www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(3): 133-135

www.thepharmajournal.com
Received: 01-01-2020
Accepted: 03-02-2020

Kanchan SS
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Agarkar BS
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Sawate AR
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Corresponding Author:
Kanchan SS
Department of Food Engineering, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Studies on physico-chemical evaluation of fresh apple and orange juice

Kanchan SS, Agarkar BS and Sawate AR

Abstract
The present investigation was carried out to study the chemical composition of fresh apple and orange juice. The chemical analysis results obtained for apple and orange juice indicated that the total soluble solids is 11.50°Bx, pH 3.60, acidity is 0.46 percent, total sugars is 10.26 percent, ascorbic acid is 10.20mg/100ml. Whereas for orange juice the total soluble solids is 9.00°Bx, pH 3.80, acidity 0.42 percent, total sugars 8.38 percent and ascorbic acid 48.60mg/100ml.The ascorbic acid content of orange juice is 48.60 mg/100ml much higher than that of apple juice having 10.20 mg/100ml ascorbic acid. Finally, it can be concluded from the obtained results that fresh juices are rich in antioxidants like ascorbic acid that makes them potential source of various bioactive compounds which can be utilised for value addition in food commercialization.

Keywords: Apple, orange, chemical composition, ascorbic acid, antioxidant

Introduction
Apples and oranges are the most popular fruits available throughout the world. Both fruits are not only popular due to their taste profile but also for their various nutritional and medicinal properties. Various parts of these fruits are utilized for making delicacies as well as traditional medicines. The major medicinal properties of these fruits include antibacterial, antidiabetic, anticancer, anti-inflammatory, antihypertensive, cardio protective etc.

Apple is the second most consumed fruit in the world (Drogoudi and Pantelidis, 2011) [6] that contains many phenolic compounds beneficial to human health (Wolfe *et al.*, 2003) [17]. It is stated that because of their high antioxidant capacity, phenolics offer protection from cancer, cardiovascular conditions and some age-related diseases (Knekt *et al.*, 1997; Kris-Etherton *et al.*, 2002; Ju *et al.*, 2012) [9, 10]. Fruits and vegetables contain many antioxidant compounds including phenolic compounds, carotenoids, anthocyanins and tocopherols (Naczk and Shahidi, 2006) [13]. Apple is an important source of bioavailable polyphenols such as flavonols, monomeric and oligomeric flavonoids, dihydrochalcones, anthocyanidins, as well as others (Escarpa and Gonzalez, 1998) [7]. The most abundant polyphenols present in apples are chlorogenic acid, phloretin glycosides and quercetin glycosides (Wijngaard *et al.*, 2009) [16]. Other polyphenolic compounds such as catechins and procyanidins have also been identified but are present in relatively small amounts (Foo and Lu, 1999).

In general, apples have shown to protect against human chronic diseases because of their fibre content and phenolic compounds. These bioactive compounds have low availability and potentially reach to colon, modulate the balance of bacterial populations in the gut and influence the host physiology (Delzenne *et al.*, 2011; Moco *et al.*, 2012) [4]. The apple health benefits are, in part, because of the interaction of fibre and phenolics with gut microbiota that results in changes in phenolic bioavailability, activity and production of short chain fatty acids (SCFAs) after fibre fermentation. Dietary fibre in apples include mainly cellulose, hemicellulose, lignin and pectin (Yan and Kerr, 2012) [18]. Previous studies have stated that apple pectin can influence the intestinal microbiota partly because of its bacteriostatic effects.

Orange specially, the sweet orange (*Citrus sinensis* L.) is a evergreen tree that belongs to family Rutaceae. Sweet orange is the most commonly grown fruit in the world. It is an evergreen flowering tree generally growing to 9-10 m height. Orange trees are widely cultivated in tropical and sub-tropical climates for the delicious sweet fruit which is peeled or cut (to avoid the bitter rind) and eaten whole, or processed to extract orange juice, ready-to-serve (RTS) beverages, cordial, nectar etc.

In India orange has been cultivated in 2,85,000 ha area with an annual production of 20.84 lakh tonnes (Anonymous, 2010) [1]. Major Orange producing states are Maharashtra, Madhya

Pradesh, Rajasthan, Tamil Nadu, Assam and Tripura. In some parts of Madhya Pradesh, particularly in Mandsaur, Neemuch, Chhindwara, Betul, Ujjain and Shajapur districts, orange is grown on large scale. The area under orange in Madhya Pradesh is 38,300 ha and production is 6,77,800 MT with productivity of 17.7 MT/ha (Anonymous, 2010) [1].

Orange is quite popular as it has a greater variety of beverage. It is also used for industrial and medicinal purposes due to its attractive colour, distinctive flavour and being rich source of vitamin "C", vitamin "B", β-carotene, calcium and phosphorus. Orange juice turns bitter after extraction due to conversion of a chemical compound limonite-a-ring lactone (non-bitter) to limonin (bitter compound) during storage (Premi *et al*., 1994) and makes the processing of this fruit limited. Therefore, blending of two or more fruit juices with spices extract for preparation of nutritive RTS beverages is thought to be a convenient and economic alternative for utilization of these fruits. Among the new exotic citrus cultivars grown in India, orange is undoubtedly the most priced one.

Materials and Methods

The fresh apples and oranges were purchased from local village market, Parbhani. The proposed research was carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhani.

Proximate composition of fresh apple and orange juice

The apple and orange juices were analyzed for TSS, pH, total acidity, total sugars, reducing sugars and ascorbic acid according to their respective standard methods.

Total Soluble Solids

TSS was determined in ^{0}Brix using a refractometer and it indicates the percentage of water-soluble solids in fruit juice.

pH

The pH of the juices was measured using an electronic digital pH meter.

Titratable acidity

5mL of sample was taken and the final volume was made to 20ml and titrated against 0.1 Normal NaOH using phenolphthalein as indicator to a light pink color. It was expressed as per cent acidity.

$$\% \text{ Acidity} = \frac{\text{Titre x Normality of NaOH x } 0.090}{\text{Volume of sample}} \text{ x } 100$$

Total Sugars

Total sugars were determined by using Phenol Sulphuric Acid Method.

Reducing Sugars

Reducing sugars was estimated using Nelson Somogyi Method (1952).

Non Reducing Sugars

The value of non- reducing sugars was obtained by subtracting the reducing sugars from total sugars.

Ascorbic Acid

Estimation of Vitamin C was performed by Titrametric Method.

Result and Discussion

Physico-Chemical properties of fresh Apple and Orange

Apple juices are highly appreciated and consumed because of its flavour and nutritional properties. The physico-chemical properties of fruits are measured for a number of reasons including nutritional factors, economic importance, food quality after processing and storage stability considerations.

Table 1: Physico-chemical properties of apple fruit

Properties	Values
Fruit weight (g)	146.00
Peel (%)	29.60
Juice content (%)	58
TSS (^{0}Brix)	11.50
pH	3.60
Acidity (%)	0.46
Total sugars (%)	10.26
Reducing sugars (%)	9.96
Non reducing sugar (%)	0.30
Ascorbic acid (mg/100ml)	10.20

*Each value represents the average of three determinations

The data recorded are tabulated in Table 1. The physical properties of apple fruit revealed that the fruit weight, peel and juice was recorded to 146 g, peel (29.60%) and juice content (58%). The chemical properties of apple were found to contain, TSS (11.50^{0}Bx), pH (3.6), acidity (0.46%), total sugars (10.26%), reducing sugars (9.96%), non-reducing sugars (0.30%) and ascorbic acid (10.2mg/mL).

These values recorded in the present study are similar to the values reported earlier by Azoubel *et al.,* (2005). The data obtained are also in good accordance with the data reported by Kanwar and Keshani (2016) [8].

Physico-chemical properties of orange fruit (Kinnow)

Citrus fruits are the main source of important phytochemical nutrients and for long have been valued for their wholesome nutritious and antioxidant properties. It is scientifically proven that oranges being rich in vitamins and minerals have many health benefits. Moreover, it is now appreciated that other biologically active, non-nutrient compounds found in citrus fruits such as phytochemical antioxidants, soluble and insoluble dietary fibres are known to be helpful in reducing the risk for cancers, many chronic diseases like arthritis, obesity and coronary heart diseases.

Table 2: Physico-chemical properties of orange fruit

Properties	Values
Fruit weight (g)	158.00
Peel (%)	26.00
Juice content (%)	50.30
TSS (^{0}Bx)	9.00
pH	3.80
Acidity (%)	0.42
Total sugars (%)	8.38
Reducing sugars (%)	1.74
Non-reducing sugars (%)	6.64
Ascorbic acid (mg/100ml)	48.60

*Each value is the average of three determinations

The physical properties of orange were found average fruit weight (158g), peel (26%) and juice content (50.3%). The chemical properties of orange were found to contain TSS

(9^0Bx), pH (3.8), acidity (0.42%), total sugars (8.38%), reducing sugars (1.74%) and non-reducing sugars (6.64%). The highest amount of ascorbic acid content was found in orange (48.6%). This indicates the vitamin C content of fruit rich than other fruits.

These values recorded in the present study are similar to the values reported earlier by Diwan *et al.,* (2014) [5]. The data obtained are also in good accordance with the data reported by Rai *et al.,* (2005) [14] and Saifur Rehman *et al.,* (1983) [15].

Conclusion

It can be concluded that through the chemical analysis it was found that fruit juices are nutrient rich beverages. Generally, thermal pasteurization is applied to fruit juices in order to preserve them and provide safe food to the consumer. In order to produce safe fruit juice that is pathogen free, having high quality, meets consumer expectations, and minimizes commercial losses, thermal pasteurization must be effective. To achieve this, the physicochemical properties of fruit juices such as pH, acidity, TSS etc. needs to be taken into consideration. Hence, this physico chemical evaluation helped in determining the various elements which are responsible for food safety and stability. Also it helped in estimating some nutrients like Vitamin C or ascorbic acid which is a powerful antioxidant that helps in prevention and cure of some diseases.

References

1. Anonymous. National Horticulture Board, Database, 2010.
2. AOAC. Official Methods of Analysis. Association of Official Analytical Chemists International. In: Horwitz W. (Ed.), 18th Ed. AOAC Press, Arlington, VA, USA, 2005.
3. Augspole I, Rackejeva T, Kruma Z, Dimins F. Shredded carrots quality providing by treatment with Hydrogen peroxide. 9th Baltic Conference on "Food for Consumer Well-Being" FOODBALT, 2014, 150-154
4. Delzenne NM, Neyrinck AM, Cani PD. Modulation of the gut microbiota by nutrients with prebiotic properties: Consequences for host health in the context of obesity and metabolic syndrome. Microbial Cell Factories. 2011; 10:1475-2859.
5. Diwan K, Naik DM, Meena Rameshwar, Vadak Yogesh, Patel Bhavesh. Survey for superior types of sweet orange (*Citrus sinensis* Osbeck) in Nanded and Parbhani district of Marathwada region. Asian Journal of Horticulture. 2014; 9(1):257-261.
6. Drogoudi P, Pantelidis G. Effects of position on canopy and harvest time on fruit physico-chemical and antioxidant properties in different cultivars. Scientia Horticulture. 2011; 129:752-760.
7. Escarpa A, Gonzalez M. High-performance liquid chromatography with diode-array detection for the determination of phenolic compounds in peel and pulp from different apple varieties. Journal of Chromatography A. 1998; 823(1-2):331-337.
8. Kanwar SS, Keshani. Fermentation of apple juice with a selected yeast strain isolated from the fermented foods of himalayan regions and its organoleptic properties. Department of Microbiology, CSK Himachal Pradesh Agricultural University, Palampur, India, 2016.
9. Knekt P, Helibvaara M, Ja Yvinen R, Sepp Snen R, Teppo L, Pukkala E *et al*. Dietary flavonoids and the risk of lung cancer and other malignant neoplasm. American Journal of Epidemiology. 1997; 146:223-230.
10. Kris-Etherton PM, Hecker KD, Bonanome A, Coval SM, Binkoski AE, Hilpert KF *et al*. Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer. American Journal of Epidemiology. 2002; 113:71-88.
11. Mattick LR, Moyer JC. Composition of apple juice. Journal-Association of Official Analytical Chemists. 1983; 66:1251-1255.
12. McCann MJ, Gill CIR, Brien O, Rao G, McRoberts JR, Hughes WC *et al*. Anti-cancer properties of phenolics from apple waste on colon carcinogenesis *in vitro*. Food Chemistry Toxicology. 2007; 45(7):1224-1230.
13. Naczk M, Shahidi F. Phenolics in cereals, fruits and vegetables: Occurrence, extraction and analysis. Journal pharmaceuticals and Biomedical Analysis. 2006; 41(5):1523-1542.
14. Rai P, Majumdar GC, Dasgupta S, DES. Understanding ultrafiltration performance with Mosambi Juice in an unstirred batch cell. Journal of Food Process Engineering. 2005; 28:166-180.
15. Saifur Rehman, Abdul Ahad, Iqtidar Ahmad, Abdul Ghaffoor. Qualitative aspects of various cultivars of sweet oranges. Pakistan Journal of Agricultural Research, 1983, 4(1).
16. Wijngaard HH, Rcossle C, Brunton N. A survey of Irish fruit and vegetable waste and by-products as a source of polyphenolic antioxidants. Food Chemistry. 2009; 116(1):202-207.
17. Wolfe K, Wu XZ, Liu RH. Antioxidant activity of apple peels. Journal of Agricultural Food Chemistry. 2003; 51:609-614.
18. Yan H, Kerr WL. Total phenolics content, anthocyanins, and dietary fiber content of apple pomace powders produced by vacuum-belt drying. Journal of the Science of Food and Agriculture, 2012, 19(10).