

Study on performance of twenty one guava cultivars in red and laterite soil of West Bengal under irrigated condition

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ABSTRACT

An investigation was made on 21 guava cultivars viz., Allahabad Safed, Lucknow-49, Harijha, S 1, F 1, S 8, Apple colour, Red Fleshed, Behat Coconut, Chittidar, Baruipur, Seedless, Supreme, Banarasi, Arka Amulya, Arka Mridula, Khaja, Almond Iskbala, Kairala Seedlings, Patialo and Florida Seedlings under irrigation condition in laterite soil. Results of four consecutive years of study indicated that Banarasi cultivar produced higher average yield (73.7kg plant⁻¹ year⁻¹) followed by Allahabad Safeda, (71.6kg plant⁻¹ year⁻¹) and Apple colour (69.5kg plant⁻¹ year⁻¹). Fruit weight was maximum in Almond Iskbala followed by Red Fleshed and Apple Colour. Fruit quality in respect of TSS/acid ratio was the best in Banarasi followed by Khaja while maximum ascorbic acid content was in Supreme followed by Seedless. Considering the overall performance, 'Banarasi' and 'Apple Colour' cultivars of guava are recommended for cultivation in red and laterite zone of West Bengal.

Keywords: Guava variety, irrigated situation, laterite soil and performance

Guava (*Psidium guajava* L.) is one of the important fruits of tropical and subtropical region in the country. Due to its high nutritive value, wide adaptability in diverse agro-climatic condition, early and prolific bearing with a good return, the crop has been gaining popularity in all corners of West Bengal. The fruit has high demand for table purpose as well as in preservation industry for preparation of jelly and jam. In West Bengal, the guava is commercially cultivated in 24- Parganas (North and South) and Nadia districts where the soil is fertile due to alluvial in nature and having good ground water table where irrigation is not the problem. However, there is a large area in Western part of the state where soil is red and laterite, rainfall is low and availability of required ground is a problem, there guava could be grown successfully. For commercialization of any crop in a set of agro-climatic condition, varietal specification is considered as one of the major task. Attempt has already been made to find out suitable cultivars in red and laterite zone of West Bengal with 12 cultivars under rainfed condition (Ghosh and Chattopadhyay, 1996). Further, a long term investigation was made under irrigated condition in red and laterite zone of West Bengal taking 21 cultivars and results have been presented in the paper.

MATERIALS AND METHODS

Air layered plants of 21 cultivars were planted in the orchard of an agro-based organization at Jhargram in collection block at 6 × 6 m distance during 2002. Six plants under each cultivar were used for the study, each plant being a unit of replication. All plants were kept under uniform cultural practices. The plants were irrigated during winter and summer months at 15-20 days interval by ring method. The yield (by weight) of rainy and winter season fruits

was calculated separately on the basis of mature fruits harvested during the period 2007 to 2010 at a stretch when the plant age was 5 and 8 year respectively. Physico-chemical analysis was based on ten randomly selected mature fruits from each plant. For chemical analysis of the fruits, the methods were followed as described by A.O.A.C. 1990. The physico-chemical attributes were studied in the last two years *i.e.*, 2009 and 2010 and average has been mentioned.

RESULTS AND DISCUSSION

Fruit yield of different cultivars of guava are presented in Table 1. It is cleared from the data that main fruiting period in laterite zone was rainy season inspite of timely providing necessary manures and fertilizer and irrigation during winter and summer months. The yield of different cultivars was significantly varied among themselves in all the four years of investigation. The cultivar 'Banarasi' stood the fruit position in respect of average fruit production as it gave 73.7 kg yield plant⁻¹ year⁻¹ with a peak of 93.6 kg plant⁻¹ in rainy season at the age of 6th year. The cultivar 'Allahabad Safeda' occupied the second position having the average yield of 71.6kg plant⁻¹ year⁻¹ with maximum of 107.5 kg plant⁻¹ (in rainy season) at the age of 5th year. The 'Apple colour' cultivar was considered the 3rd yielder in position and resulted in average yield of 69.5kg plant⁻¹ year⁻¹ with maximum of 105 kg/plant at the age of 5th year. Dubey *et al.* (2004) also obtained higher yield from Allahabad Safea (36.5 kg plant⁻¹) followed by Safed Jam (34.7 kg plant⁻¹) cultivars of guava grown at Sabour (Bihar). It was observed that irrigated guava orchard had the higher yield potentiality as compared to rainfed orchard under similar agro-climatic condition when we compared the results of

corresponding cultivars (Ghosh and Chattopadhyay, 1996). The average yield of Allahabad Safeda, Apple colour, Lucknow 49 and Banarasi under rainfed condition at Jhargram were 29.2 kg, 34.2 kg, 35.9 kg and 32.4 kg plant⁻¹ respectively (Ghosh and Chattopadhyay, 1996) while it was 71.6 kg, 69.5 kg, 42.3 kg and 73.7 kg plant⁻¹ respectively under irrigated condition at Jhargram. Another interesting observation was that the cultivars like Allahad Safeda, L 49, Apple Colour, Chittidar, Red Flesh and Arka Mridula showed better yield potentiality under present agro-climatic situation as compared to growing them in Ranchi, Bihar (Reddy *et al.*, 1999) or in Mandsaur, Madhya Pradesh (Mahour *et al.*, 2012). Among the 21

cultivars studied, the cultivars like Behat Coconut, Seedless, Supreme, Khaja and Florida Seedling were found as poor yielder because of their in-ability to produce satisfactory yield during the course of investigation.

It is established fact that winter season guava has the better market price than the rainy season crop. Considering this angle, it was revealed that Kairala Seedlings had the highest production (17.9kg plant⁻¹) in winter season followed by S 8 (14.5kg plant⁻¹) and Almond Iskbala (10.9kg plant⁻¹). If we considered the fruit quality, S 8 showed highest TSS or acid ratio (35.7) as compared to other two varieties (Table 2).

Table 1: Fruit production of guava cultivars in laterite soils

Cultivars	Fruit yield**		Total yield (kg plant ⁻¹)	Fruit wt. (g)		*Seed content (%)	
	(kg plant ⁻¹)			RS	WS	RS	WS
	RS	WS					
Alahabad Safeda	63.28	8.3	71.6	112	110	20.0	Hard
Lucknow- 49	39.16	3.2	42.3	130	108	14.4	Hard
Harijha	16.99	9.0	26.0	127	138	10.7	Hard
S 1	28.96	1.5	30.4	143	99	11.6	Hard
F 1	44.55	10.4	54.9	124	130	12.4	Hard
S 8	35.19	14.5	49.7	102	138	17.1	Hard
Apple Colour	65.69	3.8	69.5	151	127	17.1	Hard
Red Fleshed	34.42	0.8	35.3	161	110	18.0	Hard
Behat Coconut	13.60	0.9	14.5	80	62	10.7	Hard
Chittidar	28.86	5.8	34.7	97	105	15.3	Soft
Baruipur	19.91	9.1	29.0	91	140	15.6	Hard
Seedless	8.82	0.5	9.3	98	102	1.1	Hard
Supreme	20.64	0.8	21.4	114	82	14.8	Hard
Banarashi	66.50	7.2	73.7	124	120	17.4	Hard
Arka Amulya	32.39	6.4	38.9	118	128	12.0	Hard
Arka Mridula	40.16	5.5	45.6	129	122	14.2	Hard
Khaja	13.53	3.1	16.6	123	125	16.9	Hard
Almond Iskbala	56.20	10.9	67.2	177	147	18.1	Hard
Kairala Seedlings	49.16	17.9	67.0	121	97	11.6	Hard
Patialo	46.88	8.0	54.8	128	146	15.1	Hard
Florida Seedlings	18.86	0.9	19.8	93	87	36.0	Hard
LSD(0.05)	7.11	2.54	8.82	8.12	5.53	1.81	--

Note: *average of 2 seasons **Pooled(2007-10), RS=Rainy season, WS=Winter season

Fruit weight, which is directly correlated with the size, is considered as an important component of yield. Better fruit weight from rainy season crop was measured from the cultivars like Almond Iskbala (177g), Fed Flesh (161g), Apple colour (151g) and S1 (143g) while the cultivars like Behat Coconut (80g), Baruipur (91g) and Chittidar (97g) produced lower weightable rainy season fruit (Table 1). In general, the rainy season fruits had higher weight than the winter season crop in most of the cultivars, while some cultivars like Patiala (146g) Baruipur (140g) and S 8 (138g) gave better weightable fruits in winter season. Lower fruit weight (76.9 – 116.3g) in guava cultivars in different agro-climatic

situation was also reported by Das *et al.* (1995), Kundu *et al.* (1995) and Singh (2004).

The fruit quality parameters of different cultivars of guava have been presented in table-2. The results indicated that TSS, acidity, total sugar and ascorbic acid content showed significant variation among the cultivars. The total soluble solids content in winter season fruits was more as compared to rainy season fruits irrespective of the cultivars. The TSS content in the rainy season fruit was varied from 7.8 °B (Patiala) to 9.8 °B (Lucknow 49) while in winter season fruit it was 8.3 °Brix (Florida Seedlings) and 11.8 °B (Khaja). From a varietal trial with 12 cultivars, Mahur *et al.* (2012) reported that TSS of different varieties of guava ranged from 4.0 to 11.5°

Brix. The total sugar content in different varieties as estimated ranged from 3.0% (Florida Seedling) to 7.3% (Seedless) in rainy season fruit and 4.7% (Florida Seedlings) to 7.8% (Seedless) in winter season fruit (Table 2). Ray Chowdhury *et al.* (2008) observed that the total sugar content in different cultivar of guava ranged from 5.98% (White Fleshed) to 7.86% (Harijha) grown in New alluvial soil of West Bengal. The acidity percentage in fruits

of different varieties was ranged from 0.17% (Khaja) to 1.51% (Patialo) in rainy season fruits and 0.23% (Banarasi) to 2.27% (Patialo) in winter season fruits. In general, winter season fruits possess higher amount of acidity as compared to rainy season fruit irrespective of the cultivars. The T.S.S./Acid ratio, which makes the fruit tasty, was highest in Banarasi in both the season followed by Khaja and lowest in Patialo.

Table 2: Fruit quality of different guava cultivars grown in laterite soil (Pooled)

Cultivars	TSS ($^{\circ}$ B)		Acidity (%)		TSS/Acid ratio		Total Sugar (%)		Ascorbic acid (mg 100 ⁻¹ g pulp)	
	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS
Allahabad Safeda	8.3	9.7	0.30	0.34	27.7	28.5	5.9	6.0	32	38
Lucknow – 49	9.8	10.8	0.26	0.32	37.7	33.8	6.1	6.6	38	47
Harijha	8.5	10.4	0.81	0.34	10.5	30.6	5.0	7.4	28	44
S 1	8.4	10.5	0.60	0.46	14.0	22.8	5.9	5.1	48	54
F 1	8.3	9.7	0.26	0.37	31.9	26.2	5.0	6.4	47	63
S 8	9.3	10.0	0.30	0.28	31.0	35.7	5.6	6.5	42	46
Apple Colour	9.2	11.0	0.32	0.38	28.8	28.9	6.2	7.2	40	45
Red Fleshed	9.0	9.8	0.26	0.42	34.6	23.3	6.1	7.6	40	62
Behat Coconut	7.9	9.2	0.41	0.30	19.3	30.7	4.7	7.2	46	55
Chittidar	9.2	10.1	0.45	0.43	20.4	23.5	6.2	6.7	21	33
Baruipur	8.6	11.2	0.31	0.32	27.7	35.0	7.2	7.4	46	77
Seedless	8.8	11.1	0.46	0.31	19.1	35.8	7.3	7.8	50	80
Supreme	9.6	11.1	0.37	0.37	25.9	30.0	6.3	6.8	129	183
Banarashi	8.4	10.9	0.20	0.23	42.0	47.4	6.0	7.2	43	61
Arka Amulya	8.0	10.5	0.47	0.33	17.0	31.8	5.4	6.8	39	49
Arka Mridula	9.0	10.5	0.28	0.25	32.1	42.0	5.9	7.5	30	47
Khaja	9.1	11.8	0.17	0.28	53.5	42.1	6.3	7.2	47	53
Almond Iskbala	8.4	9.3	0.50	0.50	16.8	18.6	5.1	6.3	25	37
Kairala Seedlings	8.4	9.5	0.27	0.32	31.1	29.7	5.0	6.5	45	56
Patialo	7.6	8.3	1.51	2.27	5.0	3.7	4.9	5.3	32	51
Florida Seedlings	7.8	8.3	0.84	1.31	9.3	6.3	3.0	4.7	61	89
LSD(0.05)	0.22	0.25	0.12	0.16	--	--	0.13	0.15	2.22	2.63

RS=Rainy season, WS=Winter season

The ascorbic acid content in different cultivars of guava has been presented in table-2. It was observed that ascorbic acid content in winter season fruit was more as compared to rainy season fruit irrespective of the cultivars. In rainy season fruit maximum amount of ascorbic acid content was estimated from Supreme (129mg 100⁻¹ g) followed by Florida Seedlings (61mg100⁻¹ g) and Seedless (50mg 100⁻¹ g) while in winter season guava it was also maximum in Supreme (183mg 100⁻¹ g) followed by Florida Seedlings (89mg 100⁻¹ g) and Seedless (80mg 100⁻¹ g). Ray Chowdhury *et al.* (2008) observed ascorbic acid content as minimum of 74.8mg100⁻¹ g pulp in White Fleshed and maximum of 132.60mg100⁻¹ g in Teli cultivar of guava grown in alluvial soil of West Bengal.

The seed content was highest in Florida Seedlings (36%) followed by Allahabad Safeda (20%) and lowest in Seedless (1.1%). Mahour *et al.* (2012) observed seed content of 2.3% to 14.1% in different cultivars of guava. It was observed that seed texture in all the cultivars was hard except Chittidar which had soft seed texture. Due to poor fruit quality and having higher seed content in the Florida Seedlings, Patialo and Almond Iskbala, these cultivars could be used as rootstock purpose for raising seedlings.

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