

Exploring the Rich Varietal Wealth of Citrus

Pooja G. K¹. and Pavithra R².

¹Senior Research Fellow, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

²Research Associate, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, India

SUMMARY

Citrus represents a remarkable reservoir of varietal wealth, encompassing a wide range of economically important fruit groups such as sweet oranges, mandarins, acid limes, sweet limes, lemons, pummelos, grapefruits, citrons, kumquats, wild species and numerous natural and developed hybrids. The diversity among these groups is reflected in variations in fruit size, shape, rind colour, flavour, acidity, sweetness, seed content, juice quality, maturity period and adaptability to different agro-climatic conditions. Important cultivars such as Mosambi, Sathgudi, Valencia, Nagpur mandarin, Coorg mandarin, Kinnow, Kagzi lime, PKM-1, Eureka, Lisbon and Devanahalli Pummelo demonstrate the rich genetic diversity available in citrus. In addition, wild citrus species and rootstocks provides a valuable genetic resource for crop improvement. This extensive varietal wealth forms a strong foundation for the development of high-yielding, superior-quality, seedless, disease-tolerant and climate-adaptive citrus cultivars. Therefore, systematic exploration, conservation, characterization and effective utilization of citrus genetic and varietal resources are essential for strengthening sustainable citrus production, enhancing farmer's income and ensuring the long-term growth of the citrus industry.

INTRODUCTION

Citrus is one of the most diverse, colourful and economically important groups of fruit crops cultivated across the world. From the sweet and juicy orange to the refreshing mandarin, tangy lemon, aromatic lime and giant sized pummelo, citrus offers an amazing range of fruits with distinct flavours, appearances and uses. Citrus fruits are especially valued for their refreshing taste and nutritional importance, particularly as a rich source of vitamin C. In India, citrus occupies an important place among major fruit crops, following mango and banana in prominence. Most citrus species are believed to have originated in South-East Asia and the Indo-China region, which are also considered important centres of citrus diversity. The true richness of citrus lies in its remarkable varietal wealth (Dubey *et al.*, 2016). Citrus is not represented by a single type of fruit but by a large collection of species, cultivars, local landraces, natural selections, hybrids and wild relatives. These diverse genetic resources differ in fruit size, shape, rind colour, sweetness, acidity, seed content, juice percentage, maturity period and adaptability. Some varieties are preferred for fresh consumption, while others are suitable for juice extraction, squash preparation, processing or use as rootstocks. The varietal wealth of citrus not only provides farmers with a wide range of cultivation options but also offers valuable genetic material for developing improved varieties capable of meeting future challenges such as climate change, emerging diseases and changing consumer preferences.

Major citrus groups

Sweet Orange: A Wealth of Colour, Flavour and Quality



Fig.1. Varieties of Sweet Orange

Sweet orange (*Citrus sinensis*) is one of the most popular and widely cultivated citrus fruits. Its fruits are generally tight-skinned, round to oval and contain about 10-12 segments. Sweet oranges are represented by several important varietal groups, including the Spanish group, Blood orange group, Mediterranean group and

Navel orange group. The Spanish group includes important cultivars such as Sathgudi, Mosambi, Hamlin and Shamouti. Mosambi is one of the most familiar sweet orange types in India and is highly valued for its pleasant taste and juice (Kadam and Ghosh, 2025). The Blood orange group includes Malta and Blood Red, which are valued for their attractive pigmentation. Blood Red is especially popular in Northern India. The Mediterranean group includes varieties such as Jaffa, Pineapple and Valencia Late, whereas Washington Navel represents one of the well-known navel orange types.

Mandarins: India's Favourite Loose-Skinned Citrus

Mandarins (*Citrus reticulata*) form another important and highly diverse citrus group. Unlike sweet oranges, mandarins are generally loose-skinned and easy to peel. They are known for their juicy pulp, attractive orange colour and pleasant flavour. India possesses several important mandarin varieties, each associated with specific regions. Nagpur mandarin, popularly known as Nagpur Santra, is one of the most recognized citrus varieties in the country. Coorg mandarin is an important commercial variety of South India. Kinnow mandarin, which is extensively cultivated in Punjab. The fruits are medium sized, somewhat oblate and develop an attractive yellowish orange colour at maturity (ICAR-CCRI, 2022).



Fig.2. Varieties of Mandarin

Limes and Lemons: The Tangy Treasure of Citrus

Limes and lemons occupy a special place in the citrus family because of their strong acidity, refreshing flavour and wide range of culinary and processing uses. The lime group includes acid lime, sweet lime, Tahiti lime and Rangpur lime. Acid lime (*Citrus aurantifolia*) has a rich varietal spectrum. Important varieties and selections include Kagzi Lime, Pramalini, Vikram, Sai Sharabati, Chakradhar, PKM-1 and PDKV Lime. Sweet lime (*Citrus limetoides*) includes types such as Mitha Chikna, Persian Mitha and Mithotra. The fruits are medium to large and have a mild, sweet taste. Tahiti lime is another group of the lime. It is characterized by larger, spreading and nearly thornless trees. The fruits are seedless and the cultivar is of triploid origin. Rangpur lime has small to medium sized fruits with yellowish to reddish orange rind. It is also valuable as part of the diverse citrus genetic resource base. Lemon (*Citrus limon*) varieties are broadly grouped into the Eureka group, Lisbon group and sweet lemon group (Kadam and Ghosh, 2025). Important lemon varieties include Villafranca, Lucknow Seedless, Nepali Round, Kagzi Kalan, Pant Lemon 1, Malta, Meyer, Seville lemon, Nepali Oblong or Assam Lemon, Aurangabad Seedless, Baramasi and Punjab Galgal.



Fig.3. Varieties of Lime and Lemon

Pummelo: The Giant Among Citrus Fruits



Fig.4. Varieties of Pummelo

Pummelo (*Citrus maxima* or *Citrus grandis*) is known for its exceptionally large fruits. The fruits may be round or pear shaped, with a thick and spongy rind. Depending on the variety, the flesh may be white, pink or red (ICAR-CCRI, 2022). India possesses several interesting pummelo types, including Chakkota or Devanahalli

Grapefruit: Diversity in Colour and Flavour

Grapefruit (*Citrus paradisi*) is another important citrus type. Its fruits resemble pummelo but generally have a comparatively thinner rind and juicy flesh with a characteristic slightly bitter flavour. The major varieties include Marsh Seedless, Duncan, Red Blush, Foster, Flame and Star Ruby (ICAR-CCRI, 2022). Other varieties such as White Marsh, Thompson, Hudson, Ray Ruby and Rio Red further demonstrate the diversity available in grapefruit. These varieties differ in flesh colour, seed content and other fruit characteristics, thereby providing different choices for consumers and breeders.

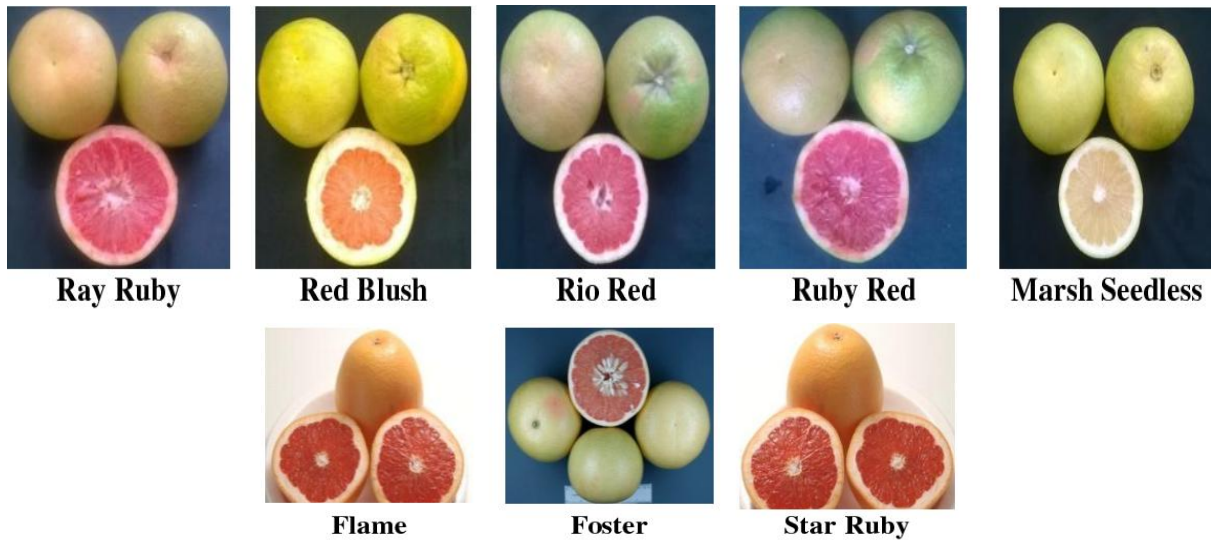


Fig.5. Varieties of Grapefruit

The wealth of citrus is not limited to commercially cultivated varieties. Wild citrus species form an extremely important reservoir of useful genes. Species such as *Citrus indica*, commonly known as Indian wild orange, *C. ichangensis* and *C. tachibana* contribute to the genetic diversity of citrus. These wild species can serve as valuable sources of characters useful for future crop improvement (Swingle and Reece, 1967)



Fig.6. Wild Citrus Species

The rich varietal diversity of citrus has immense importance for the future of horticulture. Different varieties offer different combinations of desirable traits such as high yield, superior fruit quality, seedlessness, attractive colour, high juice content, early or late maturity and tolerance to various stresses. The conservation and systematic utilization of citrus varietal wealth are therefore essential. Traditional cultivars, farmer maintained types, local landraces, wild species, natural hybrids and improved varieties together form a valuable genetic reservoir (Singh and Chadha, 1993). This diversity can play a major role in developing future citrus cultivars suited to changing climatic conditions and evolving consumer demands.



Fig.7. Citrus rootstocks

CONCLUSION

The citrus family represents a true treasure house of varietal diversity. From the popular Mosambi and Sathgudi sweet oranges to Nagpur and Coorg mandarins, from Kagzi lime and lemons and from Devanahalli Pummelo to colourful grapefruit varieties, every citrus group contributes unique characteristics to this rich genetic heritage. This remarkable varietal wealth is important not only for fruit production and marketing but also for crop improvement and future sustainability. Wild species, traditional varieties, elite selections and hybrids together provide a valuable genetic resources for developing high yielding, seedless, superior quality and climate adaptive citrus cultivars. Therefore, the identification, conservation, characterization and effective utilization of citrus varietal wealth should receive continued attention to ensure that this rich citrus heritage benefits farmers, consumers and future generations.

REFERENCES

- Dubey, A. K., Srivastav, M., Sharma, R. M., Awasthi, O. P., Verma, M. K., Kaur, C. and Singh, D. (2016) Citrus varieties enriching fruit industry. *Indian Horticulture*, 61(2).
- ICAR-Central Citrus Research Institute (ICAR-CCRI), Nagpur (2022) Citrus genetic resources, major citrus groups and crop improvement programmes.
- Kadam, D. M. and Ghosh, D. (2025) Boosting India's citrus industry: ICAR-CCRI introduced elite exotic varieties from the USA. *Indian Horticulture*, 70(5): 16-19.
- Swingle, W. T. and Reece, P. C. (1967) The botany of citrus and its wild relatives. In: Reuther, W., Webber, H. J. and Batchelor, L. D. (Eds.), *The Citrus Industry, Vol. I. University of California, Berkeley*.
- Singh, I. P. and Chadha, K. L. (1993) Genetic Resources of Citrus. *Indian Council of Agricultural Research, New Delhi*.