

Evaluation of guava germplasm under Sabour (Bihar) conditions*

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Guava (*Psidium guajava* L.) flowers are always borne on newly emerging vegetative shoots irrespective of the time of year (Rathore and Singh 1974, Singh *et al.* 2000). Consequently, flowering and fruit set can be very erratic, depending on the environmental conditions (Singh *et al.* 2000). In northern India, 3 distinct flowering seasons, i.e. summer, rainy and autumn, with corresponding harvest periods in rainy, winter and spring have been observed by Rathore (1972), Dwivedi *et al.* (1990) and Singh (2000) under Delhi, Uttar Pradesh and Bihar conditions respectively. The ripening and quality of guava fruits is greatly influenced by the prevailing atmospheric temperature and humidity conditions. Precise knowledge of flowering and fruiting behaviour help the orchardists in selecting suitable cultivars according to the market demand and to adjust the cultural practices like time of irrigation, manuring, and crop regulation etc. since no report on this aspect in different guava germplasm is available under Bihar conditions, screening of guava germplasm for their flowering, fruiting and fruit quality attributes to select new varieties for Sabour region was undertaken.

Eight years old plants of guava spaced 6 m × 6 m apart in Horticultural Garden of Department of Horticulture, Sabour, during 1998 and 1999 were selected. Single plant/unit was replicated 4 times in randomized block design with 10 collections, viz. 'Safed Jam' (V₁), 'Kohir Safeda' (V₂), 'Hybrid 1' (V₃), 'Selection 8' (V₄), R₄P₅ (V₅), R₃P₃ (V₆), R₃P₈ (V₇), R₈P₃ (V₈), R₁₀P₅ (V₉), and 'Allahabad Safeda' (V₁₀), (check cultivar). The observations were recorded on flowering, fruiting and physico-chemical quality of fruits. For physico-chemical characters, the fruits were collected from all the sides of the plants at the right stage of ripening and observations were recorded based on 10 random selected fruits. Total soluble solids, titratable acidity and sugars were determined by standard methods. Ascorbic acid content was determined by titrating freshly extracted juice against 2,6-dichlorophenol indophenol dye (AOAC

1984). Pectin content was analysed as per the method of Ranganna (1977) and was expressed as calcium pectate.

Maximum flowers/tree were borne in 'Allahabad Safeda' in rainy and winter seasons, followed by 'Safed Jam'. Least flowers/tree in both the seasons were recorded in 'Kohir Safeda'. Rate of flowering in guava is governed by the seasons and the cropping pattern (Dwivedi *et al.* 1990). Both the factors are likely to affect the food reserves of the plant. Since flowering and vegetative growth during winter season is almost negligible, the plants accumulate sufficient food reserves, which is responsible for the initiation of new growth in the following spring. Due to heavy flowering in March–April and fruiting in the rainy season, the food reserves were exhausted, therefore the rainy-season flowering (July–August) for winter season cropping (November–December fruiting) were less than with flowering in March–April (Dwivedi *et al.* 1990). There was a significant variation in fruit set (%) in different guava germplasm. Maximum fruit set (%) in both the seasons was found in 'Allahabad Safeda' and it was on par with 'Safed Jam'. 'Kohir Safeda' showed the minimum fruit set (%) during both the cropping seasons. The variation in fruit set (%) among different germplasm was perhaps due to variations in pollen germination (Srivastava 1974). In general, fruits set (%) was higher during winter season than that during rainy season. The hot summer appears to be the main cause of poor fruit set for rainy-season crop. The result confirms the findings of Dwivedi *et al.* (1990) and Singh *et al.* (1999) in guava. Maximum numbers of days were required for maturity of 'Allahabad Safeda' during both the seasons, while it was least in 'Kohir Safeda'. The days required for fruit set to maturity were more in winter than that required in rainy season, due to prevailing low temperature during the period of fruit growth in winter, while high temperature accompanied with high humidity in summer accelerated fruit growth and maturity during rainy season. Our results confirm those of Kundu and Mitra (1994) under West Bengal conditions. The maximum fruit weight was recorded in 'Allahabad Safeda', followed by 'Safed Jam' during both the seasons (Table 1). Least fruit weight was found in 'Kohir Safeda'.

* Short note

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Table 1 Reproductive and yield attributes of different guava germplasm (pooled data of 2 years)

Germplasm	Average no. of flowers/tree		Fruit set (%)		Days taken for maturity		Average fruit weight (g)		Yield/plant (kg)	
	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season
V ₁	710.00	375.00	56.90	66.00	118.00	136.00	163.90	220.00	68.74	38.14
V ₂	561.00	230.00	48.00	58.30	105.00	123.00	105.00	120.00	31.92	12.76
V ₃	589.00	280.00	52.91	62.90	108.00	128.00	126.30	149.00	35.28	20.54
V ₄	620.00	290.00	54.00	64.18	109.00	127.00	136.90	168.00	40.93	24.94
V ₅	626.00	266.00	53.81	63.00	111.00	130.00	140.40	190.00	42.56	27.00
V ₆	649.00	272.00	52.41	64.50	100.00	128.00	145.17	215.90	47.12	30.64
V ₇	586.00	248.00	51.29	62.89	113.00	130.00	132.49	180.00	67.88	24.20
V ₈	667.00	296.00	53.18	63.09	114.00	132.00	140.98	191.00	44.80	30.49
V ₉	688.00	278.00	53.99	63.18	112.00	131.00	128.00	181.00	40.57	27.28
V ₁₀	812.00	390.00	58.90	69.00	120.00	138.00	165.30	224.10	72.14	42.18
CD (P=0.05)	35.00	26.00	3.87	4.11			5.89	8.14	4.89	5.69

Details of germplasm is given in text

Rainy-season fruits had less fruit weight than of winter season in all the germplasm. Since restricted fruit : leaf ratio and limited exposure of light due to cloudy weather, probably less photosynthates were available for fruit growth in rainy season; hence medium to smaller size fruits were obtained. However, during the winter season, fruits received more organic metabolites and thus gained more weight because of higher leaf : fruit ratio and better exposure to light. These observations confirm the results of Dwivedi *et al.* (1990) in 'Sardar' guava. 'Allahabad Safeda' was found superior to other germplasm, having 72.14 kg and 42.18 kg fruit during rainy and winter season, respectively, followed by 'Safed Jam'. Least fruit yield/plant during both the seasons was recorded in 'Kohir Safeda'. The rainy-season crop recorded more fruit yield than winter season one. Higher yield in the rainy season may be owing to higher number of flowers obtained in summer flowering. While due to exhaustion of the food reserves by the rainy-season crop, less number of flowers

and fruits were produced on the tree during winter season. Similar results were obtained by Dwivedi *et al.* (190) in 'Sardar' guava. The maximum total soluble solids, total sugar, reducing sugar, Vitamin C and pectin content were found in 'Allahabad Safeda' (check cultivar) being on a par with 'Safed Jam' during both the seasons (Table 2). Best-quality fruits were obtained during the winter season. These results are in conformity with the findings of Dwivedi *et al.* (190). Rathore (1972) reported that low temperature during the ripening period of winter season crop in guava retarded the excessive loss of respiratory substrates and also increased translocation of photosynthates from leaves to fruits. Another important factor, which may contribute to the better-quality fruits during the winter, is the coincidence of low temperature with phase III (last stage of fruit growth between 90 and 120 days from the date of fruit set) of fruit growth. On the basis of yield and fruit quality attributes it may be concluded that 'Safed Jam' may be recommended in

Table 2 Fruit quality attributes of different guava germplasm (pooled data of 2 years)

Germplasm	TSS (%)		Actidity (%)		Total sugar (%)		Reducing sugar (%)		Vitamin C (mg/100 g)		Pectin (%)	
	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season
V ₁	9.35	11.89	0.30	0.42	7.00	9.00	3.59	5.11	130.00	250.00	0.89	1.36
V ₂	9.08	10.93	0.29	0.43	6.75	7.56	3.00	4.20	105.20	201.00	0.61	1.04
V ₃	9.12	11.00	0.32	0.41	6.81	8.71	3.31	4.67	110.30	210.00	0.67	1.05
V ₄	9.33	11.32	0.31	0.44	6.34	8.34	3.41	4.66	119.49	218.39	0.69	1.14
V ₅	9.18	11.28	0.33	0.45	6.24	8.21	3.24	4.54	120.00	232.00	0.73	1.30
V ₆	9.35	11.19	0.28	0.46	6.13	8.10	3.45	4.34	122.29	234.00	0.81	1.31
V ₇	9.31	11.00	0.32	0.45	6.95	7.98	3.33	4.59	124.95	240.00	0.65	1.29
V ₈	9.24	11.14	0.31	0.44	6.45	8.40	3.10	4.29	125.00	224.91	0.63	1.26
V ₉	9.38	11.00	0.29	0.43	6.14	8.10	3.20	4.34	126.00	205.00	0.75	1.24
V ₁₀	9.89	12.00	0.28	0.41	7.13	9.13	3.67	5.69	139.00	260.95	0.92	1.42
CD (P=0.05)	0.41	0.48	0.02	0.03	0.87	1.09	0.41	0.62	13.95	21.59	0.06	0.11

Details of germplasm is given in text

addition to 'Allahabad Safeda' for commercial cultivation under Bihar conditions.

SUMMARY

Ten guava (*Psidium guajava* L) germplasm, viz 'Safed Jam' (V₁), 'Kohir Safeda' (V₂), 'Hybrid 1' (V₃), 'Selection 8' (V₄), R₄P₅ (V₅), R₃P₃ (V₆), R₃P₈ (V₇), R₈P₅ (V₈), R₁₀P₅ (V₉), and 'Allahabad Safeda' (V₁₀) (check cultivar) were evaluated during rainy and winter seasons of 1998 and 1999 for their flowering, fruiting and fruit quality attributes. 'Allahabad Safeda' was found superior to others in respect of yield (42.18 kg/plant during winter season and fruit-quality attributes (12.00% TSS, 260.95 mg/100 g vitamin C during winter season) and it was on a par with 'Safed Jam'. Average number of flowers/tree was higher (812–561) during summer flowering (April–May) than that in rainy season flowering (July–August) in all germplasms, while fruit set (%) was better (69.00–58.30) during the rainy-season flowering compared with summer season flowering. Highest yield/plant (72.14–31.92 kg) was obtained in rainy season, followed by winter season (42.18–12.76 kg). However, maximum TSS (12.00–190.93%), total sugar (9.13–7.56), reducing sugar (5.69–4.20), vitamin C (260.95–201.00 mg/100 g) and pectin content (1.42–1.04%) were found in the winter season cropping, followed by rainy season in all germplasms. Based on the yield and fruit quality attributes 'Safed Jam' proved superior in addition to 'Allahabad Safeda' to others under Bihar conditions.

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