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NUTRITIONAL QUALITY EVALUATION OF DIFFERENT GUAVA VARIETIES

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A study was conducted to evaluate different guava varieties for their nutritional quality characteristics at Biochemistry Section, Ayub Agricultural Research Institute, Faisalabad during the years 2002, 2003 and 2004. Ripened fruits of seven foreign origin varieties (Sufaida, Surahi, Surkha, Waikea, Beamount, Ruby x Supreme, Hong Kong) and one local guava variety Gola were collected from the fruit garden of Horticultural Research Institute, Faisalabad and analysed for total soluble solids (TSS), acidity, dry matter, protein, mineral matter, vitamin-C and total sugars. It was concluded that maximum vitamin C (220.4 mg/100g) and total sugars (6.36%) were found in variety Hong Kong, TSS (11.87%) and dry matter (14.93%) in Sufaida, Acidity (1.67%) and protein (1.85%) in Gola variety and ash content (0.85%) in Rubi x Supreme.
Keywords: *Psidium guajava*, cultivars, nutritive value, Pakistan

INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most important tropical and subtropical fruit because it has a high nutritive value and can be grown under different soil and climatic conditions. It bears fruit twice in a year but the best quality fruit is obtained in winter (Bal and Dhaliwal, 2004). In Punjab guava ranks third in area after citrus and mango and occupies 49.4 thousand hectare with annual production of 446.0 thousand tonnes (Anonymous, 2006). The Punjab is contributing about 80.7 percent to the total production. In addition to other nutrients, it is a richer source of vitamin C than ber, citrus and apple. It has a great demand as a table fruit and also in processing industries (Archana and Siddiqui, 2004). Guava is hundred percent edible fruit and is considered as "apple of the poor" due to its low cost, easy availability and high nutritive value. It plays an important role in reducing nutritive disorders due to deficiency of vitamin C in human health. Many researchers have studied the nutritional quality of guava fruit under various modified atmospheric conditions. Archana and Siddiqui (2004) found that acetic acid ranged from 55.40 to 122.13 µ mol kg^{-1}, total sugars from 7.93 to 8.90%, reducing sugars 5.04 to 5.49%. Singh and Dhaliwal (2004) reported that TSS ranged from 9.18 to 11.14%, acidity 0.28 to 0.35% and ascorbic acid from 122.50 to 206.00 mg 100 g^{-1}. Bal and Dhaliwal (2004) observed that TSS varied from 9.60 to 11.00%, acidity 0.26 to 0.38% and vitamin C 167 to 210 mg 100 g^{-1}. Aulakh (2004) found that TSS ranged from 10.0 to 13.5%, acidity 0.26 to 0.39%, vitamin C 210 to 266 mg 100 g^{-1} and total sugars 4.16 to 5.12% in winter season guava fruit.

In Pakistan, many local and foreign origin guava varieties are available in the market but information regarding their nutritive value/quality is lacking. Keeping this in view, the present study was planned to evaluate different promising high yielding guava varieties for assessing their quality.

MATERIALS AND METHODS

These studies were conducted at Biochemistry Section, Ayub Agricultural Research Institute, Faisalabad during 2002-2004. Fruits of eight guava varieties viz; Sufaida, Surahi, Surkha, Waikea, Beamount, Ruby × Supreme & Hong Kong and local variety Gola were randomly collected during the years 2002, 2003 and 2004 from healthy trees at fruit garden, Ayub Agricultural Research Institute, Faisalabad. Guava fruits at green mature stage were cured in the laboratory by wrapping fruits in newspaper with calcium carbide @ 2g kg^{-1} of fruit and stored in a cardboard box at room temperature. Fruits were checked after 4-5 days intervals for ripening assessment. Ripened fruits were used for chemical analysis. Three samples were taken at random from each guava variety every year and were analysed for total soluble solids (TSS), acidity, ascorbic acid (vitamin C), total sugars, dry mater, crude protein and mineral matter. Total soluble solids were determined by hand refractometer (0-32° Brix). Acidity was determined by alkali titration method and results were expressed in terms of citric acid/100g of fresh sample. Crude protein and total sugars were estimated by standard AOAC methods (AOAC, 1970). To estimate ascorbic acid fruit samples were blended with pestle and mortar in 0.4% oxalic acid and then titrated against 2, 6 dichlorophenol indophenol dye till colour change. The data were analysed using analysis of variance technique of completely randomized design with Duncan's multiple range test using computer software MSTAT-C.

RESULTS AND DISCUSSION

The results were discussed on the basis of average of three years data (Table 4).

Table 1. Physico-chemical characteristics of different guava varieties (2002)

Varieties	Composition						
	T.S.S. (%)	Acidity (%)	Dry matter (%)	Protein (%)	Mineral Matter (%)	Vitamin C (mg 100g^{-1})	Total Sugars (%)
Sufaida	11.00 a	0.48 f	15.5 a	1.19 b	0.69 c	156.4 e	6.1 a
Surahi	8.00 d	0.30 g	11.1 e	1.12 bc	0.50 e	125.0 f	6.0 a
Surkha	7.22 e	0.83 e	4.36 g	1.06 c	0.32 g	214.1 a	5.14 c
Waikea	9.00 b	1.41 b	13.8 c	0.81 e	0.71 b	189.5 c	4.6 e
Beamount	9.00 b	1.25 c	12.2 d	0.74 f	0.67 d	166.5 d	4.9 d
Ruby x Supreme	8.50 c	1.38 b	14.2 b	0.98 d	0.81 a	164.5 b	3.95 g
Hong Kong	9.18 b	0.91 b	12.1 d	1.12 bc	0.45 f	204.6 b	5.36 d
Gola	8.10 d	1.93 a	9.6 f	1.78 a	0.50 e	152.5 e	4.30 f

In a column, figures sharing similar letter(s) are not statistically different at P = 5%

Table 2. Physico-chemical characteristics of different guava varieties (2003)

Varieties	Composition						
	T.S.S. (%)	Acidity (%)	Dry matter (%)	Protein (%)	Mineral Matter (%)	Vitamin C (mg 100g^{-1})	Total Sugars (%)
Sufaida	12.40 b	0.66 e	14.73 a	1.28 b	0.73 b	181.03 bc	6.36 bc
Surahi	8.50 d	0.61 e	12.68 c	1.22 bc	0.53 c	139.93 e	6.22 cd
Surkha	7.55 e	0.95 d	7.32 e	1.02 d	0.36 d	188.23 b	6.64 ab
Waikea	8.60 d	1.43 b	13.00 c	0.91 e	0.81 ab	182.35 bc	6.10 cd
Beamount	10.20 c	1.12 c	13.79 b	0.82 f	0.75 b	152.94 d	5.75 e
Ruby x Supreme	12.90 a	1.40 b	14.97 a	1.04 d	0.86 a	172.41 c	4.05 f
Hong Kong	10.10 c	1.01 d	13.92 b	1.19 c	0.52 c	232.75 a	6.80 a
Gola	8.90 d	1.81 a	10.34 d	1.86 a	0.56 c	172.41 c	6.00 de

In a column, figures sharing similar letter(s) are not statistically different at P = 5%

Table 3. Physico-chemical characteristics of different guava varieties (2004)

Varieties	Composition						
	T.S.S. (%)	Acidity (%)	Dry matter (%)	Protein (%)	Mineral Matter (%)	Vitamin-C (mg 100g^{-1})	Total Sugars (%)
Sufaida	12.20 b	0.70 f	14.51 b	1.37 b	0.74 b	183.46 c	6.63 c
Surahi	8.20 g	0.66 f	12.85 f	1.20 c	0.58 c	146.67 e	6.52 d
Surkha	8.15 g	0.99 c	10.11 h	1.00 e	0.39 d	208.41 b	6.70 b
Waikea	8.50 f	1.41 b	13.06 e	0.86 f	0.80 b	203.61 b	6.25 e
Beamount	10.15 c	1.22 c	13.23 d	0.75 g	0.77 b	162.75 d	6.03 g
Ruby x Supreme	13.00 a	1.40 b	14.93 a	1.09 d	0.88 a	178.13 c	4.50 h
Hong Kong	10.00 d	1.07 d	14.10 c	1.15 cd	0.54 c	223.86 a	6.93 a
Gola	9.10 e	1.86 a	11.15 g	1.91 a	0.60 c	170.32 d	6.16 f

In a column, figures sharing similar letter(s) are not statistically different at P = 5%

Total soluble solids (TSS)

TSS ranged between 7.64 to 11.87 percent. Maximum TSS was found in variety Sufaida followed by Ruby x Supreme. TSS of the guava varieties under test were found lower than the Indian guava varieties studied by Aulakh (2004). This variation might be due to difference in soil and climatic conditions.

Acidity

Acidity varied from 0.52 to 1.67%. Gola variety showed maximum acidity (1.67%). The acidity (0.61%) determined in Sufaida has been reported by Kumar *et*

Table 4. Physico-chemical characteristics of different guava varieties (Average of 3 years)

Varieties	Composition						
	T.S.S. (%)	Acidity (%)	Dry matter (%)	Protein (%)	Mineral Matter (%)	Vitamin C (mg $100g^{-1}$)	Total Sugars (%)
Sufaida	11.87 a	0.61 f	14.93 a	1.28 b	0.72 c	173.6 d	6.36 a
Surahi	8.23 e	0.52 g	12.21 e	1.18 c	0.53 de	136.5 f	6.24 ab
Surkha	7.64 f	0.92 e	7.27 g	1.02 d	0.35 f	203.6 b	6.15 b
Waikea	8.70 d	1.41 b	13.28 c	0.85 e	0.77 b	191.8 c	5.64 c
Beamount	9.78 c	1.22 c	13.07 d	0.76 f	0.72 c	160.7 e	5.55 cd
Ruby x Supreme	11.47 b	1.40 b	14.68 b	1.04 d	0.85 a	171.7 d	4.33 e
Hong Kong	9.77 c	0.99 d	13.36 c	1.15 c	0.50 e	220.4 a	6.36 a
Gola	8.70 d	1.67 a	10.36 f	1.85 a	0.55 d	165.1 e	5.45 d

In a column, figures sharing similar letter(s) are not statistically different at P = 5%

al. (2003) in variety Sardar. Many Indian researchers reported less acidity compared to the varieties under test. Surahi showed minimum acidity (0.52%) which is similar to the variety Lukhnow-49 (Hedge and Chharia, 2004).

Ascorbic acid

Ascorbic acid (vitamin C) content ranged from 136.5 to 220.4 mg $100g^{-1}$. Hong Kong contained the highest vitamin C (220.4 mg $100g^{-1}$). It is similar to the vitamin C contents of the varieties Sardar and Allahabad reported by Bal and Dhaliwal (2004).

Total sugars

Total sugars ranged from 4.33 to 6.36%. Sufaida and Hong Kong showed significantly higher total sugars content than all other varieties under test. These results did not agree to the findings of other scientist (Aulakh, 2004), where higher total sugars content were noted in variety L-49. Guava variety Ruby x Supreme contained the lowest (4.33%) total sugars content.

Protein

Protein content of the guava varieties ranged from 0.76 to 1.85%. Maximum protein content (1.85%) was found in Gola variety followed by Sufaida (1.28%), while minimum (0.76%) in Beamount.

Mineral matter

All the guava varieties under test gave less than 1% mineral matter content which ranged from 0.35 to 0.85% being maximum (0.85%) with variety Ruby x Supreme. Minimum mineral matter (0.35%) was found in variety Surkha.

Dry matter

Dry matter content of all the guava varieties varied from 7.27 to 14.93%. Maximum dry matter (14.93%) was present in Sufaida followed by Ruby x Supreme (14.68%). Minimum dry matter (7.27%) was found in Surkha.

CONCLUSION

On the basis of chemical analysis, Hong Kong was found the richest source of vitamin C content than all other varieties. Guava variety Sufaida was found nutritionally better due to high TSS, dry matter and total sugars contents. However, local guava variety gave the highest protein and acidity.

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