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Comparative performance of rainy and winter season guava cultivars under arid irrigated conditions of Punjab

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Abstract

Guava (*Psidium guajava* L.) is one of the most important tropical and subtropical fruits as it has a high nutritive value and can be grown under different soil and climatic conditions. It bears twice in a year but the best quality fruit is obtained in winter. A study was conducted to evaluate the performance of seven guava cultivars viz. Allahabad safeda, Apple colour, Behat coconut, Lalit, Lucknow 49, Pear shaped and Red fleshed at Regional Research Station, Abohar during the years 2010- 2012. Ripened fruits of all the varieties were collected from the orchard during winter as well as rainy season and analyzed for fruit weight, fruit yield, total soluble solids (TSS), acidity, Vitamin C and total sugars. The highest fruit yield was recorded in Lucknow -49 during rainy season (85 Kg/tree) followed by Lalit (79.0 kg) as well as during winter season (52.7 Kg/tree). The maximum content of Vitamin C (283.3 mg/100g pulp) was also recorded in Lucknow -49 during winter season harvest.

Key words : *Guava cultivars, fruit yield, Vitamin C, rainy season, winter season*

Introduction

Guava (*Pisidium guajava* L.) belongs to the family Myrtaceae. It is one of the important tropical and subtropical fruits because it has high nutritive value and can be grown under different soil and climatic conditions. Besides India, it is grown widely throughout the tropics of the world. It bears twice in a year but the best quality fruit is obtained during winter season. In India, guava ranks fourth after mango, banana and citrus fruits. It occupies 2.19 lac hec. of land with an annual production of 25.7 lac MT. It is a hardy fruit crop thriving well under a wide range of soil types varying from sandy loam to clay loam with a pH range of 4.5 to 8.2. Guava fruit is rich in 'Vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavour (Dhaliwal and Dhillon, 2003). It has a great demand as a table fruit as well as in processing industry. Guava is a hundred percent edible fruit and is considered as “apple of the poor” due to its lower cost, easy availability and high nutritive value. It plays an important role in reducing nutritive disorders caused by the deficiency of Vitamin C in human health. Studies on evaluation of guava cultivars have been reported from different locations in India (Aulakh, 2005, Deshmukh et al., 2013, Ghosh et al., 2013). To evaluate the performance of different guava cultivars under arid irrigated region of Punjab, seven cultivars of guava were introduced in the year 2001 at Regional Research Station, Abohar. These cultivars were evaluated during rainy and winter season in the years 2010-2012 with the objectives to check the performance with respect to their quality and quantity attributes

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Materials and Methods

Seven cultivars of guava namely Allahabad safeda, Apple colour, Behat coconut, Lalit, Lucknow -49, Pear shaped and Red fleshed planted at a distance of 25'x25' were evaluated with respect to growth, yield and quality traits of fruit at PAU, Regional Research Station, Abohar during 2010-2012. The trial was replicated thrice. Three trees per replication were selected from established bearing orchard (Year of plantation: 2001) for each cultivar and data were taken from selected plants with respect to growth, fruit yield and quality attributes. Ten fruits of each variety were harvested randomly from each replication. The plants were irrigated at weekly interval in summer and at monthly interval during winter and the fertilizers were applied as per recommendation of Punjab Agricultural university, Ludhiana -FYM-50Kg, Urea- 1000g, SSP-2.5kg and MOP -1.5kg . FYM and half inorganic fertilizers are applied in May June and the remaining half were applied in September - October. The tree volume, fruit yield, fruit weight and physico-chemical analysis viz., TSS (%), acidity (%), Vitamin C (mg

/100g pulp) and total sugars (%) were assessed. The observations on tree volume were recorded in June-July. The total soluble solids (TSS) were determined with the help of digital refractometer. Acidity was quantified by titrating the juice against N/10 NaOH and expressed as per cent citric acid. Vitamin C of fruit was determined with the help of the method given in A.O.A.C. (1995) and total sugars were analyzed as per the method given by Dubois et al., (1956). The fruit characters of different guava cultivars were recorded at the time of harvesting of the crop during winter and rainy season. The data recorded during 2010, 2011 and 2012 was pooled before analysis.

Results and Discussion

Physical attributes

A perusal of the data presented in the present study reveals significant variation in the seven guava cultivars during the two harvesting seasons (Table 1). The highest tree volume (124.6 m3) was recorded for Allahabad safeda followed by Lalit (112.5 m3), Red fleshed (102.23 m3). During the rainy season highest fruit weight (165 g) was recorded for Lalit followed by Lucknow-49 (108 g), all other varieties bore fruits of less than 100 g. During the winter season Lucknow-49 out performed all other varieties in terms of fruit weight (271.6 g) followed by Lalit (219 g), Behat coconut (181.3 g) and Allahabad safeda (165 g). In general higher fruit weight was recorded during the winter season as compared to the rainy season for all the cultivars. The highest values for mean fruit yield (69.25 Kg/tree) and mean fruit weight (192 g) was recorded for cultivar Lalit, closely followed by Lucknow-49 having mean fruit yield (68.85 Kg/tree) and mean fruit weight (189.8 g). Variation shown in tree volume among different cultivars is a genetic character. The variation amongst cultivars with regard to fruit weight and yield / plant might be due to genetic make up, inherent characters and climatic adaptability which might be used as a diagnostic characteristic for selection of a cultivar for local conditions (Aulakh 2005, Patel et al., 2011). Varietal variations in guava for physical characters have also been reported by Sharma et al. (1998) and Singh et al. (2008)

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Quality attributes :

The results on fruit quality in terms of TSS, acidity and TSS: acid ratio are presented in Table 2. The maximum mean TSS content (13.2%) was recorded in Lucknow-49 followed by Lalit (11.6%) and Allahabad safeda (11.3%). All the cultivars showed higher TSS content during winter season as compared to the rainy season. The higher TSS content in winter might be due to enhanced utilization of nutrients and accumulation of carbohydrates into fruits of these cultivars during low temperature conditions. The cultivar Allahabad safeda showed minimum mean acidity per cent (0.32) followed by Lucknow-49 (0.38) and Apple colour (0.39). All the cultivars showed lower acidity during the winter season as compared to the rainy season. However, Allahabad safeda recorded 36% lower acidity in winter season (0.25%) against rainy season (0.39 %). Maximum mean TSS:acid ratio (37.57) was recorded in Allahabad safeda, closely followed by Lucknow-49 (34.52) owing to lower acidity in these cultivars.

The results with respect to Vitamin C and total sugars contents are depicted in Table 3. The Vitamin C and total sugar content varied significantly among different guava cultivars. Guava cultivar, Lucknow 49 showed highest Vitamin C content during winter (283.3 mg/100 g pulp) as well as in rainy season (185.7 mg/100 g pulp). The variation in Vitamin C content may be due to varietal variability and seasonal conditions (Deshmukh et al., 2013). The sugar is one of the important gradients for preparation of value added products from guava and high concentration of sugars is desirable for enhancement of taste of the fruit. The highest total sugar was recorded in Allahabad safeda during both the seasons (2.85 & 4.73 in rainy and winter seasons, respectively). The results obtained by us are in accordance with those of Babu et al. (2002) who reported that the cultivars Allahabad safeda and Lucknow 49 produced better quality fruits.

The winter season guava has a better market price as compared to the rainy season crop. The quality attributes, viz., fruit weight, TSS : acid ratio, Vitamin C and total sugars of the winter harvest scored an edge over the rainy season harvest crop with maximum fruit weight (271.6 g) and Vitamin C (283.3 mg/100 g pulp) in Lucknow-49 and maximum TSS: acid ratio (37.57) in Allahabad safeda. Nevertheless, the rainy season produce in terms of fruit yield is more in four (Allahabad safeda, Lucknow -49, Pear shaped and Lalit) amongst seven cultivars evaluated. It is suggested that the improvement of quality attributes of rainy season crop can enhance the marketing of rainy season crop as well.

Table 1.Tree volume, fruit yield and fruit weight of guava cultivars during rainy and winter seasons(2010-12)

Cultivars	Tree volume (m3)	Fruit Yield (Kg/Tree)			Fruit Weight (g)		
		Rainy Season	Winter Season	Mean	Rainy Season	Winter Season	Mean
Allahabad safeda	124.6	76.0	39.7	57.85	88.3	165.0	126.65
Apple Colour	95.73	28.0	28.3	28.15	81.0	115.0	98.00
Behat coconut	92.37	21.0	29.0	25.00	80.3	181.3	131.80
Lucknow-49	96.33	85.0	52.7	68.85	108.0	271.6	189.80
Pear shaped	94.33	27.3	18.7	23.00	65.7	117.7	91.70
Lalit	112.50	79.0	59.5	69.25	165.0	219.0	192.0
Red fleshed	102.23	19.7	26.0	22.85	79.0	130.0	104.5
CD (5 %)		6.0	6.9	--	7.63	17.9	--

Table 2. Total soluble solids and acidity content of guava cultivars during rainy and winter seasons(2010-12)

Cultivars	Total Soluble Solids (%)			Acidity (%)			TSS : Acidity ratio		
	Rainy	Winter	Mean	Rainy	Winter	Mean	Rainy	Winter	Mean
Allahabad safeda	10.9	11.8	11.3	0.39	0.25	0.32	27.95	47.20	37.57
Apple Colour	9.4	10.2	9.8	0.40	0.39	0.39	23.50	26.15	24.82
Behat coconut	9.9	10.3	10.1	0.50	0.37	0.43	19.80	27.84	23.82
Lucknow-49	12.7	13.8	13.2	0.40	0.37	0.38	31.75	37.29	34.52
Pear shaped	9.3	9.8	9.5	0.44	0.37	0.40	21.14	26.48	23.81
Lalit	10.6	12.6	11.6	0.50	0.35	0.42	21.20	36.00	28.60
Red fleshed	9.0	10.6	9.8	0.52	0.36	0.44	17.30	29.44	23.37
CD (5%)	0.26	0.35	--	0.11	0.008	--	--	--	--

Table 3. Vitamin C and total sugar content of guava cultivars during rainy and winter seasons (2010-12)

Cultivars	Vitamin C (mg/100 g pulp)			Total sugars (%)		
	Rainy	Winter	Mean	Rainy	Winter	Mean
Allahabad safeda	160.0	235.0	197.5	2.85	4.73	3.79
Apple Colour	174.3	211.7	193.0	2.76	4.66	3.71
Behat coconut	160.0	186.7	173.3	2.60	4.45	3.52
Lucknow-49	185.7	283.3	234.5	2.70	4.46	3.58
Pear shaped	164.3	210.0	187.1	2.61	4.43	3.52
Lalit	181.0	193.0	187.0	2.38	4.50	3.44
Red fleshed	18.00	205.0	192.5	2.45	4.16	3.30
CD (5 %)	5.01	16.10	--	0.041	0.093	--

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