HISTORY, DEVELOPMENT AND IMPORTANCE OF FRUIT BREEDING

India is bestowed with a wide range of agro climatic and soil conditions. Therefore, almost all types of fruits can be grown in one or the other parts of the country. India is the second largest producer of fruits next to China. In India, horticultural crops occupy about 6.7% of gross area; contribute about 18% of gross value of agricultural output and 52% of export earnings in agriculture. The inherent nature of a long gestation period, high heterozygosity, and scanty information on inheritance pattern, often cross pollination, excessive fruit drop, parthenocarpy and low seed number restricting the availability of hybrid seedlings for evaluation are the real challenges in crop improvement. Even though, planned hybridization and clonal selections have been attempted in a number of fruit crops and these efforts have resulted in the development of promising varieties in mango, grape, guava, papaya, sapota, banana, etc. Systematic much more and dedicated efforts are required for the development of ideal varieties through modern tools. More focus on search for desired genes, critical study of inheritance pattern and use of biotechnological tools are needed in combining ideal characteristics in varietal improvement programme of fruit crops.

HISTORY OF FRUIT RESEARCH

Fruit research in India was started at the Departments of botany in six Agricultural Colleges established in 1905 at Pune, Coimbatore, Lyallpur, Nagpur, Sabour and Kanpur. Almost at the same time, the Imperial Agricultural Research Institute was set up at Pusa (Bihar) and the Provincial and Central Departments of Agriculture were organized which were to look after the work on horticultural crops. At that time, the responsibility of research on fruit crops was mainly of the State Governments. During this period, some of the European settlers like Lee in Kullu Valley, Coutts and Stokes in Shimla hills and some European Missionaries in South India introduced new varieties of fruit crops from UK, France and East Indies etc. A pomological Station was established at Coonoor near Ooty in 1920 to study the adaptability of temperate fruit varieties. The initiative by the Imperial Council of Agricultural Research to provide financial assistance to the Provincial Governments in the year 1929 gave considerable boost to research activities. Several schemes were sanctioned to the State Governments to carryout work on important
problems. E.g. Citrus dieback, fruit preservation, nutritional value of fruits and control of pests such as San Jose scale of temperate fruits.

**Fruit Breeding**

Fruit breeding is the manipulation of a biological system that requires many generations to achieve result. It is also a dynamic, exciting and challenging profession, operating under continually changing conditions.

**Major problems in fruit breeding**

- Most of the fruit crops have long generation cycle of 2-10 years depending upon species and cultivars and hence more recombination's are not possible.
- Fruit crops have long juvenile period and making it difficult for early assessment of strains e.g. mango, *Madhuka latifolia*, jack fruit etc.
- Majority of the fruit species are highly heterozygous, requiring large populations for an effective selection.
- Most fruit species are polyploid in nature e.g. ber, banana etc.
- Polyembryony nature of fruit species e.g. citrus, mango.
- Presence of parthenocarpy and seedlessness e.g. banana, pineapple etc.
- Presence of sexual incompatibility e.g. mango, apple, pear, loquat etc.
- More number of chromosome hinders genetic analysis e.g. ber, mulberry.
- Excessive fruit drop e.g. mango, citrus, grape etc.
- Presence of single seed in most of the cases warrants number of crosses e.g. mango, litchi, mahua etc.

**OBJECTIVES OF FRUIT BREEDING**

The objectives of fruit breeding depend on the fruit crops, location and requirements of the consumers. The main objectives of fruit breeding are to get maximum quality production per unit area with low cost, besides tolerance to biotic and abiotic stresses, the objectives are distinct and variable in respect of breeding for rootstocks and scions.

**For rootstock**

- Wide geographical adaptability
- Easily propagated, preferably through asexual means
• Compatibility with most of the scion cultivars having strong scion stock union and more longevity
• Resistance to biotic and abiotic stresses
• Induction of dwarfing without affecting the productivity of scion cultivars
• Should possess strong root system with out brittleness e.g. EM 9 root stock of apple
• It should be free from suckering habit

For scion cultivars
• Dwarf stature
• Regular, precocious and prolific bearing per unit canopy area
• High productivity with good quality fruits
• Resistance to biotic and abiotic stresses
• Attractive fruit colour with pleasant aroma
• Suitable for processing and export

IMPORTANCE OF FRUIT BREEDING

Although cultivation and utilization of fruits have been known in India since the Vedic age, a modest beginning for systematic research was made only during the twenties. Owing to the growing awareness on the importance of fruits in daily diet and the need to increase their supply position to the growing population, more emphasis was laid on fruit research during the sixties. Especially during the last fifteen years, development in horticulture has gradually moved from rural to urban areas and from traditional agricultural enterprise to corporate sector adopting improved technology, greater commercialization and professionalism in the management of production and marketing. During the last two decades, research approach on fruits has undergone considerable change with ever-increasing multi-location, inter-disciplinary and inter-institutional involvement to solve specific problems in a coordinated manner. Intensive research in horticulture has been taken up in many ICAR institutions; Agricultural Universities for the last 50 years with the result that many improved cultivars have been made available for planting by the horticulturist despite the fact that the problems are encountered in breeding of horticultural crops are enormous. Research on crop improvement in fruit crops is receiving considerable augmentation on account of the newly emerging production constraints due to pest, diseases, drought, salinity and climate change.