



Development of New *Hibiscus rosa-sinensis* L. Cultivar Acharya Jagadish Chandra Bose D. Chakraborty, J. Swamy & D. Singh in West Bengal, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Hibiscus has a unique and wide range of colors ranging from brown, purple, white, pink, red, orange, yellow, etc. Many cultivars introduced from various countries were adapted to Indian conditions, of which suitable elegant cultivars *Hibiscus rosa-sinensis* L. 'Valentine's Day' (female pod parent) and *Hibiscus rosa-sinensis* L. 'Moorea Memory of July' (male pollen parent) were selected and hybridized. Hybrid seeds from the female parent were collected, germinated, and grown to the flowering stage. The developed cultivar was named after a great Indian scientist Acharya Jagadish Chandra Bose (*H. rosa-sinensis* cv. Acharya Jagadish Chandra Bose). A detailed development of the new cultivar with photographs is discussed.

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1. INTRODUCTION

The improvement of ornamental *Hibiscus* through breeding in India is mainly done in tropical areas like southern states namely Karnataka, Tamil Nadu, and Kerala, where the environmental conditions are conducive for seed setting in some of the species and cultivars but less work has done in West Bengal. The people of West Bengal use to offer *Hibiscus* flowers to Hindu god and goddess especially the Goddess Kali and the flowers are considered highly significant in Indian culture. Due to the significance of flowers in Indian culture, many cultivars were introduced to India from Hawaii during 1961-64 at Lalbagh Botanical Garden, Bengaluru [1] for breeding and development of new hybrids. Then, the hybrids developed through inter-varietal hybridization more than 25 promising hybrids of *H. rosa sinensis* have been released by IHR, Bengaluru, Lalbagh Botanical Garden, Bengaluru, and TNAU [1,2]. Although many species have improved in one way or another, they have yet to achieve the wide range of flower shapes and colours that would come as a result of more intense hybridization in the 20th century. Early *hibiscus* cultivars were first cultivated on the island of Hawaii in the first decade of the 20th century. Kew Botanical Garden, London, UK, has conserved several types of the hibiscus mother species and hybrids in their field gene bank, and besides this, some reputed institutes and commercial houses like Hidden Valley *Hibiscus* have maintained all mother cultivars of present-day hibiscus [3]. In India, it has more than 389, and the state of West Bengal has more than 300 registered cultivars [4,5,6,7], of which more than 75 cultivars have been maintained at AJC Bose Indian Botanic Garden, Howrah. With the existing cultivars in the garden, and the need of the people, authors aimed to develop new cultivars and hybrids and to improve the overall aspects of the ideal plants of *Hibiscus* through selection, hybridization [5,6,7].

2. MATERIALS AND METHODS

2.1 Parents Selection

Polyploidy in *Hibiscus rosa-sinensis* plays keys role for production of new cultivars and varieties. A side effect of polyploidy is a condition where the phenotype of the offspring may be quite

different from the parent, or certainly any ancestor, essentially allowing possibly random expression of all or any of the characteristics of all the generations that they have gone before. Due to this characteristic nature, *H. rosa-sinensis* has become popular with who cross and re-cross varieties, creating new named varieties and holding competitions to exhibit and judge the many resulting new seedlings and often resulting to strikingly unique flowers [8]. To develop desired traits, the authors have selected elite cultivars for hybridisation namely 'Valentine's Day' (female parent) from USA California which was developed by Black Charles, and 'Moorea Memory of July' (male parent) from French Polynesia which created by Atiu Charles. Before cross-pollination, authors were cross-checked, on how genetic traits of parent plants have come into play and how they tend to pass genes to progeny [5,6,7,9]. To track the lineage of *Hibiscus* cultivars, authors have consulted the cultivar genealogy tree of the International Hibiscus Society Database (2023).

2.2 Hybridisation

During the winter in 2021, the designated female parent was identified one day before pollination. While the flower was at the full balloon stage, the petals and pollen were removed to expose the stigma and this was covered with a piece of packet to avoid pollen contamination. The detailed methodology described by Chakraborty et al. [5,6] and Swamy et al. [7] has been followed.

3. RESULTS AND DISCUSSION

3.1 Development of New Cultivar

After successful hybridization, hybrid seeds were collected from the female parent, germinated, and grown characterized at AJC Bose Indian Botanic Garden, Botanical Survey of India, Howrah. The developed new cultivar started to produce flowers at the age of 1 year old. The fully developed cultivar branches were collected for cuttings, grafting, and budding for clonal propagation and multiplication. The propagated saplings were used to check/stabilize the characters. High quality, bush development, propagation, disease resistance power, ability to bloom and bloom size have been observed in the newly developed cultivar. The developed

Hibiscus cultivar is named after a great Indian scientist Acharya Jagadish Chandra Bose. The newly developed cultivar was registered in the International Hibiscus Society and accepted by the same society on July 23, 2023 (Fig. 1). The cultivar *Hibiscus rosa-sinensis* L. cv. Acharya Jagadish Chandra Bose D. Chakraborty, J.

Swamy & D. Singh is characterised by bright velvety pink flowers with large red centred and white strips at the margin when it is in full bloom and a longer flowering period (more than two days in winter and one day in summer). The detail differences between the parents and cultivar have given in Table 1.

Pod parent - Valentine's Day

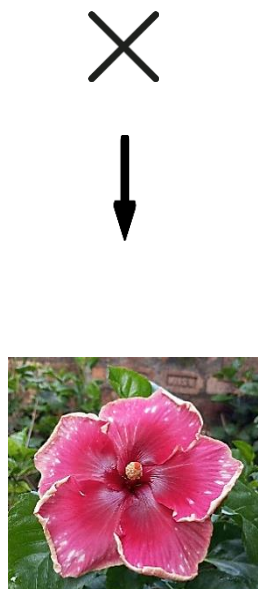


Origin: USA California

Pollen parent – Moorea Memory of July



Origin: French Polynesia



Acharya Jagadish Chandra Bose

**Date of Registration in International Hibiscus Society: July 23, 2023
(Hybridizer: Deep Chakraborty)**

Fig. 1. *Hibiscus rosa-sinensis* L. cv. Acharya Jagadish Chandra Bose D. Chakraborty, J. Swamy & D. Singh and it's *H. rosa-sinensis* pod parent (Valentine's Day) and male parent (Moorea Memory of July)

Table 1. Morphological comparison of *Hibiscus rosa-sinensis* cv. Acharya Jagadish Chandra Bose with its parents

Sl. No.	Characters	Pod parent (Valentine's Day)	Pollen parent (Moorea Memory of July)	New Cultivar (Acharya Jagadish Chandra Bose)
1	Flower colour	Pinkish red	Pinkish with white strips	Bright velvety pink with white strips
2	Flower size	20-22 cm diameter	20-22 cm diameter	16.5-17 cm diameter
3	Colour of eye zone	Black	Red	Pinkish red
4	Petals lower surface	Creamy pink	Yellowish creamy with pink edges	Creamy yellow
5	Staminal column colour	Creamy red	Creamy with red base	Creamy with red base
6	Stigma pad colour	Orange	Yellow	Orange
7	Propagation	Seeds and grafting	Grafting	Cutting and grafting
8	Flowering season	Throughout the year	Winter	Throughout the year

3.2 Taxonomy of *Hibiscus rosa-sinensis* L. cv. Acharya Jagadish Chandra Bose D. Chakraborty, J. Swamy & D. Singh (Fig. 2)

Shrubs up to 60 cm high; branches densely spreading, green; internodal portion 2-3 cm long. Leaves simple, petiolate; petiole 4.8-5 cm long, 0.2-0.3 cm wide; blades broadly ovate, 8-9 cm long, 8-8.5 cm wide, cordate base, crenate along

the margin, acute to acuminate at apex, dark green above, light green below, 6-7 nerved from the base. Stipules linear, 0.8-1 × 0.1-0.2 cm. Inflorescence axillary, solitary; peduncle 5-5.3 × 0.1-0.2 cm; pedicel 1.4-1.7 × 0.3-0.4 cm; flower bud pale yellow, 3.6-4 × 0.2-0.3 cm. Flowers bright velvety pinkish red with white strips, 16.5-17 cm in diameter. Epicalyx 2.5-2.8 × 2.5-2.7 cm, linear, 10-lobed; each lobe 1-1.3 × 0.2-0.4 cm.

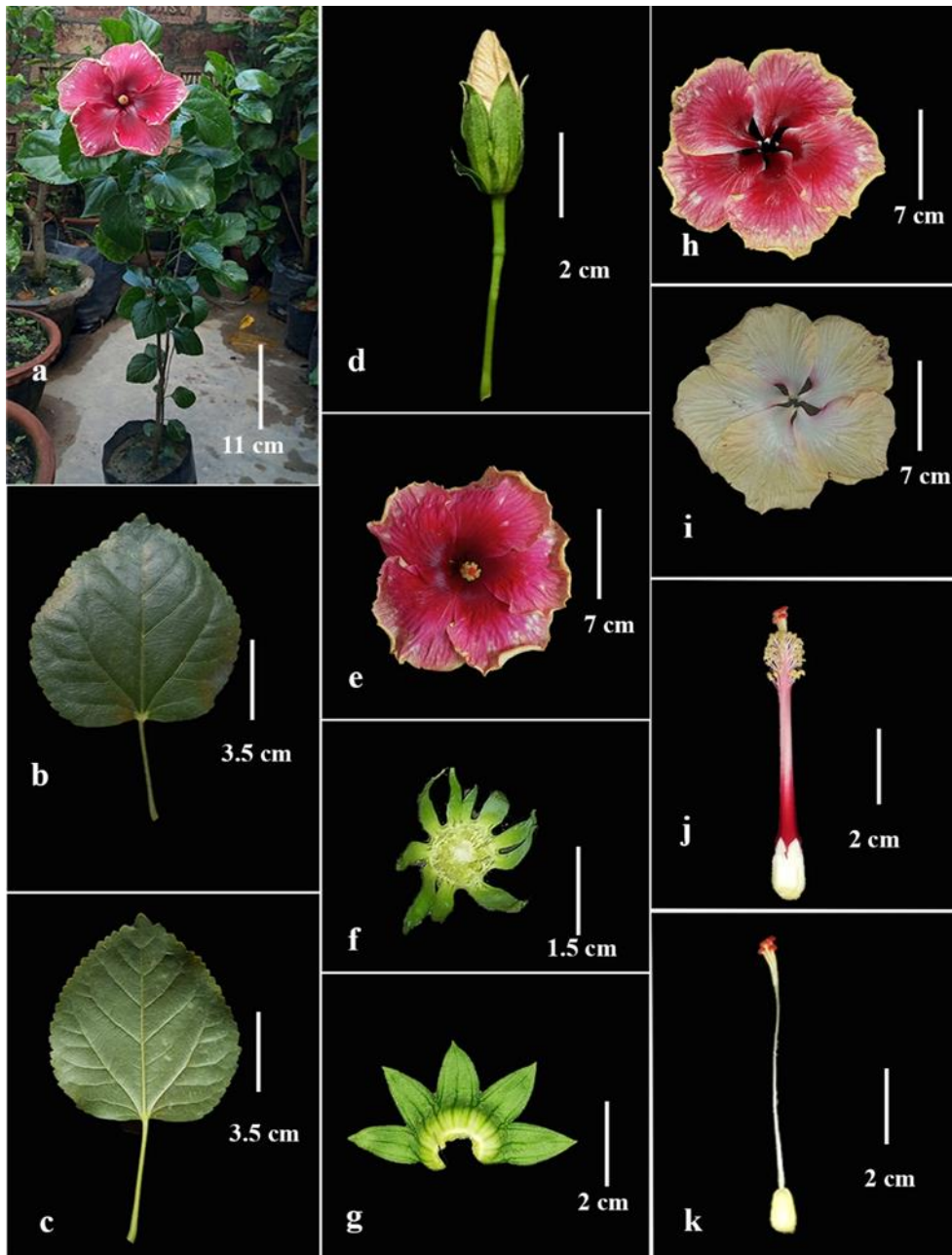


Fig. 2. *Hibiscus rosa-sinensis* L. cv. Acharya Jagadish Chandra Bose D. Chakraborty, J. Swamy & D. Singh: a. Habit; b-c. Leaves; d. Flower bud; e. Flower; f. Epicalyx; g. Calyx; h. Corolla (upper surface); i. Corolla (lower surface); j. A staminal column with pistil; k. Pistil

Sepals united below the half, 2.7-3 × 5-5.5 cm; tube 1.3-1.5 × 0.9-1 cm, 5-lobed; lobes ovate-lanceolate, 1.2-1.5 × 0.8-0.9 cm, acute apex. Petals 8.5-9 × 8.6-7 cm, polypetalous, 5, obovate, cuneate to unequal at the base, entire to undulate along the margin, rounded at apex, upper surface creamy pink with red eye zone and white strips, pale yellow along the margin, lower surface creamy yellow; veins prominently raised beneath, creamy. Staminal column red, 7-7.3 cm long, 0.3-0.4 cm wide; naked zone 5-5.5 cm long, 0.3-0.5 cm wide; anther zone 1.6-1.7 cm long, 1-1.1 cm wide, kidney shaped, yellow; filaments 0.3-0.6 cm long. Pistil 7-7.5 cm long; ovary cylindrical, 0.8-0.9 cm long, 0.4-0.5 cm wide; style 4.5-5 cm long, 0.1-0.2 cm wide, hairy at base; stigma orange, 0.3-0.4 cm long, 0.4-0.5 cm wide; lobes unequal, densely hairy.

Flowering: Throughout the year. Usually, flowers open early in the morning and close after one day of its opening.

Propagation: It can be done by cutting, air layering, grafting, budding, etc.

4. CONCLUSION

The developed new cultivar has very much ornamental potential, and cultural significance due to its unique flowers, which will be used in breeding work for further development of new cultivars/hybrids and are also useful in landscaping. The present work is also useful to enhance the income of farmers through its propagation/cultivation.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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