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Evaluation of the different varieties of Lotus *(Nelumbo nucifera)* in Prayagraj agroclimatic condition, Uttar Pradesh

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Abstract— *The experiment was conducted in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, during 2024-2025. The experiment was laid out in Randomized Block Design (RBD) with 12 Lotus varieties and each variety was replicated 4 times. The different varieties used in the experiment were 108, Akhila, Fong Hu, Sai Thung Sui, Super lotus 14, Allahabad local lotus-1, Allahabad local lotus-2, Yellow penoy, Super lotus, Bucha, Rani red, White lotus. The result obtained showed that the variety V11: Rani red showed significantly better performance in parameters like plant height (34.01 cm), number of leaves (40.32), leaf length (23.18 cm), leaf width (20.79 cm), number of days for emergence of flower bud (21.62), flower diameter (16.92 cm), flower length (24.99 cm), duration of flowering (9.89), vase life (6.71), total number of flowers/plant (35.90), and which was found to be at par with variety V3: Fong Hu in plant height (33.00 cm), number of leaves (38.93), leaf length (22.78 cm), leaf width (24.03 cm), number of days for emergence of flower bud (22.84), flower diameter (16.25 cm), flower length (24.62 cm), duration of flowering (9.53), vase life (6.43), total number of flowers/plant (35.46), Hence, variety V11 and V3 is excellent in terms of performance and plant growth under Prayagraj agroclimatic conditions.*

Keywords— ***Lotus, varieties, plant growth, vase life.***

I. INTRODUCTION

Lotus (*Nelumbo nucifera* Gaertn.) is a signature of Indian social legacy, profoundly connected with Hindu folklore, workmanship and culture consequently lotus has been concurred the situation with the National flower of India. It is quite possibly the most appealing aquatic plant species in India existing from Kashmir to Kanyakumari displaying tremendous thermo-plasticity and phenotypic biodiversity with countless racial variations for shapes, sizes and shade of the flower going from white, pink to dark pink and having 16-160 petals [3]. The plants being profoundly aesthetic are taken advantage for beautifying ponds and lakes, it is quite possibly the most appealing native aquatic plant species. In India it is holy to Hinduism and Buddhism [12]. Lotus is a large perennial erect aquatic herb with big round floating leaves of size 20-80 cm. The flowers are generally pink or white with numerous sepals and petals and have a sacred importance. Young leaves, petioles and flowers are used as food or medicine. The species is of religious significance in South East Asia, its seeds and leaves are also eaten in this region. Each part of lotus is commercial useful: flowers on auspicious occasions, the rhizome and tender leaves are used as vegetables, seed as medicine, thalamus as fruit, leaves as plates, stalks as pickle and petals for colour extraction [9]. Wetlands are the place where water is found in abundance governs the kinds and life of organisms. Such habitats are known as sarovar, jheel, lake or pond. Marsh and swamp are the foundation of human civilisation which has been an integral part of our socio –cultural ethos in India. Historically wetlands were modified and managed by

local communities for using their resources in various ways [6]. Lotus is an important and monetary aquatic plant, which is broadly utilized as food, flower, medicine and packaging material in Chhattisgarh. Sacred lotus (*Nelumbo nucifera* Gaertn.) has been screened experimentally for different pharmacological components like anti-ischemic action, cell reinforcement movement, hepatoprotective action, mitigating action, anti-fertility activity, against arrhythmic action, anti-fibrosis activity, antiviral action, anti-proliferative action, anti-diarrhoeal action, psychopharmacological action, diuretic action, cancer prevention agent action, antipyretic action, immunomodulatory action, hypoglycaemic action, aldose reductase inhibitory action, antibacterial, aphrodisiac activity, antiplatelet action, cardiovascular action, anti-obesity activity, lipolytic action, hypocholesterolaeic action [8]. Lotus is primarily developed in India, China, Japan, Korea, South East Asia, Russia and a few nations in Africa. There are three biodiversity of Lotus utilized in China -for organic product or seeds (Lian-zi, Lian-mi), for flower (Lian hua, ha) and for rhizomes (Lian-ngau, Ou-lian). In china, lotus varieties found especially for rhizome, having diverse bloom tone, starch content. Japan delivered 822'00 tons lotus rhizomes in 1982 from an area of 6,350 ha. which has been diminished to 719'00 tons from 4,900 ha in 1998. During 1995, interestingly Japan imported lotus rhizomes, including new and processed products from China [1-2]. Taiwan produces lotus rhizome from June to November with August being top gathering time around 550 tons in 1993 [15]. South Korea delivered 9,261 tons of lotus rhizomes on 291.0 ha [1]. Mean yield of lotus rhizomes was 31.83 tons per ha. Lotus is the fourth biggest crop in South Korea area, where lotus rhizomes produce from August to December [7]. In India lotus flowers was in high demands on the occasion of Deepawali for rangoli decoration in offices, house, and shops. It flowers profusely, both the flowers and flower buds are in great demand for religious offering in temples. Sacred lotus in Chhattisgarh has genetic variability reflected in flower colour which ranges from white, pink, dark pink and having variation in number of petals which depict the single type and double type flowers, the characteristics of rhizomes and leaves and in their yield (1500 to 5000 kg/ha.). Apart from these, sacred Lotus field also support a fairly rich biodiversity of aquatic fauna, flora, insects, molluscs, other invertebrates, amphibians and birds. Unlike paddy fields which are known to be a source of methane emission, the sacred lotus plants are known to transport large volume of air from the atmosphere to the soil through big air spaces in their petiole and rhizomes, thereby aerating the soil. Sacred lotus supports wetland which helps to mitigate climate change without compromising on the provision of food and supports biodiversity [11]. Presently sacred lotus was constantly being ignored by habitat, by increasing human activities in natural wetlands for fish cultivation or for recreation purposes leading to genetic erosion of the wild lotus. The genetic diversity of lotus and its geographical pattern remains unknown. We are now facing the problem of shrinkage of natural wetlands as well ponds and reservoirs, which leads to extinction of wild lotus. The purpose of this investigation was to evaluate different varieties of lotus in agroclimatic conditions of Prayagraj to help further research and development of more sustainable and easier to reproduce lotus cultivars.

II. MATERIALS AND METHODS

The details of the various materials used and methods adopted in carrying out the experiment are presented below:

2.1 DATA ANALYSIS:

The data was analyzed using STAR.

2.2 EXPERIMENTAL SITE:

The present investigation entitled **"Evaluation of the different varieties of Lotus *(Nelumbo nucifera)* in Prayagraj agroclimatic condition**" was carried out during the year 2024-2025 in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology & Sciences Prayagraj in the months of October 2024 to February 2025. The experiment was conducted on different cultivars of lotus. All the facilities necessary for cultivation, including labor were made in the department.

2.3 Varieties and Notations

Study on different varieties of lotus during 2024-25 at Horticulture Research Farm of Naini Agricultural Institute, SHUATS, Prayagraj, (Uttar Pradesh). The experiment was laid out in RBD, with 4 replications of 7 different varieties viz. V1: 108, V2: Akhila, V3: Fong Hu, V4: Sai Thung Sui, V5: Super Lotus 14, V6: Allahabad Local Lotus-1, V7: Allahabad Local Lotus-2, V8: Yellow Penoy, V9: Super Lotus, V10: Buch, V11: Rani Red, V12: White Lotus. The transplanting was done on 28/10/2024 in field condition.

2.4 Climate

The Prayagraj District comes under subtropical belt in the southeast of U.P. which experience extremely hot summer and fairly cold winter. During the winter months (Dec.-Jan) temperature falls 2-5^{0}C or even low, while in summer months (May-June) it reaches as high as 49^{0}C. Hot blowing winds are regular feature during the summers and an occasional spell of frost may be during winters. Most of the rainfall is received in the middle of July to end of September after which the intensity of rainfall decreases. The mean

annual rainfall is about 850-1100mm. However, occasional precipitation is also not uncommon during winter months.

2.5 Running status

Growth parameter

1. Plant height (cm)
2. Number of Leaves
3. Leaf Length (cm)
4. Leaf width (cm)

Floral parameter

5. Number of flowers per plant
6. Number of days for emergence of flower buds
7. Flower diameter (cm)
8. Flower length (cm)

Quality parameter

9. Vase life (days)

III. RESULT AND DISCUSSION

The experiment entitled "EVALUATION OF THE VARIETIES OF LOTUS *(Nelumbo nucifera)* IN PRAYAGRAJ AGROCLIMATIC CONDITION, UTTAR-PRADESH" was carried in the polyhouse, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agricultural, Technology and Sciences, Prayagraj. The tabulated data were statistically analyzed with a view to find out. The data present in the tabular forms shows the relevant standard error of mean deviation S (±) and the critical difference (C.D) at 5% level of significance, wherever necessary. The results emanating from the present studies are presented under appropriate heading:

Table 1: Plant height (cm) of different varieties of lotus (Nelumbo nucifera) at monthly time interval.

VARIETIES	30DAP	60DAP	90DAP	120DAP
V_1	14.91	25.54	26.12	27.00
V_2	17.04	27.21	27.86	30.24
V_3	17.98	28.48	29.36	33.00
V_4	12.17	19.63	20.90	22.84
V_5	13.72	22.89	24.53	25.28
V_6	17.26	27.22	27.91	32.16
V_7	12.46	21.79	22.06	23.84
V_8	14.36	24.16	25.88	26.82
V_9	17.40	27.72	29.13	32.24
V_{10}	12.72	22.61	23.34	24.82
V_{11}	18.29	29.13	30.62	34.01
V_{12}	15.72	25.91	26.27	29.05
F-Test	S	S	S	S
SE(d) ±	1.27	1.969	1.668	3.205
CD	2.828	4.023	3.409	6.549
CV	8.182	11.049	9.014	15.933

Significantly, higher plant height was observed in the lotus cultivar V11: Rani red (34.01 cm), which was found to be at par with cultivar V3: Fong Hu (33.00 cm), while lesser plant height was observed in the cultivar V4: Sai Thung Sui (22.84 cm).

Variation in plant height could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in lotus by **H. Birkumar (2004), Pinto *et al.* (2009), Mekbib *et al.* (2020) and Srijika (2024).**

Table 4.2: Varietal observation on number of leaves of different varieties of lotus.

VARIETIES	30DAP	60DAP	90DAP	120DAP
V_1	15.82	18.03	28.05	35.16
V_2	16.54	20.20	34.06	37.02
V_3	17.67	22.80	36.46	38.93
V_4	11.81	15.45	20.10	27.64
V_5	14.96	16.91	22.92	29.40
V_6	16.95	21.51	35.91	37.28
V_7	13.28	15.85	20.47	28.65
V_8	15.30	17.12	26.65	31.19
V_9	17.21	22.35	36.19	37.63
V_{10}	14.60	16.71	21.02	29.10
V_{11}	17.98	24.55	37.05	40.32
V_{12}	16.17	19.07	30.45	35.34
F-Test	S	S	S	S
SE(d) ±	1.353	2.172	4.526	4.347
CD	2.764	4.439	9.249	8.883
CV	12.386	15.986	21.984	18.093

Significantly, higher number of leaves was observed in the lotus cultivar V11: Rani red (40.32), which was found to be at par with cultivar V3: Fong Hu (38.93), while lesser number of leaves was observed in the cultivar V4: Sai Thung Sui (27.64).

Variation in number of leaves could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in lotus by **Pinto *et al.* (2009), Guo et al. (2010), Mekbib *et al.* (2020) and Srijika (2024).**

Table 4.3: Varietal observation on leaf length (cm) of different varieties of lotus.

VARIETIES	30DAP	60DAP	90DAP	120DAP
V_1	8.03	11.53	13.96	19.70
V_2	8.17	12.28	14.31	20.74
V_3	8.93	13.15	14.98	22.78
V_4	7.06	9.92	11.61	17.63
V_5	7.86	11.11	13.05	18.69
V_6	8.24	12.84	14.43	20.93
V_7	7.31	10.45	12.06	17.72
V_8	7.92	11.52	13.55	19.08
V_9	8.58	12.99	14.80	22.02
V_{10}	7.67	10.64	12.49	17.94
V_{11}	9.03	13.90	15.03	23.18
V_{12}	8.06	11.94	14.04	19.97
F-Test	S	S	S	S
SE(d) ±	0.55	1.09	0.956	1.651
CD	1.124	2.227	1.953	3.374
CV	9.634	12.996	9.866	11.653

Significantly, higher leaf length was observed in the lotus cultivar V11: Rani red (23.18 cm), which was found to be at par with cultivar V3: Fong Hu (22.78 cm), while lesser leaf length was observed in the cultivar V4: Sai Thung Sui (17.63 cm).

Variation in leaf length could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in lotus by **Pinto *et al.* (2009), Guo et al. (2010), Mekbib *et al.* (2020) and Srijika (2024).**

Table 4.4: Varietal observation on leaf width (cm) of different varieties of lotus.

VARIETIES	30DAP	60DAP	90DAP	120DAP
V_1	9.44	13.48	15.43	22.52
V_2	9.51	14.48	15.86	23.20
V_3	10.44	15.02	16.91	24.03
V_4	8.59	11.56	13.22	20.94
V_5	9.00	13.05	14.97	21.87
V_6	9.77	14.75	16.06	23.28
V_7	8.73	12.20	14.35	21.52
V_8	9.24	13.34	15.21	22.18
V_9	10.08	14.89	16.35	23.83
V_{10}	8.99	12.88	14.72	21.77
V_{11}	10.63	15.44	17.39	24.79
V_{12}	9.45	14.04	15.63	22.94
F-Test	S	S	S	S
SE(d) ±	0.542	1.015	1.055	0.895
CD	1.107	2.075	2.156	1.830
CV	8.067	10.433	9.618	5.567

Significantly, higher leaf width was observed in the lotus cultivar V11: Rani red (24.79 cm), which was found to be at par with cultivar V3: Fong Hu (24.03 cm), while lesser leaf width was observed in the cultivar V4: Sai Thung Sui (20.94 cm).

Variation in leaf width could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in lotus by **Pinto *et al.* (2009), Guo et al. (2010), Mekbib *et al.* (2020) and Srijika (2024).**

Table 4.5: Varietal observation on number of flowers per plant, number of days for emergence of flower bud, flower diameter, flower length and vase life of different varieties of lotus.

Variety No.	Number of flowers per plant	Number of days for emergence of flower bud	Flower diameter	Flower length	Vase life of flowers
V_1	29.81	27.12	14.67	20.32	4.86
V_2	33.36	25.59	15.62	22.98	5.33
V_3	35.46	22.84	16.25	24.62	6.43
V_4	21.86	29.14	12.86	18.94	4.04
V_5	27.53	27.9	13.99	19.58	4.26
V_6	34.09	25	15.74	23	5.58
V_7	24.16	28.78	13.44	19	4.2
V_8	27.79	27.49	14.33	20.01	4.79
V_9	34.77	24.24	16.16	23.88	6.05
V_{10}	26.02	28.42	13.74	19.34	4.24
V_{11}	35.9	21.62	16.92	24.99	6.71
V_{12}	30.7	25.81	14.94	21.49	5.24
F-test	S	S	S	S	S
SE(d) ±	3.04	2.224	2.224	1.824	0.616
CD at 5%	6.212	4.564	4.564	3.728	1.371
CV	14.27	12.022	12.022	11.989	12.094

The increase in number of flowers per plant, days for emergence of flower bud, flower diameter, Flower Length, duration of flower, vase life be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in lotus by **Pinto *et al.* (2009)**, **Shubhashree *et al.* (2015), Ashoka *et al.* (2023) and Srijika (2024).**

IV. CONCLUSION

From the present investigation it is concluded that the variety V11 (Rani red) is found to be best in terms of Growth parameters: plant height, number of leaves, leaf length, leaf width, number of buds per plant, Floral parameter: number of days to open flower bud, total number of flowers per plant, total number of flowers per hectare.

REFERENCES

[1] Anonymous. (1997). Horticultural crop production in Korea. National Horticultural Research institute, Rural Development Administartion, Seoul, Korea.

[2] Anonymous, (1989, 1997, 2000). Pocketto Norinsuisan Toke (Pockets statistic of Agriculture, forestry & fisheries. Ministry of Agriculture, forestry and fisheries (MAFF), Japan.

[3] Goel Anil, Sharma S C, Sharma A.N. (2001). The Conservation of the diversity of Nelumbo (Lotus) at the National Botanical Research Institute, Lucknow (India), Proceeding of 3rd Global Botanic Garden Congress volume 3, November 6-June.

[4] Guo, H. B. (2009). Cultivation of lotus (Nelumbo nucifera Gaertn. ssp. nucifera) and its utilization in China. Genetic Resources and Crop Evolution,56(3), 323-330.

[5] Guo, H., Ke, W., & Li, S. (2010). Morphological diversity of flower lotus (Nelumbo nucifera Gaertn. ssp. nucifera) germplasm. Botanical Research,30(1), 70-80.).

[6] National Wetland Atlas (2010): Chhattisgarh, Space applications centre(ISRO), Ahmadabad and National Remote sensing centre (NRSC), Hyderabad, November 2010.

[7] Nguyen, V.Q., &Hicks, D. (2001). Exportinglotus to Asia, an agronomic &physiological study, a report for the rural industries research & development corporation.

[8] Nishkruti R, Ekta P, Pragnesh V. (2013). Nelumo nucifera (Lotus): A review on Ethanobotany, Phytochemistry and pharmacology. Indian journal of pharmaceutical and Biological Research1(4):152-167.

[9] Pal, I., & Dey, P. (2015). A review on lotus (Nelumbo nucifera) seed. International Journal of Science and Research,4(7), 1659-1665.

[10] Pinto, A.C.R., Mello, A. P., Jacomino, A.P., Minami, K., Barbosa, J.C. (2009) ISHS Acta Horticulture 812: VI International symposium on new floriculturalcrops.813.94.

[11] Sahu, R. &Gopal, Brij. (2017). Wetlandwealth of Chhattisgarh: Lotus field of Dhamtari wetland brief1, Worldwetland day, Chhattisgarh state planning commission, Naya Raipur, Chhattisgarh, India.

[12] Shen-miller, J. (2002). Sacred lotus, the long-living fruits of China Antique. Seed sciences Research,12(3):131-143.

[13] Shubhashree MN, Shantha TR, RamaRao V. (2015). A Review on Therapeutic uses of flowers as depicted in classical texts of Ayurveda and Siddha, J. Res. Edu. Indian Medicine, Vol, XXI Jan-March.

[14] Srijika Mondal (2024). Evaluation of the Different Varieties of Lotus (Nelumbo nucifera) in Prayagraj Agro Climatic Conditions, Uttar Pradesh. Journal of Advances in Biology & Biotechnology Volume 27, Issue 7, Page 287-295, 2024; Article no. JABB.118525 ISSN: 2394-1081.

[15] Vinning, G. (1995). Market compendium of Asian vegetables, RIRDC Research paper no. 95/12.