

Development of hybrids in Guava (*Psidium guajava* L.)

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Received : January, 2011; Accepted : March, 2011

SUMMARY

To develop guava hybrids having few soft seeds with good fruit quality, hybridization involving superior genotypes was undertaken at Horticultural Farm, B. A. College of Agriculture, Anand Agricultural University, Anand. Out of Nineteen crosses made, the seedlings of fourteen crosses were well established in the field. The six hybrids flowered and fruits were harvested from five hybrids and evaluated for fruit characteristics. The fruit of hybrid "Anand Selection (Red) x Exotica" was large in size with pleasant flavour having high T.S.S. with soft seeds.

Patel, D.A., Patel, H.C., Saravaiya, S.N., Koladiya, P.B. and Patel, B.N. (2011). Development of hybrids in Guava (*Psidium guajava* L.). *Internat. J. Plant Sci.*, 6 (2): 237-239.

Key words : Guava, Hybrids, Fruit characteristics

Guava (*Psidium guajava* L.) is one of the important tropical fruits of India. It is often referred as 'apple of tropics' because of its nutritive value. It is rich in vitamin-C and is a fair source of useful minerals such as calcium, phosphorus and iron. Though guava fruit is nutritive and sells at moderate prices, it is not quite popular as a dessert fruit, mainly because of its seediness, the seeds being numerous and hard. The number of seeds varies in different diploid varieties from 300 to 500 per fruit (Shanker, 1967), while the fruits of seedless varieties are parthenocarpic with irregular shape and the trees are shy bearers and over-vigorous (Negi and Rajan, 2007). Moreover, the strong flavour and short shelf life are another limiting factors for the development of domestic and export market of guava (Zipori *et al.*, 2007).

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So development of soft and few seeded (10-20 seeds per fruit) or Seedless guava with good shape and pleasant flavour is highly imperative to enhance the demand and income for this 'tropical apple'. Hence, the present investigation was made to develop guava hybrids having less and soft seeds with agreeable flavour, taste and sweetness.

MATERIALS AND METHODS

The present study was undertaken at Horticultural Farm, B. A. College of Agriculture, Anand Agricultural University, Anand. Different guava genotypes maintained at Horticultural Farm have wide range of variability for pulp colour (white, red and pink), seed type (soft and hard), seed arrangement (dense, few and scattered), fruit taste and flavour. Using existing variability in germplasm, hybridization programme involving superior genotypes was undertaken for four years. The important characteristics of parents involved in hybridization are given in Table 1. The cross fruits were harvested and seeds were sown in polythene bags in nursery. The well developed hybrid seedlings were then planted in the field. The visual observations were taken for the growth, flowering and fruiting of hybrids established in the field. All cultural practices were adopted during the period of investigation.

RESULTS AND DISCUSSION

Large scale hybridization was carried out at Horticultural farm, B. A. College of Agriculture, AAU, Anand. Using superior genotypes of guava, fourteen crosses were made during three years. Crossed fruits were obtained in all the crosses and hybrid seedlings were

Table 1: Important characteristics of parents involved in hybridization

Sr. No.	Genotypes	Important features
1.	Apple colour	Medium size fruit, peel colour pinkish at maturity, very sweet taste, keeping quality good, number of seeds medium
2.	Exotica	Pink colour of flesh, less seeded, sweet taste and pleasant flavour
3.	Allahabad Safeda	Commercially grown cultivar, tree vigorous with heavy branches, fruit big size, flesh sweet and soft, seeds few but hard
4.	Lucknow-49	Commercially grown cultivar, tree vigorous with heavy branches, sweet taste, high yielding, excellent keeping quality, seeds soft and plenty
5.	Dholka	Popular variety of Gujarat, fruits medium size, sweet taste, heavy bearer, good keeping quality, seeds soft and plenty
6.	Bhavanagar selection	Fruits small and in cluster, heavy bearer, seeds soft and plenty
7.	Anand selection (Red)	Local selection, fruit medium size, flesh reddish and soft, seeds many and soft, pleasant flavour
8.	Seedless	Fruits are medium size, practically no seeds or very few seeds, sweet taste, irregular shape, good keeping quality
9.	Chittidar	Fruit medium size, flesh light pink, sweet taste, seeds are plenty but very soft
10.	Matchless	Fruit medium to big size, seeds hard and arranged centrally, good keeping quality

established in the field. Out of 14 crosses made, the maximum hybrid seedlings were established in the cross Anand Selection (Red) x Exotica, which might be due to higher number of seeds in the female parent Anand Selection (Red). Sufficiently large number of hybrid

seedlings were also established in the cross Exotica x Apple Colour, Apple Colour x Chittidar and Apple Colour x Matchless (Table 2).

One seedless variety of guava is maintained at Horticultural farm, which is shy bearer with abnormal

Table 2 : Crossing programme in guava using selected genotypes

Sr. No.	Name of cross	No. of crosses made	No. of fruits harvested	No. of hybrid seedlings established in the field
Crosses made during 1st year				
1.	Apple Colour x Allahabad Safeda	52	11	03
2.	Apple Colour x Dholka	32	07	03
3.	Allahabad Safeda x Dholka	15	02	03
Crosses made during 2nd year				
4.	Apple Colour x Bhavnagar Selection	12	02	07
5.	Exotica x Apple Colour	24	08	30
6.	Anand Selection (Red) x Exotica	56	12	106
Crosses made during 3rd year				
7.	Apple Colour x Chittidar	41	07	27
8.	Apple Colour x Matchless	49	08	27
9.	Apple Colour x Lucknow-49	46	05	05
10.	Apple Colour x Anand Selection (Red)	30	02	03
11.	Exotica x Chittidar	28	03	06
12.	Exotica x Allahabad Safeda	38	04	09
13.	Exotica x Lucknow-49	32	06	15
14.	Exotica x Anand Selection (Red)	14	01	02
Crosses made during 4th year				
1.	Seedless x Exotica	119	56	-
2.	Seedless x Anand Selection (Red)	91	15	-
3.	Seedless x Apple Colour	119	34	-
4.	Seedless x Chittidar	115	35	-
5.	Seedless x Matchless	42	10	-

fruit shape. With a view to develop aneuploid having seedless/few seeded fruit with regular shaped and desirable fruit quality, five new crosses involving seedless (as female parent) and normal diploid variety (as male parent) were made during fourth year. Sufficiently large numbers of crossed fruits were harvested from five new crosses of seedless type. The number of seeds in the crossed fruits was very less, however, seeds could not germinate in the nursery. Negi and Rajan (2007) made crosses between seedless triploid and seeded diploid variety Allahabad Safeda and obtained several aneuploids.

Some of the hybrids viz., Anand Seleccion (Red) x Exotica, Exotica x Apple Colour showed considerable hybrid vigour. Normally in guava, juvenile phase is observed and plant raised from seeds flower after 3 to 4 years. However, in some of the hybrids particularly Anand Selection (Red) x Exotica, flowering and fruiting were

Table 3 : Number of plants showing flowering in various crosses

Sr. No.	Name of cross	No. of plants showing flowering
1.	Apple Colour x Allahabad Safeda	02
2.	Apple Colour x Dholka	02
3.	Allahabad Safeda x Dholka	02
4.	Apple Colour x Bhavnagar Selection	05
5.	Exotica x Apple Colour	11
6.	Anand Selection (Red) x Exotica	57

observed after one and half year. The hybrids showing flowering were depicted in Table 3.

Out of six hybrids showing flowering, five hybrids were in fruiting stage. Fruits of five hybrids were harvested and evaluated for different morphological and quality parameters. The details fruit characteristics of hybrids are as under.

Apple Colour x Allahabad Safeda:

The fruit of hybrid was round in shape and large in size (260 g) as against parents Apple Colour (155 g) and

Allahabad Safeda (156 g). Fruit skin was rough just like Apple Colour. Fruit colour was greenish yellow when ripe. Rind was thick. Pulp colour was white. Taste was sweet. T.S.S. of hybrid fruit was 14.1 % as against Apple Colour 13.5% and Allahabad Safeda 12.7%. Seeds were many (213), big size and hard. Seeds were scattered throughout the pulp.

Apple Colour x Dholka:

The fruit of hybrid was oblong in shape and of medium size (200 g). Fruit skin was yellowish green and smooth. Pulp was yellowish white in colour having mixed taste, more sweet and slight acidic. T.S.S. was 13.1 %. Seeds were many (197), medium size and hard. Seeds were arranged centrally.

Allahabad Safeda x Dholka:

The fruit of this hybrid was round to oblong in shape and large size (225 g). Fruit skin was greenish yellow and rough surface. Rind was thick. Pulp white in colour with very sweet taste. Seeds were many (263), medium to big size and hard.

Apple Colour x Bhavnagar Selection:

Fruit shape was oblong and fruit size was medium (185 g). Skin was greenish yellow and rough. Rind hard and thick with white pulp. The taste was sweet. Seeds were many (235), big size and hard.

Anand Selection (Red) x Exotica:

Fruit shape was oblong to round and it was of large size (240 g) as compared to both the parents. Skin colour was yellowish green and fruit surface was smooth. Rind was slightly thick. Pulp colour was reddish to light pink. Fruit taste was sweet with pleasant flavour. T.S.S. content was 15.4 %. Seeds were arranged centrally and were of medium number (156) and soft.

The above results are in conformity with Patel *et al.* (2007) who found guava hybrid with high sweetness, less seed content and soft flesh texture.

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