Studies on Phytochemical and Antioxidant Activity of Wild Apricot (*Prunus armeniaca* L.) and Pomegranate (*Punica granatum*)

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Abstract

Wild Apricot (*Prunus armeniaca* L.) is one of the important wild plant found in higher ranges of western Himalayan region. The fruit is a rich source of antioxidants especially flavonoids and carotenoids and still remains underutilized with low economic value. Pomegranate (*Punica granatum*) belongs to the Punicaceae family but is also one of the commercially important fruit which is extensively cultivated in many tropical and subtropical regions such as Iran. Pomegranate is also a rich source of anthocynins, vitamin C and antioxidant. In the present studies the fruits of wild apricot and pomegranate grown in Himachal Pradesh have been studied for their physicochemical and nutraceutical values. The physico-chemical properties studied such as weight, colour, pulp yield, total soluble solids, titratable acidity, pH, total sugar, reducing sugar, total phenols, ascorbic acid and carotenoids. The total phenols content was higher (240±12 mg l^{-1}) in pomegranate and lower (132±8 mg l^{-1}) in case of wild apricot. However, the ascorbic acid content was recorded higher (37±3 mg 100 g^{-1}) in pomegranate fruits then in case of wild apricot (24±2 mg 100 g^{-1}). The qualitative estimation of phytochemicals showed that alkaloid, flavonoid, terpenoid are present in both the fruits where as saponin, phlobatannin and cardiac glycosides were absent and tannin was present in pomegranate fruit only. Furthermore, the DPPH antioxidant activity of pomegranate was found 75% where as in case of wild apricot it was 68%. The FRAP antioxidant power of pomegranate 976 µmol Fe (II) g^{-1} whereas in wild apricot 308 µmol Fe (II) g^{-1}. Furthermore, the ABTS activity in case of pomegranate was 79% whereas in case of wild apricot was 73%. Higher the antioxidant value more will be the health benefits. Hence, from the present studies it can be concluded that the fruits grown in Himachal Pradesh have potential to be a good source of various nutraceutical compounds.

Keywords: ABTS, antioxidant, carotenoids, DPPH, FRAP, phenols, pomegranate, wild apricot

1. Introduction

Wild Apricot (*Prunus armeniaca* L.) is classified under the *Prunus* species of the *Rosaceae* family of the Rosales group. The fruit is similar to cultivated apricot but is usually found wild and known with name Zerdali (wild apricot) (Ozbek, 1978). It is one of the most popular fruit among the temperate fruit species. The world production of the wild apricot is not known yet. It is thought that apricot is a rich food in terms of antioxidants because it contains the flavonoids and carotenoids (Parlakpinar et al., 2009). However, wild apricot is rich source of potassium and β-carotene. Pomegranate (*Punica granatum*) belongs to the *Punicacea* family and is one of the commercially important fruit which is extensively cultivated in many tropical and subtropical regions (Tehranifar and Mahmoodi-Tabar, 2009) such as Iran. The fruit is also a rich source of anthocynins, vitamin C and antioxidant. The antioxidant capacity of pomegranate juice is greater than other fruit juices and beverages (Seeram et al., 2008). This antioxidant activity has been attributed to the high level of phenolic compounds (Gil et al., 2000). Further, the fruit is also known to contain considerable amount of phenolic compounds, including anthocynins (3-glucosides and 3, 5 diglucosides of delphinidin, cyanidin and pelargonidin), ellagic acid, punicalin, punicalagin, pedunculagin and different flavanoids (Gonzalez et al., 2009). The consumption of pomegranate has been associated with beneficial health effects, such as prevention of oxidation of both low and high density lipoprotein, blood pressure, inflammatory, atherosclerosis, prostate cancer, heart disease, and HIV-1 (Aviram et al., 2004; Malik et al., 2005; Neurath et al., 2005; Rosenblat et al., 2006).

2. Materials and Methods

The pomegranate (*Punica granatum*) was procured from local market of Solan (Himachal Pradesh). However, the wild apricot (*Prunus armeniaca L*) was collected in the month of

June from Janjehali, area of District Mandi and Jubal area of District Shimla Himachal Pradesh, India.

2.1. Physicochemical characteristics of fruits

Physical parameters were evaluated taking fruits of both wild apricot and pomegranate fruits randomly. The weight was taken by using weighing balance in g. Colour was analysed by visual evaluation and comparison. Diameter and length was taken by using Vernier callipers in cm. The pulp yield is measured by percentage of pulp obtained from fruits. Further, the fruits of pomegranate and wild apricot were analysed for various chemical characteristics viz. TSS (°B), titratable acidity, reducing sugar, total sugar, pH total phenols, ascorbic acid, carotenoids, antioxidant activity by DPPH, FRAP and ABTS methods. The total soluble solids were measured using Erma Hand refractometer (0 to 32 °B). Titratable acidity as % citric acid was estimated by titrating a known volume or aliquot of sample against N/10 NaOH solution (AOAC, 1980). The pH was measured with Delux pH meter. The total and reducing sugars were estimated by Lane and Eynon's volumetric method (AOAC, 1980). The ascorbic acid content was determined by titration as per the method described by (Thimmaiah, 1999). The total phenol content was determined by the Folin-Ciocalteau procedure given by Singleton and Rossi (1965) taking the absorbance at 765 nm in colorimeter against a blank. A standard calibration curve of tannic acid using its different concentration will be prepared from which the tannin contents was estimated. The *β*-carotene was determined according to the method of (Nagata and Yamashita, 1992).

2.1.1. Phytochemical analysis

The phytochemical constituents of pomegranate and wild apricot were analysed qualitatively. Reducing sugars, flavonoids, tannins, phlobatannin, alkaloids, saponnin, cardiac glycosides and terpenoids were analyzed as per the methods given by Harborne, 1973.

2.1.1.1. Antioxidant analysis

DPPH assay

The DPPH scavenging antioxidant activity was estimated as per the method of Brand-Williams et al., 1995.

FRAP assay

The FRAP (ferric reducing antioxidant power) was performed on a modified version of the method by Valavanidis et al., 2009.

ABTS assay

The ABTS activity estimated as per the method of Re et al., 1999.

3. Results and Discussion

3.1. Physical parameter of pomegranate and wild apricot.

The data in Table 1 reveals that pomegranate have an average weight of 250±25 (g), length 7±2 (cm), diameter 10±3 (cm) with red colour of fruit and the pulp yield. Further, the weight of wild apricot was 15±4 (g), length 1.8±0.5 (cm), diameter 2±0.7 (cm) with colour of fruit is light orange pulp 65±8% recovery.

Table 1: Physical characteristics of pomegranate and wild apricot.

Characteristics / Fruit	Weight (g)	Length (cm)	Diameter (cm)	Colour	Pulp Yield %
Pomegranate (Mean±SE)	250±25	7±2	10±3	Red	40±7
Wild Apricot (Mean±SE)	15±4	1.8±0.5	2±0.7	Light Orange	65±8

3.1.1. Chemical characteristics of pomegranate and wild apricot.

The chemical characteristics of pomegranate showed (Table 2) that the total soluble solids and titratable acidity was 14±2 °B and 2±0.3% (as citric acid) in the pomegranate. Perusal of the data further revealed that the pH (3±0.64), total sugar (11±0.39 %) and reducing sugar content of the pomegranate was 8±0.86%. The total phenols content in pumpkin was 240±12 mg per 100 ml and ascorbic acid was 37±3 mg per 100 g with the carotenoids content 0.063±0.02 mg per 100 ml.

Table 2: Chemical characteristics of pomegranate and wild apricot.

Characteristics	Pomegranate (Mean ± S.E.)	Wild Apricot (Mean ± S.E.)
TSS (°B)	14±2	12±2
Titratable Acidity (%)	2±0.3	2±0.4
pH	3±0.64	3±0.56
Total Sugar (%)	11±0.39	10±0.89
Reducing Sugar (%)	8±0.86	7±0.5
Total Phenols mg per 100 ml	240±12	132±8
Ascorbic Acid mg per 100 g	37±3	24±2
Carotenoids mg per 100 ml	0.063±0.02	0.108±0.08

The chemical characteristics of wild apricot shows that the total soluble solids and titratable acidity was 12±2 °B and 2±0.4% (as citric acid) in the wild apricot. Perusal of the data further revealed that the pH (3±0.56), total sugar (10±0.89%) and reducing sugar content of the wild apricot was (7±0.5%). The total phenols content was 132±8 mg per 100 ml with ascorbic acid and carotenoid content of 24±2 mg per 100 g 0.108±0.08 mg per 100 ml.

3.1.1.1. Phytochemical characteristics of pomegranate and wild apricot.

The qualitative estimation of phytochemicals of pomegranate

and wild apricot is depicted in Table 3. It is clearly seen that the Fehling, alkaloid, flavonoid, terpenoid are present in both the fruits where as Saponin, phlobatannin and cardiac glycosides are absent. Furthermore comma tannin was present in pomegranate fruit where as absent in wild apricot.

Table 3: Qualitative estimation of various phytochemicals of pomegranate and wild apricot.

Tests	Pomegranate	Wild Apricot
Fehling test	+	+
Alkaloid test	+	+
Flavonoid test	+	+
Saponin test	–	–
Tannin test	+	–
Phlobatannin test	–	–
Cardiac glycosides test	–	–
Terpenoid	+	+

+: Present; -: Absent

3.1.1.1.1. Antioxidant characteristics of pomegranate and wild apricot.

The antioxidant activity of pomegranate and wild apricot are shown in Table 4. The results clearly depict that pomegranate has higher (75%) DPPH antioxidant activity as compared to wild apricot (68%). further, the fruit had also higher FRAP antioxidant power and ABTS activity (976 micro mol Fe2g- and 79%) in comparison to wild apricot. Further, the results signifies better health benefits of pomegranate as compared to wild apricot. It concludes that higher the antioxidant value more will be the health benefits.

Table 4: Antioxidant activity of pomegranate and wild apricot

Antioxidant Tests	Pomegranate	Wild apricot
DPPH (%)	75	68
FRAP [µmol Fe(II) g^{-1} extract]	976	308
ABTS (%)	79	73

4. Conclusion

It can be concluded from the present studies that pomegranate is a rich source of phenols, ascorbic acid and carotenoids as compared to wild apricot. The qualitative estimation of phytochemicals showed that that the Fehling, alkaloid, flavonoid, terpenoid are present in both the fruits where as saponin, phlobatannin and cardiac glycosides are absent. Furthermore, tannin was present only pomegranate fruit but not in wild apricot. Whereas, pomegranate is rich in antioxidants as compare to wild apricot. Higher the antioxidant activity more will be the health benefits.

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