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Short communication

Preliminary evaluation of *bael* varieties under rainfed conditions of hot semi-arid ecosystem of western India

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ABSTRACT

Evaluation of *bael* varieties under rain-fed, hot semi-arid ecosystem of western India was conducted. Nine *bael* varieties, *viz.*, NB-5, NB-7, NB-9, CISH-B-1, CISH-B-2, Pant Shivani, Pant Urvashi, Pant Aparna and Pant Sujata (10-year-old) were evaluated for growth, yield and qualaity parameters. Maximum yield per tree was recorded in NB-9 (25.00 kg) followed by CISHB-2 (22.74 kg), NB-5 (20.00 kg). Fruit weight was recorded maximum in NB-7 (3.15 kg) followed by Pant Shivani (2.20 kg) and Pant Urvashi (2.00 kg). Pulp TSS was found highest in NB-9 (38°B) followed by Pant Aparna (37°B) and Pant Shivani (36°B). The other parameters varied considerably. NB-9 and CISHB-2, NB-5 and CISHB-1 could be recommended for commercial cultivation.

Key words: *Bael*, evaluation, semi-arid ecosystem.

Bael (*Aegle marmelos* Correa), an indigenous fruit, belongs to family Rutaceae, occupies an important place among the underutilized fruits grown in India. It has attained an important position among the fruits owing to its high therapeutical, nutraceutical values apart better shelf-life. It is not becoming popular as dessert fruit, even though, no other fruit has such high content of riboflavin. Although, a large number of genotypes are growing naturally particularly in forest area of Gujarat, most of them do not satisfy the qualities available in commercial cultivars.

Evaluation of commercial *bael* varieties under rain-fed hot semi-arid ecosystem of western India was conducted at Experimental Block of CHES, Vejalpur, Panchmahals, Gujarat. Nine *bael* varieties, *viz.*, NB-5, NB-7, NB-9, CISH-B-1, CISH-B-2, Pant Shivani, Pant Urvashi, Pant Aparna and Pant Sujata, which were established through *in-situ* patch budding were selected. Thus, there were nine treatments (varieties) which were replicated four times in randomized block design considering two trees as a unit. The plants were planted at 10 m × 10 m distance on which recommended package and practices were followed and maintained under uniform cultural practices.

The growth data were recorded in the last week of November each year. The data on physico-chemical characters were recorded in second fortnight of April. The fruits were stored for ripening before data were recorded. Percentage of pulp, seed, fibre and shell were calculated in relation to total fruit weight of each variety. Quality parameters such as total soluble solids (TSS) and acidity were determined by standard methods and for estimation of sugars, phenols and vitamin C, the methods as suggested by AOAC (1).

Results of on vegetative growth revealed that all the varieties demonstrated differences for their vegetative parameters (Fig. 1). The maximum growth in terms of plant height was recorded with the variety NB-7 (4.70 m) followed by Pant Shivani (4.60 m) and Pant Sujata (4.12 m), however, minimum plant height was recorded with NB-5 (3.07 m) followed by Pant Aparna (3.35 m). Plant spread was recorded highest in Pant Shivani (5.70 m) followed by Pant Urvashi (5.38 m) and NB-7 (5.15 m), whereas minimum plant spread was recorded in NB-5 (3.75 m), whereas stem girth was recorded maximum in pant Shivani (0.62 m) followed by NB-7 (0.61 m) and Pant Urvashi (0.56 m), whereas the lowest was recorded in NB-5 (0.37 m). Percentage increase in plant height and stem girth over previous year was calculated as 17.47 and 18.12 being highest in NB-7, while plant spread was recorded highest in Pant Urvashi (21.73). Percentage increase in growth over previous year in terms of plant height, stem girth and plant spread were recorded minimum in NB-5 and CISHB-1, respectively (Fig. 2). Central (9.50 cm × 6.25 cm) and lateral (9.00 cm × 5.04 cm) leaf size was recorded maximum in NB-7 followed by Pant Urvashi, while minimum was in NB-9 (6.8 cm × 3.74 cm) (Figs. 3 & 4). Differences in growth behavior among evaluated varieties may be due to the genetical constitution of the individual genotype and their acclimatization under rainfed conditions. Similar findings have been reported by Pathak *et al*. (6), Singh *et al*. (8) and Pandey *et al*. (5) in *bael*.

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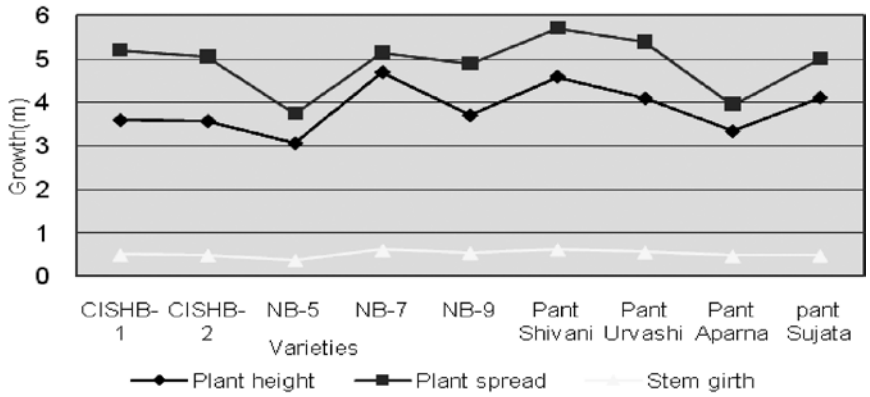

Fig. 1. Growth behaviour of different *bael* varieties (m).

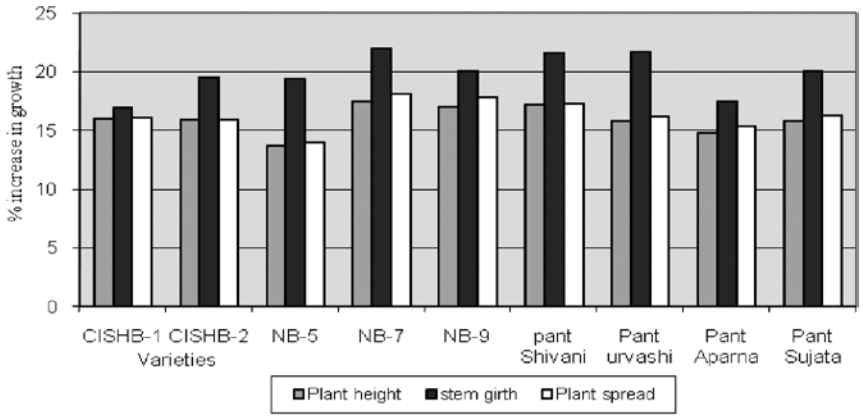

Fig. 2. Percentage increase in growth over previous year.

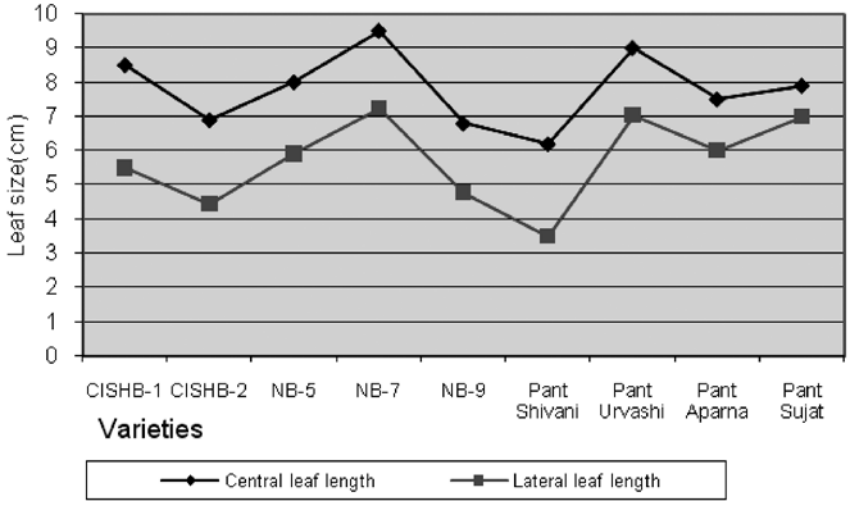

Fig. 3. Central and lateral leaf length (cm).

Results on the yield and yield attributing characters (Fig. 5) revealed that the yield per plant varied from 14.00 to 25.00 kg being the maximum in NB-9 (25.00 kg) followed by CISHB-2 (22.74 kg), NB-5 (20.00 kg), NB-7 (19.78 kg) and Pant Aparna (18.92 kg) and it was recorded the lowest in Pant Sujata (14.00 kg) followed by Pant Shivani (14.32 kg), Pant Urvashi (16.18 kg) and Pant Aparna (18.92 kg). Fruit weight, length,

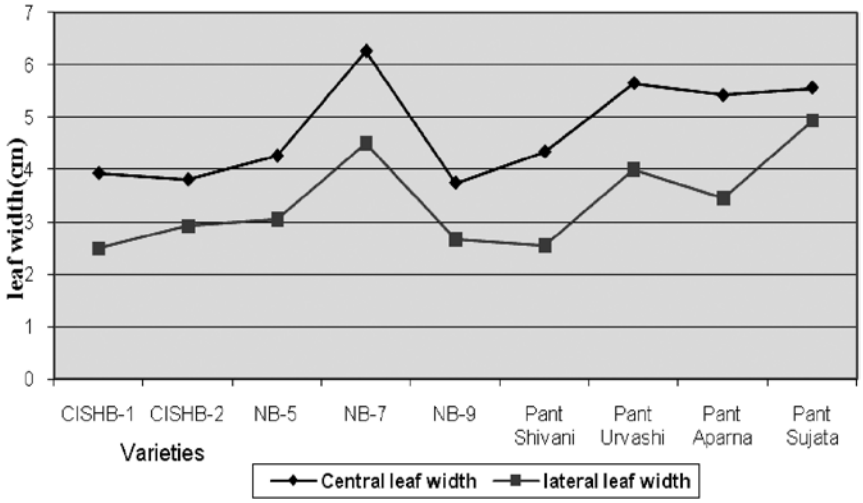

Fig. 4. Central and lateral leaf width (cm).

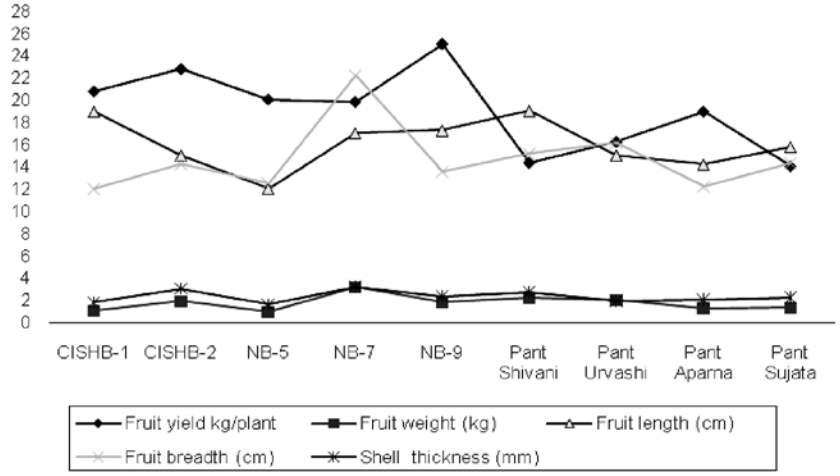

Fig. 5. Yield and yield attributing characters of different *bael* varieties.

width and shell thickness ranged from 0.98-3.15 cm, 12-19 cm, 12.00-22.17 cm and 1.6-3.5 cm among the different varieties. Fruit weight was recorded maximum in NB-7 (3.15 kg) followed by Pant Shivani (2.20 kg) and Pant Urvashi (2.00 kg), while minimum fruit weight was recorded in NB-5 (0.98 kg) followed by CISH-B-1 (1.03 kg) and Pant Aparna (1.28 kg) under rainfed hot semi-arid environment of western India. Fruit length (19.00 cm) and breadth (22.17 cm) were recorded highest in Pant Shivani and NB-7, respectively. Shell thickness was observed minimum in NB-5 (1.6 mm) followed by CISHB-1 (1.8 mm) and Pant Aparna (2.3 mm) and it was recorded maximum in NB-7 (3.20 mm). Similar results with respect to yield and yield attributing characters were also reported by Nath *et al.* (2) and Pandey *et al*. (4) in *bael* accessions collected from different parts of the country.

Results on physical composition of fruits of different varieties showed wide variations with respect to shell thickness, pulp, seed and mucilage (Fig. 6). The percentage of fibre, mucilage, shell, pulp and seed in the fruit of different varieties ranged 4.25-6.38, 11.00-14.50, 13.8-17.25, 60.25-66.52 and 2.5-3.4, respectively. The fibre content (%) was recorded maximum in Pant Shivani (6.38) followed by NB-9 (5.42), CISHB-2 (5.15) and Pant Urvashi (14.82), while the minimum was recorded in CISHB-1 (4.25) closely followed by NB-5 (4.48), Pant Aparna (4.65). The mucilage content was recorded highest in NB-9 (14.5%) followed by Pant Shivani (13.80%), CISHB-2 (13.51%) and Pant Urvashi (13.27%). The shell content (%) was recorded maximum in Pant Shivani (17.25) followed by NB-7, Pant Urvashi and CISHB-2, while pulp content (%) was maximum in CISHB-1 (66.52)

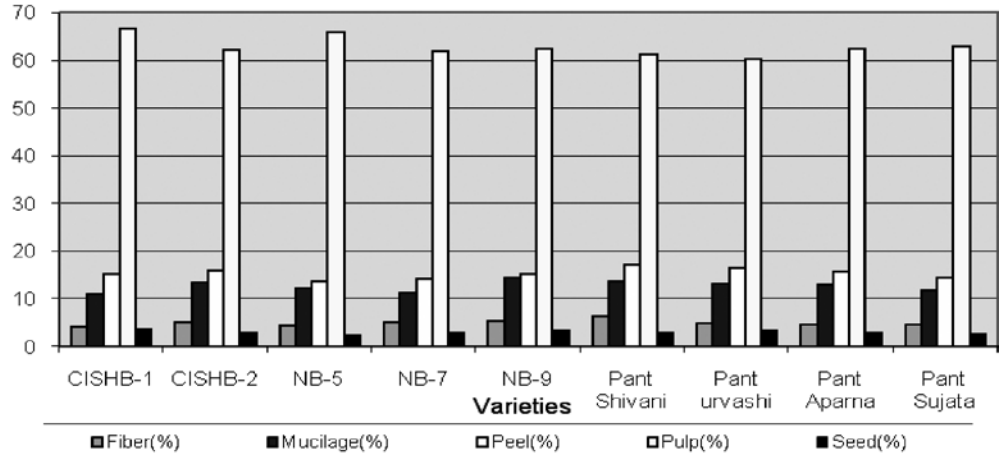

Fig. 6. Physical composition of fruits of *bael* varieties.

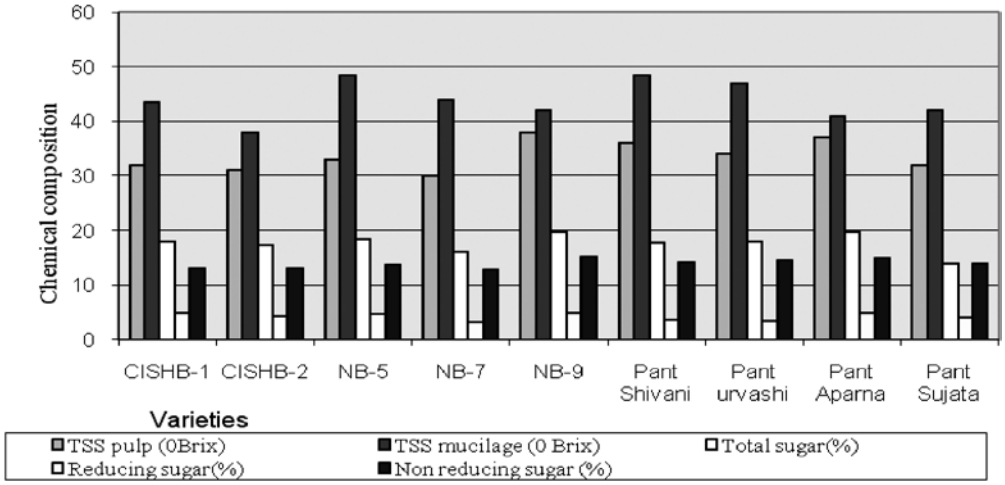

Fig. 7. Chemical composition of *bael* varieties.

followed by NB-5 (65.80), Pant Sujata (63.00), Pant Aparna (62.43), NB-9 (62.37) and CISH-B-2 (62.15). The percentage of seed content was recorded minimum in NB-7 (3.0). These results are in accordance with the findings of Singh *et al.* (9), Nath *et al.* (2) and Pandey *et al*. (3).

The data indicate that quality characters differed significantly among the evaluated varieties under rainfed conditions (Figs. 7 & 8). TSS ranged from 30 to 36°B, it was recorded highest in NB-9 (38°B) followed by Pant Aparna (37°B) and Pant Shivani (36°B) and it was recorded the lowest in NB-7 (30°B). TSS of mucilage varied from 38.00 - 48.50°B and it was recorded highest in NB-5 and Pant Shivani and the lowest was recorded in CISH-B-2 (38°B). Total sugars varied from 14.00 to 19.70% being highest in Pant Aparna (19.70%) followed by NB-9 (19.30%), Pant Urvashi (18.00%) and Pant Shivani (17.77%), while it was least in NB-7 (16.15%). The highest reducing (4.87%) and non reducing sugar content (15.13%) was estimated in CISHB-1 and NB-9, respectively. The maximum phenols content was found in CISHB-1 (2.75%), whereas it was noted minimum in Pant Sujata (2.41%). Vitamin 'C' content was recorded highest in NB-5 (20.97%) followed by NB-7, CISH-B-1, while it was lowest in Pant Sujata (17.10%).The titratable acidity of fruit pulp varied from 0.31-0.47% and it was recorded maximum in Pant Shivani, while it was recorded the lowest in CISH-B-1. These findings are in consonance with the results of Ram and Singh (7).

Thus, it may be inferred from the study that the different *bael* varieties can be grown successfully under rainfed semi-arid ecosystem of western India. Among the varieties, NB-9 and CISHB-2 performed better in terms of yield, whereas NB-5 and CISHB-1 were found to better in terms of qualitative attributes.

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