Original Research Article

Physico-chemical evaluation of different cultivars of guava under gird region of Madhya Pradesh, India

Abstract

The present investigation was conducted in the University Laboratory, RVSKVV, Gwalior, MP, India during the period of February, 2020 to March, 2021. Guava fruits were randomly collected and cleaned in tap water to remove surface dust and leaves before weighing, sorting. This study was limited to five guava varieties viz., Allahabad Safeda, Gwalior-27, Lucknow- 49, SL (Barafkhan) and Lalit. The sample was taken in cotton bag allotted a varieties number/treatment and then brought to departmental laboratory for analysis and then stored in cool place until the measurement had taken. The maximum fruit weight (292.14 gm) and volume of fruit (296.4ml) was found in the SL varieties. The maximum acidity (1.02%) was found in AS and no. of seeds/100gm of guava fruit (183.79) was found under lalit. The maximum TSS: acid ratio (21.76) and vitamin-C (ascorbic acid) 230.44mg/100gm) was found under G-27.

Keywords: Psidium, variety, Physical, Chemical, Parameters.

UNDER PEER REVIEW

Introduction

Tropical fruit production in the sumptuous and significant fro guava (*Psidium guajava* L.). It is a member of the Myrtaceae family and likely originated in tropical America between Mexico and Peru. Early in the 17th century, the Portuguese brought it to India (Hayes, 1957). Tropical fruit trees with guavas are the hardiest, and they outperform most other fruit crops in productivity and adaptability. In terms of ascorbic acid, pectin, and other mineral contents, it outperforms other fruits. After mango, banana, and citrus, it has the fourth-largest area under cultivation in India. India's largest guava grower is

Uttar Pradesh, and Allahabad is known for producing the best guavas in the world (Mitra and Bose, 1990). Because it is the main location of a species' origin and in order to safeguard the biological resources, fingerprint technology is urgently needed. Guava is sometimes referred to as a super fruit due to its high nutritional value and antioxidant capabilities. It is also known as the "Apple of the Tropics," "Poor man's Apple," and other names. In addition to being one of the most popular and delectable fruits, guavas are also high in nutrients like vitamin A, vitamin C, niacin, riboflavin, thiamine, phosphorus, calcium, iron, and edible fibre. With the exception of the summer, it is accessible all year long.

Every year, the guava crop bears twice, once in the winter (Ambe bahar) and once in the rainy season (Mrig bahar). Fruits are used both as table fare and in the jam, jelly, and nectar industries. In the winter, guava fruit quality is thought to be superior. Guava can grow in a variety of soil types and can tolerate harsh weather conditions. The five guava varieties in Madhya Pradesh's Gird Zone were evaluated in the current study. The soil and climate in Madhya Pradesh's Gird region are ideally suited for the effective cultivation of guava under irrigation and even rainfed conditions. Guava is grown commercially in Madhya Pradesh at Jabalpur, Katani, Betul, Satana, Ujjain, Sheopur, Balaghat, Rewa, Shivpuri, Gwalior, Bhind, Chhindwara, and Morena, all of which have favourable soil and weather conditions for the guava crop. Guava output and cultivation combined in India total 408 MT and around 2.51 lakh hectares, respectively. Madhya Pradesh leads all other states in guava output, with a 37.4 MT/ha average. Among fruits, guava accounts for 3.3 percent of production and 4.5 percent of area in India.

Materials & methods

Experiment was conducted in the University Laboratory, RVSKVV, Gwalior, MP, India during the period of February, 2020 to March, 2021. The experiment site, College of Agriculture, Gwalior is situated at 26^0 13' North latitude and 78^0 14' East longitudes at an altitude of 208.5 meters from mean sea level (MLS) in Gird region of Madhya Pradesh. Fresh ripened guavas of similar maturation grade were procured from the orchard. Guava fruits were randomly collected and cleaned in tap water to remove surface dust and leaves before weighing, sorting. This study was limited to five guava

UNDER PEER REVIEW

varieties viz., Lucknow- 49, Allahabad Safeda, Gwalior-27, Lalit and Bharafkhan. The age of the trees under study was 8-10 years. During the month of January-february 2020, matured and ripen fruits of guava were collected randomly from selected plants in college orchard. The sample was taken in cotton bag allotted with varieties number/treatment and then brought to departmental laboratory for analysis and then stored in cool place until the measurement (ten fruits per replication from each treatment) had taken. The quality characters of plant includes fruit physical characters such as Fruit weight (gm), Fruit length (cm), Diameter of fruits (cm), No. of seeds/100gm fruit weight, Volume of fruit (ml), Specific gravity of fruit (ml) and chemical characters such as TSS(°Brix), Ph, acidity(%), TSS: acid ratio, pectin (%), vitamin-C (mg/100gm), total sugar (%).

Data analysis

The observational data were noted and analyzed as per standard Completely Randomized Design (CRD) technique suggested by Panse and Sukhatme. “F” test for significant treatment differences and critical differences were worked out at 5% significance level.

Results and discussion

The findings (Table 1) pertaining to the physical attributes of different guava varieties are discussed under the subheadings. The maximum weight of fruit (292.14g) was found in the cultivar SL (barafkhan) varieties and minimum fruit weight (141.66g) was found in Lalit variety of guava. Diameter of fruit was found highest in SL (7.96 cm) and minimum was in G-27(5.23cm). Pandey *et al*. (2007) reported that among 11 guava cultivars, Pant Prabhat showed higher fruit diameter (7.13cm), followed by IIHR Hybrid-21 (6.75cm). Length of fruit was highest in SL (7.82cm) and lowest was found in AS(4.79cm). Singh (1988) evaluated 25 guava cultivars under Basti (U.P.) conditions and found that the fruit weight ranged z was highest in (296.4ml) and lowest was in Lalit (125.89ml). The maximum number of seed per 100 gm is found in Lalit (183.79) and minimum was found in SL (136.73) and highest specific gravity was highest in AS (1.75) and lowest was in (0.84) in G-27. Findings are similar to the findings of Deshmukh *et al*. (2013) in guava (table 1), also S.K. Mehta *et al*. (2015) find the similar findings. Dolkar

UNDER PEER REVIEW

et al. (2014) noticed the highest number of seeds per fruit in Arka Amulya (380.25) followed by Pant Prabhat (300.50), whereas the seed number was lowest in Lalit (205.75). The findings of present study are similar to the findings of Aulakh (2005) and Raghav and Tiwari (2008) in guava.

Table 1. Physical attributes of different guava varieties.

Varieties	Fruit weight(g)	Fruit Diameter (cm)	Fruit length(cm)	Fruit Volume(ml)	No. of seed/100g of fruit weight	Specific gravity
AS	279.8	6.22	4.79	159.57	156.71	1.75
G-27	205.73	5.23	4.98	247.25	176.5	0.84
L-49	196.95	6.21	6.3	164.03	167.8	1.17
SL	292.14	7.96	7.82	296.4	136.73	0.98
Lalit	141.66	5.58	5.37	125.89	183.79	1.12
SEd±	**19.614**	**0.138**	**0.062**	**7.286**	**1.506**	**0.103**
C.D.(P=0.5)	**43.699**	**0.307**	**0.139**	**16.233**	**3.356**	**0.231**

The maximum total soluble solid (11.91°Brix) was recorded under (SL) guava fruits, while minimum total soluble solid was found in the (8.78°Brix) Lalit variety. Babu *et al*. (2002) reported TSS in RCG-11 (11.88%) followed by RCGH-7 (10.20%) and the lowest in Lalit (9.35%). The maximum pH was recorded in (4.83) in AS while minimum was in (4.15) G-27 variety. The data of acidity content in Guava fruit showed difference among all the varieties. The maximum acidity (1.02%) was found under SL variety, while minimum acidity (0.44%) was recorded in G-27 variety. Gupta *et al*. (1979) observed the acidity in guava fruits increased up to 4 days of storage under room temperature condition and decreased thereafter. The findings of Aslam *et al*. (2014) in guava match these results with respect to acidity. The maximum vitamin-C (ascorbic acid) in guava fruits(289.73mg/100gm) was found in the G-27 variety, while minimum (183.53mg/100gm) was found in Lalit variety. The data pertaining to ascorbic acid indicated that there were differences in guava fruits from different varieties and their genetic makeup. Bisen *et al*. (2014) noticed that the ascorbic acid (mg/ 100gm) of the fruit pulp was increased at the time of harvesting to 2 DAH and thereafter, it decreased during further storage period in 2009-10 and 2010-11, respectively. The above findings also agree with the finding of Bashir and Abu-Goukh (2002) in guava. The data of pectin content in Guava fruits juice showed significant difference among all the cultivars. The

UNDER PEER REVIEW

maximum pectin content (1.03%) under SL variety, while the minimum (0.88%) was recorded in Lalit variety. The above findings also agrees with the finding of Deshmukh *et al*. (2013) in guava. The data of total sugar content in guava fruit juice showed difference among all the varieties. The maximum total sugar content (11.07%) was recorded under G-27 variety, while the minimum (6.74%) was recorded in Lalit variety.

Table 2. Biochemical attributes of different guava varieties.

Varieties	TSS(°B)	pH	Acidity (%)	Vitamin-C (mg/100g)	Pectin (%)	Total Sugar (%)	TSS:Acid ratio
AS	10.45	4.83	0.65	267.80	0.93	8.32	16.03
G-27	9.57	4.15	0.44	289.73	0.97	11.07	21.76
L-49	10.15	4.72	0.48	194.74	0.98	7.57	20.89
SL	11.91	4.54	1.02	239.14	1.03	9.76	11.64
Lalit	8.78	4.35	0.64	183.53	0.88	6.74	13.6
SEd±	**0.207**	**0.201**	**0.016**	**3.555**	**0.023**	**0.521**	**0.656**
C.D.(P=0.5)	**0.461**	**0.449**	**0.037**	**7.921**	**0.051**	**1.161**	**1.461**

The data of TSS: acid ratio in guava fruits showed difference among all the varieties. The maximum TSS: acid ratio (21.76) was found under G-27 variety while minimum acidity (11.64) was recorded in SL variety. The phenotypic and genetic constituents of the hybrids and cultivars might have enhanced the utilization of nutrients and accumulation of more carbohydrates into the fruits, which may be responsible for developing high value for quality traits. The present study substantiated the earlier findings of Aslam *et al*. (2014) in guava. The prevailing agro-climatic conditions of mid-hills are more favorable for quality fruit development.

Conclusion

There is a need to create and discover the promising cultivars either through selection or hybridization among the existing cultivars of the superior genotypes by including the suitable cultivars, given the economic and nutritional value of the guava under the belt region of Madhya Pradesh. With regard to physical and chemical criteria, the variants SL (Barafkhan) and G-27 have been proven to be superior in the current experiment.

Bibliography

UNDER PEER REVIEW

A.Z. Mercadante, A. Steck, H. Pander,(1999). Carotenoids from guava (Psidium guajava L): isolation and structure elucidation, J. Agric. Food Chem. 47 (1): 145–151.

C. Rojas-Garbanzo, J. Winter, M.L. Montero, B.F. Zimmermann, A. Schieber,(2019) Characterization of phytochemicals in Costa Rican guava (Psidium friedrichsthalianum-Nied.) fruit and stability of main compounds during juice processing-(U) HPLC-DAD-ESI-TQD-MSn, J. Food Compos. Anal. 75 : 26–42.

H.M. Araújo, F.F. Rodrigues, W.D. Costa, C. de Fa Nonato, F.F. Rodrigues, A.A. Boligon, M.L. Athayde, J.G. Costa(2015)., Chemical profile and antioxidant capacity verification of Psidium guajava (Myrtaceae) fruitss at different stages of maturation, Excli J. 14 :1020–1030.

Hayes W.B.(1957).Fruit Growing in India. Edn 3, Kitabistan Allahabad, 283-299.

J. Chiveu, M. Naumann, K. Kehlenbeck, E. Pawelzik,(2019) Variation in fruit chemical and mineral composition of Kenyan guava (Psidium guajava L.): inferences from climatic conditions, and fruits morphological traits, J. Appl. Bot. Food Qual. 92:151–159.

Mehta SK, Singh KK, Dev Kishan Jat and Rana DK.,(2016) Comparative studies of physico-chemical characteristics of various cultivars of guava (*Psidium guajava* L.) under sub tropical valley condition of garhwal himalaya (Uttarakhand), India. Plant Archives.,16. 1: 361-364.

Mitra SK, Bose T. (1990). Guava. In: Fruits Tropical and Subtropical. Bose, T.K. and Mitra, S.K., Eds., Naya Prakash, Calcutta,: 278-303.

Murmu SB, Mishra HN. (2018). The effect of edible coating based on Arabic gum, sodium caseinate and essential oil of cinnamon and lemon grass on guava. Food Chem. ; 245:820–8.

Murmu SB, Mishra HN. (2018). Selection of the best active modified atmosphere packaging with ethylene and moisture scavengers to maintain quality of guava during low-temperature storage. Food Chem.;253: 55–62.

UNDER PEER REVIEW

Nakasone HY, Paull RE (1998). Tropical fruits. Cab International;.

P. Moon, Y. Fu, J. Bai, A. Plotto, J. Crane, A. Chambers(2018), Assessment of fruit aroma for twenty-seven guava (Psidium guajava) ac- cessions through three fruit developmental stages, Sci. Hortic. 238 : 375–383.

Pandey D, Shukla SK, Yadav RC and Nagar AK.,(2007). Promising guava (*Psidium guajava* L.) cultivars for North Indian condition. In: *Proceedings of the first International guava Symposium* (eds. G. Singh, R. Kishun and R. Chandra). *Acta Hort*., 735: 91-94.

Patel RK, Maiti CS, Deka Bidyut C, Deshmukh NA and Roy D.,(2011). Variability studies in guava (*Psidium guajava* l.) genotypes for growth, yield and quality attributes at mid-hills of Meghalaya. *Indian Journal of Hill Farming 24(1): 25-29.*

Pedapati A, Tiwari RB, Singh AK.(2014) Effect of different osmotic pre-treatment son sensory quality of osmotically dehydrated guava slices. HortFlora Res. Spectrum.; 3: 21–28.

Raghav M. and Tiwari JP.,(2008). Genetic variability and correlation analysis in guava. *Indian J. Hort*., 65(3): 263-270.

Sanda KA, Grema HA, Geidam YA, Bukar-Kolo YM.(2011). Pharmacological aspects of *Psidium guajava*: An update. Int. J. Pharmacol.; 7(3): 316–24.

UNDER PEER REVIEW