



Studies on Growth, Development and Establishment of Different Bael (*Aegle marmelos L.*) Varieties under Prayagraj Agro Climatic Conditions

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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

The objective of the experiment was to work out the "Studies on Growth, development and establishment of different variety of Bael (*Aegle marmelos L.*) for establishment under Prayagraj agro-climatic Condition. So, a field experiment was conducted during session 2022-2023 at, Department of Horticulture, Sam Higginbottom University Agriculture, Technology and Sciences, (SHUATS), Prayagraj (U.P). The experiment was conducted in Randomized Block Design with 7 Variety (treatment) replicated thrice. The treatments were V₁ Narendra Bael-5, V₂ Narendra Bael-6, V₃ Narendra Bael-7, V₄ Narendra Bael-9, V₅ Narendra Bael-1, V₆ Narendra Bael-11, V₇ Narendra

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Bael-8 .V₆ was found to be superior in the term of Survival Percentage (94.66%) Plant height (61.30 cm), Number of leaves plant (54.33), Number of branches plant⁻¹ (6.66), Stem diameter (5.36 cm), Plant spread (41.46cm) (E-W) and (43.40 cm) (N-S), Chlorophyll content (50.70) The research conduct will help the farmers to select superior variety of Bael under Prayagraj agro-climatic condition.

Keywords: Bael; varieties; neem cake; bone meal; vermicompost;

1. INTRODUCTION

Bael (*Aegle marmelos* L.) is important underutilized indigenous fruit crop of India, belongs to family Rutaceae. It is a subtropical and deciduous tree, which is very hardy and can thrive well under diverse agro-climatic conditions. The tree generally reaches a height of 6 to 8 metres with trifoliate, aromatic leaves, while the terminal leaflet is 5.7 cm long and 2.8 cm broad with a long petiole. Moreover, two lateral leaflets are 4.1 cm long and 2.2 cm wide, almost sessile [1].

Bael (*Aegle marmelos* L.) is an underutilized fruit indigenous to India. It belongs to the citrus family Rutaceae, and it is also known as Bengal quince, bilva, Indian quince, golden apple, holy fruit, bel, belwa, sriphal, stone apple and maredoin India. It was introduced to Europe from India in 1759. It is sacred tree in Hinduism, and is offered in prayers of Hindu deities Lord Shiva and Parvati and thus, the tree is also known by the name Shivaduma (The Tree of Shiva). Its medicinal properties have been described in the ancient treatise like Charaka Samhita, Upvana Vinod and Yajur Veda, and it has also been portrayed in the paintings of Ajanta Caves Singh et al. [2].

Aegle marmelos L. (Bael) is an indigenous tree fruit species in the Indian subcontinent and Southeast Asia. Bael is a perennial crop in India, Sri Lanka, Pakistan, Bangladesh, Myanmar, Thailand, Vietnam, the Philippines, Cambodia, Malaysia, Java, and other southeastern Asian countries" Roy et al. (1979) and Asghar et al. [3]. "Bael is a sacred tree in India. The gardens of many Indian Hindu temples have bael trees" Singhal et al. (2011). "The ripe fruit, which contains a delicious pulp, is the most valuable part of the bael tree Seth (2003). People mainly consume bael as fresh fruit. However, the value-added products of bael, such as drinks, traditional sweets, jam, and pudding, are available in the market Morton (1987), People prefer bael primarily because of its rich taste and ability to cure constipation" Dutta et al. [4]. "Bael fruit is an expensive commodity in supermarkets and street fruit stalls. All parts of the bael tree

possess medicinal values Baliga et al. [5]. "Thus, bael is famous as a valuable crop with immense medicinal and nutritional potentials" Kumar and Nath (2010). "There are many reports available on the medicinal and industrial values of bael in India" Mukherjee et al. (2007), Kintzios (2006), Raja et al. (2008), Kamalakkannan et al. [6] and Kenghe et al. [7]. "*Aegle marmelos* L. grows well in the dry forests of hilly and plain areas. It can adapt a wide range of habitat and can be cultivated worldwide. This tree is mentioned in the prehistoric writings dating back to 800 B.C. The Chinese Buddhist pilgrim, Hiuen Tsiang also noticed the presence of this tree during his visit to India in 1629 A.D." Sharma et al. (2014). The fruits of bael are rich in vitamins, minerals, antioxidants and with importance in medicinal remedies for rural folks.

2. MATERIALS AND METHODS

The experiment was carried out the Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj 2022-2023. The method employed during the course of investigation and materials utilized have greater significance in the research program. "The details of materials used and technique employed in carrying out the investigation described under the following heads.

The experiment was carried out at the Floriculture research farm, Department of Horticulture, SHUATS, Prayagraj is situated in the agro-climatic zone (Sub-tropical belt) of Uttar Pradesh state. Geographically, Allahabad is located at of 25°48' North latitude, 81° 5' East longitudes and at an altitude of 98 meters above mean sea level (MSL).

The maximum temperature of the location reaches up to 46°C-48°C and seldom falls as low as 4°C-5°C. There relative humidity ranged between 20 to 94 per cent.

3. RESULTS AND DISCUSSION

Influence of different planting on their survival and growth parameters of different cultivar of bael are given into Table 1.

Table 1. Effect of planting on growth parameters in different varieties of bael

Varieties symbol	Variety	Plant height(cm)	Stem diameter	No. of leaves	No. of branches	Plant spread(cm)		Chlorophyll content (SPAD)	Survival (%)
						E-W	N-S		
V1	Narendra Bael-5	53.77	4.36	46.33	6.5	35.23	35.23	55.54	77.66
V2	Narendra Bael-6	55.80	5.4	52.66	6.6	40.36	40.36	56.54	82.66
V3	Narendra Bael-7	53.75	4.61	48.43	6.4	38.66	38.66	64.42	81.66
V4	Narendra Bael-9	46.30	3.53	38.26	6.43	34.38	34.38	60.28	77.66
V5	Narendra Bael-17	51.47	3.26	43.43	5.43	34.43	34.43	53.36	75
V6	Narendra Bael-11	61.30	5.36	54.53	6.66	43.4	43.4	50.7	94.66
V7	Narendra Bael-8	48.13	3.5	35.46	5.6	30.81	30.81	68.33	75
F.test		S	S	S	S	S	S	S	S
S.E (d)		0.40	1.98	0.16	0.20	0.21	0.21	0.15	2.27
(±)		0.88	4.21	0.36	0.44	0.46	0.46	0.34	4.95
CD (5%)									

The results obtained have been summarized below:-

Plant height:

At 120 DAP, The maximum plant height 61.30 cm was found in V₆ (Narendra Bael-11) and the minimum was recorded in V₄ (Narendra Bael-9) with 46.30 cm.

Singh et al. [8] reported that “difference in vegetative growth among the varieties may be due to inherent characters of individual varieties and their acclimatization to varied agro-climatic conditions”.

Stem diameter:

At 120 DAP, The maximum Stem diameter (cm) (5.4) was found in V₂ Narendra Bael-6 varieties and the minimum Stem diameter (cm) (3.26) was recorded with V₅ Narendra Bael-17. However, Singh et al. [9] reported highest stem diameter in NB-17 and lowest in CISHB-2.

No. of leaves:

At 120 DAP, The maximum number of leaves plant⁻¹ (54.53) was found in V₆ Narendra Bael -11 varieties and the minimum number of leaves plant⁻¹ (35.46) was recorded with V Narendra Bael-8.

Singh and Misra [10] registered higher PCV (phenotypic coefficient of variation) for number of leaves. High magnitude of GCV (genotypic coefficient of variation) and PCV indicates a scope for improvement of these traits through selection.

No. of branch:

At 120 DAP, The maximum Number of branches plant⁻¹ (6.66) was found in V₆ Narendra Bael-11 varieties and the minimum Number of branches plant⁻¹ (5.43) was recorded with V₅ Narendra Bael-17.

Plant spread(E-W):

“At 120 DAP, The maximum Plant spread (cm) (E-W) (41.46) was found in V₆ Narendra Bael-11 varieties and the minimum Plant spread (cm) (E-W) (28.73) was recorded with V₇ Narendra Bael-8”. [11]

Singh et al. [8] reported that “difference in vegetative growth among the varieties may be due to inherent characters of individual varieties and their acclimatization to varied agro-climatic conditions. The dwarfness is the desirable

characters for the high density planting by accommodating more number of plants per unit area and harvest more sunlight to enhance the productivity”. Misra et al. [12] also reported that “the different bael genotypes exhibited variations in their growth behaviour under moist conditions of eastern India” [13-15].

Plant spread(N-S):

At 180 DAP, The maximum Plant spread (cm) (N-S) (43.4) was found in V₆ Narendra Bael-11 varieties and the minimum Plant spread (cm) (N-S) (30.81) was recorded with V₇ Narendra Bael-8.

Chlorophyll content (SPAD):

At 120 DAP, The maximum chlorophyll content (SPAD) (68.33) was found in V₇ Narendra Bael-8 varieties and the minimum chlorophyll content (SPAD) (50.7) was recorded with V₆ Narendra Bael-11.

“These traits might have improved the photosynthetic efficiency and thus ultimate growth potential of the plant. Chlorophyll-a, Chlorophyll-b and total chlorophyll contents were found higher in genotypes” [9,16-17].

Survival percentage:

At 120 DAP, The maximum survival plant (94.66%) was found in V₆ Narendra Bael- 11 varieties and the minimum survival per plant (75%) was recorded with V₇ Narendra Bael-8.

4. CONCLUSION

From the present investigation it may be concluded that Bael (*Aegle marmelos* L.) V₆ Narendra Bael-11 resulted in highest survival percentage and vegetative growth parameters like plant height (cm), number of leaves plant⁻¹, number of branches plant⁻¹, stem diameter (cm), plant spread (cm) (e-w), plant spread (cm) (n-s) and chlorophyll content (spad). All the varieties were significantly superior in their survival percentage and vegetative growth parameters over V₇ Narendra Bael-8. Since this is based on one season trial therefore, further evaluation trials are needed to substantiate the findings.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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