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Mineral composition of apricot varieties grown in North India

Volume 4 Issue 1 - 2017

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Received: November 23, 2016 | **Published:** March 08, 2017

Introduction

The major apricot producers are Turkey, Iran, Pakistan, Uzbekistan and Italy. In India apricots are grown commercially in the hills of Himachal Pradesh, Jammu and Kashmir, Utter Pradesh and to a limited extent in the north-eastern hills. Some apricots are being grown in dry temperate regions of Kinnaur and LahaulSpiti in Himachal Pradesh and Ladakh in Jammu and Kashmir. Apricot is the main horticultural crop of some hardy regions of North India. The people in these regions depend mainly on apricots for their living. Introduction of these apricot varieties to the world would enhance the economical value of these varieties and simultaneously enhance their production in other suitable regions. Although different apricot varieties have been investigated by many researchers in the world.[1–4] A research on the chemical compositions of Indian apricots (Halman, Rakhchekarpo, Khante, Shakanda, Nugget, Venatchaa, Shakarpara, Viva Gold, Rakauslik, Sterling, Cith-1, Cith-2, Newcastle, and Turkey) from the different parts of North India has not yet been investigated in detail. Considering that climatic conditions, soil properties and type of apricot cultivars carries great influences on their chemical composition, this research was aimed to determine mineral composition of apricot fruit.

Results and discussion

The apricot varieties were analyzed for nine minerals and the data has been presented in Table 1. A significant difference ($p \leq 0.05$) was seen in the mineral composition of the apricot varieties studied. In the apricot varieties, Zn, Ca, Cu, Fe, Mg, Na, Mn, P, and K were found in the range of 1.16-34.14, 43.48-614.60, 0-3.76, 0.83-33.80, 42.15-84.77, 19.65-70, 0-5.33, 29.67- 793.7, and 997-5117ppm, respectively. Mn, Cu, and Zn elements were present in micro amounts while as, K, Mg, Ca, P, and Fe levels were present in macro amounts in the varieties studied. However, Cu in Rakhchekarpo, Khantay, and Turkey and Mn in Halman, Khantay, and Shakanda were not detected and have been assigned zero values in the table. To the authors' knowledge, there are no comparable data in the literature so far that show the detailed mineral content of apricot varieties studied here. The apricot varieties, namely Hacihaliloglu, Hasanbey, Soganci, Kabaasi, Cataloglu, Cologlu, Hacikiz, Tokaloglu, Alyanak, Igdir, and Bursa,[3] Alman, Habi, Khakhas, Mirmalik, Neeli, and Shai,[5] and Zerdali, Cataloglu, Hacihaliloglu, Hasanbey, Soganci, and Kabaasi[6] have been analysed for their mineral contents and are comparable to the results of the present study.

Table 1: Mineral analysis (ppm) of some apricot varieties grown in North Indian hills (n=3)

Varieties	Zn	Ca	Cu	Fe	Mg	Na	Mn	P	K
Halman	6.58±0.52c	361.67±7.63h	0.21±0.03ab	8.30±0.31c	64.96±3.00de	27.73±2.06bc	12:00 AM	700±30.00f	5117±76m
Rakhchekarpo	1.42±0.51a	72.05±2.61b	12:00 AM	21.56±1.25 h	45.63±3.19ab	25.68±3.05b	0.45±0.05ab	100±10.00c	4227±64k
Khante	0.72±0.25a	128.20±7.59d	12:00 AM	0.83±0.12a	42.15±2.57a	19.65±2.51a	12:00 AM	27.33±2.51a	3923±107i
Shakanda	1.16±0.29a	284.20±5.18g	2.69±0.05e	17.28±1.10fg	60.64±3.20d	25.17±2.02b	12:00 AM	100±10.00c	2917±104f
Nugget	25.92±1.00f	196.45±7.71e	2.89±0.13e	18.46±0.90g	52.23±4.67bc	66.18±3.54e	5.49±0.96f	64.46±5.09b	4837±100l
Venatchaa	3.40±0.52b	250.00±10.00f	0.96±0.15c	13.83±0.76e	49.36±2.51bc	67.77±2.54e	1.47±0.40d	22.41±2.50a	3430±79g
Shakarpara	4.55±0.50b	105.31±5.02c	0.98±0.13c	16.10±0.85f	52.51±2.50bc	68.27±2.84e	2.83±0.21e	84.09±5.24bc	4067±76ij
Viva Gold	14.74±1.09d	43.48±4.83a	3.25±0.25f	33.80±2.03i	53.19±3.54c	67.79±2.55e	5.33±0.76f	194.9±10.00d	1717±76b
Rakauslik	3.48±0.50b	132.27±5.00d	1.49±0.24d	10.99±1.00d	49.86±2.58bc	69.02±2.66e	1.53±0.50d	64.69±5.03b	4207±40jk
Sterling	3.56±0.51b	289.33±11.01g	3.76±0.25g	12.57±1.51de	52.01±3.00bc	70±3.00e	2.08±0.28d	793.7±25.10g	1937±70c
Cith-1	6.38±0.53c	463.67±14.84i	0.43±0.08ab	9.03±0.50c	70.00±5.00e	31±2.00c	0.30±0.03a	29.67±2.52a	2250±122d
Cith-2	18.7±1.06e	614.60±22.07j	0.35±0.39ab	10.86±0.72d	80.95±6.00f	42.34±2.08d	1.03±0.06bc	30.33±2.52a	2530±98e
Newcastle	34.14±1.62g	642.67±16.16k	1.00±0.20c	11.18±0.76d	84.77±5.02f	65.35±4.51e	1.32±0.17c	320±20.00e	997±25a
Turkey	18.88±1.02e	620.73±8.92j	12:00 AM	3.02±0.22b	83.29±4.03f	42.04±2.00d	1.6±0.10cd	39.67±2.52a	3727±102h

Each value is the mean±standard deviation of three determinations.
Means with different letters in thecolumn for each apricot variety are significantly ($p \leq 0.05$) different.

The highest level of zinc was seen in Newcastle (34.14±1.62ppm) and the lowest concentration was seen in Khante (0.72±0.25ppm). Newcastle (642.67±16.16) showed the highest concentrations of calcium, whereas, Viva Gold (43.48±4.83ppm) showed the lowest concentration. Sterling (3.76±0.25ppm) showed the highest concentrations of copper that are well below the recommended daily intake levels recommended by most authorities. However, Halman (0.21±0.03ppm) showed the minimum detectable level of copper. Viva Gold (33.80±2.03ppm) showed the highest concentration of iron and Khante (0.83±0.12ppm) showed the lowest concentration. All the varieties studied here are good sources of magnesium, with Newcastle (84.77±5.02ppm) showing the highest and Khante (42.15±2.57ppm) showing the lowest concentrations. The varieties studied here are generally rich in sodium with Rakauslik (69.02±2.66ppm) showing the highest concentration and Khante (19.65±2.51ppm) showing the lowest concentration. The highest concentration of Manganese was found in Nugget (5.49±0.96ppm) and the lowest detectable concentration was found in Cith-1 (0.30±0.03ppm). The apricot varieties were generally found to be very rich in Phosphorus with Sterling (793.7±25.10ppm) showing the highest concentration and Venatchaa (22.41±2.50ppm) showing the lowest concentration. Potassium, which is required in higher amounts, was seen to be the highest in Halman (5117±76ppm) and the lowest in Newcastle (997±25ppm). The reasons behind the varietal difference in the mineral composition of the apricot varieties may be due to the genetic and geographical reasons.

An adult man requires 800-1200mg/d Ca, 700-800mg/d P, 300-400mg/d Mg, 500mg/d Na, 10-15mg/d Fe, and 12-15mg/d Zn.[7–9] Potassium (K) is a major mineral, required by humans at level higher than 100mg/d.[10] However, Copper (Cu) is a toxic mineral, and the daily intake for a normal adult is between 1-3mg, roughly corresponding to the intake levels recommended by most authorities.[11,12] Ca, Zn and Mg are required as cofactors in enzymatic processes that represent an integral part of the structure of DNA self-repair system. Ca is required for chromosome segregation, Zn is required for DNA synthesis and repair and Mg is required for DNA synthesis and chromosome segregation.[13] Iron (Fe), a physiologically essential trace element, functions in the haemoglobin in red blood cells, which transports oxygen from the lungs to the body's tissues, including the muscles and the brain.[14]

Acknowledgements

The research was financially supported by the Department of Biotechnology, Govt. of India.

Conflict of interest

The author declares no conflict of interest.

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