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Morphological screening of guava (*Psidium guajava* L.) hybrids

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Abstract
An investigation entitled "Morphological screening of guava (*Psidium guajava* L.) hybrids" was conducted during the year *Rabi*-2016 at Horticultural Research cum Demonstration Farm, Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand to estimate morphological parameters of guava hybrids. In the experiment undertaken, fourteen guava (*Psidium guajava* L.) hybrids were evaluated for selected thirty-eight morphological characters using CRD in three repetitions. Out of which, eight characters of matured leaves of guava hybrids are presented here. The experimental results showed that the strong curvature was recorded for Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Mishri, Local Red x Matchless and Allahabad Safeda x Exotica, the twisting present was recorded for Local Red x Allahabad Safeda, Local Red x Matchless and Allahabad Safeda x Tehsildar, the curvature of midrib of leaf present was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Dholka, Local Red x Mishri, Allahabad Safeda x Matchless, Allahabad Safeda x Mishri and Allahabad Safeda x Tehsildar, the variegation of leaf was found absent for all guava hybrids, the colour of midrib on lower side of leaf was observed cream for all guava hybrids, the relief of surface on upper side of leaf was recorded smooth for all guava hybrids, the cordate shape of leaf base was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Chittidar, Local Red x Banarasi Surkha, Allahabad Safeda x Tehsildar and the Obtuse shape of leaf tip was recorded for Local Red x Chittidar, Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Banarasi Surkha, Local Red x Matchless, Allahabad Safeda x Matchless, Allahabad Safeda x Tehsildar.

Keywords: Morphological screening, matured leaves, repetitions, experimental results, curvature, twisting, colour, shape, hybrids

1. Introduction
Guava (*Psidium guajava* L.) belonging to Myrtaceae family is native of America: However, it was introduced to another region of the world where it is cultivated nowadays. It is an important tropical commercial fruit crop of India. It is also known as "Apple of the tropics", *amarood*, *jamphal* or *jamrukh* in Hindi in India. Guava is the fourth most important fruit crop in India after Mango, Citrus and Banana (Ray, 2002) [11]. Guava is the hardiest among tropical fruit trees and excels most of the other fruit crops in productivity and adaptability. It can resist water logged condition to a greater extent than other fruit crops. It can also withstand temperature up to 45° C. In India it occupies a cultivated area of 251.02 thousand hectares with an annual production of 4083.26 thousand tones with average productivity of 16.3 tones ha-1 (Anon., 2015a) [1]. The fruit is extensively grown in Uttar Pradesh, Bihar, Madhya Pradesh, Gujarat, West Bengal, Orissa and Tripura. However, Uttar Pradesh is an important guava producing state and Allahabad has the reputation of growing the best guava in the world. In Gujarat, guava occupies about 10.81 thousand hectares with production of 140.8 thousand tones and productivity is 13.30 tones ha-1 (Anon., 2015b) [2]. It is grown widely in many districts of Gujarat particularly in Bhavnagar, Baroda, Kheda, Mehsana, Anand, Gandhinagar and Kutch. Genus *Psidium* contains about 150 species (Hayes, 1974) [6]. All cultivated varieties of guava are either diploid 2n=2x =22 or triploid 2n=3x =33 (Atchinson, 1947) [3]. In guava, most of the commercial varieties are reported to be diploids, except the seedless types which are triploids. A natural triploid was reported by Kumar and Ranade (1952) [7], but most of them are shy bearers (Menzel, 1985) [9]. Guavas are symmetrically dome-shaped with broad, spreading, low branching canopy, shallow-rooted shrubs reaching a height of up to 33 feet (Morton, 1987) [7]. They can be easily recognized by the smooth, mottled green or copper-colored bark that peels off in thin flakes, showing the attractive "bony" aspects of its trunk (Yadava, 1996) [13]. It is a popular fruit of India due to its delightful taste, flavour and easy availability. The lycopene content in fruit has been found to give rise to the pink flesh, which contains 3 mg of carotene/100g of fruit.

The young fruits are rich in tannin. The tartness of guavas has been ascribed to the pH of around 3-4, which is largely due to the presence of maleic and citric acids. Over 15 compounds have been identified in the volatile flavor constituents of guavas (Chan *et al.* 1971) [4]. Guava is used for preparation of jams, jellies, juices, cakes, pies, ice-cream, milk shakes, sauces, butter, cheese, marmalade, chutney, relish, pickle, puree, beverages, ethanol, wine, animal feed, baby food, soft-drinks, as source of pectin, etc. Moreover, guava scores over other fruits in ascorbic acid, pectin and other mineral contents. Guava cultivars however, display a greater diversity in tree size, bearing habit and yield, fruit size, shape, quality and ripening season.

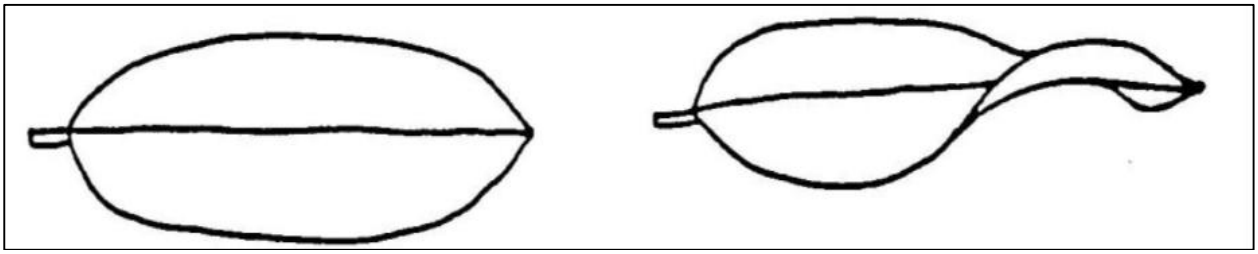
2. Materials and Methods

The present findings "Morphological screening of guava (*Psidium guajava* L.) hybrids" was carried out on 14 different hybrids of guava, planted on 09-08-2012 and maintained at Horticultural Research-cum-Demonstration Farm, Department of Horticulture, B. A. College of Agriculture, Anand during the *Rabi*-2016. The climate of Anand region represents a typical tropical climate and soil of the experimental field was sandy loam, locally known as '*Goradu'*.

Table 2.1: Explanation of table of characteristics

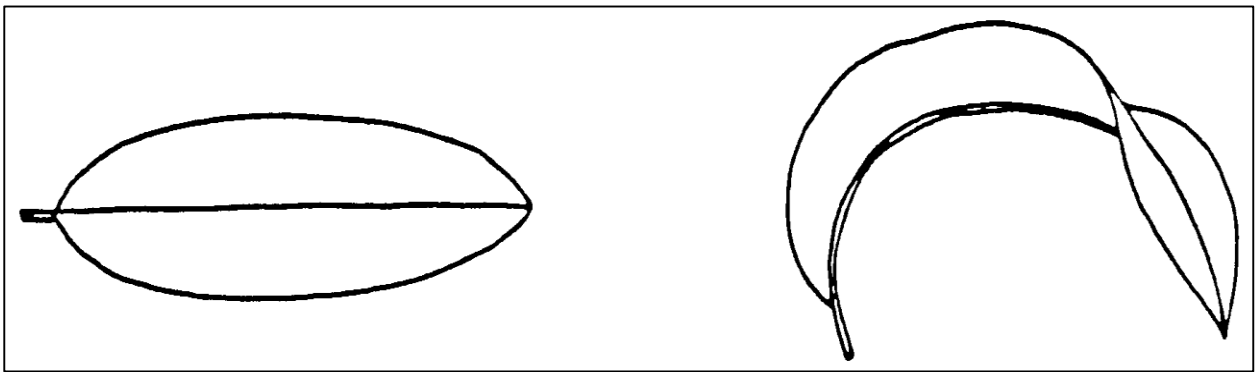
S. No.	Characteristics	States
1.	Fully developed leaf: curvature in cross section	Weak, Medium or Strong
2.	Fully developed leaf: twisting	Absent or Present
3.	Fully developed leaf: curvature of midrib	Absent or Present
4.	Fully developed leaf: variegation	Absent or Present
5.	Fully developed leaf: colour of midrib on lower side	Cream, Yellow or Reddish
6.	Fully developed leaf relief of surface at upper side	Smooth, Medium or Wrinkle
7.	Fully developed leaf: shape of base	Obtuse, Rounded or Cordate
8.	Fully developed leaf: shape of tip	Acute, Obtuse or Rounded

It is alluvial by its origin and very deep, well drained and with fairly good moisture holding capacity. The experiment was laid out in Completely Randomized Design with fourteen hybrids. Hybrids act as treatment and each plant from treatment like repetition. Five leaves of similar size and same age were collected randomly from each repetition from all fourteen hybrids as sample for assessment of various morphological parameters. Curvature in cross section of leaf was observed visually based on leaf curve and recorded as weak, medium or short and twisting present in leaf was observed visually based on leaf twisting and recorded as present or absent. Curvature of midrib of leaf was observed visually based on leaf curve and recorded as present or absent and variegation present in leaf was recorded visually based on leaf appearance and expressed as present or absent. Colour of midrib present on lower side of leaf was observed visually based on leaf midrib and expressed as cream, yellow or reddish and relief of surface on upper side of leaf surface was observed visually and recorded as smooth, medium or wrinkled. Shape of leaf base was observed visually based on leaf margin at base and recorded as obtuse or rounded and shape of tip of leaf was observed visually based on leaf margin at tip and recorded as acute, obtuse and rounded.



Absent **Present**

Fig 1: Fully developed leaf: twisting



Absent **Present**

Fig 2: Fully developed leaf: curvature of midrib

Absent **Present**

Fig 3: Fully developed leaf: variegation

3. Result and Discussion

All Fourteen hybrids were evaluated for eight morphological characters of matured leaf.

Matured leaf: Curvature in cross section

Curvature in cross section of leaf of different guava hybrids was ranged from weak to strong (Table 3.1). The strong curvature was recorded for Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Mishri, Local Red x Matchless and Allahabad Safeda x Exotica. While weak curvature in cross section was recorded Allahabad Safeda x Local red and Allahabad Safeda x Tehsildar. Whereas medium curvature in cross section was recorded for rest of guava hybrids.

Allahabad Safeda x Local Red Allahabad Safeda x Apple Colour Allahabad Safeda x Exotica Allahabad Safeda x Matchless

Fig 4: Morphological variation in curvature in cross section of mature leaves of guava hybrids

Local Red x Allahabad Safeda Allahabad Safeda x Dholka Local Red x Matchless Allahabad Safeda x Tehsildar

Fig 5: Morphological variation in shape of mature leaves of guava hybrids

Table 3.1: Summery of various qualitative characters of mature leaves of guava hybrids

S. No.	Hybrids	Curvature in cross section	Twisting	Curvature of midrib	Variegation	Colour of midrib on lower side	Relief of surface on upper side	Shape of base	Shape of tip
1.	Allahabad Safeda x Local Red	Weak	Absent	Absent	Absent	Cream	Smooth	Rounded	Acute
2.	Local Red x Allahabad Safeda	Medium	Present	Absent	Absent	Cream	Smooth	Rounded	Acute
3.	Allahabad Safeda x Apple Colour	Medium	Absent	Present	Absent	Cream	Smooth	Cordate	Acute
4.	Allahabad Safeda x Chittidar	Medium	Absent	Absent	Absent	Cream	Smooth	Cordate	Acute
5.	Local Red x Chittidar	Medium	Absent	Absent	Absent	Cream	Smooth	Rounded	Obtuse
6.	Local Red x Dholka	Strong	Absent	Absent	Absent	Cream	Smooth	Rounded	Obtuse
7.	Allahabad Safeda x Dholka	Strong	Absent	Present	Absent	Cream	Smooth	Rounded	Obtuse
8.	Local Red x Banarasi Surkha	Medium	Absent	Absent	Absent	Cream	Smooth	Cordate	Obtuse
9.	Local Red x Mishri	Strong	Absent	Present	Absent	Cream	Smooth	Rounded	Acute
10.	Local Red x Matchless	Strong	Present	Absent	Absent	Cream	Smooth	Rounded	Obtuse
11.	Allahabad Safeda x Exotica	Strong	Absent	Absent	Absent	Cream	Smooth	Rounded	Acute
12.	Allahabad Safeda x Matchless	Medium	Absent	Present	Absent	Cream	Smooth	Rounded	Obtuse
13.	Allahabad Safeda x Mishri	Medium	Absent	Present	Absent	Cream	Smooth	Rounded	Acute
14.	Allahabad Safeda x Tehsildar	Weak	Present	Present	Absent	Cream	Smooth	Cordate	Obtuse

Matured leaf: Twisting

Twisting of leaf was ranged from present to absent. The twisting present was recorded for Local Red x Allahabad Safeda, Local Red x Matchless and Allahabad Safeda x Tehsildar (Table 3.1). Whereas twisting absent was recorded for rest of guava hybrids.

Matured leaf: Curvature of midrib

Curvature of midrib of leaf was ranged from present to absent. The curvature of midrib of leaf present was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Dholka, Local Red x Mishri, Allahabad Safeda x Matchless, Allahabad Safeda x Mishri and Allahabad Safeda x Tehsildar (Table 3.1). The curvature of midrib absent was recorded for rest of guava hybrids.

Matured leaf: Variegation

Variegation in leaf was ranged from present to absent. The variegation in leaf was observed absent for all guava hybrids (Table 3.1).

Matured leaf: Colour of midrib on lower side

Colour of midrib on lower side of leaf was ranged from cream to reddish (Table 3.1). The colour of midrib on lower side of leaf was observed cream for all guava hybrids. These results were in close conformity with finding of Singh (2013) [12].

Matured leaf: Relief of surface on upper side

Relief of surface on upper side of leaf was ranged from smooth to wrinkled. The relief of surface on upper side of leaf was recorded smooth for all guava hybrids (Table 3.1). Similarly, Singh (2013) [12] noted that most of the genotypes showed smooth surfaced leaves, whereas genotypes Portugal, 16-11, 17-16, 19-3 and 30-9 had medium rough leaf surface.

Matured leaf: Shape of base

Shape of leaf base was ranged from Rounded to cordate. The cordate shape of leaf base was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Chittidar, Local Red x Banarasi Surkha, Allahabad Safeda x Tehsildar. Whereas rounded type shape of leaf base was recorded for rest of guava hybrids (Table 3.1). Similar kind of variation for shape of leaf base for different *Psidium* genotypes was also observed by Singh (2013) [12] and Dubey *et al.* (2016) [5].

Matured leaf: Shape of tip

Shape of leaf tip was ranged from Acute to rounded. The Obtuse shape was recorded for Local Red x Chittidar, Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Banarasi Surkha, Local Red x Matchless, Allahabad Safeda x Matchless, Allahabad Safeda x Tehsildar (Table 3.1). Whereas acute type shape was recorded for rest of guava hybrids. Similar kind of variation for shape of tip for different *Psidium* genotypes was also observed by Mani *et al.* (2011) [8] Singh (2013) [12] and Dubey *et al.* (2016) [5].

Local Red x Dholka | **Local Red x Banarasi Surkha** | **Local Red x Matchless** | **Allahabad Safeda x Mishri** | **Allahabad Safeda x Tehsildar**

Fig 6: Morphological variation in shape of base of mature leaves of guava hybrids

Local Red x Allahabad Safeda | **Local Red x Mishri** | **Local Red x Matchless** | **Allahabad Safeda x Matchless** | **Allahabad Safeda x Mishri**

Fig 7: Morphological variation in shape of tip of mature leaves of guava hybrids

4. Conclusion

Study of eight morphological parameters revealed that guava (*Psidium guajava* L.) hybrids possess strong curvature in cross section of leaf was recorded for Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Mishri, Local Red x Matchless and Allahabad Safeda x Exotica. Whereas twisting present was recorded for Local Red x Allahabad Safeda, Local Red x Matchless and Allahabad Safeda x Tehsildar. The curvature of midrib of leaf present was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Dholka, Local Red x Mishri, Allahabad Safeda x Matchless, Allahabad Safeda x Mishri and Allahabad Safeda x Tehsildar and variegation in leaf was observed absent for all guava hybrids. The colour of midrib on lower side of leaf was observed cream for all guava hybrids while relief of surface on upper side of leaf was recorded smooth for all guava hybrids. The cordate shape of leaf base was recorded for Allahabad Safeda x Apple Colour, Allahabad Safeda x Chittidar, Local Red x Banarasi Surkha, Allahabad Safeda x Tehsildar. Whereas rounded type shape of leaf base was recorded for rest of guava hybrids whereas Obtuse shape of leaf tip was recorded for Local Red x Chittidar, Local Red x Dholka, Allahabad Safeda x Dholka, Local Red x Banarasi Surkha, Local Red x Matchless, Allahabad Safeda x Matchless, Allahabad Safeda x Tehsildar.

5. References

1. Anonymous. Horticultural Statistics at a Glance, 2015a. Retrieved from http://www.nhb.gov.in
2. Anonymous. Horticulture Department, Gujarat State, Gandhinagar. 2015b, 47-49. Retrieved from https://agri.gujarat.gov.in/horticulture-mission.htm
3. Atchison E. Chromosome numbers in the Myrtaceae! American Journal of Botany, 34 (Special issue), 1947, 159-164.
4. Chan HT, Brekke JE, Chan T. Nonvolatile organic acids in Guava! Journal of Food Science. 1971; 36:237-239.
5. Dubey MC, Kumar R, Kumar J, Kumar A. Morphological and physico-chemical characteristics of guava genotypes! Research on Crops. 2016; 17(2):276-282.
6. Hayes WB. Fruit growing in India. Kitabistan, Allahabad, 1974. http://www.fruitipedia.com/guava.htm
7. Kumar LSS, Ranade SG. Auto-triploidy in guava (*Psidium guajava* Linn.)! Current Science. 1952; 21:75-76.
8. Mani A, Mishra R, Thomus G. Eloci-dation of Diversity among *Psidium species* using morphological and SPAR methods! Journal of Phytology. 2011; 3(8):53-61.
9. Menzel CM. Guava: An exotic fruit with potential in Queensland! Queensland Agriculture Journal. 1985; 111(2):93-98.
10. Morton J. Guava. In Fruits of warm climates. In J. F. Morton & Miami (Eds), School-based play therapy, 2nd ed., 1987, 356-363.
11. Ray PK. Breeding tropical and subtropical fruits. Narosa publishing house, New Delhi, 2002, 143-155.
12. Singh D. Morphological and molecular characterization of guava (*Psidium guajava* L.) germplasm and hybrids! (Doctoral thesis, Punjab Agricultural University, Ludhiana), 2013.
13. Yadava UL. Guava: An exotic fruit tree with potential in Southeastern USA! Horticultural Science, (in press), a1996, 30.