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Studies on physical & yield attributes on Bael (*Aegle marmelos* Correa) fruits in sodic soil condition

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Abstract
The present investigation entitled "Studies on Physical & yield attributes on bael (*Aegle marmelos* Correa) fruits in sodic soil condition." was carried out at the Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) during the years 2016-2017. The experiment was conducted in Randomized Block Design with twelve genotypes and replicated three times, considering one plant as a unit. On the basis of Physico-chemical attributes of bael fruit *viz*. maximum fruit length (27.35cm), pulp weight (2.094kg), Specific gravity (1.01g/cc) and Minimum acidity(0.29%) found in ND/AH-25, fruit width(25.57cm) and total soluble solids(39.00) in ND/AH-10, fruit yield (224.06Q/ha) and fruit weight(2.51kg) are found is best in ND/AH-8.

Keywords: fruit length, fruit weight, fruit yield, specific gravity

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 7degree to 48 degree 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 climatric fruit, a 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.

Materials & Methods

The present investigation entitled "Studies on Physical & yield attributes on bael (*Aegle marmelos* Correa) fruits in sodic soil condition." was carried out at Main Experimental Station and P.G. Laboratory of the Horticulture, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad (U.P.) during the year 2016-17.

Experimental site: Main Experimental Station, Horticulture, N.D. University of Agriculture & Technology is located 45 km. away from Faizabad city on Faizabad - Raebareily Road. The geographically, university is situated at 26.47^0 N latitude, 82.12^0 E longitude and at altitude of 113.0 meter from sea level in the Indo-Gangatic plain of Eastern Uttar Pradesh, India.

Experimental Details:

1. Treatments - 12 genotypes
2. Design - RBD
3. Replications - 3

Results & Discussion

Physical characters of Bael fruit

Fruit length (cm)

Data presented in Table-1 clearly indicated significant variation in bael Genotypes. The maximum (27.35cm) fruit length was recorded with ND/AH-25 followed by NB-21. The comparatively lowest (17.67cm) fruit length was recorded in ND/AH-12 during course of investigation.

Table 1: Estimates of length of fruits in bael genotype.

Bael genotypes	Fruit length(cm)
ND/AH-8	23.50
ND/AH-9	22.60
ND/AH-10	25.93
ND/AH-11	26.30
ND/AH-12	17.67
ND/AH-16	25.53
ND/AH-17	25.65
ND/AH-21	19.18
ND/AH-25	27.35
ND/AH-26	25.38
ND/AH-27	21.53
NB-21	26.40
S.Em ±	0.92
CD at 5%	2.71

Fruit width (cm)

Data presented in Table-2 showed that the width of bael Genotype ND/AH-10 wasfound maximum (25.57cm) followed by NB-21(25.43cm). ND/AH-12 showed minimum fruit width (14.63cm) followed by ND/AH-21(18.27cm) during the years (2016-17). The fruit width noted significant.

Table 2: Estimates of width of fruits in bael genotype.

Bael genotypes	Fruit width(c.m.)
ND/AH-8	22.37
ND/AH-9	22.18
ND/AH-10	25.57
ND/AH-11	24.93
ND/AH-12	14.63
ND/AH-16	24.60
ND/AH-17	25.03
ND/AH-21	18.27
ND/AH-25	25.33
ND/AH-26	24.07
ND/AH-27	22.47
NB-21	25.43
S. Em±	00.66
CD at 5%	1.93

Fruit weight (kg)

It is obvious from data given in Table 3 of fruit weight noted significant. The maximum (2.51kg) fruit weight was obtained from the genotype ND/AH-25followed by genotype ND/AH-11 However, the lowest (1.40kg) fruit weight was recorded with genotype ND/AH-21.

Table 3: Estimates of weight of fruits in bael genotype

Bael genotypes	Fruit weight (kg.)
ND/AH-8	1.52
ND/AH-9	1.48
ND/AH-10	1.73
ND/AH-11	2.16
ND/AH-12	1.42
ND/AH-16	1.94
ND/AH-17	1.94
ND/AH-21	1.40
ND/AH-25	2.51
ND/AH-26	1.64
ND/AH-27	1.44
NB-21	2.01
S.Em ±	0.12
CD at 5%	0.34

Specific gravity (g/cc)

It is evident from data subscribed in Table 4 that average specific gravity was noted significant. The highest (1.01g/cc) specific gravity was obtained through genotype ND/AH-25. However, the lowest (0.90g/cc) specific gravity was recorded with the genotype ND/AH-27.

Table 4: Estimates of specific gravity of fruits in bael genotype.

Bael genotypes	Specific gravity(g/cc)
ND/AH-8	0.95
ND/AH-9	0.93
ND/AH-10	0.96
ND/AH-11	1.00
ND/AH-12	0.92
ND/AH-16	0.98
ND/AH-17	0.97
ND/AH-21	0.91
ND/AH-25	1.01

ND/AH-26	0.94
ND/AH-27	0.90
NB-21	0.97
S. Em ±	0.01
CD at 5%	0.04

Pulp weight (kg)

Data displayed in Table-5 show that pulp weight was noted significant. The maximum (2.094kg) pulp weight was recorded with the genotype ND/AH-25 whereas minimum (1.046kg) pulp weight was recorded with genotype ND/AH-12.

Table 5: Estimates of pulp weight of fruits in Bael genotype.

Bael genotypes	Pulp weight(kg)
ND/AH-8	1.132
ND/AH-9	1.090
ND/AH-10	1.344
ND/AH-11	1.748
ND/AH-12	1.046
ND/AH-16	1.554
ND/AH-17	1.554
ND/AH-21	1.052
ND/AH-25	2.094
ND/AH-26	1.312
ND/AH-27	1.080
NB-21	1.609
S.Em ±	1.07
CD at 5%	3.16

Number of seeds/fruit

Data presented in Table-6 and illustrated showed that the number of seed/fruit was noted significant. The number of seeds were found maximum (185.67) in genotype ND/AH-17 followed by genotype NDAH-11(180.67).The minimum (98.00) number of seed /fruit was recorded as the genotype NB-21.

Table 6: Estimates of number of seed/fruits in Bael genotype.

Baelgenotypes	Number of seed/fruit
ND/AH-8	120.67
ND/AH-9	116.00
ND/AH-10	139.33
ND/AH-11	180.67
ND/AH-12	151.00
ND/AH-16	162.67
ND/AH-17	185.67
ND/AH-21	127.00
ND/AH-25	119.67
ND/AH-26	108.67
ND/AH-27	106.33
NB-21	98.00
S.Em ±	11.64
CD at 5%	34.14

Fruit yield (Quintal/ hectare)

It was evident from the data arranged in Table-7 that yield of Bael fruits was noted significant. The fruit yield was recorded maximum (224.06Q./ha.) in bael genotype ND/AH-8 followed by (151.5Q./ha.) in genotype ND/AH-17where as minimum (21.33 Q./ha.) fruit yield was noted in ND/AH-12.

Table 7: Estimates of fruit yield of fruits in bael genotype.

Bael genotypes	Fruit yield (Quintal/hectare)
ND/AH-8	224.06
ND/AH-9	147.27
ND/AH-10	135.67
ND/AH-11	28.22
ND/AH-12	21.33
ND/AH-16	35.42
ND/AH-17	151.53
ND/AH-21	117.17
ND/AH-25	65.29
ND/AH-26	74.82
ND/AH-27	33.32
NB-21	44.66
S.Em ±	7.73
CD at 5%	22.25

Summary

A significant variation in fruit length was observed in all the genotypes. The fruit length varied between 27.35cm to 17.67cm. Among genotypes, ND/AH-25 produced longest fruit and closely followed by NB-21 and ND/AH-11. The value was found lowest in ND/AH-12.

The fruit width varied between 25.57cm to 14.63cm. Among genotypes, ND/AH-10 was found maximum fruit width (25.57cm) followed by NB-21 (25.43cm). The value was found lowest in genotype ND/AH-12 (14.63cm) followed by ND/AH-21 (18.27cm).

The fruit weight varied between 1.40 kg to 2.51kg. Among the genotype ND/AH-25 recorded maximum fruit weight closely followed by ND/AH-11, whereas, minimum fruit weight was noted in ND/AH-21, it might be because of varietal effect.

A significant variation in specific gravity of bael fruit was observed in all the genotypes. The specific gravity of bael fruit varied between 1.01 to 0.90 g/cc. Among genotypes, the highest (1.01) specific gravity was obtained in genotype ND/AH-25 followed by ND/AH-11(1.00). However, the lowest (0.90) specific gravity was noted with the genotype ND/AH- 27 followed by ND/AH-21(0.91).

A significant variation in pulp weight of bael fruit was observed in all the genotypes. The pulp weight of bael fruit was varied between 1.046kg to 2.094kg. Among genotypes, the maximum pulp weight (2.094) was recorded with the genotype ND/AH-25 followed by ND/AH-11 (1.748kg). The value was found lowest in ND/AH-12 (1.046) followed by ND/AH-21.

A significant variation in number of seeds/fruit was observed in Bael genotypes. The number of seeds/fruit varied between185.67 to 98.00. Among genotypes, the number of seed were found maximum (185.67) in genotype ND/AH-17 followed by genotype ND/AH-11(180.67). The minimum (98.00) number of seed/fruit was recorded with the genotype NB-21followed by ND/AH-27.

The present finding revealed that the maximum fruit yield (224.06 Q/ha.) was recorded ingenotype ND/AH-8 followed by genotype ND/AH-17 (151.5) and ND/AH-9 (147.27).

Conclusion

1. The maximum fruit length was recorded in bael genotype ND/AH-25 followed by NB-21.
2. The maximum fruit width was observed with the bael genotype ND/AH-10 followed by NB-21.
3. The maximum fruit weight was observed with the bael genotype ND/AH-25 followed by ND/AH-11.
4. The highest specific gravity was observed with the bael genotype ND/AH-25.
5. The maximum pulp weight was observed with the bael genotype ND/AH-25.
6. The minimum number of seed per fruit was observed with the genotype NB-21.
7. The higher fruit yield (Q./ha.) was recorded in bael genotype ND/AH-8 followed by ND/AH-17.

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