Varieties of pomegranate (Punica granatum) in India

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Abstract

Pomegranate (Punica granatum L.) belongs to the family Punicaceae. It is an important fruit due to its nutritional and medicinal properties. Pomegranates are widely distributed around the world and, therefore, have a broad genetic diversity, resulting in differences in their physico-chemical parameters. The scientific community has focused on the disease and pest tolerance as well as having high yielding potential. This review aims to provide holistic information of the different varieties of pomegranate developed by state agricultural university and ICAR research institute in India. This review intends to provide a information regarding cultivar growing in all over India. Varietal difference, characteristics of varieties, yield potential and quality parameters of fruits.

Keywords: Aril, Anardana, Solapur lal, punicaceae, biofortified variety, pomegranate

Introduction

Pomegranate is one of the oldest known edible fruits and is capable of growing in different agro-climates ranging from tropical to temperate regions of the world. It is cultivated throughout the world in different micro-climatic zones of sub-tropical and tropical regions. In Western Himalayas, it grows up to 1600-3330 m above mean sea level. Contrary to this, good quality pomegranate fruits are produced in Deccan Plateau between altitudes of 270 and 900 m above mean sea level. It is well known that arid regions have vast potential for its intensive cultivation and quality fruit production with assured irrigation. India is the world’s leading countries in pomegranate production. The statistics on acreage and production of pomegranate are not available with Food and Agriculture organization at global level, however, estimated global cultivated area under pomegranate is around 282000 ha and production 3216000 MT. In India pomegranate is extensively grown in Maharashtra, Karnataka, Andhra Pradesh, Gujarat, and is picking up fast in, Himachal Pradesh, Rajasthan and Madhya Pradesh. Small areas are under cultivation in Tamil Nadu, Mizoram, Odissa, Nagaland, Lakshedweep, Jharkhand and Jammu and Kashmir. As per recent advance estimates for the year 2021-22. Total area in Maharashtra under pomegranate is 166,20000 ha and production is 1764000 Toones. (First Advance Estimates According to 2021-22).

Today, more than 500 varieties of pomegranates are being grown throughout the world (Kahramanoglu and Usanmaz, 2016) [8]. This review paper summarizes the varietal difference of pomegranate in India.

I. Ganesh

Also known as GBG-1 and selected by Dr. Cheema in 1936. A soft seeded selection from open pollinated seedlings of hard seeded Alandi. Later, in 1970, it was renamed as ‘Ganesh’. Tree is evergreen with spreading habit. Flowering throughout the year; crop duration 140-150 days under Maharashtra condition. Fruit is round and smooth, pinkish yellow to reddish yellow rind colour, having soft seeds and light pink arils fruits weighing between 225 to 250 gm, with T.S.S. 16°B with acidity of 0.3%. The arils of this cultivar are sweet in taste with pink color in winter months and are whitish in warmer months. The juice percent showed variation which was 52.8% in mrig bahar and 51.5% in ambe bahar. The variety is susceptible to fruit borer (18.55%), leaf spot (PDI-15.72) and fruit spot (PDI-22.86). It is grown extensively in Pune, Solapur and Satara districts of Maharashtra.
2. Solapur Lal
Variety developed by ICAR-NRCP Solapur, (MS) crossing of Bhagawa x [(Ganesh x Nana) x Darul]. Solapur Lal is also known as a Biofortified pomegranate. It requires 160-165 days for maturation of fruits. It matures 15-20 days earlier than Bhagawa var., No. of fruits/tree 130-140, yield Potential 35-39 kg/tree, Fruit size is slightly lesser than Bhagawa, Aril & Rind colour is deep red, thickness of rind is medium, Vit. C, Anthocyanins, Iron and Zinc contents are significantly higher than Bhagawa var., TSS is 17.5-17.7° Brix, Seed texture is Harder than Bhagawa. Variety mainly used for Processing (Juice, value addition) and Table purpose.

3. CAZRI Vishal
It is a cross between Ganesh x Khog released by Central Arid Zone Research Institute Jodhpur in 2020. Plants are medium in height, semi vigorous and spreading habit. It is an early maturing variety with attractive yellowish red colour and very soft seeds. The yield potential is about 20-25 kg/plant after five years of planting. Economic yield commences from fourth year onwards.

4. G-137
It was released by Mahatme Phule Krishi Vidhyyapeeth Rahuri in the year 1989. It is the results of Clonal selection from open pollinated variety Ganesh. Sawant (1973) identified four superior clones from clonal population of Ganesh i.e., G - 107, G - 132, G - 133 and G - 137. Their evaluation showed that although yield differences were negligible, G - 137 was superior to Ganesh in respect of skin and aril colour, aril size and TSS (Keskar et al., 1989,1990) [6,7] and, therefore, it was recommended for released (Anon., 1986) [1]. This variety is cultivated to a limited extent in Maharashtra state. The growth habit of tree is spreading type with evergreen nature. The tree flowers throughout the year with three main flushes. Fruit is round and smooth and reddish yellow in colour. Fruit weight was maximum in mrig bahar (270 g), whereas, in ambe bahar it was 232 g / fruit. Arils are sweet in taste with light pink in color. The juice percent showed variation which was 55.2 percent in mrig bahar and 54.9 percent in ambe bahar. T.S.S. of the juice observed to be 17.0° Brix in mrig bahar and 17.4° Brix in ambe bahar. The acidity in mrig bahar was found to be 0.49 percent and 0.42 % in ambe bahar. Seeds were found to be soft and softest in ambe bahar (1.04 kg/cm² pressure) compared to mrig bahar seeds (1.27 kg cm² pressure). The variety is susceptible to fruit borer (20.42%), leaf spot (PDI-18.45) and fruit spot (PDI-31.74).
5. P-23
It was released by Mahatma Phule Krishi Vidyapeeth, Rahuri in the year 1986-87. Selection from the orchards of Muskat variety around Kolhar/Shirdi region. Fruits are smooth, yellow with red tinge, round in shape, arils are light pink in colour. Average weight of fruit is 340.00 g. Seed mellowness is 1.48 kg/cm² TSS (16.50%), acidity is 0.50%. Productivity (t/ha) 9.28. Resistant to the water stress, variety is most suited for plantation in medium soil, highly susceptible to the fruit borer & nematode, moderately susceptible to leaf spot & fruit spot.

6. P-26
It was released by Mahatma Phule Krishi Vidyapeeth, Rahuri in the year 1986-87. Fruits are smooth, yellow with red tinge, round in shape arils are light pink in colour. Selection from Muskat variety. Average weight of fruit is 315.00 gm. TSS (15.50%), acidity 0.45%. Seed mellowness is 1.42 kg/cm². Resistant to the water stress. Productivity (t/ha) 9.85. Variety is most suited for plantation in medium soil. Highly susceptible to the fruit borer & nematode, moderately susceptible to leaf spot & fruit spot.

7. Mridula
It was released by Mahatma Phule Krishi Vidyapeeth, Rahuri in the year 1994. Var. suitable for Light to medium Soil type and Dry weather, Less humidity Climatic condition. Plant is an evergreen bush in nature with dark green foliage and spiny branches. Male, hermaphrodite and intermediate flowers are observed. It flowers in all three seasons. Fruits are medium in size (300-350 g) with reddish brown skin colour. The arils (sarcotesta) are deep blood red in colour, soft, and sweet in taste. Productivity (t/ha) 10.62. Variety is suitable for long distant market. Resistant to the water stress condition and well suited for arid region.

8. Phule Arakta
Released in Research Review Committee and Joint Agresco meetings during 2003 by MPKV, Rahuri. It is selection from F-2 progeny of cross between Ganesh x Gul-e-Shah Red, a Russian cultivar. It is reported that it has acreage next to Ganesh and this is the most sought-after variety among farmers. It is a heavy yielder with fruit maturity of 130-140 days only. The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and glossy; dark brick red in colour; arils are sweet in taste with dark red in color. Fruits are medium in size (182.70 g). Rind thickness is 0.24 cm. Seeds are soft (Mellowness – 1.12 kg/cm²). Fruits are more juicy (63.71%) with 15.89% T.S.S. and 0.45% acidity. Maximum anthocyanin content (55.50 mg/100g). Fruit yield 29.83 kg/tree, 220.74 q/ha and average number of fruits per tree 78-90. The variety is suitable for both export and domestic market. The variety is susceptible to fruit borer (21.50%), leaf spot (PDI-17.02) and fruit spot (PDI-18.43).

9. Bhagwa
It was released by Mahatma Phule Krishi Vidyapeeth, Rahuri in the year 2003. Variety suitable for light to medium soil and dry weather with less humidity climatic requirement. Fruits are bigger in size (405.00 – 420.00 g). Fruit surface is glossy & attractive saffron rind colour, rind thickness is 0.35 cm, seeds are soft, days for maturity (180-190). Productivity (t/ha) 22.50. Resistant to internal breakdown. Variety is suitable for export in European and domestic market. Moderately susceptible to thrips, leaf spot and fruit spot.
10. Phule Bhagwa Super
Variety suitable for light to medium type of soil and dry weather with less humidity developed by MPKV Rahuri in the 2013. Fruits are medium in size (271.00 – 299.00 g). Fruit surface is glossy, having attractive dark saffron rind colour, rind thickness is 0.35 cm, and seeds are soft. Fruits are more juicy (51.34%) with maximum anthocyanin content (53.12mg/100g). Days for maturity are 176.60. Fruit yield 30.6 kg/tree. Productivity (t/ha) 22.65. Attractive and glossy peel increasing its market value, dark red coloured and attractive arils. Suitable for both export and domestic market.

11. Phule Anardana
It was released by Mahatma Phule Krishi Vidyapeeth, Rahuri in the year 2015. Fruits are more acidic, arils are bold and blood red in colour, highly suited for preparation of anardana. Fruits are medium sized, attractive red surface, recovery of anardana is 13.95% and anardana yield is about 1.58 kg/plant.

12. Jalore Seedless
Clonal selection from Ahore area of Jalore by Central Arid Zone Research Institute Jodhpur. Popular variety of Rajasthan, fruits round fruit, yellow with red tinge in colour, aril colour light pink to pink, juicy, taste sweet. TSS 15-16˚ Brix Arils are light pink in colour. It is soft seeded variety and plants semi vigours.
13. Jyoti (GKVK-1)
It is a open pollinated seedlings of Bassein Seedless and Dhokla developed by University of Agricultural Sciences Dharwad in the year 1985. The fruits are medium to large sized, having attractive, yellowish red, more fleshy and pink aril. Fruits are very sweet, soft seeded and taste good. It yields moderately.

14. Yercaud-1
Horticulture Research Station, Yercaud, Tamil Nadu has developed this variety through selection. Sayed et al. (1985) \cite{15} reported that a clone Acc. No. 455 had outstanding performance in Tamil Nadu. Later on, this was released as Yercaud-1. Fruits of this selection are of medium size with easily peelable rind. The seeds are soft with attractive deep purple arils.

15. Moga-Local
The plants are upright, spreading and bear profusely. It is very popular in Punjab and one plant produced 50 fruits weighing 180 g each. The skin of the fruit is creamy-yellow with pink blush. Arils develop pink colour; TSS 16\(^{0}\)B, acidity 0.67\% and seeds are hard.

16. RCR-1
Rama et al. (1996) \cite{14} reported a new seedless selection “RCR-1” from cv. “Alandi”. It gave 267 fruits per tree in 10th year with average fruit weight of 220 g per fruit and average yield of 58.7 kg fruit/tree.

17. CO-1
Variety developed by Tamilnadu Agricultural University Coimbatore in the year 1983 through the Clonal selection method. It is a high yielding selection. Fruits are medium-sized with attractive rind, soft seeds, higher pulp content and sweet taste.

18. Ruby
Variety developed through multiple crossing hybrid between Ganesh x Kabul x Yercaud and Gulesha Rose Pink by Indian Institute of Horticultural Research, Bengaluru in the year 1997. It has soft and red arils with good flavour. The plants are dwarf, prolific bearer, providing uniformly red fruits.

19. Amlidana
It is developed cross of Ganesh x Nana by Indian Institute of Horticultural Research, Bengaluru in the year 1999. Arils are highly acidic (4.8\%), fruit medium size, plant dwarf, suitable for Anardana.
20. **Goma Khatta**
Variety developed through cross of Ganesh x Daru by Central Institute Arid Horticulture, Bikaner in the year 2010. Suitable for anardana. Yield 6.59 kg/plant and anardana yield 1.18 kg/plant. Seeds medium hard, juice 46.7%, TSS 14.5° Brix and acidity 7.3%.

![Goma Khatta](image)

21. **G-107**
The variety of pomegranate is a clonal selection from Ganesh. The GBPUT-107 pomegranate seeds are organic and suitable for both indoor and outdoor use.

22. **Red Silk**
A smaller variety that produces great tasting fruit

23. **Pomegranate Nana**
A dwarf variety that is good for bonsai and containers

24. **Parfianka**
A popular variety that is good for eating fresh or juicing.

![Parfianka Pomegranate](image)

25. **Alandi/Vadki**
The fruit size is medium, blood red or deep pink with sweet acidic taste with hard seeds.

![Alandi/Vadki](image)

26. **IIHR selection**
It is a selection from the open pollinated seedlings. Mean fruit weight is approx 255 g with soft seeds. It provides quality fruits with heavy bearing capacity.

27. **Kabul**
The fruit size is large deep red rind mixed with pale yellow, dark red aril with slightly bitter juice.

28. **Kandhari**
The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and pink in color with reddish tinge. Fruit weight per fruit was maximum in mrigbahar (317.6 g), whereas, in ambe bahar it was 190.4 g/fruit. Arils are sweet in taste with light pink in color with semi hard seeds. The juice percent showed variation which
was 52.3 percent in mrig bahar and 50.2% in ambe bahar. T.S.S. of the juice observed to be 14.4° Brix in mrig bahar and 14.8° Brix in ambe bahar. The acidity in mrig bahar was found to be 0.41 percent and 0.40% in ambe bahar. The variety is susceptible to fruit borer, leaf spot and fruit spot. The variety is suitable for different parts of Maharashtra and Gujarat states.

29. Paper Shelled
The fruit size is medium with pink aril of good quality, seeds are soft.

30. Spanish Ruby
Small to medium sized fruits with soft seeds.

31. Pomegranate Selection-303
It is a open pollinated fruit of F1 hybrids cross between Ganesh x Gulsha Red have characters i.e. yellowish brown colour of fruits, average fruit weight is 140 (g), Aril colour are blood red, Mellowness of seeds is soft having sweet taste, 45 no. of grains/100g, Grain to peel ratio is 1.80, Juice colour of fruit blood red having 80% Juice contains, 19.0% Total Soluble Solids and 0.64% acidity

32. Dholka
Fruits large, rind yellowish red with pinkish white aril. It is a popular cultivar of Gujarat.
33. **Vellodu**  
Fruit medium to large in size, rind moderately thick, fleshy testa, juicy, seed moderately hard.

34. **Poona**  
Fruit large in size, fleshy testa, deep scarlet or pink and red.

35. **Bedana**  
Bedana is a moderate yielding variety having medium size plants. Fruits are of medium size with brownish or whitish rind and pinkish white taste. Seeds are soft. It also produces sweet juice of very good taste. Plants grow extremely well in arid and semi arid regions of Rajasthan. This variety is cultivated in Rajasthan and the plants are semi- spreading in habit; this has fruits weighing between 280 to 320 gm. Fruit is round and smooth. The rind colour is reddish yellow to pinkish yellow. Arils are sweet in taste with light pink in color. The seeds are very soft. The juice percent showed variation which was 51.72 percent in mrig bahar and 50.25% in ambe bahar. The T.S.S. is 15°B with acidity of 0.42%. The variety is susceptible to fruit borer (29.53 %), leaf spot (PDI-22.66) and fruit spot (PDI-29.66). Prasad and Banker (2000) reported that Jalore Seedless showed its superiority with respect to fruit size, juice content, softness of seeds and quality characters of fruits with less cracking as compared to 9 pomegranate cultivars studied at Jodhpur (Rajasthan).

36. **Muskat**  
This variety used to be cultivated in Maharashtra. The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and pink in color with reddish tinge. Fruit weight was maximum in mrig bahar (310.27g), whereas, in ambe bahar it was 219.1 g / fruit. The T.S.S. is 16°B with acidity of 0.6% acidity. Seeds were found to be hard with a pressure of 8.73 kg/cm$^2$ in ambe bahar and in mrig bahar seeds 9.41 kg cm$^2$ pressure. The variety is susceptible to fruit borer (25.74%), leaf spot (PDI-21.42) and fruit spot (PDI-15.32).

37. **Pomegranate Selection-130**  
It is an open pollinated fruit of F$_1$ hybrids cross between Ganesh x Gulsha Rose Pink have characters i.e. Greenish brown colour of fruits, average fruit weight is 107 (g), Aril colour are dark red, Mellowness of seeds is soft having sweet taste, 94 no. of grains/100g. Grain to peel ratio is 1.17, Juice colour of fruit blood red having 80% Juice contains, 15.8% Total Soluble Solids and 0.80% acidity

38. **Jodhpur Red**  
It is favourite cultivars of arid and semi arid tracts of Rajasthan. The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and pink in color with reddish tinge. The fruits of this variety weigh between 180 to 220 g. Arils are sweet in taste with pink in color. The juice percent showed variation which was 37.5% in mrig bahar and 39.5% in ambe bahar. The T.S.S. is 15.0°B with 0.6% acidity. Seeds were found to be hard with a pressure of 8.73 kg/cm$^2$ in ambe bahar and in mrig bahar seeds 9.41 kg cm$^2$ pressure. The variety is susceptible to fruit borer (25.74%), leaf spot (PDI-21.42) and fruit spot (PDI-15.32).

39. **P-13**  
This is also a selection from Muscat variety Naik (1975). The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and yellow in color with reddish tinge. Fruit weight was maximum in mrig bahar (310.27g), whereas, in ambe bahar it was 219.1 g / fruit. The T.S.S. is 16°B with acidity of 0.5%. Arils are sweet in taste with light pink in color. The juice percent showed variation which was 50.3 percent in mrig bahar and 49.7 percent in ambe bahar. Seeds are medium hard. The variety is susceptible to fruit borer, leaf spot and fruit spot.
be soft with ambe bahar fruit (1.64 kg/cm² pressure) compared to mrig bahar seeds (1.82 kg cm² pressure). The variety is susceptible to fruit borer, leaf spot and fruit spot.

40. **P-16**
This is also a selection from Muscat variety (Naik 1975). The growth habit of tree is spreading type with evergreen nature. Fruit is round and smooth and pink in color with reddish tinge. Fruit weight was maximum in mrig bahar (245g), whereas, in ambe bahar it was 201 g / fruit. Arils are sweet in taste with light pink in color. The juice percent showed variation which was 48.9% in mrig bahar and 52.7% in ambe bahar. T.S.S. of the juice observed to be 16.2° Brix in mrig bahar and 15.8° Brix in ambe bahar. The acidity in mrig bahar was found to be 0.47% and 0.38% in ambe bahar. Seeds were found to be soft with softest in ambe bahar (1.63 kg/cm² pressure) compared to mrig bahar seeds (2.14 kg cm² pressure). The variety is susceptible to fruit borer (26.97%), leaf spot (PD-19.50) and fruit spot (PDI-23.33).

41. **Gul-F-Shah**
The growth habit of tree is spreading type with evergreen nature under Maharashtra condition. The leaf is entire and elliptic in shape. There is sparse flowering and fruiting. Fruit is round and smooth and pink in color with dark pink in color. The juice percent showed variation which was 42.85% in mrig bahar and 49.76% in ambe bahar. T.S.S. of the juice observed to be 13.2° Brix in mrig bahar and 14.0° Brix in ambe bahar. The acidity in mrig bahar was found to be 1.5% and 1.4% in ambe bahar. Seeds were found to be medium hard with a pressure to break the seed of 5.28 kg/cm² in ambe bahar and in mrig bahar seeds 4.72 kg cm² pressure. The variety is less susceptible to fruit borer (8.54%), highly susceptible to leaf spot (PDI-31.76) and fruit spot (PDI-17.48). The variety though do not have commercial value but can be used in breeding for imparting aril colour and for resistance to fruit borer.

42. **Pomegranate Selection-5**
It is an open pollinated fruit of F₁ hybrids cross between Ganesh x Shirin Anar have characters i.e. apple red colour of fruits, avarage fruit weight is 130 (g). Aril colour are blood red, Mellowness of seeds is soft having sweet taste, 58 no. of grains/100g. Grain to peel ratio is 1.17, Juice colour of fruit dark red having 80% Juice contains, 18.4% Total Soluble Solids and 0.64% acidity.

43. **Jodhpur Red/ Local**
Fruits medium to large, Hard rind, Fleshy aril light pink juicy, Seed moderately hard.

44. **Muscat Red**
Commercially cultivate in Kolhar, Rahuri region of Maharshtra. Fruits are small to medium size with thick red rind, Aril fleshy with moderately sweet juice, seed are medium hard, High yielding better quality strains have been selected from the cultivar muscat.

45. **Bassein seedless**
This variety is cultivated to some extent in Karnataka state. Tree is evergreen with spreading habit. The fruit is round and weight varies from 260 to 300 gm. The outer rind colour is red; the seeds are soft having light pink coloured arils. The T.S.S. is 16°B with acidity of 0.37%. There is limited area under this cultivar.

**Conclusion**
The review paper deals with a total of 45 varieties of Pomegranate. It comprises varieties with their important features, breeding method, year and institute from where they were released. The majority of fruit crops varieties are developed through selection followed by hybridization.

**Acknowledgement**
We acknowledge College of Horticulture Dapoli affiliated under Dr. Balasaheb Sawant Kokan Krishi Vidyapeeth Dapoli, (Maharashtra) India.

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