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Variability in *bael* (*Aegle marmelos* Correa) germplam collected from Rajasthan

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Abstract

Bael (*Aegle marmelos* Correa.) is a nutritive and medicinally important drought hardy fruit tree found throughout the country. Its fruit is eaten as fresh and also used for making several value added products. A survey for biodiversity of *bael* was conducted in Chomu, Jaipur, Sariska area of Alwar district during April-May,2014 to identify elite type germplasm having better horticultural traits.Twelve fruit samples from different location were collected for physical and biochemical analysis. Seedlings of different age groups were available on the farmer's field. However, in Sariska forest naturally grown *bael* trees having very small size fruits of inferior quality were observed. Variability in fruit shape- oval to cylindrical, round, fruit weight from 0.580kg to 1.860kg, number of fruit 21- 130 per tree was observed. The pulp colour light yellow to dark yellow and TSS ranged from 22.4 to 40.6°brix. Out of these, four plus tree (*Bael* accession, 4, 6, 10 and 12) were marked having superior bearing habit, medium fruit size and better fruit quality in respect of pulp colour, taste, high TSS (°brix) content and low acidity(0.22%) for further study.

Key words: *Bael*, *Aegle marmelos*, variability, germplasm, Sariska forest, Rajasthan,

Introduction

Bael (*Aegle marmelos* Correa.) is an important fruit tree for semi arid and hot arid regions of the country. It is a highly nutritious and favorite fruit throughout the country because of its medicinal and neutraceutical values. Besides fresh eaten, many products like jam, squash, candy, nectar, beverages, powder, RTS, etc. are prepared from fruits (Singh and Roy,1984; Sharma *et al.* 2007; Singh *et al.* 2011).This fruit can supplement the dietary needs of the rural people, where very less nutritious fruit is available. Exploitation of its horticultural traits is necessary to increase fruit production in low rainfall areas. Analysis of the fruit gave the following values: 61.5g moisture, 1.8 g protein, 0.39 g fat, 31.8 g carbohydrates, 1.7 g minerals, 55 mg carotene, 0.13 mg thiamine, 1.19 mg riboflavin, 1.1mg niacin and 8.0 mg vitamin C per 100 g of edible portion (Gopalan *et.al.* 1985). In India, *bael* fruits mature after 10-11 month of flowering and harvested during mid March to mid June. In recent times, to make better use of fruits there has been a renewed interest in the *bael* as a main component in ayurvedic preparations, health food, beverages and delicious drink, etc (Singh *et al.* 2011).

Keeping in view, a survey was under taken in villages of Chomu tehsil, Jaipur, Sariska forest, Alwar district, Rajasthan to identify trees having better quality of fruits, higher fruits yield, medium to heavy bearing types, suitability for processing and fruit cracking tolerance. The details of survey, identification of elite type, fruiting and quality characters and production system have been discussed in this paper.

Material and Methods

A survey was undertaken during the year 2014 to identify genotypes having better quality and productivity of fruits and also having tolerance to cracking. The farmer's field and forest area were surveyed in villages near by Chomu,Karvakidhani, Jaipur and Bhakeda, Narayan-Pura, Umren, Sahodi, Goth, Chhagu-Rampura, Malakheda, Dhigawada, Bhada, Kushalgarh, Rajgarh in Alwar district. Efforts were made to identify only prolific bearer, dwarf type, with thin skull, less number of seeds and medium size fruits. A total 12 genotypes having better fruit characters were marked. The trees having very small size, more number of fruits and more number of seeds in fruits were not marked. The method of random sampling from population after gathering information about particular genotype to record morphological and qualitative characters was used. The number of fruits per tree was counted at survey site and information on fruiting pattern was also collected from farmers. The physical attributes like fruit shape, size and average fruit weight, specific gravity were recorded and kept for proper ripening at room temperature. Number of seeds/fruit, No. of seed per sacs, skull thickness and weight were recorded. The colour of pulp was visually observed.

Total Soluble Solids (TSS°brix) of fruit pulp was measured by Digital Hand refractometer. Titratable Acidity (%) was estimated by titrating known amount of pulp against 0.1N NaOH using phenolphthalein as indicator (Ranganna, 1984).The ascorbic acid content in fruit was estimated using standardized 2, 6-diclorophenol- indophenol dye and

expressed in terms of mg per 100g fruit pulp.

Results and Discussion

The mean data pertaining to physical characters of *bael* germplasm is presented in table -1.The data showed considerable variability for all the characters studied. The number of fruit per tree varied from 21-130. Higher number of fruit was recorded in *bael* accession -8 (130Nos.) followed by *bael* accession-10 (115Nos.) in trees identified in villages Malakheda, Dhigawada of Alwar district. The number of fruit 104 per tree was noted in *bael* accession-4 in Chomu having less acidity and high TSS content. In Chomu area of Jaipur, mostly seedlings are planted on the boundary of fields and growing under dry land conditions. Looking to potential of this crop, now farmers are taking interest to conserve the bale plants. There is a fast genetic erosion in wild bael genotypes, therefore, its conservation has become necessary (Srivastava *et al.*, 1998). Rai and Dwivedi (1992) reported vivid account of *bael* genetic diversity available in India. The genetic diversity in *bale* germplasm was also observed at different locations by Rai*et al*, (1991). The tree heights were comparatively lower in Chomu area than farmer's field in Alwar which depends on soil and climatic conditions. Apart from the tree morphological characters, wide variability exists in fruit size and shape, bearing habit, flesh colour, texture, fiber content, sugar content, mucilage content, etc.(Pandey *et al*, 1986; Singh *et al*, 2009).Variation in fruiting, size and shape was also noticed during survey. No systematic plantations of *bael* in Alwar were observed. However, cracking in fruits was also observed in *bael* trees grown in Chomu, Jaipur and Alwar district. In Sariska forest, the trees were big in size and less in population. The trees having very small size fruit of inferior quality, more number of seeds and bitter in taste, which were generally eaten and damaged by monkeys as stated by foresters. Therefore, these types were not suitable from horticultural traits point of view. Lal (2002) evaluated 12 genotypes collected from Jaipur area (Rajasthan) and found that 8 genotypes produce fruits of excellent quality under semi-arid conditions.

Variation in morphological and physico-chemical characters of fruits have been reported by Nath *et al.* (2003) in fruit samples collected from eastern India. The number of fruits per trees, fruit weight and fruit yield per tree varied greatly among the different accessions collected and reported that big size and old *bael* trees are available in eastern part of country.

In the present study, variability in weight of fruits was observed from 0.585 to 1.860kg, fruit size (length 10.14-15.93cm and width (10.47.-14.15cm) besides fruit shape as depicted in fig. -1. One tree in Dhigawada village was having cylindrical fruit (average fruit weight 865g.) and farmer informed that this type is more suitable for making sherbet and skull is thin of this type.

The variation in size, colour, length& width, weight and quality has also been described by Rai *et al.* (1991). The characters *viz,* fruit weight, fruit length, number and weight of seed per fruit, fibre content, contributed maximum in genetic divergence. These characters may be used in selecting diverse parents in hybridization and intercrossing between clusters to develop superior clones of *bael* with most desirable traits (Rai, *et al*, 2002). Variation in shape was round, oval, obviated and one type was flat cylindrical. The pulp colour was light yellow to dark yellow in maximum germplasm. The small size fruits were having more seeds which were not considered promising for further collection of scion. The number of seeds per fruit varied from 50 to 128.The skull thickness was also differed among germplasm (table-1). The rind (skull) thickness varied from 1.08 mm to 4.25mm among germplasm which is also a good character while selecting a type with respect to cracking tolerance. The average weight of skull/rind ranged from 136g to 360g among germplasm.

Total Soluble Solids (TSS) was measured and variation was observed from 22.4 to 40.6° brix at ripening stage in fruits. Titrable acidity was estimated in pulp and it also varied from 0.22 to 0.32 %. The finding is in accordance to Lal, (2002) and Nath *et al.* (2003). The maximum ascorbic acid content was found 16.1 in *bael* accession -4 collected from chomu, Jaipur. The plants were grown under totally dry land conditions. The data presented showed that range of ascorbic acid/ in fruit pulp was 9.1 to 16.1mg per 100g (table-

Fig. 1: Variability in *bael* germplasm collected from Chomu and Alwar, Rajasthan

Fig: View of variability in *Beal* fruits

1). The ascorbic acid content was the higher in baelaccesion.-4 (16.10 mg/100g) while lowest (9.10) was in sample collected from Dhigawada village, Alwar and number of fruit was maximum in this germplasm. Variation in ascorbic acid content in bale germplasm was possibly being due to genetic character or climatic factors. Similar results have also been reported by Rai *et al*,(2002) and Singh *et al*.(2011).

Thus, on the basis of overall assessment, *bael* accession- 4, accession- 6, accession-10 and accession.-12 were found promising and have been marked for collection of bud wood for further evaluation under hot arid conditions.

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