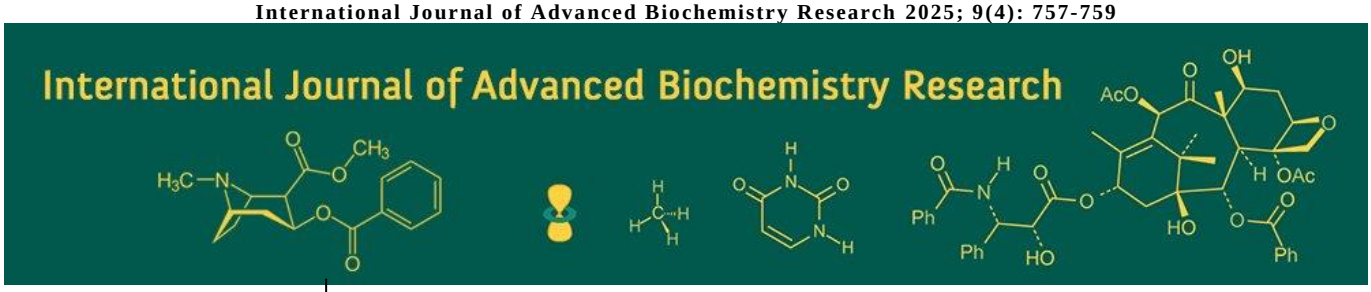

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating: 5.29
IJABR 2025; 9(4): 757-759
www.biochemjournal.com
Received: 21-02-2025
Accepted: 26-03-2025

DL Bagdi
Department of Plant Physiology, SKN College of Agriculture (SKNAU), Jobner, Rajasthan, India

NK Gupta
Director Research, SKN Agriculture University, Jobner, Rajasthan, Rajasthan, India

Corresponding Author:
DL Bagdi
Department of Plant Physiology, SKN College of Agriculture (SKNAU), Jobner, Rajasthan, India

Morpho-physiologically identification of SKN B-15 and SKN B-2 genotypes of Bael under semi-arid conditions

DL Bagdi and NK Gupta

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i4i.4178

Abstract
The present investigation entitled "Morpho-physiologically Identification of SKN B-15 and SKNB-2 genotypes of bael under semi-arid conditions" was carried during the year 2024-25 at Asalpur farm, Department of Horticulture, SKN College of Agriculture, Jobner. The experiment was conducted in Randomized Block Design with thirteen genotypes and replicated four times, considering one plant as a unit. The identification of SKN B-15 and SKN B-2 among 13 genotypes of bael and others cited in literature were carried out by using morphological and physiological traits *viz*. growth habit, foliage, phyllotaxy, inter nodal distance, leaf size, central leaf shape, lateral leaf shape, leaf apex, leaf base, leaf surface, leaf length, leaf width, trunk colour, bark splitting pattern, leaf colour, leaf margin, thorniness at basal portion of primary branch, flower size, maturity of fruit, immature fruit colour, mature fruit colour, fruit shape, fruit surface, pulp colour, shell thickness, mucilage, styler end cavity, stem end cavity, seed shape, locule arrangement, total number of seeds, total soluble solids(^{0}Brix) of pulp, frost tolerance capacity and chlorophyll content.

Keywords: Bael, phyllotaxy, leaf size, TSS, mucilage, frost tolerance, and chlorophyll content

Introduction
Bael fruit (*Aegle marmelos correa*) is a tropical fruit native to south-east Asia and belongs to family Rutaceae. It is an important indigenous fruit of India. It is also known as 'Bengal Quince'. Aegle, the genous of bael is monotypic. It is a midsized, slender, aromatic, armed, gum-bearing tree growing up to 18 meter tall. It has a compound leaf with three leaflets. It has been known in India from prehistoric times and is more prized for its medicinal virtues than its edible quality. In Hinduism the tree is considered sacred. It is used for worship of lord Shiva, who is said to favour the leaves. The trifoliate leaves symbolize the trident the Shiva holds in his right hand. The fruit were used in place of Coconuts before large-scale rail transportation become available. The fruit is said to resemble a skull with a white, bone-like outer shell and a soft inner part. The tree grows wild in dry forests on hills and plains of central and southern India, Burma, Pakistan, Bangladesh, Sri Lanka, Northern Malaya, Java, and Philippine Islands. However, there was no organized orcharding of bael in India but now a day organized orchard are having planted it grows mainly wild and in temple gardens in early years. The fruit is available in almost all states of India, but most abundantly available in Uttar Pradesh, Bihar, West Bengal and Odisha, In Odisha the fruit is predominantly present in forests of Dhenkanal, Angul, Bolangir and Rayagada districts. It has a reputation in India for being able to grow in places where other trees cannot grow. The fruit is very hardy and can grow even under adverse agro-climatic conditions. Most of the tropical and subtropical condition fruits have a poor keeping quality but this let fruit can be kept for a longer period because of its hard outer shell and as, it can easily withstand transport and marketing hazards. It copes with a wide range of soil pH of 5-10 and a wide temperature tolerance from 7^0 to 48 °C. It requires a pronounced dry season to give fruit.

In India, some types have been named According to fruit shape and quality. It is found that the spherical flattened once were usually the best on the basis of fruit weight and chemical composition. In India, various size of bael having good quality are available which are known after the locality. Ripe fruit is available mainly during the February to May. But immature fruit are sold in the month of August to mid January, which are consumed after

boiling or roasting. Dried chips of unripe fruit are also sold in the market. Most of the consumers like fully ripe Bael fruits, because of its higher sugar content and excellent flavor. As a climactric fruit, marked compositional changes occur during its growth, development, ripening, storage and processing. Major constituents e.g. total sugars, reducing sugar, starch, acidity, vitamin, total phenolics etc. of this fruit are changed during natural ripening. Every genotype of bael has different morphological and physiological structure and value. Therefore, this experiment was conducted to identify SKN B-15 and SKN B-2 genotypes among others genotypes of bael by using these morpho-physiological traits.

Materials and Methods

The present investigation entitled "Morpho-physiologically identification SKN B-15 and SKNB-2 genotypes of bael under semi-arid conditions" was carried out at Asalpur farm, Department of Horticulture, SKN College of Agriculture, Jobner during the year 2024-25. Experimental site: This Experimental Station is located 45 km west of jaipur at 26^0 05' North latitude, 75^0 28' East longitude and at an altitude of 427 meters above mean sea level. The area falls in agro climatic zone-IIIA (Semi-arid eastern Plain Zone) of Rajasthan.

Experimental Details

1. Treatments-13 genotypes
2. Design-RBD
3. Replications-4

Results and Discussion

Morphological and Physiological Characters

1. Measurement by single observation of a group of plants or part of plant (MG)

Data presented in Table-1 clearly indicated high inter nodal distance i.e. more than 3.5cm in SKN B-15 and SKN B-2 germplasm of bael. The observation was recorded in the month of October by measurement by single observation of a group of plants or parts of plant.

2. Measurement by single observation of an individual plants or part of plant (MS)

Data of leaf size presented in Table-1 clearly indicated medium leaf size in SKN B-15 and SKN B-2 germplasm of bael; Data of Leaf length was recorded small (less than 21cm) in SKN B-15 and small (less than 20 cm) in SKN B-2 germplasm of bael; Leaf width was recorded small (less than 19cm) in SKN B-15 and small (less than 18cm) in SKN B-2 germplasm of bael; Flower size was found medium (12-15cm) in SKN B-15 and SKN B-2 germplasm of bael; Total number of seeds was found Low (<125) in SKN B-15 and SKN B-2 germplasm of bael, the observation was recorded on mature fruits, when they are 40% ready for harvesting; Total soluble solids ((^{0}Brix) of pulp was recorded high (39.46 ^{0}Brix) in SKN B-15 and medium (36.45 ^{0}Brix) in SKN B-2 germplasm of bael, the observation was recorded on mature fruits, when they are 40% ready for harvesting. The observation was recorded in the month of October by measurement by single observation of individual plant or parts of plants.

3. Visual assessment by a single observation of a group of plants or parts of plants (VG)

Growth habit

Data of growth habit presented in Table-1 clearly indicated drooping and semi-spreading growth habit in SKN B-15 and SKN B-2 germplasm of bael; Foliage clearly indicated dense foliage in SKN B-15 and SKN B-2 germplasm of bael; Phyllotaxi clearly indicated pentasticshous phyllotaxi in SKN B-15 and SKN B-2 germplasm of bael; Central leaf shape was recorded ovate in SKN B-15 and broadly lanceolate to ovate in SKN B-2 germplasm of bael; Lateral leaf shape was recorded ovate in SKN B-15 and broadly lanceolate in SKN B-2 germplasm of bael; Leaf apex was recorded acute in SKN B-15 and acuminate in SKN B-2 germplasm of bael; Leaf base was recorded round in SKN B-15 and narrowly cuneate in SKN B-2 germplasm of bael; Leaf surface was recorded smooth in SKN B-15 and acuminate in SKN B-2 germplasm of bael; Trunk colour was recorded yellowish grey in SKN B-15 and grey in SKN B-2 germplasm of bael; Bark splitting pattern was recorded rectangular in SKN B-15 and SKN B-2 germplasm of bael; Leaf colour was recorded green in SKN B-15 and SKN B-2 germplasm of bael; Leaf marginwas recorded crenate in SKN B-15 and crenulate in SKN B-2 germplasm of bael; Maturity of fruit was recorded early (after 280 days of fruit setting) in SKN B-15 and late (after 340days of fruit settinh) in SKN B-2 germplasm of bael; Immature fruit colour was recorded light green in SKN B-15 and green in SKN B-2 germplasm of bael; Mature fruit colour was recorded greenish pale yellow in SKN B-15 and yellowish green in SKN B-2 germplasm of bael; Fruit surface was recorded rough in SKN B-15 and SKN B-2 germplasm of bael; Pulp colour was recorded pale yellow in SKN B-15 and yellow in SKN B-2 germplasm of bael; Shell thickness was recorded thin(<2mm) in SKN B-15 and SKN B-2 germplasm of bael; Styler end cavity and stem end cavity were found depressed in SKN B-15 and SKN B-2 germplasm of bael; Seed shape was found oblong in SKN B-15 and round in SKN B-2 germplasm of bael; Locule arrangement was recorded centric in SKN B-15 and scattered in SKN B-2 germplasm of bael The observation was recorded in the month of October by visual assessment by a single observation of a group of plants or parts of plants and Frost tolerance capacity noted up to-4 °C in SKN B-15 and-2 °C in SKN B-2 germplasm of bael during frost injury in 2020-22.The frost injury was not occurred during 2022-24.

4. Visual assessment by observation of individual plants or parts of plan (VS)

Data presented in Table-1 clearly indicated that basal portion of primary branch was found thorny in SKN B-15 and SKN B-2 germplasm of bael; Fruit shape was recorded elliptical in SKN B-15 and globose in SKN B-2 germplasm of bael; Mucilage was found low in SKN B-15 and high SKN B-2 germplasm of bael. The observation was recorded in the month of October by visual assessment by a single observation of plant parts and Chlorophyll content (mg/g fr wt of leaf) It is evident from the data subscribed in Table-1 that total chlorophyll content was recorded 1.63 and 1.27 mg/g fr wt of leaf in SKN B-15 and SKN B-2 germplasm of bael during October by using the method of Arnon (1949).

Table 1: Morphological and Physiological identifying traits of SKN B-15 and SKN B-2 germplasm of bael.

S. No	TRAITS	SKN B-15	SKN B-2	Stage of observation	Type of assessment
1	Growth habit	Drooping	Semi-spreading	A	VG
2	Foliage	Dense	Dense	A	VG
3	Phyllotaxy	Pentasticshous	Pentasticshous	A	VG
4	Inter nodal distance	High (more than 3.5cm)	High (more than 3.5cm)	A	MG
5	Leaf size	Medium	Medium	A	MS
6	Central leaf shape	Ovate	Broadly lanceolate to ovate	A	VG
7	Lateral leaf shape	Ovate	Lanceolate	A	VG
8	Leaf apex	Acute	Acuminate	A	VG
9	Leaf base	Round	Narrowly cuneate	A	VG
10	Leaf surface	Smooth	Smooth	A	VG
11	Leaf length	Small (<21cm)	Small (<20 cm)	A	MS
12	Leaf width	Small (<19cm)	Small (<18 cm)	A	MS
13	Trunk colour	Yellowish grey	Grey	A	VG
14	Bark splitting pattern	Rectangular	Rectangular	A	VG
15	Leaf colour	Green	Green	A	VG
16	Leaf margin	Crenate	Crenulate	A	VG
17	Thorniness at basal portion of primary branch	Thorny	Thorny	A	VS
18	Flower size	Medium(12-15cm)	Medium(12-15cm)	A	MS
19	Maturity of fruit	Early (after 280 days of fruit setting)	Late (after 340 days of fruit setting)	A	VG
20	Immature fruit colour	Light green	Green	B	VG
21	Mature fruit colour	Greenish pale yellow	Yellowish green	C	VG
22	Fruit shape	Elliptical	Globose	C	VS
23	Fruit surface	Rough	Rough	C	VG
24	Pulp colour	Pale yellow	Yellow	C	VG
25	Shell thickness	Thin(<2mm)	Thin(<2mm)	C	VG
26	Mucilage	Low	High	C	VS
27	Styler end cavity	Depressed	Depressed	C	VG
28	Stem end cavity	Depressed	Depressed	C	VG
29	Seed shape	Oblong	Round	C	VG
30	Locule arrangement	Centric	Scattered	C	VG
31	Total number of seeds	Low (<125)	Low (<125)	C	MS
32	Total soluble solids(^{0}Brix) of pulp	High (39.46 0Brix)	Medium (36.45^0 Brix)	C	MS
33	Frost tolerance capacity up to	-4 °C	-2 °C	During Dec. to January	VG
34	Chlorophyll content (mg/g frwt of leaf)	1.63	1.27	A	VS

Note: A=Observation on growth habit, shoot surface and leaf characters taken during September to October.
B=Observation on immature fruits taken in the month of September. C=Observation on mature fruits recorded when 40% fruits are ready for harvesting.MG=Measurement by single observation of a group of plants or parts of plant.MS= Measurement by single observation of individual plants or parts of plant. VG=Visual assessment by a single observation of a group of plants or parts of plant. VS= Visual assessment by observation of individual plants or parts of plant.

Conclusion

Based on the overall traits on morphological and physiological aspect the identification of genotypes *viz*. SKN B-15 and SKN B-2 were carried out under agro climatic zone-IIIA (Semi-arid eastern Plain Zone) of Rajasthan.

Acknowledgements

Authors are highly thankful to the University authority, SKNAU, Jobner and AICRP of AZF, Bikaner for providing support and financial assistance. All the authors whose works are consulted are equally acknowledged.

References

1. Arnon DI. Copper enzyme in isolated chloroplasts. Polyphenol oxidase in *Beta vulgaris*. Plant Physiol. 1949;24:1-15.
2. Fatema MK, Mamun MA, Sarker U, Hossain MS, Mia MA, Roychowdhury R, *et al*. Assessing morpho-physiological and biochemical markers of soybean for drought tolerance potential. Sustainability. 2023 Jan 11;15(2):1427.
3. Rehman M, Maqbool Z, Peng D, Liu L. Morpho-physiological traits, antioxidant capacity and phytoextraction of copper by ramie (*Boehmeria nivea* L.) grown as fodder in copper-contaminated soil. Environmental Science and Pollution Research. 2019 Feb 28;26:5851-5861.
4. Jeong BR, Sivanesan I. Micropropagation, berberine content and antitumor activity of *Jeffersonia dubia* (Maxim.) Benth et Hook. Plant Cell, Tissue and Organ Culture (PCTOC). 2016 Feb;124:453-458.
5. Fan SM, Li ZQ, Zhang SZ, Chen LY, Wei XY, Liang J, *et al*. Multi-integrated approach for unraveling small open reading frames potentially associated with secondary metabolism in Streptomyces. Msystems. 2023 Oct 26;8(5):e00245-223.