.5 to 8.0 has been acclaimed for its health benefits, in particular for its disease fighting antioxidant potential, significant amount of vitamin C and vitamins B_1, B_2, niacin, B_6, B_{12} whilst the leaves are an excellent source of vitamin A (Singh *et al.*, 2013). The juice of beetroot is also consumed as a natural remedy for sexual weakness and to expel kidney and bladder stones (Sharma *et al.*, 2011). *Beta vulgaris* extracts (root) possess antihypertensive, hypoglycaemic, antioxidant (Ninfali *et al.*, 2013), anti-inflammatory, and hepato-protective activities (Singh *et al.*, 2011; Jain *et al.*, 2011; Chakole *et al.*, 2011; Kujala *et al.*, 2000). The claimed therapeutic use of beetroot includes its antitumor, carminative, emmenagogue and hemostatic and renal protective properties and is a potential herb used in cardiovascular conditions (Vali *et al.*, 2007). Beetroot is known to be a powerful antioxidant (Christiana Winkler *et al.*, 2005). The balance between the production of reactive oxygen species (ROS) and reactive nitrogen species (RNS), collectively termed 'RONS', and the protective mechanisms against them is considered important in preserving good health (Valko *et al.*, 2007). The beneficial effects of beetroot juice supplementation (BJS) have been tested in cycling, walking, and running (Lansley *et al.*,

2011; Larsen *et al.*, 2007). Beetroot juice which is rich in antioxidant compounds may help to redress the balance between RONS production and endogenous protection when the body is under oxidative stress (Peter *et al.*, 2011). Other than used as a food, beet is also used as colouring agent and in medicinal applications. Beetroot is an excellent source of folate and a good source of manganese (USDA nutritional database, 2014). Beetroot is a beneficial for digestive problems, such as constipation, for the skeletal system, and for a good circulation of blood (Profir *et al.*, 2013). Betaine has several noted effects related to human health and function, including acting as an osmolyte (protecting cells against dehydration), as an antioxidant agent (protecting cells against free radicals), as a methyl group donor (lowering potentially harmful levels of homocysteine), and as a vascular protectant (Bloomer *et al.*, 2011).

Orange (*Citrus sinensis*) is tasty & juicy fruit, belongs to the family Rutaceae. *Citrus sinensis* is one of the most important and widely grown fruit crops, with total global production reported to be around 120 million tons (Parle *et al.*, 2012). Orange pulp is an excellent source of vitamin C, providing 64% of the daily requirement of an individual (USDA nutritional Database, 2014). Citrus juices are considered to be a rich source of antioxidants including vitamin C, phenolic compounds (flavonoids) and carotenoids that the human body cannot synthesize (Peterson and Dwyer, 2006). Numerous other essential nutrients are present in low amounts. Orange juice contains diverse phytochemicals including carotenoids (beta-carotene, lutein and beta-cryptoxanthin), flavonoids (e.g., naringenin) (Aschoff *et al.*, 2015) and numerous volatile organic compounds producing orange aroma, including aldehydes, esters, terpenes, alcohols, and ketones (Perez-Cacho *et al.*, 2008). Being a citrus fruit, the orange is acidic: its pH levels are as low as 2.9, and as high as 4.0. (USDA February, 1997)

Ginger (*Zingiber officinale* Roscoe) is a flowering plant, belongs to the family Zingiberaceae whose rhizome, ginger root or simply ginger is widely used as a spice or a folk medicine. Ginger plants are generally 1-3 ft. in height and having different chemical constituents like Amaldehyde, Gingerol, Shogaol, and Paradol etc. It has some tremendous beneficial effect on human body to cure various types of diseases (Banerjee *et al.*, 2011). Other members of the family Zingiberaceae include turmeric and cardamom. The distantly related dicots in the genus Asarum are commonly called wild ginger because of their similar taste. It is widely claimed as a Stomachic, aromatic, carminative, aphrodisiacs, diaphoretic, antiemetic, allergic rhinitis and gastric stimulant and for treating migraine headache (Prasad *et al.*, 2012). It is also used as an antispastic against intestinal colic (Prasad *et al.*, 2012). Ginger oil is used in mouthwashes and liquors (Evans *et al.*, 1989).

In limited studies, ginger was found to be more effective than placebo for treating nausea (Marx *et al.*, 2013) caused by seasickness (Ernst *et al.*, 2000), morning sickness (Wood *et al.*, 1988), and chemotherapy (Grontved *et al.*, 1988), although it was not found superior to placebo for pre-emptively treating postoperative nausea. Some studies advise against taking ginger during pregnancy (Ernst *et al.*, 2000), suggesting that ginger is mutagenic, though some other studies have reported antimutagenic effects (Ernst *et al.*, 2000).

MATERIALS AND METHODS

PROCUREMENT OF RAW MATERIALS

The vegetables and fruit used for this study: beetroot and ginger was purchased from a local market. All the preliminary operations like washing, peeling, cutting, slicing were carried out. The vegetable juice was prepared by using grinder. While the fresh citrus fruit orange was purchased from the local market. The procured fruits were washed, peeled and juiced with fruit juicer.

PREPARATION OF BEETROOT JUICE

BEETROOT
↓
Selection
↓
Washing
↓
Peeling
↓
Cutting
↓
Crushing
↓
Juice extraction
↓
Filtration
↓
Beetroot juice

Beetroot was peeled out and sliced, crushed in a grinder with addition of subsequent water, then pulped by using hydraulic press and the extracted juice was again filtered by using a four layer muslin cloth to remove remaining pomace.

PREPARATION OF ORANGE JUICE

ORANGE
↓
Selection
↓
Peeling
↓
Pulping
↓
Filtration
↓
Orange juice

Oranges were cleaned with tap water, peeled and then orange juice was extracted using juice blender.

PREPARATION OF GINGER JUICE

GINGER
↓
Selection
↓

Washing
↓
Peeling
↓
Cutting
↓
Crushing
↓
Juice extraction
↓
Filtration
↓
Ginger juice

The rhizome of ginger was cleaned and scrapped to remove superficial skin, cut into small pieces and then water is added to prepare ginger juice with the help of mixer-grinder. The juice was then filtered through muslin cloth to remove fibres.

PREPARATION OF BEETROOT-ORANGE RTS

After that the juice of beetroot, Orange and ginger juices was blended as per the different formulations such as 40:40:20, 50:30:20, 30:50:20 respectively. Then sugar and citric acid was added to juice properly and then mixture was filtered through muslin cloth. The product was then filled in glass bottles which was earlier washed with 1% Cl and presterilized at 121^0 C for 15 minutes and then sealed. After that bottle was pasteurized at 85^0C for 30 sec, cooled and stored at refrigerated temperature for 3 months and studied for shelf life. The flow chart of blend is shown in table no. 1.

Table no. 1: Process Details and Flow Chart

Beet Juice | **Orange Juice** | **Ginger Juice** | **Sugar syrup**

↓
Pasteurization
(85^0 C for 15 sec)
↓
Mixing
↓
Filtration
↓
Filling in the bottles
(Head space 2 cm)
↓
Crown Corking
↓
Pasteurization
(85^0c for 30 sec.)
↓
Labelling
↓
Storage
(At Refrigerate temp.)

STANDARDIZATION OF BEETROOT ORANGE RTS

In the present investigation three samples were prepared, i.e. sample BOG 1 using 40:40:20 proportion, sample BOG 2 using 50:30:20 proportion, sample BOG 3 using 30:50:20 proportion (as shown in table no. 2.6) respectively.

Table no. 2.6: Standardization of Beetroot Orange RTS

Sr. no.	Sample name	Juice: (ml) Beetroot: Orange: Ginger	Citric acid (gm)	Sodium benzoate (gm)
1.	BOG 1	40:40:20	2	0.3
2.	BOG 2	50:30:20	2	0.3
3.	BOG 3	30:50:20	2	0.3

**where BOG- Beetroot, Orange & Ginger*

PHYSICO-CHEMICAL ANALYSIS

The pH values were determined with the help of an electronic pH meter (Thermo Scientific, 2 star), Acidity of various samples was determined by titrating against 0.1 N NaOH according to A.O.A.C (1995) method. TSS measurement was done using a hand refractometer (ERMA INC., Tokyo, Japan) (0-32^{o}Brix) and value was expressed in ^{o}Brix. Ascorbic acid content was determined by the titration method using 2,6-dichlorophenol endophenol dye ($C_{12}H_7NCl_2$) as recommended by Ranganna (1986).

SENSORY ANALYSIS

Sensory evaluation of RTS samples was performed by 20 semi trained panellists. The 9-point hedonic scale and composite scoring test was used to carry out sensory evaluation. They assessed RTS in terms of Colour, Flavour, Clarity, Taste properties. Overall acceptability score was calculated as average of whole sensory attributes.

RESULTS AND DISCUSSIONS

COMPOSITION PROFILE OF BEETROOT, ORANGE AND GINGER JUICE

Juice prepared from beetroot, orange and ginger was analysed for their Composition profile and the obtained results shown in Table no. 3.1.

EFFECT ON TSS, PH, ASCORBIC ACID AND ACIDITY PARAMETER OF RTS DURING STORAGE

Effect on TSS, pH, ascorbic acid and acidity parameter of RTS during storage was studied and obtained results are presented in table no. 1, 2, 3 and 4. A physico-chemical property of beverages such as TSS, pH, ascorbic acid, acidity and overall acceptability was affected significantly by change in the proportion of ingredients. A reducing trend was observed in ascorbic acid whereas an increasing trend was observed in acidity content during storage. Significant change was observed in TSS content of the sample during 90 days of storage.

The sample BOG 1, 2, 3 contains similar values for pH and TSS, while slight variation occurred in acidity and vitamin C (at 0 day).

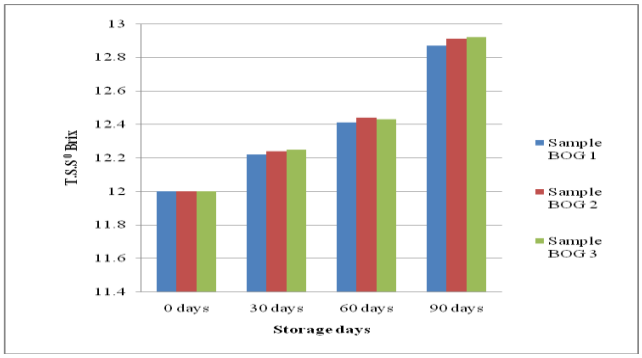
PHYSICO-CHEMICAL ANALYSIS

TOTAL SOLUBLE SOLIDS

TSS was measured by using a hand refractometer (ERMA INC., Tokyo, Japan) (0-32^{o}Brix) and values were expressed as ^{o}Brix. The TSS increased with gradual passage of storage time, which might be due to hydrolysis of polysaccharides into monosaccharide and oligosaccharides (Awsi *et al.*, 2012). It was observed that maximum increase in TSS (12.92%) was recorded in sample BOG 3 while, minimum increase in TSS (12.87%) was recorded in sample BOG 1. During passage of storage (0 to 90 days) there was significant increase in TSS ranging from (12 to 12.87 ^{0}Brix, 12 to 12.91 ^{0}Brix and 12 to 12.92 ^{0}Brix) in BOG 1, BOG 2 and BOG 3 respectively as shown in figure no. 3.3.1.

Table no. 3.1: Composition Profile of juices per 100 gm of fruit and vegetables

Parameter	Beetroot juice	Orange juice	Ginger juice
Moisture (%)	86%	81 %	87.4%
pH	8.4	3.34	5.80
Acidity	0.06	13.38	0.08
TSS (^{0}Brix)	5	6.5	2.3
Vitamin c	10.07 mg	124 mg	4 mg



**where BOG- Beetroot, Orange & Ginger*

Figure no. 3.3.1: TSS Content of Beetroot-Orange RTS Beverage during Storage Period

Table no. 1: Chemical parameters of Beetroot-Orange RTS Drinks during 0 days storage.

Parameter	Sample BOG 1	Sample BOG 2	Sample BOG 3
Acidity (%)	0.31	0.30	0.32
TSS (^{0}Brix)	12.00	12.00	12.00
pH	4.39	4.39	4.39
Vitamin C (mg)	25.247	21.454	30.243

**where BOG- Beetroot, Orange & Ginger*

Table no. 2: Chemical parameters of Beetroot-Orange RTS Drinks during 30 days storage.

Parameter	Sample BOG 1	Sample BOG 2	Sample BOG 3
Acidity (%)	0.36	0.34	0.37
TSS (^{0}Brix)	12.22	12.24	12.25
pH	4.34	4.35	4.33
Vitamin C (mg)	21.349	18.921	26.383

**where BOG- Beetroot, Orange & Ginger*

Table no. 3: Chemical parameters of Beetroot-Orange RTS Drinks during 60 days storage.

Parameter	Sample BOG 1	Sample BOG 2	Sample BOG 3
Acidity (%)	0.43	0.40	0.45
TSS (^{0}Brix)	12.41	12.44	12.43
pH	4.11	4.09	4.10
Vitamin C (mg)	17.198	15.816	21.516

**where BOG- Beetroot, Orange & Ginger*

Table no. 4: Chemical parameters of Beetroot-Orange RTS Drinks during 90 days storage.

Parameter	Sample BOG 1	Sample BOG 2	Sample BOG 3
Acidity (%)	0.49	0.45	0.53
TSS (^{0}Brix)	12.87	12.91	12.92
pH	4.01	3.98	3.99
Vitamin C(mg)	14.263	12.021	18.962

**where BOG- Beetroot, Orange & Ginger*

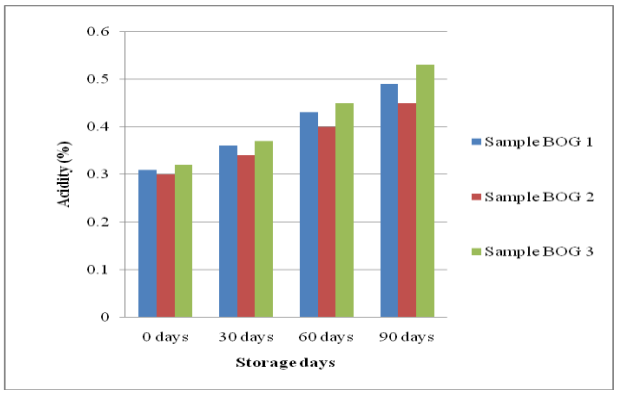
Table No. 3.4.1: Average of Sensory analysis Data

Sample	Organoleptic Score*					
	Color	Taste	Flavour	Clarity	After taste	Overall Acceptability
BOG 1	6	7.5	7.7	6.7	7	7.9
BOG 2	7	8	8	7.1	8	8.6
BOG 3	6	7	7	6.5	6	7

Score between 1-9 as per liking

TITRABLE ACIDITY

Acidity of various samples was determined by titrating against 0.1 N NaOH according to A.O.A.C (1995) method. It was observed that maximum increase in acidity (0.53%) was recorded in sample BOG 3 while, minimum increase in acidity (0.45%) was recorded in sample BOG 2. During passage of storage (0 to 90 days) there was significant increase in acidity ranging from (0.31 to 0.49%, 0.30 to 0.45% and 0.32 to 0.53%) in BOG 1, 2 and 3 respectively as shown in figure no. 3.3.2.

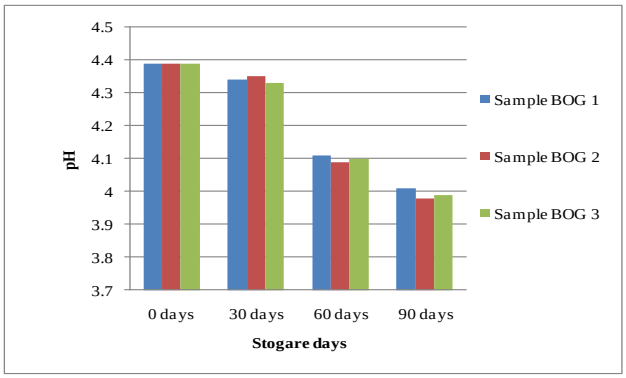


**where BOG- Beetroot, Orange & Ginger*

Figure no. 3.3.2: Acidity Content of Beetroot-Orange RTS Beverage during Storage Period.

pH

The pH value was determined with the help of an electronic pH meter (Thermo Scientific, 2 star). It was observed that maximum decrease in pH (3.98) was recorded in sample BOG 2 while, minimum decrease in pH (4.01) was recorded in sample BOG 1. During passage of storage (0 to 90 days) there was significant decrease in pH ranging from (4.39 to 4.01, 4.39 to 3.98 and 4.39 to 3.99) in BOG 1, 2 and 3 respectively as shown in figure no. 3.3.3.

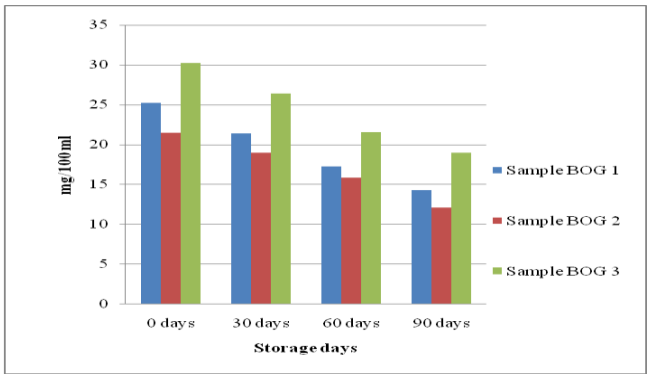


**where BOG- Beetroot, Orange & Ginger*

Figure no. 3.3.3: pH Content of Beetroot-Orange RTS Beverage during Storage Period.

ASCORBIC ACID

Ascorbic acid content was determined by the titration method using 2,6-dichlorophenol endophenol dye ($C_{12}H_7NCl_2$) as recommended by Ranganna (1986). The ascorbic acid (vitamin C) content of the juice decreased during storage with the advancement of storage period, which was probably 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 (Mapson, 1970). It was observed that maximum decrease in ascorbic acid (12.021 mg/100 ml juice) was recorded in sample BOG 2 while, minimum decrease in ascorbic acid (18.962 mg/100 ml juice) was recorded in sample BOG 1. During passage of storage (0 to 90 days) there was significant decrease in ascorbic acid ranging from (25.24 to 14.263 mg, 21.45 to 12.02 mg and 30.24 to 18.96 mg per 100 ml juice) in BOG 1, 2 and 3 respectively as shown in figure no. 3.3.4.



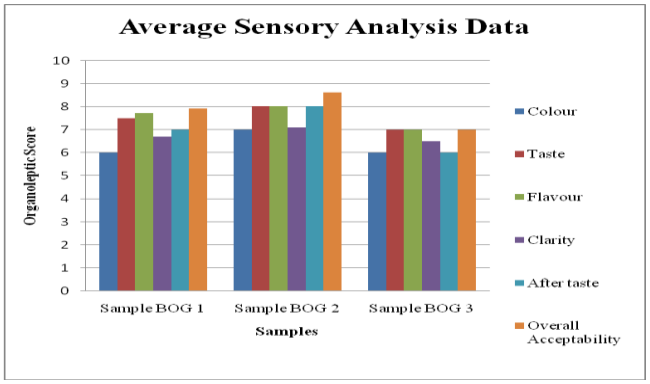
**where* BOG- Beetroot, Orange & Ginger

Figure no. 3.3.4: **Ascorbic acid Content of Beetroot-Orange RTS Beverage during Storage Period**

SENSORY ANALYSIS

The 3 blends prepared were analysed by 9 point hedonic scale and composite scoring test. The colour, flavour and taste of sample BOG 2 has scored maximum organoleptic score other than the sample BOG 1 and sample BOG 3. Results obtained by composite scoring test were shown in table no. 3.4.1.

While, average sensory analysis data analysed by 9 point hedonic scale were shown in figure no. 3.4.2.



**where BOG- Beetroot, Orange & Ginger*

Figure no. 3.4.2: Average sensory analysis data

CONCLUSION

In this present investigation, research has been made to prepare and standardize the method of Beetroot-Orange RTS Drink. The nutritious drink with good storage life was developed by taking different proportion of beetroot, orange and ginger juice. After preparation the quality of product was evaluated with help of various properties like acidity, pH, ascorbic acid and TSS. The quality of product was found good for a period of 90 days. The blend of beetroot: orange: ginger juice (50:30:20) was most effective juice blend for minimum change in TSS (12 to 12.9 ^{0}Brix), acidity (0.30 to 0.45), vitamin C (21.454 to 12.021 mg) & pH (4.39 to 3.98). The population of bacteria was (1.7 X 10^3) at the end of storage of 90 days.

So, the product was microbiologically safe during 90 days of storage with good acceptability.

REFERENCES

- A.O.A.C. (1995). Official methods of analysis. 16th edn, Association of Official Analytical Chemists, Washington. D.C.
- Aschoff, J. K., Kaufmann, S., Kalkan, O., Neidhart, S., Carle, R. and Schweiggert, R. M. (2015). "In Vitro Bioaccessibility of Carotenoids, Flavonoids, and Vitamin C from Differently Processed Oranges and Orange Juices [Citrus sinensis (L.) Osbeck]". *Journal Agric Food Chem. in press, Jan 8; 578–87.*
- Awsi, J. and Er. Masih, D. (2012). Development and Quality Evaluation of Pineapple Juice Blend with Carrot and Orange juice. *International Journal of Scientific and Research Publications, Volume 2: Issue 8; 1-8.*
- Banerjee, S., Mullick, H. I., and Banerjee, J. (2011). Zingiber Officinale: A Natural Gold. *International Journal of Pharma and Bio Sciences, Volume 2: Issue 1; 283-294.*
- Bloomer, R. J., Farney, T. M., Trepanowski, J. F., McCarthy, C. G. and Canale, R. E.(2011). Effect of betaine supplementation on plasma nitrate/nitrite in exercise-trained men. Journal of the International Society of Sports Nutrition, Volume 8: Issue 5; 1-7.
- Chakole, R., Zade, S. and Charde, M. (2011). "Antioxidant and anti- inflammatory activity of ethanolic extract of Beta vulgaris Linn. roots," *International Journal of Biomedical and Advance Research, volume 2, 124–130.*
- Christiana Winkler, B. W., Schroecksnadel, K., Schennach, H. and Fuchs, D. (2005). "In vitro effects of beet root juice on stimulated and unstimulated peripheral blood mononuclear cells," *The American Journal of Biochemistry and Biotechnology, volume 1; 180–185.*
- Ernst, E. and Pittler, M. H. (2000). "Efficacy of ginger for nausea and vomiting: a systematic review of randomized clinical trials". *British Journal of Anesthesia, Volume* 84*: Issue (3): 367–371.*
- Evans, W. C. (1989). Trease and Evans Pharmacognosy, *13th edition. ELBS 1989; 464-468.*
- Grontved, A. (1988). "Ginger root against seasickness. A controlled trial on the open sea". *Acta Otolaryngology. Volume* 105: *Issue (1-2): 45–9.*
- Jain, S. G. V. and Sharma, P. K. (2011). "Anti-inflammatory activity of aqueous Extract Of Betavulgaris L,"*Journal of Basic and Clinical Pharmacy, volume 2, .83–86.*
- Kujala, T. S., Loponen, J. M., Klika, K. D. and Pihlaja, K. (2000). "Phenolics and betacyanins in red beetroot (Beta vulgaris) root: distribution and effect of cold storage on the content of total phenolics and three individual compounds," Journal of Agricultural and Food Chemistry, volume 48, Issue no.11, 5338–5342.
- Lansley, K.E., Winyard, P.G., Fulford, J., Vanhatalo, A., Bailey, S., Blackwell, J.R., DiMenna, F.J., Gilchrist, M., Benjamin, N. and Jones, A.M. (*2011*). Dietary nitrate supplementation reduces the O2 cost of walking and running: A placebo-controlled study. J. Appl. Physiol., Volume 110, 591–600.
- Larsen, F.J., Ekblom, B., Lundberg, J.O., Weitzberg, E. (2007). Effects of dietary nitrate on oxygen cost during exercise. *Acta Physiol. Volume 191, 59–66.*
- Mapson, L.W. (1970). Vitamins in Fruits. *Biochemistry of Fruits and their Products. Academic Press, London. 369-383.*
- Marco, P., Silvana, R., Raffaele, M., Elisabetta, M., Sergio, O., Andrea, L., Gian, M., Johnny, P., Carmine, O., Filippo, T., Alberto, C., and Antonio, C. (2014). Effect of Beetroot Juice Supplementation on Aerobic Response during Swimming. *Journal of nutrients, Volume 6; 605-615.*
- Marx, W.M., Teleni L; McCarthy AL; Vitetta L; McKavanagh D; Thomson D; Isenring E. (2013). "Ginger (Zingiber officinale) and chemotherapy-induced nausea and vomiting: a systematic literature review". *Nutr Rev, Volume 71: Issue (4): 245–54.*
- Ninfali, P. and Angelino, D. (*2013*). "Nutritional and functional poten- tial of Beta vulgaris cicla and rubra," *Fitoterapia, Volume 89, Issue no. 1, 188–199,.*
- Parle, M., and Dev, C. (2012). Orange: Range of Benefits. *International research journal of pharmacy, Volume 3: Issue 7; 59-63.*
- Perez-Cacho, P. R., Rouseff, R. L. (2008). "Fresh squeezed orange juice odor: a review*". Crit Rev Food Sci Nutr, Volume 48: Issue 7; 681–95.*
- Peter, C., Wootton, B., Ryan, L. (2011). A beetroot juice shot is a significant and convenient source of bioaccessible antioxidants. *Journal of functional food, Volume 3; 329-334.*
- Peterson, J. J., Dwyer, J. T., Beecher, G. R., Seema, A. B., Gebhardt, S. E., Haytowitz, D. B., Holden, J. M., (2006). Flavanones in oranges, tangerines (mandarins), tangors, and tangelos: a compilation and review of the data from the analytical literature. *Journal of Food Composition and Analysis, Volume 19; S66-S73.*
- Prasad, S. S., Kumar, S., Patel, K., Dumater, C., Vajpeyee, S. K. and Bhavsar, V. H. (2012). To Investigate The Action Of Ginger-Juice Zingiber Officinale Roscoe (Zingiberaceae) On Blood Coagulation Process. *International Journal of Pharma Sciences and Research, Volume 3: Issue 7; 407-415.*

- Prasad, S. S., Kumar, S., Dumater, C., Vajpeyee, S. K. and Bhavsar, V. H. (2012). To Establish The Effect Of Ginger-Juice Zingiber Officinale (Zingiberaceae) On Important Parameters Of Lipid Profile. *International Journal of Pharma Sciences and Research, Volume 3: Issue 4; 352-356.*
- Profir, A. G., and Vizireanu, C. (2013). Evolution Of Antioxidant Capacity Of Blend Juice Made From Beetroot, Carrot And Celery During Refrigerated Storage. *AUDJG – Food Technology, Volume 37: Issue* 2; 93-99.
- Profir, A. and Vizireanu, C. (2013). Effect of the preservation processes on the storage stability of juice made from carrot, celery and beetroot. *Journal of Agroalimentary Processes and Technologies, Volume 19: Issue 1 ; 99-104.*
- Ranganna S. (1986). Handbook of analysis and quality control for fruit and vegetable products. 2nd edn, Tata McGraw-Hill Publ, New Delhi.
- Sharma, N., Tanwer, B. S. and Vijayvergia, R. (2011). "Study of medicinal plants in Aravali regions of Rajasthan for treatment of kidney stone and urinary tract troubles," International Journal of Pharm Tech Research, Volume 3, Issue no.1; 110–113.
- Sindumathi, G. and Premalatha. M. R. (2013). Development and Storage Studies of Naturally Flavored Papaya-Pineapple Blended Ready-to-Serve (RTS) Beverages. *International Journal of Science and Research, Volume 4: Issue 2; 856-860.*
- Singh, A., Garg, V. K., Sharma, P. K., and Gupta, S. (*2011*). "Wound healing activity of ethanolic extract of Beta vulgaris," *Pharma- cologyonline, Volume 1, 1031–1038.*
- Singh, B., and Singh Hatan, B. (2013). Optimization of osmotically dehydrated beetroot candy using response surface methodology. *International Journal of Food and Nutritional Sciences, Volume 2, Issue 1 ; 15-21.*
- United States Standards for Grades of Florida Oranges and Tangelos (USDA; February, 1997).
- USDA Nutrition facts [Includes USDA commodity food A099], per 100 g, USDA Nutrient Database for Standard (10 December 2014) Reference, version SR-21.
- Vali, L., tefanovits-Banyai, E., Szentmihalyi, K. (2007). "Liver protecting effects of table beet (Beta vulgaris var.rubra) during is chemia-reperfusion," *Nutrition, Volume 23, Issue no. 2; 172–178.*
- Valko, M., Leibfritz, D., Monocol, J., Cronin, M. T., Mazur, M., and Telser, J. (2007). Free radicals and antioxidants in normal physiological function and human disease. *International journal of biotechnology and cell biology, Volume 39; 44-48.*
- Wood, C. (1988). "Comparison of efficacy of ginger with various antimotion sickness drugs". *Clin Res Pr Drug Regul Aff* 6 (2): 129–36.