



# COMPARATIVE STUDIES OF PHYSICO-CHEMICAL CHARACTERISTICS OF VARIOUS CULTIVARS OF GUAVA (*PSIDIUM GUAJAVA* L.) UNDER SUB TROPICAL VALLEY CONDITION OF GARHWAL HIMALAYA (UTTARAKHAND), INDIA

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## Abstract

An experiment was conducted at Horticulture Research Centre of H.N.B. Garhwal University, Srinagar Garhwal (Uttarakhand), India. This study was limited to three guava varieties viz., Allahabad safeda, Lucknow-49 and Pant Prabhat. The age of the trees under study was 10 years. The experiment was laid out in Randomized block design. The maximum fruits weight of guava (158.08gm), fruit length of guava (6.10cm), diameter of guava fruits (6.45cm), volume of fruits (160.87ml), number of seed/100gm fruit weight (146.51gm) was found in the T<sub>1</sub> (Lucknow-49) cultivar and the minimum fruit weight (108.18gm) was recorded under T<sub>3</sub> (Pant Prabhat) cultivar and maximum specific gravity of fruit (0.99ml), total soluble solids (11.82°Brix), acidity (0.60%), total soluble solids and acid ratio (44.29), total sugar content (7.38%), pectin content (0.98%), vitamin-C (ascorbic acid) in guava fruits (230.44mg/100gm) were found in T<sub>2</sub> (Allahabad Safeda) cultivar. In the present investigation, the cultivars Lucknow-49 and Pant Prabhat has been found superior with respect to physical and chemical characteristics, respectively.

**Key words :** Guava (*Psidium guajava* L.), total soluble solid, quality traits, sugar contents.

## Introduction

Guava (*Psidium guajava* L.) belong to family Myrtaceae is one of the most important fruit in India, believed to be originated in Central America and the southern part of Mexico (Somogyi *et al.*, 1996). Guava is a very popular fruit. It is available throughout the year except during the summer season. Guava fruit is known for its 'vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavour (Dhaliwal and Dhillon, 2003). The Guava fresh leaf extract (decoction) is used to treat digestive disorders like diarrhea and vomiting whereas application of powdered leaves is believed to have soothing effect in rheumatic pains. Guava is considered useful for eyes due to richness in vitamin A, good for nourishment of skin because of availability of vitamin E, antioxidants etc. Guava leaf tea is commonly used as a medicine against gastroenteritis (dysentery). Keeping in the view these problems and economic

importance of guava in developing economy of Uttarakhand. However, thorough investigation is needed to study their growth behavior, flowering, fruit setting and quality. Many of the Guava cultivars seemed to be quite promising, which also have a good future in Uttarakhand and need further investigation in terms of plant growth, fruit yield and quality attributes for proper selection of a promising cultivars. The present study entitled "Comparative studies of physico-chemical characteristics of various cultivars of guava (*Psidium guajava* L.) under valley condition of Garhwal Himalaya" was undertaken with the following objectives :

1. To evaluate the physico-chemical parameters of Guava cultivars viz., Allahabad Safeda, L-49 and Pant Prabhat.
2. To find out the most economic and nutritious cultivar of guava available in H.N.B. Garhwal University region.

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## Materials and Methods

The present investigation was carried out at Horticulture Research Centre, Department of Horticulture, H.N.B. Garhwal University (Uttarakhand), India during 2015. This study was limited to three guava varieties *viz.*, Allahabad safeda, Lucknow-49 and Pant Prabhat. The age of the trees under study was 10 years. During the month of March-April 2015, mature and ripe fruits of guava were collected randomly from selected plant in Horticultural Research Centre. 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 (ten fruits per replication from each treatment) had taken. The quality character of plant includes fruit physical characters such as fruits weight, fruit length, diameter of fruit, fruit volume, number of seeds/100gm fruit weight, specific gravity and chemical characters such as TSS, acidity, TSS: acid ratio, total sugar, pectin and vitamin-C content. The data were analyzed according to the procedure of analysis of randomized block design with four replications (Snedecor and Cochran, 1968). The significance of variation among the treatments was observed by applying analysis of variance (ANOVA) and critical difference (C.D.) test at 5% probability level.

## Results and Discussion

There was significant difference among the cultivars for fruit weight and length at harvesting stage. The maximum weight of guava fruit (158.08 gm) was found in the  $T_1$  (Lucknow-49) cultivar and minimum fruit weight (108.18 gm) was founded in  $T_3$  (Pant Prabhat). Maximum length of guava fruit (6.10cm) was found in the  $T_1$  (Lucknow-49) cultivar, while minimum length of fruit (4.94 cm) was recorded in  $T_3$  (Pant Prabhat) cultivar. Singh (1988) evaluated 25 guava cultivars under Basti (U.P.) conditions and found that the fruit weight ranged from 51.6gm in *cv.* Florida Seedling to 220gm in *cv.* Barafkhana. Mitra *et al.* (1983) evaluated eleven guava cultivars and reported that fruit length ranged between 5.8cm (*cv.* Lucknow-49 and Behat Coconut) and 4.2cm (*cv.* Seedless) under West Bengal conditions. These finding also agree with the findings of Chundawat *et al.* (1976) in guava.

Significantly the maximum diameter of guava fruit (6.45cm) was recorded under  $T_1$  (Lucknow-49) cultivar, while the minimum diameter of fruit (5.43cm) was recorded in the  $T_3$  (Pant Prabhat). Pandey *et al.* (2007) reported that among 11 guava cultivars, Pant Prabhat showed higher fruit diameter (7.13cm), followed by IHR Hybrid-21 (6.75cm). Among all cultivars the maximum

volume of guava fruit (160.87ml) was recorded in  $T_1$  (Lucknow-49) cultivar, while the minimum volume of fruit (109.14ml) was founded under  $T_3$  (Pant Prabhat) cultivar. Under Bangalore conditions fruit volume ranged from 119.40ml in TG selection 6/8 to 69.20ml in TG selection 5/5 among ten seedling progenies of Taiwan guava (Biradar and Mukunda, 2007). The findings of present study are similar to the findings of Aulakh (2005) and Raghav and Tiwari (2008) in guava.

Among all cultivars the maximum no. of seed of (146.51) was recorded under  $T_2$  (Allahabad Safeda) cultivar of guava, while the minimum no. of seed (133.45) was founded under  $T_3$  (Pant Prabhat) cultivar. Dolkar *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). There was non-significant difference among the growing sites/genotypes/cvs. for specific gravity at harvesting stage. The maximum specific gravity of guava fruit (0.99) was found in the  $T_3$  (Pant Prabhat) cultivar, while minimum was recorded (0.98) in  $T_1$  (Lucknow-49) &  $T_2$  (Allahabad Safeda) cultivar. Miano *et al.* (2010) worked on effect of different packaging materials and storage conditions on physico-chemical characteristics of guava (var. Allahabadi) in Pakistan. He reported that the results of analysis pertaining to specific gravity of fruit shows non-significant difference among all the treatments at room temperature and fridge temperature, days of storage had also no effect on this parameter. However, the maximum specific gravity of 1.244 and 1.246 was recorded in fridge under tissue papers after 4 days and 8 days storage at green stage of maturity as compare to room temperature (1.227), respectively. The present findings are similar to the findings of Deshmukh *et al.* (2013) in guava (table 1).

Among all provenances the data indicated that the various concentration of TSS showed significant difference among the provenances. The maximum total soluble solid (11.82°Brix) was recorded under  $T_3$  (Pant Prabhat) guava fruits, while minimum total soluble solid was found in the (10.14°Brix)  $T_2$  (Allahabad Safeda) cultivar. 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 data of TSS: acid ratio in guava fruits showed significant difference among all the cultivars. The maximum TSS: acid ratio (44.29%) was found under  $T_3$  (Pant Prabhat) cultivar while minimum acidity (16.92%) was recorded in  $T_2$  (Allahabad Safeda) cultivar. The phenotypic and genetic constituents of the hybrids and cultivars might have enhanced the utilization of nutrients and accumulation of more carbohydrates into

**Table 1 :** Physical characteristics of guava cultivars.

Cultivar	Fruit weight (gm)	Fruit length (cm)	Diameter of fruits (cm)	Volume of fruit (ml)	Number of seeds/ 100gm fruit weight	Specific gravity of fruit (ml)
T <sub>1</sub> (Lucknow- 49)	158.08	6.10	6.45	160.87	139.72	0.98
T <sub>2</sub> (Allahabad Safeda)	148.06	5.95	6.10	152.12	146.51	0.98
T <sub>3</sub> (Pant Prabhat)	108.18	4.94	5.43	109.14	133.45	0.99
S.Em±	4.64	0.20	0.09	5.54	1.72	0.009
CD at 5%	14.63	0.64	0.28	17.45	5.44	NS

**Table 2 :** Chemical characteristics of guava cultivars.

Cultivar	TSS (°Brix)	Acidity (%)	TSS : Acid ratio	Total sugar (%)	Pectin (%)	Vitamin-C (mg/100gm)
T <sub>1</sub> (Lucknow- 49)	10.16	0.53	19.19	7.16	0.97	195.62
T <sub>2</sub> (Allahabad Safeda)	10.14	0.60	16.92	6.98	0.93	179.36
T <sub>3</sub> (Pant Prabhat)	11.82	0.27	44.29	7.38	0.98	230.44
S.Em±	0.04	0.01	1.31	0.05	0.01	2.72
CD at 5%	0.15	0.04	4.14	0.16	0.03	8.58

the fruits, which may be responsible for developing high value for quality traits. The prevailing agro-climatic conditions of mid-hills are more favorable for quality fruit development. The present study substantiated the earlier findings of Aslam *et al.* (2014) in guava.

The data of total sugar content in guava fruits juice showed significant difference among all the cultivars. The maximum total sugar content (7.38%) was recorded under T<sub>3</sub> (Pant Prabhat) cultivar, while the minimum (6.98%) was recorded in T<sub>2</sub> (Allahabad Safeda) cultivar. Shukla *et al.* (2009) investigated the effect of integrated nutrient management under high density planting of guava (*cv.* Sardar) in Rajasthan. The combined application of 50 per cent dose of recommended NPK + 50 kg FYM + 250gm Azotobacter (T<sub>7</sub>) gave significantly higher fruit weight (153.30gm), TSS (14%), ascorbic acid (198.30mg/100gm pulp), reducing sugar (4.77%) and total sugars (8.10%). The data of pectin content in Guava fruits juice showed significant difference among all the cultivars. The maximum total sugar content (0.98%) under T<sub>3</sub> (Pant Prabhat) cultivar, while the minimum (0.93%) was recorded in T<sub>2</sub> (Allahabad Safeda) cultivar. The above finding also agrees with the finding of Deshmukh *et al.* (2013) in guava.

The data of acidity content in Guava fruit showed significant difference among all the cultivars. The maximum acidity (0.60%) was found under T<sub>2</sub> (Allahabad Safeda) cultivar while minimum acidity (0.27%) was recorded in T<sub>3</sub> (Pant Prabhat) cultivar. 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 ascorbic acid in guava fruits (230.44mg/100gm) was found in the T<sub>3</sub> (Pant Prabhat) cultivar, while minimum (179.36mg/100gm) was found in T<sub>2</sub> (Allahabad Safeda) cultivar. The data pertaining to ascorbic acid indicated that there were significant differences in guava fruits from different cultivars 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 (table 2).

## Conclusion

In view of the economic importance of the guava under the valley condition of Uttarakhand, there is a need to develop and identify the promising cultivars either through selection or hybridization among the existing cultivars of the superior genotype by involving the suitable cultivars. In the present investigation, the cultivars Lucknow-49 and Pant Prabhat has been found superior with respect to physical and chemical characteristics, respectively.

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