



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemjournal.com

IJCS 2021; 9(1): 1527-1531

© 2021 IJCS

Received: 08-10-2020

Accepted: 17-11-2020

Patel MJ

Department of Horticulture,
B.A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Pagi NK

Department of Horticulture,
B.A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Patel DA

Department of Genetics and
Plant Breeding, B.A. College of
Agriculture, Anand Agricultural
University- Anand, Gujarat,
India

Dhaduk HL

Medicinal and Aromatic Plant's
Research Station, Anand
Agricultural University- Anand,
Gujarat, India

Shah NI

Department of Horticulture,
B.A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Corresponding Author:**Patel MJ**

Department of Horticulture,
B.A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Evaluation of Guava (*Psidium guajava* L.) genotypes for growth and yield in middle Gujarat condition

Patel MJ, Pagi NK, Patel DA, Dhaduk HL and Shah NI

DOI: <https://doi.org/10.22271/chemi.2021.v9.i1.v.11440>

Abstract

An experiment was conducted for evaluation of eight different guava genotypes for growth, yield and yield attributes for their suitability under Middle Gujarat conditions. The collected eight different guava cultivars viz., AGRS 1, AGRS 2, AGRS 3, AGRS 4, AGRS 5, AGRS 6, AGRS 7, AGRS 8 and two checks Dholka and Lalit were showed wide range of variation with respect to plant growth, yield and yield attributes of fruit at sub tropics of middle Gujarat conditions. Results of three year study indicated that the red flesh genotype AGRS 8 (35.85 kg/plant) produced higher fruit yield followed by AGRS 4 (32.23 kg/tree). This genotype has lower incidence of fruit fly damage as compared to the checks Lalit and Dholka. The genotype AGRS 8 (Lal Bahadur) is out yielder and suitable for cultivation under middle Gujarat condition. The genotype respond well to mrig-bahar (Jun-July flowering time) to get maximum yield.

Keywords: Evaluation, middle Gujarat, guava, selection, red flesh and sub tropics

Introduction

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae is one of the most important commercial fruit crops of tropics and subtropics of India and world too. It is the fourth most important fruit after mango, banana and citrus. Because of its superior adaptability, it is also known as "The apple of tropics" (Hayes, 1970, Singh and Ashutosh 2018)^[4, 16] Guava is native to Central America and is widely cultivated in South Africa, Hawaii, Indian continent and Mexico.

In India, guava occupies an area of 2.65 lakh hectares with annual production of 40.54 lakh MT (NHB 2017-18 database)^[5]. In India, it is cultivated throughout except higher hills. Allahabad area in U.P is noticeable for the production of higher quality of guava in India and the world. In Gujarat it occupies an area of 13487 hectares with annual production of 179165 MT during 2018-19 (DOH, Gandhinagar)^[6]. The major districts of Gujarat growing guava are Bhavnagar, Vadodara, Mehsana, Gandhinagar, Kutch, Kheda, and Chhotaudepur which occupied more than 75% area and production of total guava crop. In Middle Gujarat, guava crop occupied about 32.00% area of Gujarat contributing 37.68% share in production during the year 2016-17. Guava is quite resilient, productive bearer and highly remunerative crop. It flourishes well under wide range of soil types having a pH range from 4.5 to 8.2 (Rushie, 1948; Ghosh *et al.* 2013)^[13, 3]. Guava fruit is rich in 'vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavour (Bhalekar and Chalak 2017)^[2]. The western region of India which is bestowed with moderate downpour has its own tremendous potentialities for raising guava. There are three distinct phases of growth and fruiting *i.e.* Ambe bahar, Mrig bahar and Hast bahar in subtropical climate (Lodaya and Masu 2019)^[8]. The quality of the guava fruit is observed to be better in winter season (Singh *et al.*, 2016)^[17]. In general, the tendency of the farmers is to go for raising high yielding varieties so as to earn rewarding net returns while the consumer's attraction is for delicious and least number of seeded fruits of optimal size (Babu *et al.*, 2002)^[1]. Less seeded, a desirable trait of guava readily attracts the attention of farmers and consumers. Mainly guava has two types *i.e.* white and red flesh. Presently, majority area of guava is cultivated under local white fleshed varieties.

At present, only two red flesh guava varieties i.e., Lalit (CISH-Lucknow) and Pant Red (Pantnagar) is commercially grown in India. In Gujarat, improved red fleshed variety is not available for commercial cultivation. Moreover, red flesh variety has distinct value for processing and there is urgent need to develop variety having high yield with better quality in red flesh segment. So, it is requisite to screen the vast varietal wealth of red flesh guava for higher yield and quality traits for its wider acceptance and better preference among the growers and consumers. Hence, attempt was made to screen available genotypes of red flesh guava suitable for Gujarat leads to develop suitable variety for the region.

Materials and Methods

Eight genetically diverse red flesh guava genotypes viz., AGRS 1, AGRS 2, AGRS 3, AGRS 4, AGRS 5, AGRS 6, AGRS 7, AGRS 8, along with two checks Dholka (LC) and Lalit (NC) were evaluated with respect to growth, yield and yield contributing traits of fruit at Horticultural Research Farm, AAU, Anand during 2017-2019. The guava genotypes were planted at spacing of 5 m x 5 m in randomized block design. Crop was regulated by imparting *Mrig bahar* i.e. flowering in June-July and fruiting from November till February. Three plants per replication of each genotype were selected from established orchard and data were recorded from selected plants with respect to growth, yield and quality traits. Growth, yield and morpho-physiological characteristic's study was made in terms of plant height (m), plant spread (N-S; E-W) (m), number of fruit per plant, average fruit weight (g), fruit volume (cc), fruit yield (kg/tree), number of seeds/fruit, seed weight/fruit (g), pulp weight/fruit (g) and pulp to seed ratio. The data was statistically analysed by method of analysis of variance using RBD as described by Panse and Sukhatme (1985) [10].

Results and Discussion

There were wide variations observed among different guava cultivars with respect to growth characters, fruit characters and yield potential. Data (Table 1) revealed that genotypes differed significantly with respect to their growth and yield attributes.

Growth characters

Plant growth was recorded in terms of plant height (m) and plant spread (m) i.e., East West (EW) and North South (NS)

spread. Significant differences were recorded for all these characters. Maximum plant height was noticed in Exotica (3.48 m) followed by AGRS 4 (3.47 m) and AGRS 8 (3.15 m) though they were statistically at par. Similarly, canopy spread was recorded maximum by Exotica East-west (4.59 m) and North-south (4.53 m) direction, while Dholka recorded the minimum plant spread in East-west (2.98 m) and North-south (3.08 m) direction. Similar work also reported earlier by Patel *et al.* (2011) [11], Talang *et al.*, (2017) [18], Kumar *et al.* (2017) [7].

Yield and yield attributes

The data presented in Table 2 in respect of fruit characters revealed that the significant differences were recorded for different yield and yield attributes viz., number of seeds per fruit, seed weight per fruit (g), pulp weight per fruit (g), pulp: seed ratio and fruit volume (cc), number of fruits per plant, average fruit weight (g) and fruit yield per tree (kg/tree). The AGRS 3 (318.22) recorded minimum number of seeds per fruit whereas maximum number of seeds per fruit was observed in Dholka (421.44) followed by Exotica (410.33) and Lalit (409.00). The seed weight per fruit was recorded minimum in AGRS 3 was (5.59 g) followed by AGRS 4 (6.10 g) and maximum seed weight per fruit was observed in Dholka (8.92 g). Similar findings was also reported by Singh (2003) [14] in guava cv. Lucknow-49 under Tripura condition. The maximum pulp weight per fruit was obtained in Dholka (143.10 g) which was closely followed by AGRS 8 (140.04 g) and AGRS 4 (138.12 g) whereas, the minimum pulp weight per fruit was registered in AGRS 7 (108.04 g). The highest pulp: seed ratio was recorded in AGRS 4 (22.70) followed by AGRS 3 (19.57) and AGRS 8 (18.09) whereas, lowest pulse: seed ratio was found in Lalit (13.91). The maximum fruit volume was recorded in Dholka (180.11 cc) whereas, minimum in AGRS 3 (110.89 cc). This study was in close conformity with the findings of Patel *et al.* (2007) [12], Singh *et al.*, (2016) [17], Singh and Ashutosh (2018) [16].

The highest fruit yield was recorded by AGRS 8 (35.85 kg/tree), which was 57.80% higher than the white flesh check variety Dholka (22.72 kg/tree) and 91.10% higher than the red flesh check variety Lalit (18.76 kg/tree). The guava genotype AGRS 4 ranked second with fruit yields of 32.23 kg/tree. AGRS 8 recorded maximum number of fruits per plant (402.11) which was followed by AGRS 4 (346.22).

Table 1: Effect of different genotypes of red flesh guava on plant height and plant spread

Treatments	Plant height (m)				Plant Spread (m)							
	2017	2018	2019	Pooled	N-S (m)				E-W (m)			
					2017	2018	2019	Pooled	2017	2018	2019	Pooled
1 AGRS-1	2.53	2.63	2.73	2.63	3.85	3.28	3.98	3.70	3.43	3.80	3.62	3.62
2 AGRS-2	2.82	2.73	2.82	2.79	3.90	4.25	3.97	4.04	4.07	3.77	4.52	4.12
3 AGRS-3	2.55	2.58	2.67	2.60	3.62	3.60	3.80	3.67	3.58	3.73	3.80	3.71
4 AGRS-4	3.32	3.45	3.63	3.47	4.57	4.27	4.75	4.53	4.27	4.62	4.52	4.47
5 AGRS-5	2.83	2.90	2.90	2.88	3.70	3.47	3.82	3.66	3.42	3.67	3.68	3.59
6 AGRS-6	2.95	3.03	3.07	3.02	4.02	4.47	4.20	4.23	4.47	4.08	4.60	4.38
7 AGRS-7	2.67	2.77	2.88	2.77	3.53	3.40	3.92	3.62	3.42	3.65	3.52	3.53
8 AGRS-8	2.93	3.20	3.32	3.15	4.32	4.55	4.60	4.49	4.53	4.28	4.75	4.52
9 LALIT (C)	3.07	2.92	3.10	3.03	3.63	3.95	3.83	3.81	3.88	3.65	4.13	3.89
10 DHOLKA (C)	1.98	2.90	3.08	2.66	2.78	3.13	3.03	2.98	3.08	2.82	3.35	3.08
11 EXOTICA (C)	3.47	3.47	3.52	3.48	4.57	4.45	4.75	4.59	4.40	4.67	4.52	4.53
S. Em. ±	0.18	0.14	0.10	0.14	0.19	0.24	0.08	0.19	0.19	0.24	0.08	0.19
CD at 5%	0.52	0.41	0.29	NS	0.57	0.72	0.24	NS	0.57	0.72	0.24	NS
CV %	10.92	8.32	5.75	8.46	8.76	11.02	3.50	8.28	8.76	11.02	3.50	8.28
Y x T	-	-	-	NS	-	-	-	NS	-	-	-	NS

Table 2: Effect of different genotypes of red flesh guava on yield and yield attributing characteristics

Treatments	No. of Fruits/plant				Average Fruit weight (g)				
	2017	2018	2019	Pooled	2017	2018	2019	Pooled	
1	AGRS-1	146.67	154.33	195.00	165.33	118.53	123.33	122.00	121.29
2	AGRS-2	162.67	165.00	217.67	181.78	119.00	130.43	125.67	125.03
3	AGRS-3	180.67	179.67	247.00	202.44	108.20	116.67	119.00	114.62
4	AGRS-4	381.00	330.33	327.33	346.22	139.00	150.67	143.00	144.22
5	AGRS-5	177.33	179.00	254.00	203.44	121.33	128.33	130.33	126.67
6	AGRS-6	194.67	143.67	263.33	200.56	105.97	123.33	119.00	116.10
7	AGRS-7	193.67	194.00	274.67	220.78	110.77	118.67	116.67	115.37
8	AGRS-8	476.67	369.33	360.33	402.11	144.67	153.33	145.33	147.78
9	LALIT (C)	177.67	181.33	273.00	210.67	117.47	122.33	127.33	122.38
10	DHOLKA (C)	172.67	253.00	235.67	220.44	150.07	152.33	153.67	152.02
11	EXOTICA (C)	167.67	139.00	147.00	151.22	141.67	145.33	138.33	141.78
	S. Em. ±	10.21	10.99	18.97	13.97	4.87	5.28	3.64	4.65
	CD at 5%	29.96	32.26	55.65	39.46	14.30	15.48	10.67	NS
	CV %	8.00	9.15	12.93	10.62	6.75	6.87	4.82	6.21
	Y x T	-	-	-	Sig.	-	-	-	NS

Table 2: Contd...

Treatments	Fruit volume (cc)				Fruit yield (kg/tree)				
	2017	2018	2019	Pooled	2017	2018	2019	Pooled	
1	AGRS-1	134.00	135.33	135.00	134.78	14.33	14.50	19.20	16.01
2	AGRS-2	137.67	135.67	136.00	136.44	14.82	14.08	20.07	16.32
3	AGRS-3	107.67	111.33	113.67	110.89	15.07	15.12	22.10	17.43
4	AGRS-4	161.33	162.67	157.33	160.44	36.25	28.25	32.20	32.23
5	AGRS-5	143.67	144.67	145.67	144.67	16.12	15.18	22.60	17.97
6	AGRS-6	108.67	112.00	123.33	114.67	16.33	13.63	23.13	17.70
7	AGRS-7	136.00	137.67	136.33	136.67	17.40	16.08	24.03	19.17
8	AGRS-8	171.67	173.00	167.33	170.67	41.85	32.14	33.57	35.85
9	LALIT (C)	142.67	142.33	143.33	142.78	16.07	16.38	23.83	18.76
10	DHOLKA (C)	177.67	180.33	182.33	180.11	17.62	25.72	24.83	22.72
11	EXOTICA (C)	164.33	161.33	160.00	161.89	16.82	12.08	13.93	14.28
	S. Em. ±	2.34	2.70	3.44	2.83	1.18	1.17	1.56	1.32
	CD at 5%	6.88	7.53	10.10	NS	3.47	3.44	4.59	3.72
	CV %	2.82	3.07	4.10	3.38	10.12	10.99	11.49	11.01
	Y x T	-	-	-	NS	-	-	-	Sig.

Table 2: Contd...

Treatments	No. of seeds/fruit				Seed weight/fruit (g)				
	2017	2018	2019	Pooled	2017	2018	2019	Pooled	
1	AGRS-1	333.00	326.67	321.67	327.11	6.49	6.41	6.37	6.42
2	AGRS-2	388.33	383.33	385.00	385.56	8.19	8.04	7.95	8.06
3	AGRS-3	320.33	321.00	313.33	318.22	5.66	5.53	5.58	5.59
4	AGRS-4	324.67	318.33	316.67	319.89	6.41	5.98	5.91	6.10
5	AGRS-5	370.67	367.33	371.67	369.89	7.48	7.31	7.33	7.37
6	AGRS-6	337.33	330.00	323.33	330.22	7.24	7.14	7.15	7.17
7	AGRS-7	338.67	331.67	333.33	334.56	7.50	7.24	7.25	7.33
8	AGRS-8	398.33	395.00	398.33	397.22	8.07	7.58	7.57	7.74
9	LALIT (C)	407.00	408.33	411.67	409.00	8.27	8.17	8.18	8.21
10	DHOLKA (C)	427.67	421.67	415.00	421.44	9.12	8.85	8.80	8.92
11	EXOTICA (C)	412.67	410.00	408.33	410.33	8.23	8.16	8.16	8.18
	S. Em. ±	12.46	11.81	10.69	11.68	0.14	0.11	0.10	0.12
	CD at 5%	36.54	34.66	31.37	NS	0.42	0.32	0.31	NS
	CV %	5.85	5.61	5.10	5.53	3.36	2.65	2.53	2.88
	Y x T	-	-	-	NS	-	-	-	NS

AGRS 8 recorded maximum number of fruits per plant (402.11), which was followed by AGRS 4 (346.22). Data revealed that the highest average fruit weight was recorded in cultivar Dholka (152.02 g) which was closely followed by AGRS 8 (147.78 g) and AGRS 4 (144.22 g) though they were statistically at par. The lowest average fruit weight was found

in AGRS 7 (115.37 g). The highest number of fruits per plant was recorded in AGRS 8 (402.11) followed by AGRS 4 (346.22) while, lowest number of fruits per plant was observed in Exotica (151.22). These results are in concurrence with the findings of Patel *et al.* (2011)^[11], Singh *et al.* (2013)^[15], Singh *et al.*, 2016^[17]; Singh and Ashutosh 2018^[16].

Table 2: Contd...

Treatments	Pulp weight/fruit (g)				Pulp: Seed ratio				
	2017	2018	2019	Pooled	2017	2018	2019	Pooled	
1	AGRS-1	112.05	116.93	115.63	114.87	17.32	18.29	18.17	17.93
2	AGRS-2	110.81	122.39	117.72	116.97	13.50	15.24	14.81	14.51
3	AGRS-3	102.54	111.13	113.42	109.03	18.26	20.15	20.30	19.57
4	AGRS-4	132.59	144.68	137.09	138.12	20.72	24.19	23.20	22.70
5	AGRS-5	113.86	121.02	123.00	119.29	15.23	16.56	16.78	16.19
6	AGRS-6	98.73	116.20	111.85	108.93	13.64	16.28	15.64	15.19
7	AGRS-7	103.27	111.43	109.41	108.04	13.77	15.39	15.08	14.75
8	AGRS-8	136.60	145.75	137.77	140.04	16.93	19.28	18.08	18.09
9	LALIT (C)	109.19	114.16	119.15	114.17	13.19	13.97	14.56	13.91
10	DHOLKA(C)	140.95	143.48	144.87	143.10	15.45	16.21	16.47	16.04
11	EXOTICA(C)	133.44	137.18	130.18	133.60	16.22	16.82	15.96	16.34
S. Em. ±		4.83	5.30	3.63	4.65	0.74	0.88	0.51	0.73
CD at 5%		14.19	15.55	10.65	NS	2.17	2.60	1.49	NS
CV %		7.12	7.30	5.08	6.57	8.10	8.80	5.15	7.51
Y x T		-	-	-	NS	-	-	-	NS

Correlation among the traits

The correlation coefficients were estimated among all the pairs of variables (Figure 1). The traits, East West spread had a positive and highly significant association with North South spread for Anand in all the three Mrig bahar seasons (June-July flowering time) during 2017, 2018 and 2019. Though, East West and North South spread also had a positive and significant correlation with fruit volume (Table 3). The number of fruits per plant had highly significant and positive correlation with fruit yield and significant pulp: seed ratio. The highly significant and positive correlation was exhibited

by average fruit weight with pulp weight per fruit and fruit volume. The number of seeds per fruit showed positive and highly significant association with seed weight per fruit. So, it was significantly correlated in desired direction with fruit volume. Seed weight per fruit had significant positive correlation with fruit volume. Pulp weight per fruit depicted significant and positive correlation with fruit volume. It indicated that these characters may be used in selection for amelioration of guava for high yield. Similar findings were also reported by Meena *et al.* 2020^[9] in guava.

Table 3: Pearson correlation between different yield and yield contributing traits

Variable	Environment	PH	E.W	N.S	NFP	AFW	FY	NSF	SWF	PWF	PSR	FV
PH	Anand	1	0.596**	0.616**	0.290	0.320	0.304	0.103	0.009	0.336	0.269	0.312
E.W	Anand		1	0.679***	0.339	0.140	0.289	-0.021	-0.116	0.161	0.236	0.025**
N.S	Anand			1	0.281	0.109	0.271	-0.053	-0.172	0.126	0.246	0.028**
NFP	Anand				1	0.409	0.968***	-0.018	-0.097	0.421	0.423*	0.412
AFW	Anand					1	0.480	0.399	0.351	0.946***	0.456	0.830***
FY	Anand						1	0.019	-0.057	0.485	0.439*	0.494
NSF	Anand							1	0.817***	0.361	-0.425	0.590*
SWF	Anand								1	0.313	-0.635	0.554*
PWF	Anand									1	0.526	0.783**
PSR	Anand										1	0.146
FV	Anand											1.000

Values in * and ** significant at 5% & 1% level of significant; PH = Plant height (m), Plant spread - E.W = East West (m), N.S = North South (m), NFP = Number of fruits per plant, AFW= Average Fruit Weight (g), FY = Fruit yield (kg/tree), NSF = Number of seed per fruit, SWF =Seed weight per fruit (g), PWF = Pulp weight per fruit (g), PSR =Pulp seed ratio (g), FV=Fruit volume (cc)

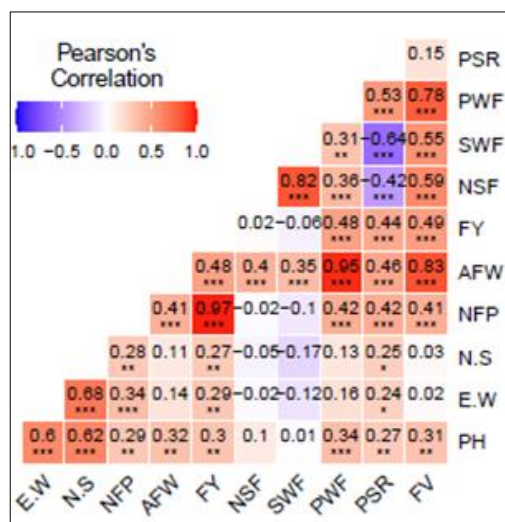


Fig 1: Pearson correlation between yield and yield contributing traits

Conclusion

On the basis of foregoing findings, it is concluded that AGRS 8 Lal Bahadu was superior in most of the characters studied and might be one of the promising cultivar of guava for cultivation in middle Gujarat condition.

Acknowledgements

Authors are thankful to the project on "Research on Horticultural Fruit and Flower crops" for providing all the experimental facilities for successful conduct of the experiment.

References

1. Babu DK, Dubey AK, Yadav DS. Evaluation of guava cultivar for their performance under mid hill attitude of meghalaya. Indian Journal of Hill Farmg 2002;15(1):119-121.
2. Bhalekar SG, Chalak SU. Studies on performance of different guava cultivars under western Maharashtra

- conditions. Electronic Journal of Plant Breeding 2017;8(2):577-579.
3. Ghosh SN, Roy S, Bera B. Study on performance of twenty one guava cultivars in red and laterite soil of West Bengal under irrigated condition. Journal of Crop and Weed 2013;9(2):81-83.
 4. Hayes WB. Fruit growing in India. 3rd Edition, Kitabistan, Allahabad, India 1974.
 5. NHB database 2017. [http://nhb.gov.in/statistics/State_Level/2017-18-\(Final\).pdf](http://nhb.gov.in/statistics/State_Level/2017-18-(Final).pdf)
 6. <https://doh.gujarat.gov.in/Images/directorofhorticulture/pdf/statistics/Area-Production-horticulture-2018-19.pdf>
 7. Kumar J, Kumar R, Tripathi S, Singh VP. Physico-chemical and morphological evaluation of guava (*Psidium guajava* L.) genotypes under Tarai conditions. Hort Flora Research Spectrum 2017;6(2):97-101.
 8. Lodaya BP, Masu MM. Effect of biofertilizer, manures and chemical fertilizers on fruit quality and shelf life of guava (*Psidium guajava* L.) cv. Allahabad safeda. Indian Journal Chemical Sciences 2019;7(4):1209-1211.
 9. Meena LK, Bhatnagar P, Singh J, Chopra R, Solanki P. Correlation amongst yield and quality attributes of guava fruit in response to foliar feeding of zinc and iron in Vertisols of Jhalawar district. The Pharma Innovation Journal 2020;9(6):349-351.
 10. Panse VG, Sukhatme PV. Statistical Methods for Agricultural workers. 4th ed. ICAR, New Delhi 1985, 167-174.
 11. Patel RK, Maiti CS, Bidyut C, Dekadeshmukh NA, Roy D. Variability Studies in Guava (*Psidium guajava* L.) Genotypes for growth, Yield and Quality Attributes at mid-hills of Meghalaya. Indian Journal Hill Frmgng 2011;24(1&2):24-28.
 12. Patel RK, Yadav DS, Babu KD, Singh A, Yadav RM. Growth, yield and quality of various guava (*Psidium guajava* L) hybrids/cultivars under mild hills of Meghalaya. Proceedings of the first International guava symposium (eds. Singh G., Kishun R., and Chandra R.). Acta Horticulture 2007;735:57-59.
 13. Rushie GD. Economic Botany 1948;2:306-325.
 14. Singh IP. Performance of different guava (*Psidium guajava* L.) cultivars under Tripura climatic conditions. Prog. Hort 2003;35:55-58.
 15. Singh SK, Singh SP, Singh JN. Evaluation of guava (*Psidium guajava* L.) cultivars under eastern U.P. conditions. Annals of Horticulture 2013;6(2):392-394.
 16. Singh Y. Growth and yield attributes of guava (*Psidium guajava* L.) genotypes under Chhattisgarh plains. Journal of Pharmacognosy and Phytochemistry 2018;7(6):1566-1567.
 17. Singh A, Kumar S, Kulloli RN. Performance evaluation of guava (*Psidium guajava* L.) introductions in arid conditions of western Rajasthan. Annals of Arid Zone 2016;55(1&2):25-28.
 18. Talang *et al.*, Performance of Guava (*Psidium guajava* L.) Genotypes at Lower Hills of Nagaland 2017.