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Characterization of bael (*Aegle marmelos*) varieties under rainfed hot semi-arid environment of western India

A K SINGH¹, SANJAY SINGH², R S SINGH³, H K JOSHI⁴ and S K SHARMA⁵

Central Horticultural Experiment Station (CIAH), Vejalpur, Panchmahals (Godhra), Gujarat

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ABSTRACT

The present study was undertaken to evaluate the performance of different varieties of bael (*Aegle marmelos* Correa.), established through *in-situ* patch budding during the year 2003, at Experimental Farm of Central Horticultural Experiment Station (CIAH), Vejalpur, Panchmahals (Godhra), Gujarat under rainfed hot semi-arid ecosystem of western India during the years 2010-12. The results of study revealed that the different varieties of bael exhibited considerable variation for vegetative, floral, yield and physico-chemical attributes of bael fruits. The vegetative growth in terms of plant height, stem girth, plant spread (E-W) and plant spread (N-S) varied between 3.38-5.85m, 28.95-88.39 cm and 3.74-7.68 m and 3.40-7.52 m, respectively, while the terminal leaf length, breadth, lateral leaf length and breadth ranged between 10.72-15.02 cm, 5.85-9.38 cm, 7.45-11.38cm and 4.13-6.57cm, respectively. Different varieties of bael exhibited wide variations with respect to morphometrics of vegetative characters under rainfed conditions of western India. Varieties also showed wide differences for floral traits with regards to bud size, flower size and other floral organs. The morphological features of fruit of different varieties, viz. fruit yield (40.50-69.29 kg), fruit weight (0.43-4.25 kg), length (10.61-19.59 cm), width (9.40-22.00 cm) and fruit girth (29.10-70.00 cm) also showed variations. Physical composition of bael fruit exhibited wide variation in their shell weight (115.25-560.05g), shell thickness (0.16-0.31cm), number of seed/fruit (90.34-212.25), total fresh seed weight (17.34-43.41 g), number of seed sacs (10.23-19.17), fibre weight (15.91-106.50g) and pulp weight/fruit (0.27-3.67 kg). The qualitative characters of fruit in terms of TSS mucilage, TSS pulp, total sugar, reducing sugar, non reducing sugar, vitamin C, total phenols, acidity and TSS to acid ratio ranged between 37.00-49.50° brix, 30.57-37.45° brix, 16.15-19.98%, 3.30-4.95%, 12.85-15.13%, 17.13-21.03 mg/100g, 2.34-2.75%, 0.30-0.49% and 68.88-124.83, respectively. All the varieties of bael showed significant differences for qualitative and quantitative morphological characters under rainfed hot semi arid environment.

Key words: Bael, Evaluation, Morphology, Quantitative characters, Qualitative characters, Rainfed

Bael (*Aegle marmelos* Correa.) is one of the important indigenous medicinal fruit tree of India. It belongs to family Rutaceae and various species of the genus persist naturally throughout the India, but it is found growing frequently in Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal and Rajasthan, which typically represents varied agro-climatic conditions of India. Hot semi-arid zone is characterised by the low rainfall and the rainy spells are confined to 2 to 4½ wet months (June to September) and the remaining parts of the year are dry months. The rains are also erratic and often come in a few storms of short duration which results in great runoff without charging the soil moisture profile resulting into water stress in soil as well as atmosphere during major parts of the year. Arid and semi-arid regions have peculiar eco-climatological features in which several

major agronomical crops fail to sustain. As one of the hardy underutilised fruit crop, bael has capability to adapt the varied agro-climatic conditions. It is well known that the level of variation in reproductive traits of its constituents influence fruit production. Hence, any detectable variation in these traits may be attributed to genetic causes and can be effectively used as markers to characterise the varieties. Owing to highly nutraceutical, therapeutical, and post harvest values, and its usages in *Ayurvedic* system of medicines, the demand of this fruit is increasing day-by-day. It has higher content of riboflavin (Mukharjee and Ahmed 1957) and has great potential to become a new export commodity for the country, because each part of the tree such as root, bark, leaf flower and fruit are the important ingredients of indigenous traditional formulations. Studies on physico-chemical attributes of some varieties of bael (Ram and Singh 2003), floral traits and yield in some bael cultivars (Singh and Mishra 2004) have been reported by earlier workers, but systematic work on characterization of bael varieties has not been still reported especially under rainfed

¹ Senior Scientist, ² Principal Scientist & Head (e mail: sanjaysingh@gmail.com), ³ Principal Scientist (e mail: rssinghl@yahoo.com), ⁴ Scientist (e mial: chesvejalpur@gmail.com), ⁵ Director, CIAH, Bikaner, Rajasthan