Rose Breeding at ICAR-Indian Agricultural Research Institute, New Delhi

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Rose is universally referred to as the "**Queen of flowers**". According to the widely accepted classification of Rehder, there are about 120 species of roses which grow wild in various parts of the world. These wild species have descended the present day garden roses. In India, approx. 10 species were reported to be grown wildly, of which three such as *Rosa clinophylla, R. leschenaultiana* and *R. longicuspis* are endemic. The important species which played an important role in evolving modern garden roses are *R. chinensis, R. gallica, R. gigantea, R. moschata, R. multiflora, R. damascena, R. wichuriana* and *R. foetida.* Modern roses have a long blooming period and their flowers are beautiful with good shelf life. Besides its use as cut flowers, rose is grown in beddings and gardens for its ornamental value. In India, rose is being grown for a long period and is considered the principal cut flower crop grown both in open and under protected environments. The demand for roses is centred on Valentine's Day, but Chinese New Year, International Women's Day, Mother's Day, Teacher's Day and Friendship Day, as well as major festivals also see brisk sales. Even more important, as weddings get more lavish, the domestic market is increasing exponentially, with huge amounts of money spent on floral decorations and bouquets

Breeding of rose varieties made a late start in India and the earliest mentioned about an Indian raised variety relates to one named "Dr. S.D. Mukherjee" introduced by B.K. Roychoudhary in 1935. The first phase of rose breeding in India was dominated by B.S. Bhattacharjee, Head of the well known rose nursery at Deogarh on the boarder of Bengal and Bihar who raised a very large number of varieties between 1941 when the first one, Ramakrishna Deva was introduced, and 1968. The main objective of the work was to raise new varieties for the tropics. In this regard S. P. Banerji apparently raised some varieties in fifties and sixties.

The Indian Agricultural Research Institute is a pioneer in scientific research on floricultural crops spearheaded by luminaries like Dr. B.P. Pal who laid a foundation for scientific breeding of rose flower in late 50's and early 60's. The work on rose breeding was

initiated in the Division of Genetics and later in the Division of Horticulture in the year 1956 with the organization of National Rose Collection at Institute. The rose collection at that time consist of all the different groups *viz.,* hybrid Teas, Floribundas, polyanthas, miniatures, climbing roses and different wild species. The first two varieties namely Rose Sherbet and Delhi Pink Pearl were evolved by the late Dr. B P Pal in 1962 who at that time was the Director of the Institute and showed his interest in rose breeding at the Institute. Ever since its inception as a separate identity in the year 1983, the Division of Floriculture and Landscaping heralded an articulated and comprehensive research programmes on rose crop improvement using conventional and non conventional approaches. The development of new rose varieties at ICAR-IARI has created a great interest in rose cultivation in India.

Major objectives to bred ICAR-IARI roses

- Attractive flower form and colour
- Fragrance in flower
- Floriferousness
- Recurrent flowering
- Long stem roses
- Resistance to diseases and pests
- Suitable for growing in sub tropical climatic conditions
- Tolerance to a biotic stresses
- Varieties rich in anthocyanin pigment

Criteria used for selecting parents for breeding programme

Studies conducted at ICAR- IARI, New Delhi have been suggested that varieties known to have high female and male fertility should be chosen as parents for hybridization. Varieties which produce more hips and achenes (seeds) having more germination should be used as parents in crossing. It was also observed that when a particular parent was used as a seed parent, the number of seeds per hip and the percentage of seed germination were higher than those used as pollen parent. Inheritance of flower colour and other characters should be taken into consideration. For incorporating fragrance in hybrid progenies both female and male parents having high fragrant flowers should be utilized in hybridization. However, fragrant hybrid progenies were also raised from non-fragrant parents which suggested the presence of complementary genes for fragrance.

Varieties evolved at ICAR-IARI

The Division of Floriculture and Landscaping of ICAR-IARI remained pioneer in rose improvement and evolved numerous varieties utilizing various breeding methods. These varieties belong to Hybrid Teas, Floribundas, Polyanthas, Miniature roses and Climbing/Rambling roses.

Varieties evolved at ICAR-IARI

Hybrid Teas	Abhisarika (1971), Anurag (1980), Apsara (1983), Arjun (1980), Bhim (1970), Chambe de Kali (1983) Charugandha (1972), Chitra (1995) Chitralekha (1972), Chitwan (1971), Dr. Benjamin Pal (1993) Dr. B P Pal (1980) Dr. M S Randhawa (1989) Dulhan (1983), Ganga (1970) Golden Afternoon (1983), Gulzar (1971), Hans (1970), Homage (1986), Indian Princess (1980), Jawahar (1980), Jawani (1985), Kamla Devi Chattopadhyay (1989), Lalima (1978) Madhosh (1975), Maharani (1986) Mechak (1979) Mother Teresa (1994) Mridula (1975) Mrinalini (1973), Nayika(19750, Nehru Centenary (1989), Nishada(1982), Nurjehan (1980), Poornima (1971), Preyasi(1991), Priyadarshani (1986) Pusa Sonia(1986), Pusa Sonara(1984), Rajhans (1983), Rajkumari (1975), Raktagandha (1975), Raktima (1991), Rangshala (1969), Ranjana(1975), Ratnaar(1985),Shreyasi(1991), Sir C. V. Raman(1989), Soma(1980), Sugandhini(1969), Sujata (1971), Surabhi (1975), Surekha (1976), Uma Rao (1989), Pusa Mahak (2017), Pusa Ajay (2005), Pusa Mohit (2002), Pusa Mansij (2002), Pusa Arun(2005)
Floribundas	Arunima (1975), Banjaran(1969), Belle of Punjab (1965), Chandrama (1980), Chitchor (1972), Deepika(1975), Deepshikha (1975), Delhi Brightness (1963), Dr. B B Bhatnagar (1994), Himangini (1968), Jantar Mantar (1982), Kavita (1972), Lahar (1991), Loree (1968), Madhura (1979), Manasi (1991), Mohini (1970), Navneet (1971), Nav- Sadabahar (1980), Neelambari

	(1975), Paharan (1971), Prema (1970), Rose Sherbat (1962), Rupali (1971), Sadabahar (1969), Saroja (1984), Shabnam (1975), Shola (1969), Shrinagar (1972), Sindoor (1980), Suchitra (1972), Suryakiran (1979), Tarang (1989) Usha (1975), Pusa Urmil (2001), Pusa Muskan (2001), Pusa Manhar(2001), Pusa Abhishek (2001), Pusa Pitambar (2000), Pusa Bahadur(2000), Pusa Shatabdi (2000), Pusa Virangana (2000), Pusa Priya (2000), Dr. Bharat Ram (2000)
Polyanthas	Swati (1968)
Miniature roses	Delhi Starlet (1963)
Climbing/Rambling roses	Climbing Sadabahar (1991), Delhi White Pearl (1963)

Some of the outstanding recently developed varieties by ICAR-Indian Agricultural Research Institute, New Delhi have been described below:

1. Pusa Shatabdi: The variety produces very attractive light pink coloured flowers. The petals (numbering 35-40) are fleshy and are pink in colour. Each plant produces 20-30 flowers in winter and 35-40 flowers in spring season. This variety is moderately tolerant to powdery mildew and Leaf spot diseases. The blooms are mildly fragrant and are suitable for cut flower and exhibition purposes.

2. Pusa Ajay: Foliage is pigmented and glossy. It has dark pink coloured flowers. The petals (numbering 35-40) are fleshy and are dark pink in colour. Recurrent blooming. Each plant produces 15-20 flowers in winter and 35-40 flowers in spring season. This variety is moderately tolerant to powdery mildew and black spot diseases. The blooms are mildly fragrant and are suitable for cut flower and exhibition purpose.

3. Pusa Mohit : Variety is thorn less and has red petals with lighter shade on the reverse side of petals, tolerant to black spot. Each plant produces 20 flowers in winter and 45 flowers in spring season.

4. Pusa Arun: It is a variety of Hybrid tea category, produces medium to tall bushes often reaching a height of about one meter with broad and moderately glossy leaves. The shinning foliage contains higher pigmentation in early stages. The flower buds are pointed and are dark red in colour which opens to dazzling dark red, large sized, double blooms on strong and long

shoots. This variety is tolerant to red scale, which is one of the major insect pests attacking roses in open cultivation. It takes 45-50 days to bloom after pruning in second fortnight of October. It produces 20-30 flowers during winter and 35-40 flowers during spring season. The blooms remain fresh for 8-10 days on the plant as well as in the vase when harvested at bud stage.

5. Pusa Komal: Pusa Komal is a hybrid between an exotic variety Pink Parfait and an indigenous variety Suchitra. It is a highly floriferous bushy variety, which belongs to floribunda group. The short to medium stature bushes are completely thornless. The variety possesses strong stems with multiple flower buds arranged in different heights, which open in a sequential manner. The variety produces as many as 60 flowers, which are mostly borne in clusters.

6. Pusa Mahak: It is a Hybrid Tea variety of rose. The plants are tall and vigorous with a height of 100 - 120 cm. The Flowers are dark pinkish in colour and have outstanding fragrance. The flowering starts in 40-45 days after pruning. Flowers are large and semi-double with 22-23 petals. It is a recurrent flowering and floriferous variety and each plant produces on an average 50-60 flowering shoots in a season. The variety is ideal for garden display and the fragrant flowers can be used for floral arrangements.

		
Pusa Shatabdi	**Pusa Ajay**	**Pusa Mohit**
		
Pusa Arun	**Pusa Komal**	**Pusa Mahak**

Recently Released Rose Varieties from ICAR-IARI

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