E-ISSN: 2663-1067
P-ISSN: 2663-1075
https://www.hortijournal.com
IJHFS 2023; 5(1): 77-80
Received: 08-01-2023
Accepted: 20-02-2023

Deep Chakraborty
[a)] Botanical Survey of India, Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah, West Bengal, India
[b)] Ramakrishna Mission Vivekananda Centenary College, Rahara, North 24 Paraganas, West Bengal, India

Jetti Swamy
Botanical Survey of India, Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah, West Bengal, India

Devendra Singh
Botanical Survey of India, Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah, West Bengal, India

Corresponding Author:
Jetti Swamy
Botanical Survey of India, Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah, West Bengal, India

Development and characterisation of new *Hibiscus rosa-sinensis* cultivar ('Janaki Ammal') from India

Deep Chakraborty, Jetti Swamy and Devendra Singh

DOI: https://doi.org/10.33545/26631067.2023.v5.i1b.161

Abstract
Hibiscus rosa-sinensis L. is a well-known traditional, ornamental, and aesthetic plant in India and China due to its wide range of coloured cultivars, and a long history of cultivation and worship. The flowers of hibiscus are locally called Joba /Gudhal, and which are offered to Goddess Kali/Durga and Lord Vinayaka in West Bengal, India. A new significant cultivar *H. rosa-sinensis* 'Janaki Ammal' has been developed from the cross-breeding of *Hibiscus rosa-sinensis* L. 'Yvonne' (Female pod parent) and *Hibiscus rosa-sinensis* L. 'White Satin' (Male pollen parent). The new cultivar named as 'Janaki Ammal' after a famous Indian Botanist E. K. Janaki Ammal. Detailed selection, hybridisation and characterisation of the new cultivar with photographs is provided to facilitate identification.

Keywords: Cultivar, Janaki Ammal, *Hibiscus*, West Bengal, White Satin, Yvonne

Introduction
The genus *Hibiscus* L. belongs to the flowering plants family Malvaceae. It comprises about 432 species (POWO, 2023) [2] and more than 23306 registered cultivars (International Hibiscus Society, 2023) in the world and is naturally distributed in tropical, subtropical, and warm-temperate regions of the world. In India, the *Hibiscus* is represented by 27 taxa belonging to 23 species, one subspecies and three varieties (Pramanick *et al*., 2020) and more than 369 registered cultivars (International Hibiscus Society, 2023) [3]. *Hibiscus rosa-sinensis* L. has a wide range of applications. As per our recent enumeration in various nurseries, the state West Bengal has more than 300 cultivars of *Hibiscus*.
The improvement of ornamental *Hibiscus* through breeding in India is mainly done in tropical areas like southern states like Karnataka, Tamil Nadu, and Kerala where the environmental conditions are congenial for seed setting in some of the species/cultivars. But now-a-days it is not confined to the above-mentioned areas; rather, it has been extended to other parts of India like West Bengal and Odisha. There is a huge scope of hibiscus breeding in West Bengal because it is no longer used only as an offering to Hindu goddess Kali/Durga, Lord Vinayaka etc. but considered of great significance as an ornamental and aesthetic plant due to its wide range of coloured cultivars. The prime aim of this study is to develop new cultivars of *Hibiscus* through selection, hybridisation and to improve the overall aspects of the ideal plant. To conduct the hybridization, authors have been selected parents from imported cultivars of USA California and Australia. They were mostly used as parents because they have unique flower colours, forms, and produce large blooms.

Materials and Methods
Parent's selection
Selection of parent plants are very important to develop and improve plant quality, bloom presentment, ability to bloom, bloom size and other aspects of ideal new *H. rosa-sinensis* cultivars. Before cross pollination, authors randomly cross checked that, how genetic traits of parent plants has come into play and how they tend to pass genes to progeny. To track the lineage of Hibiscus cultivars, authors have been consulted cultivar genealogy tree of International Hibiscus Society database. Based on the genealogy of Hibiscus, the authors obtained female parent (Yvonne) from Australia and male parent (White Satin) from California, USA.

Hybridisation

During winter (December), the designated female parent was identified one day before pollination, while the flower is at the full balloon stage (Magdalita *et al*., 2016; Magdalita & Pascual, 2022) [1, 4]. The petals were removed to expose the stigma and this was covered with a piece of packet to avoid pollen contamination. Hibiscus breeding, we have collected pollens from a designated male parent through brush methods then it transferred manually into the previously covered stigma of the chosen female parent during the daytime at 10 am (11/12/2020). The pollinated stigma was covered again with a packet to prevent contamination. After crossing, the crossed flowers are covered with paper bags to protect from pollinators. The pollinated flowers are labelled, which is indicating that the parents were involved in the crossing. After a week of crossing, the bags are removed and the young capsules were allowed to develop under natural conditions. After 60 days of its successful pollination, about 15 seeds were collected from the matured capsules in February 2021.

At the end of March 2021, the collected seeds were carefully cut round with a sharp sterilised blade to open hard shells and were soaked overnight in water. Soaked seeds were covered with tissue paper and shifted to an airtight container and maintained 25-30 °C temperature. The seeds were sprouted within 7-8 days. The sprouted seeds were transferred to a media bed which is consisting of coco peat. Seedlings were gradually acclimatized into natural conditions, after sprouting of 2-3 leaves from the growth media bed. Undeveloped or poorly developed and die-back diseased seedlings were discarded. After the field observation found that one seedling was obviously different from the previous registered hibiscus cultivars. After six months healthy seedlings were shifted experimental garden of AJC Bose Indian Botanic Garden, Howrah for further characterisation.

Characterization of a new cultivar

The developed new cultivar started to produce flowers attaining at the age of 1 year old. The fully developed cultivar branches were collected for cuttings, grafting, and budding for clonal propagation and multiplications. The propagated saplings were used to check/stabilise the characters. High quality, bush development, propagation, disease resistance power, ability to bloom and bloom size has been observed in the newly developed cultivar. The flower's bright pink with red eye zone when it's full bloom and has a longer flowering period (more than two days in winter and 1 day in summer) has been determined as a stable character. The developed and standardised new cultivar has been named as 'Janaki Ammal' in honour of E. K. Janaki Ammal, the Indian Botanist who worked on plant breeding, cytogenetics, phytogeography and first special officer in the Botanical Survey of India. The new cultivar registration was accepted by the International Hibiscus Society on 08.05.2022.

https://internationalhibiscussociety.org/searchive/genealogy_tree?Search_box=Janaki%20Ammal

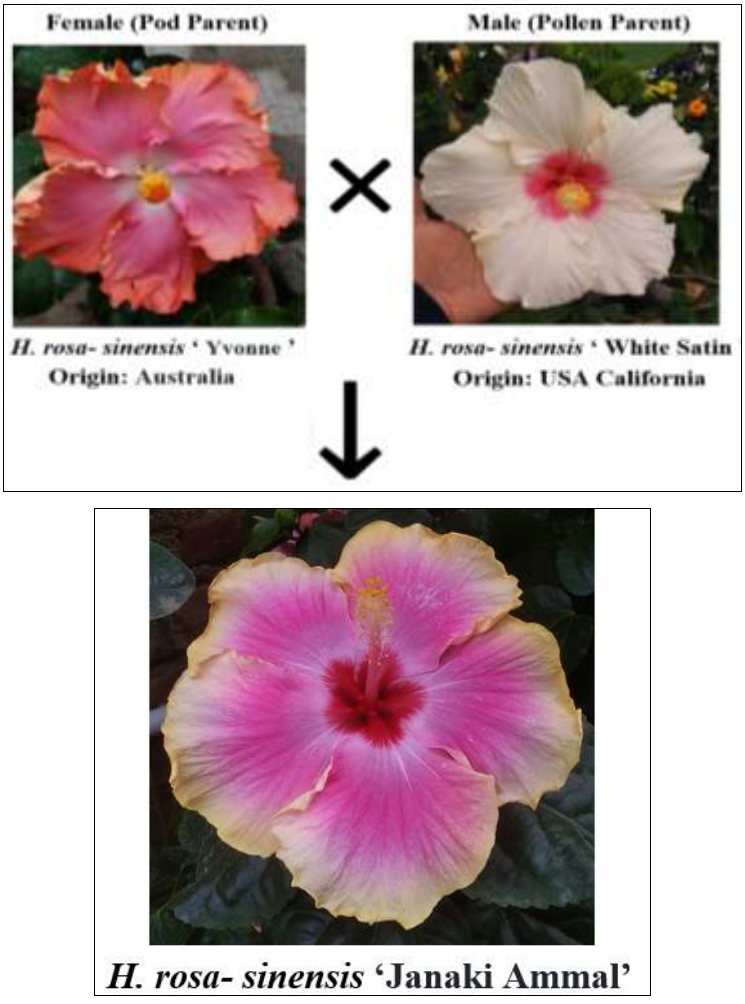

Fig 1: The hybrid *Hibiscus rosa-sinensis* 'Janaki Ammal' and its female *parent H. rosa-sinensis* 'Y vonne' and male parent *H. rosa-sinensis* 'White Satin'

Taxonomy of *Hibiscus rosa-sinensis* L. "Janaki Ammal"

Shrubs up to 2 m high; branches densely upright, green; intermodal portion 1-2 cm long. Leaves simple, petiolate; petiole ca. 3 × 0.2 cm, blades ovate, 9-10 × 8-9 cm, rounded to cordate at base, crenate along the margin, acute at apex, dark green above, light green beneath, 5-7-nerved from the base. Stipules linear, 0.4-0.5 × 0.1-0.2 cm. Inflorescence axillary, solitary; peduncle 3.5-3.7 × 0.3-0.5 cm; pedicel ca. 0.7 × 0.4 cm, flower bud pale yellow, 4-4.5 × 1.8-2 cm. Flowers pink, 10-15 × 9.5-14 cm. Epicalyx ca. 3 × 3 cm, linear, 6-lobed, each lobe 1.2-1.3 × 0.2-0.3 cm. Sepals united below the half, ca. 2.4 × 5.8 cm, tube ca. 0.9 cm long, 5-lobed; lobes ovate-lanceolate, ca. 1.4 × 1.2 cm, acute at apex. Petals 10-10.5 × 9.5-10 cm, polypetalous, 5; obovate, cuneate to unequal at the base, entire to undulate along the margin, rounded at apex, upper surface pink with red eye zone, pale yellow along the margin, lower surface yellow with creamy centred veins prominently raised beneath, creamy. Staminal column red, ca. 9.5 × 0.6 cm, naked zone 6 cm long anther zone ca. 3.2 × 1. 6 cm, anthers ca. 0.1 × 0.2 cm, kidney-shaped, yellow; filaments ca. 0.7 cm long. Pistil ca. 10 cm long ovary cylindrical, ca. 1 × 0.8 cm, style ca. 7.8 cm long, linear, stigma yellow, ca. 0.8 × 0.9 cm, 5-lobed; lobes 0.1-0.2 × 0.3-0.4 cm, unequal, densely hairy. Capsule ca. 1.7 × 1.3 cm, cylindrical, pubescent, and beaked at apex, 7-8 seeded; seeds reniform, ca. 0.5 × 0.4 cm, densely hairy. Flowering & fruiting: Throughout the year but very prominent in winter. Usually, flowers open early in the morning and close after two days of its opening.

Propagation: It can be done by cuttings, grafting, budding and seeds.

Fig 2: *Hibiscus rosa-sinensis* L. 'Janaki Ammal': a. Habit; b. Branch; c. Leaf-upper surface; d. Leaf lower surface; e. Flower bud; f. Flower-top view; g. Epicalyx; h. Calyx; i. Petal-top view; j. Petal-lower surface; k. Staminal column with red eye zone; l. Staminal column with pistil; m. Pistil; n. Stigma pad; o. T.S. of ovary; p. Staminal column; q. Capsule; r. Capsule dehiscence-top view; s. Seeds

Conclusion

Breeding different hibiscus cultivars from foreign sources (Australia & California, USA) was conducted from 2020-2023 to develop unique cultivar that are comparable with other flowers. This breeding work led to the development of a new cultivar which has a very much ornamental potential, and cultural significance and is also useful in landscaping. Since the hibiscus flowers have high demand in the country especially in West Bengal for cultural significance. The newly developed *H. rosa-sinensis* L. 'Janaki Ammal' cultivar will address the current demand of the country/ region and further, it has a wide scope for future research, especially in the field of pharmacology and as cosmeceuticals. The developed hibiscus cultivar is registered with the International Hibiscus Society.

Acknowledgement

Authors are thankful to the Director, Botanical Survey of India, and Kolkata for facilities and to the faculty and principal of Ramakrishna Mission Vivekananda Centenary College, Rahara for encouragement.

References

1. Magdalita PM, Cayaban MFH, Gregorio MT, Silverio. Development and characterization of nine new Hibiscus hybrids. Philippine Journal of Crop Science JV. 2016;41(2):31-45.
2. POWO. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew; c2023. Accessed on 10.02.2023. Available at: http://www.plantsoftheworldonline.org
3. Chakraborty D, Swamy J, Singh D. Development and characterisation of new *Hibiscus rosa-sinensis* cultivar ('Janaki Ammal') from India. International Journal of Horticulture and Food Science. 2023;5(1):77-80.
4. Magdalita PM, Pascual AO. *Hibiscus* (*Hibiscus rosa-sinensis*): Importance and classification. In Floriculture and Ornamental Plants. Singapore, Springer Nature Singapore; c2022. p. 483-522.
5. Pramanick B, Mukherjee S, Ghosh D, Saha S, Mandal T. In India, the Hibiscus is represented by 27 taxa belonging to 23 species, one subspecies and three varieties. International Journal of Botany Studies. 2020;5(6):108-112.
6. Magdalita PM, Pascual LN. Hybridisation of *Hibiscus rosa-sinensis* L. International Journal of Plant Breeding and Genetics. 2016;4(3):45-52.