



Effect of Seasons on Morphological Traits of Odisha Lotus-9 (OL -9), A Local Germplasm of Sacred Lotus (*Nelumbo nucifera* Gaertn.)

Avinash Patnaik and Sashikala Beura*

Department of Floriculture & Landscaping, College of Agriculture,
Odisha University of Agriculture and Technology, Bhubaneswar (Odisha), India.

(Corresponding author: Sashikala Beura*)

(Received: 26 November 2022; Revised: 23 December 2022; Accepted: 03 January, 2023; Published: 18 January, 2023)

(Published by Research Trend)

ABSTRACT: The present research was done to study the influence of different seasons (summer and rainy) on different vegetative parameters of Odisha Lotus-9 (OL-9), a local germplasm of Lotus (*Nelumbo nucifera* Gaertn.). This experiment was laid out in Completely Randomized Design (CRD) with three replications in the Department of Floriculture & Landscaping, on the research plot located at BTCC (Biotechnology cum Tissue Culture Centre) of the Odisha University of Agriculture and Technology, Barmunda, Bhubaneswar, Odisha during 2021-22. OL-9 (*Nelumbo nucifera* Gaertn.) were planted inside the cemented wells exhibited best performance for vegetative growth parameters in terms of leaf length (30.99 cm), leaf breadth (26.34 cm) during rainy season, length of leaf stalk (65.32 cm), no. of uncurled leaves (5.88) during late rainy season and total no. of floating leaves per plant (35.44) during rainy season. Rainy season is the best for vegetative parameters and hence peak production during rainy season is favorable to produce foliage plants for enhance the flowering characters. The revealed data can be utilized for more advanced studies for lotus improvement.

Keywords: *Nelumbo nucifera* Gaertn., Morphological traits, Odisha Lotus-9, Rainy season.

INTRODUCTION

Nelumbo, popularly known as Lotus, is the most attractive aquatic plants of India. The Lotus flower is most important due to its national importance in India as a National Flower. The plant has rhizomatous stem, large peltate leaves, some floating and some standing above the water. The genus consists of two species- *N. lutea*, a native of North America, which bears scented yellow flowers and *N. nucifera* is a native to India. The flowers are white, rosy or deep pink in colour, single or double type.

Lotus (*Nelumbo nucifera* Gaertn.), also called Asian lotus, is an aquatic herbaceous perennial plant. *N. nucifera* has an extremely long history in cultivation as a vegetable, medicinal, and ornamental plant in Eastern countries (Wang and Zhang 2004). Sacred lotus is associated with Hindu Gods, Bramha and Vishnu and also cited in Bhagwat 'Geeta'. The lotus flowers & garlands are offered to Gods and Goddesses in temples, the buds of lotus are used in flower arrangements.

Nelumbo nucifera stands out not solely for its historical and aesthetic significance but also for the breadth of research elucidating its complex nature (Salaemae *et al.*, 2018b).

The lotus, *Nelumbo nucifera*, is an aquatic plant that plays a central role in the art of Indian religions. In

Asian art a lotus throne is a stylized lotus flower used as the seat or base for a figure. It is the normal pedestal for divine figures in Buddhist art and Hindu art. Originating in Indian art, it followed Indian religions to East Asia in particular. It is also popularly called as sacred lotus because of its religious significance in Hinduism and Buddhism (Shen-Miller, 2002).

Lotus is considered the most important offering to the God & Goddess. In Jagannath temple Padma Vasha is done on any Saturday or Wednesday between the new moon day of Magha and Basanta Panchami. Prior to the Odia month of Magha, we have the winter season when the lotus disappears from the tanks and reservoirs. But from the month of Magha onwards, these flowers reappear. The lotus signifies 'health and wealth' at the same time. The lotus blossoms when the sun rises in the morning and it is mythologically held that Goddess Lakshmi (the Goddess of Wealth), moves on fully blossomed lotus. In the fitness of things, Lord Jagannath is dressed with the "Vasha of Lotus". This also indicates that gifts of Nature like the lotus must be duly honoured (Pradhani, 2004).

Pink and white lotus flowers is offered to Goddess specially Lakshmi and during few other local festivals at different locations of Odisha. But the city residents are facing difficulty in fetching flowers from the market as it is selling at almost thrice its usual price since

florists aren't able to match the high demand during the Puja. Residents had no other options but to purchase white and pink lotuses at high rates. This shows the market demand for the lotus flowers round the year and high at certain time but less supply since only few farmers taken up cultivation of lotus due to lack of systematic research for enhance its commercial production and also government support & awareness. Odisha has a rich source of lotus germplasm across the State but not yet properly documented or any research work done. So this research work will be the first step towards that. The study aims to understand the impact of different seasons on the plants morphological traits which is essential for horticulturists, landscapers and urban planners. In order to promote country's national flower as a commercial crop across the State.

MATERIALS AND METHODS

For the experiment Odisha Lotus -9 (OL-9) rhizomes were planted thrice in a cemented well of size 4m diameter and depth of 90cm. Filled with soil upto 1 feet height and filled 1 days before planting. Weeds and stubbles were completely removed. The plants were planted in the cemented well filled up with soil media & organic compost and watered to settle down the soil as well standing water of 2 cm for planting of rhizome. Rhizomes with minimum 3 nodes were planted per pit, hence 3 plants were planted per cemented well and replicated thrice.

The observations on vegetative parameters were taken from three sample plants in each replication and recorded at 30 days intervals. Leaf length, leaf breadth, length of leaf stalk, no. of uncurled leaves and total no. of floating leaves per plant were among the vegetative characteristics for which data were collected and analyzed statistically following CRD by OP STAT application.

RESULTS AND DISCUSSION

The data presented in Table 1 for studying the effect of seasons on leaf length in OL-9 during 2 seasons *i.e.* summer & rainy, revealed that leaf length was

significantly larger in rainy season. Recorded highest leaf length (30.99 cm) in mid-rainy season in the treatment T₆ for the month of August 2021. Whereas the data recorded for leaf breadth (26.34 cm) was recorded highest in early rainy season in the treatment T₅ for the month of July 2021 in OL-9.

Lowest length (1.46cm) & breadth (1.34 cm) in the treatment T₁ in the month of March 2021 since it's the initial planting period and rhizome is not properly developed. The perceptible increase in leaf length and breadth is due to the active synthesis of tryptophan, which is precursor of Indole Acetic Acid which could have stimulated the growth of plant tissue with a gradual elongation & enlargement of underground rhizomes.

The highest length of leaf stalk (65.32 cm) was recorded for the month of October 2021 in late rainy season in the treatment T₈. It is enhanced with age of the crop & also level water maintained in the well.

The highest number of uncurled leaves per plant (5.88) was recorded in late rainy season in the treatment T₇ for the month of September 2021 and the data remains at par T₆ with whereas lowered (1.55) in month of October due to short day length which enlarges rhizome leading to reduction in leaf proliferation as reported by Masuda *et al.* (2006).

The highest number of floating leaves per plant (35.44) was recorded in late rainy season in the treatment T₈ for the month of October 2021. From the data presented in Table 1 its clearly visible that there is an continuous increase in the number of floating leaves from summer season till rainy season due to enlargement of rhizomes of lotus. In lotus, some reports have revealed that high temperature and long day length could promote vegetative growth in terms of leaf production, rhizome branching and rhizome node formation (Masuda *et al.*, 2006).

Lotus is a special crop in which vegetative growth and reproductive growth are alternated and nutrients are provided by rhizome (propagules) in the early growth stage (Yang *et al.*, 2015).

Table 1: Effect of seasons on vegetative parameters in OL-9 (*Nelumbo nucifera* Gaertn.).

Characters Treatments (Months)		Leaf length (cm)	Leaf breadth (cm)	Length of leaf stalk (cm)	Total no. of uncurled leaves per plant	Total no. of floating leaves per plant
T ₁ Mar 21	Summer	1.46	1.34	2.34	1.00	1.00
T ₂ Apr 21		1.78	1.50	9.66	1.44	1.57
T ₃ May 21		4.84	4.60	15.82	1.66	2.66
T ₄ Jun 21		9.83	8.60	44.16	2.44	7.00
T ₅ Jul 21	Rainy	30.66	26.34	46.66	5.44	20.56
T ₆ Aug 21		30.99	25.50	57.66	5.66	24.44
T ₇ Sept 21		27.46	22.62	58.66	5.88	34.44
T ₈ Oct 21		21.84	18.44	65.32	1.55	35.44
SE(m) ±		0.02	0.12	0.01	0.09	0.19
CD (5%)		0.06	0.35	0.03	0.27	0.57

CONCLUSIONS

In comparison to summer season, the rainy season was found to be favorable in enhancing the vegetative characteristics of lotus. Higher leaf length (30.99cm), leaf breadth (26.34 cm), length of leaf stalk (65.32 cm), no. of uncurled leaves (5.88) and total number of floating leaves (35.44) of OL-9 observed during rainy season is favorable to enhance the flowering characters. Leaves are essential for production of photosynthates which enhanced the quality flower production. Hence, ultimately luxuriant vegetative growth is reciprocal for better flower production.

FUTURE SCOPE

Research in this area could lead to enhanced cultivation techniques, germplasm conservation & commercialization of lotus. Further research can be done to establish & explore different cultivation aspects of lotus for landscape gardening.

Acknowledgement. I would like to express my gratitude to Dr. Sashikala Beura, Professor and Head of the Department of Floriculture and Landscaping, College of Agriculture, OUAT, Bhubaneswar and field workers of Department of Floriculture

and Landscaping for helping and supporting during my research.

Conflict of Interest. None.

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How to cite this article: Avinash Patnaik and Sashikala Beura (2023). Effect of Seasons on Morphological Traits of Odisha Lotus-9 (OL -9), A Local Germplasm of Sacred Lotus (*Nelumbo nucifera* Gaertn.). *Biological Forum – An International Journal*, 15(1): 777-779.