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Studies the physico-chemical characteristics of guava (*Psidium guajava*) fruits in Chittorgarh district of Rajasthan

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Abstract

The nutritional survey was conducted on guava fruit orchards at different locations in Chittorgarh district of Rajasthan. Variation in different characteristics of fruits was observed. The fruit weight is varied from 167.51 to 185.64g. The pooled average polar fruit diameter and equatorial fruit diameter varied from 5.58 to 6.01 cm and 6.03 to 6.51 cm, respectively. The seed weight varied from 3.53 to 5.11g, pulp to stone ratio from 87.83 to 115.67g, fruit yield per tree from 50.73 to 69.83 kg plant^{-1} were recorded. The total soluble solids content varied from 10.76 to 11.78° Brix, total acidity from 1.85 to 1.93 per cent, ascorbic acid content from 411.65 to 581.50 mg/100g pulp, total sugar from 1.71 to 2.10 per cent, reducing sugar from 4.97 to 6.28 per cent and TSS/acidity ratio from5.58 to 6.35 recorded.

Key words: *Guava, physico-chemical characteristics, nutrition, yield.*

Introduction

Guava (*Psidium guajava* L.), belongs to the family Myrtaceae. It is native of tropical America and is widely grown in tropical and sub-tropical parts of India. Guava is a very common fruit, popular among rich and poor alike due to its moderate price, nourishing value and good taste. The fruit is rich in vitamin 'C' which ranges from 75-260 mg per 100 g pulp and pectin which ranges from 0.5 to 1.8 per cent and a good source of thiamine and riboflavin which range from 0.03 to 0.07 mg per 100g and 0.02 to 0.04 mg per 100 g pulp, respectively. Guava being hardy and with ability to grow under arid and semi-arid condition is becoming most potential fruit crop of Rajasthan. At present in Rajasthan, it is third most important fruit crop, The major guava growing districts in Rajasthan are Udaipur, Bundi, Kota, Chittorgarh, Ajmer, Swaimadhopur and Bhilwara.

Materials and Method

Studies were conducted on healthy and vigorously growing trees of guava at farmer's fields during 2009-10 to 2010-11. The uniform age five orchards were selected for investigation. The fruits were harvested during October to January. The details of fruit orchards taken in the present study are given as under.

Table 1: Location of guava fruit orchards

Name of fruit grower	Location
Sh. Ramlal Salvi	Surjana I
Sh.Bheru Lal Salvi	Surjana II
Sh.Parmanand Teli	Aonwalheda
Sh. Harshvardhan Singh	Ochadi
Sh.Madan Lal Baldi	Laljee kakheda

Ten trees were selected for assessing the physico-chemical characteristics of fruits from each orchard. From each tree ten fresh fruits were randomly plucked from all four directions. Observations were recorded for fruit weight, polar diameter, equatorial diameter, seed weight, pulp to seed ratio, yield, TSS, TSS : acidity ratio, ascorbic acid, total sugar and reducing sugar. Fruit diameter polar and equatorial was taken with the help of vernier caliper and expressed in centimeter. From each tree, 10 ripe fruits were selected randomly and their weight was measured separately and means weight was recorded. From ten randomly selected fruits skin was peeled out with the help of peeling knife and weighed on electronic balance and weight was recorded in gram. Then seeds were extracted from fruits and weighed on electronic balance and recorded and then pulp weight was measured by the subtracting peeled fruit weight from seed weight and average was recorded. The ratio was obtained by dividing the weight of pulp with weight of seed of randomly selected fruits and average was worked out. The TSS content was directly measured on "Zeiss" Hand refrectometer (0-32°) on percentage basis at 20 °C room temperature. Total acidity was determined by diluting the known volume of juice and titrating the same against N/10 sodium hydroxide solution using phenolphthalein as an indicator. It was expressed on percentage basis (A.O.A.C., 1990). TSS/Acidity ratio was estimated by dividing the total soluble solids to total acidity. The ascorbic acid (Vitamin C) content of juice was determined by diluting the known volume of juice with 3 per cent Metaphosphoric acid and titrating it against 2,6-dichlorophenol-indophenol dye solution (A.O.A.C.,1970) until a faint pink colour was obtained. The results are expressed as vitamin C in mg/100 g pulp. Total sugar content was determined using anthrone reagent method (Dubois *et al.*, 1951). Reducing sugar content was measured by following 'Nelson's modification' of 'Somogyis method' (Somogyis, 1952) using arsenomolybdate colour forming reagent and two copper reagent 'A' and 'B'.

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Results and Discussion

The data on physico-chemical characteristics of guava fruit are presented in table. 2 to 5. A significant variation in respect to physical characteristics and yield was noticed in different orchard location. The maximum polar and equatorial fruit diameter (pooled) i.e. 6.01 and 6.51 cm, respectively were recorded on orchard at Ochadi location as compared to minimum (5.58 cm and 6.03 cm) in orchard at Aonwalheda I location. The maximum fruit weight and pulp weight i.e. 185.64 g and 115.67 g were observed in orchard at Ochadi location and minimum i.e. 167.51 and 87.83 g were recorded orchard at Aonwalheda I location. The maximum seed weight and seed index i.e. 5.11 g and 1.101 respectively were observed at Ochadi location while minimum i.e. 3.53 g and 1.079, respectively were recorded in Aonwalheda I village. The maximum pulp stone ratio (25.68) was recorded at Surjana I location followed by Aonwalheda I and Surjana II location. The minimum (22.64) was recorded in Ochadi location. The maximum fruit yield (69.83 kg plant^{-1}) was observed at ochadi location followed by laljee ka kheda and Aonwalheda I, while lowest yield (50.73 kg plant^{-1}) was recorded at Surjana I location. Ecological specific variation with regard to physical parameter and yield were also observed by Bhatnagar and Chandra (2003), Rohitash (2007) and Singh and Chandra (2010). Application of proper nutrition and adoption of appropriate management practice might have created the difference in physical characteristics and yield of guava plants.

The chemical parameters like TSS, total acidity, TSS/acidity ratio, ascorbic acid, reducing sugar and total sugar also showed difference in different orchards. The maximum TSS (11.77° Brix) was recorded at Ochadi location and minimum (11.35 ° Brix) at Surjana II location. The lowest total acidity (0.325 %) was recorded at Surjana I while maximum acidity (0.380 %) was recorded at Aonwalheda I location. The maximum TSS/acidity ratio (35.67) were recorded at Ochadi location whereas lowest (30.16) at Aonwalheda I location. The maximum ascorbic acid, reducing sugar and total sugar i.e. 139.35 mg/100 ml pulp, 3.43 (%) and 7.72 (%) respectively were recorded at Ochadi location whereas minimum i.e. 132.64 mg/100 ml pulp, 3.08 % and 7.36 % respectively were recorded at Surjana II location. Difference in chemical parameters might be due to variation in nutrient status of the orchards. These chemical parameters appears directly related with nutrient status of plants. Similar finding were reported by Ram and Rajput (2000), Lal *et al.* (2001) and Singh and Chandra (2010).

Table 2: Physical characteristics of guava fruits cv. Allahabad Safeda from different orchards of Chittorgarh district

Location of the orchard	Fruit diameter in cm (Polar)			Fruit diameter in cm (Equatorial)			Fruit weight (g)			Pulp weight (g)		
	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled
Surjana I	5.81	5.97	5.89	6.21	6.35	6.28	179.77	181.15	180.46	106.98	109.70	108.34
Surjana II	5.61	5.77	5.69	6.10	6.19	6.15	172.65	176.58	174.62	96.35	101.13	98.74
Aonwalheda I	5.53	5.63	5.58	5.98	6.08	6.03	165.28	169.74	167.51	85.86	89.80	87.83
Ochadi	5.96	6.05	6.01	6.44	6.58	6.51	183.56	187.72	185.64	113.92	117.42	115.67
Laljee ka kheda	5.99	6.01	6.00	6.29	6.39	6.34	179.36	183.52	181.44	109.64	112.88	111.26
Mean	5.78	5.89	5.83	6.20	6.32	6.26	176.12	179.74	177.93	102.55	106.18	104.37
SEm	0.126	0.08	0.0738	0.103	0.089	0.0679	3.604	2.814	2.2864	2.997	2.801	2.0509
CD at 5 %	0.359	0.219	0.2074	0.292	0.253	0.1908	10.267	8.016	6.4239	8.536	7.978	5.7623

Table 3: Physical characteristics and yield of guava fruits cv. Allahabad Safeda from different orchards of Chittorgarh district

Location of the orchard	Seed weight (g)			Pulp : Stone ratio			Seed Index			Yield (Kg plant^{-1})		
	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled
Surjana I	4.15	4.29	4.22	25.78	25.57	25.68	1.091	1.097	1.094	48.80	52.65	50.73
Surjana II	3.97	4.13	4.05	24.27	24.49	24.38	1.086	1.090	1.088	53.10	56.95	55.03
Aonwalheda I	3.48	3.59	3.53	24.67	24.94	24.81	1.076	1.082	1.079	55.30	59.15	57.22
Ochadi	5.06	5.16	5.11	22.51	22.76	22.64	1.098	1.104	1.101	67.90	71.75	69.83
Laljee ka kheda	4.59	4.75	4.67	23.89	23.76	23.82	1.093	1.099	1.096	65.95	69.13	67.54
Mean	4.25	4.38	4.32	24.22	24.30	24.27	1.089	1.094	1.092	58.21	61.93	60.07
SEm	0.113	0.102	0.0761	0.409	0.413	0.2906	0.013	0.012	0.0089	4.942	4.911	3.484
CD at 5 %	0.322	0.289	0.2137	1.164	1.177	0.8164	0.038	0.034	0.0250	14.076	13.989	9.787

Table 4: Chemical characteristics of guava fruits cv. Allahabad Safeda from different orchards of Chittorgarh district

Location of the orchard	TSS (°B)			Total acidity (%)			TSS/Acidity ratio		
	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled
Surjana I	11.47	11.68	11.58	0.330	0.320	0.325	34.76	36.50	35.63
Surjana II	11.27	11.43	11.35	0.380	0.370	0.375	29.66	30.89	30.27
Aonwalheda I	11.42	11.49	11.46	0.370	0.390	0.380	30.86	29.46	30.16
Ochadi	11.68	11.85	11.77	0.336	0.323	0.330	34.66	36.67	35.67
Laljee ka kheda	11.60	11.72	11.66	0.359	0.351	0.355	32.31	33.39	32.85
Mean	11.488	11.63	11.56	0.355	0.351	0.353	32.45	33.38	32.92
SEm	0.128	0.127	0.0900	0.006	0.005	0.0038	0.728	0.802	0.5417
CD at 5 %	0.361	0.362	0.2527	0.016	0.015	0.0108	2.075	2.284	1.5218

Table 5: Chemical characteristics of guava fruits cv. Allahabad Safeda from different orchards of Chittorgarh district

Location of the orchard	Ascorbic acid (mg/100 ml pulp)			Reducing sugar (%)			Total sugar (%)		
	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled
Surjana I	132.67	135.29	133.98	3.19	3.27	3.23	7.35	7.38	7.37
Surjana II	131.98	133.30	132.64	3.07	3.09	3.08	7.34	7.37	7.36
Aonwalheda I	132.92	134.72	133.82	3.09	3.11	3.10	7.51	7.67	7.59
Ochadi	138.23	140.47	139.35	3.41	3.45	3.43	7.69	7.75	7.72
Laljee ka kheda	136.76	138.32	137.54	3.34	3.37	3.35	7.65	7.68	7.66
Mean	134.51	136.42	135.47	3.22	3.26	3.24	7.51	7.57	7.54
SEm	1.717	1.487	1.1356	0.034	0.035	0.030	0.079	0.083	0.0575
CD at 5 %	4.889	4.236	3.1905	0.098	0.101	0.069	0.227	0.236	0.1614

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