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VARIABILITY AND POTENTIALS OF IDENTIFIED GERMPLASM IN BAEL (*AEGLE MARMELOS* CORR.)

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*In an exploration for 'bael' (*Aegle marmelos *Corr.) germplasm from the tarai belt of eastern Uttar Padesh and adjoining area of Bihar, twenty four genotypes including three wild types were identified which showed wide range of variation for thorniness on the stem, fruit shape, skull thickness and pulp characteristics, viz., colour, sweetness, taste and presence of aroma. These genotypes also exhibited a wide range of variability for all the 6 quantitative characters recorded. The mean values were also high for number of fruits per tree, fuit yield and number of seed per fruit. Among these, six genotypes were identified as promising based on yield potential and fruit quality. These have been suggested for direct utilization and also use in improvement programmes. Three wild genotypes having small size non-edible fruits showed very high bearing (upto 3000 fruits per tree) and thus may be useful as suitable donor paents fo high bearing potential.*

Bael (*Aegle marmelos* Corr.) is known for its medicinal properties, nutritive values and religious importance. It is one of the most common fruit tree, native to India. Many of the spiritual writings have a mention of **bael** (Singh and Ray, 1984) probably due to great thearpeutic value of various parts of its tree. The ripe fruit is delicious, good for processing and also used in diarrhoea and dysentry. Vaious chemical constituents, viz., alkaloids, coumarins and steroids have been isolated and identified from its leaves, wood, root and bark (Ray, 1985). It has ability to tolerate arid conditions (Chundawat, 1990) as well as high rainfall. However, during explorations, no systematic plantation was observed. It was growing mainly on roadside, forests, threshing yard, scattered planting in orchard, backyard of houses and religious places.

Although known varieties were not available yet different local types/ landraces, viz., **Mirzapuri** (Singh, 1961), **Kagji Gonda** (Chundawat, 1990)

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are being grown at different places with considerable variability in qualitative and quantitative characters. Few superior types reported by the farmers are under threat of erosion. Therefore, there is an urgent need to identify the germplasm, augment/collect and conserve for improvement and for future uses.

MATERIALS AND METHODS

An exploration for **bael** germplasm was undertaken in parts of Faizabad, Basti, Gorakhpur, Deoria and Azamgarh districts of Uttar Pradesh and Gopalganj district of Bihar (Fig. 1) located between 82°-85° E longitude and 25°-27° N. latitude and twenty four genotypes including thee wild types were identified. Among these, six located in Basti, thirteen in Deoria, two each in Gorakhpur and Azamgarh district of Uttar Pradesh and one in Gopalganj district of Bihar. The exploration was undetaken when fruits were physiologically mature and ripening started. The method of random sampling from a population and biased sampling after gathering information about a particular genotype was followed (Sinha, 1981). In general, germplasm were sampled from seedling origin trees having desirable qualitative parameters, viz., papery scull (paper type), less seeded, less mucilage content, attractive pulp colour, aromatic, sweet taste and soft pulp. Five fruits were randomely collected and observations for qualitative traits were recorded. The yield of the fruits per tree were calculated on the basis of average weight of the fruit. Range, mean and standard error for six quantitative characters were also computed.

RESULTS AND DISCUSSION

Considerable variability was observed in the germplasm for various characters viz., thorniness of the stem, tree height, time of initiation of ripening etc. Diversity was also noted in different morphological characters of fruits such as shape, scull thickness, pulp colour, pulp taste and mucilage content in the pulp (Table 1). The range, mean and C.D. of 24 genotypes for six quantitative characters are presented in table 2. Range for fruit length varied from 5.5 cm (MR/RD 887) to 16.5 cm (MR-889 and MR-890), fruit circumference from 12.5 cm (MR-888 and MR/RD-871) to 56.5 cm (MR-889), average fruit weight from 0.08 kg. (MR/RD-877) to 3.5 kg (MR-889), seeds per fruit from 46 (MR/RD-876) to 120 (MR/RD-877), number of fruits per tree from 60 (MR 883) to 3000 (MR/RD- 877) and fruit yield per tree from 126 kg (MR 883) to 754.4 kg (MR/RD 875). Variances were high for number of fruits per tree and fruit yield. Considerable variance was also found for number of seeds per fruit and fruit circumference. Six genotypes were identified as promising for fruit size, (medium to large); scull thickness (thin and papery), and soft, deep yellow colour pulp having sweet and highly flavoured taste and less content of mucilage. Among these, MR/RD-876 (identified in Deoria district) showed its superiority in comparison to all other genotypes having very thin (papery) scull which can even be pressed by the finger at maturity. The pulp of this genotype is highly sweet with pleasant aroma, less quantity of mucilage and few number of seeds (46 per fruit). The tree is less thorny, with spreading branches and drooping growth habit.

The genotype identified at Tiwaripatti (MR-889) in Deoria district bore largest fruit size (length 16.5cm, circumference 56.5cm , and average weight 3.5kg). The pulp of this fruit is deep yellow, highly sweet and aromatic. Other four genotypes (MR/RD-869, MR/RD-870, MR/RD-872, MR/RD-874) identified as promising are located in Basti district of Uttar Pradesh. The geontype MR/RD-874 bore medium size fruit having 14.5 cm length, circumstances 31.5 cm and average weight 16.5 kg. The fruits were of superior quality with less amount of mucilage and seeds in the pulp. It yielded 709.5 kg per tree and was the second highest yielding accession. Early maturing genotype MR/RD-869 has larger fruits, deep yellow sweet pulp, and paper scull. The genotype MR/RD-872 bore flattened round fruits. The scull of the fruit is papery and contain deep yellow pulp with moderate number of seeds (72/fruits). The tree has tall upright growth habit and less number of thorn on branches. However, landrace MR/RD-870 has medium size fruits. The scull of the fruit is papery, yellow colour, aromatic pulp having less mucilage.

Three wild genotypes (MR/RD-877, MR/RD-879, MR/RD-893) bearing small sized non-edible typess were also identified. It was reported that fruits

Table 1. Characterization of Bael germplasm

	Fruit traits								
	Shape	Scull thickness	Pulp colour	Pulp taste	Mucilage	Tree height	Thorniness	First maturity	Organoleptic test/ Remarks
MR/RD 869	Round	Thin	Deep Yellow	Highly sweet	Less	Tall	Few	Early March	Papery type,best quality
MR/RD 870	Round	Thin	Deep Yellow	Highly sweet	Less	Tall	Medium	Early March	Papery type,good quality
MR/RD 871	Round	Thin	Yellow	Highly sweet	Less	Medium Tall	Medium	Mid March	Papery type,good quality
MR/RD 872	Flattened	Thin	Deep Yellow	Highly sweet	Less	Med. tall	Few	Mid March	Papery type,best quality
MR/RD 873	Round	Thin	Deep Yellow	Highly sweet	Less	Med. tall	Medium	Mid March	Papery type,best quality
MR/RD 874	Round	Thin	Deep Yellow	Highly sweet	Less	Tall	Medium	Early March	Papery type,best squality
MR/RD 875	Oval	Thin	Light Yellow	Less sweet	Less	Tall	Medium	nd of March	papery type,good quality
MR/RD 876	Round	Thin	Deep Yellow	Highly sweet	Less	Medium tall	Few	Mid March	Papery type,best quality Very thin scull
MR/RD 877	Oval	Thick	Light Yellow	Bitter	High	Tall	Many	End of March	Hard scull-wild
MR/RD 878	Pyriform	Medium	Deep Yellow	Medium sweet	Tall	Medium	Many	End of March	Hard scull,good quality
MR/RD 879	Round	Thick	Light Yellow	Bitter	High	Tall	Many	Mid March	Hard scull-wild

Contd.

Table 1. Contd.

	Fruit traits								
	Shape	Scull thickness	pulp colour	Pulp taste	Mucilage	Tree height	Thorniness	First maturity	Organoleptic test/ Remarks
MR 880	Round	Thin	Light Yellow	Sweet	Less	Medium	Medium	Erly March	Papery type,better quality
MR 881	Round	Thin	Deep Yellow	Sweet	Less	Medium	Medium	Early March	Papery type,better quality
MR 882	Round	Thin	Deep Yellow	Highly sweet	Less	Medium	Few	Mid March	Papery type best quality
MR 883	Oval	Thin	Deep Yellow	Highly sweet	Medium	Medium	Few	Late March	Papery type,good quality
MR 884	Oval	Thin	Deep Yellow	Highly sweet	Medium	Medium	Few	Late March	Papery type,best quality
MR 886	Round	Thin	Deep Yellow	Highly sweet	Medium	Medium	Few	Late March	Papery type,best quality
MR 887	Round	Thin	Deep Yellow	Sweet	Medium	Tall	Medium	Late March	Papery type,best quality
MR 888	Oval	Thin	Deep Yellow	Sweet	Less	Medium Tall	Medium	Late March	Papery type best quality
MR 889	Oval	Thin	Deep Yellow	Highly Sweet	Less	Tall	Few	Late March	Papery type,best quality
MR 890	Oval	Medium	Deep Yellow	Sweet	Less	Medium Tall	Many	Mid March	papery type,good quality
MR 891	Round	Thin	Deep Yellow	Sweet	Less	Medium tall	Many	Mid March	Papery typegood quality
MR 892	Round	Thin	Deep Yellow	Highly sweet	Less	Medium tall	Few	Mid March	Papery type.good quality
MR 893	Oval	Thick	Orange	Bitter	High	Tall	Many	End of March	Hard scull-wild

Table 2 : Mean values and Range for six quantative characters in bael

Accession number	Fruit length (cm)	Fruit circum-ference (cm)	Single fruit weight (Av. kg.)	No. of seeds/ fruit	No. of fruits/ tree	Fruit yield (kg.)
MR/RD 869	16.5	51.5	2.60	50	130	338.00
MR/RD 870	12.5	36.0	1.65	90	150	247.50
MR/RD 871	11.5	12.5	1.45	90	140	203.00
MR/RD 872	15.5	48.5	2.20	72	120	264.00
MR/RD 873	16.0	52.5	2.90	63	70	203.00
MR/RD 874	14.5	31.5	1.65	61	430	709.50
MR/RD 875	14.5	15.5	1.84	90	410	754.40
MR/RD 876	15.5	48.5	2.20	46	120	264.00
MR/RD 877	5.5	26.5	0.08	120	3000	240.00
MR/RD 878	11.5	36.5	0.90	95	200	180.00
MR/RD 879	9.0	22.0	0.28	74	610	170.80
MR 880	11.8	34.9	1.45	72	250	362.50
MR 881	10.0	25.5	0.70	96	400	280.00
MR 882	12.1	33.0	1.40	63	280	392.00
MR 883	16.5	42.1	2.10	52	60	126.00
MR 884	15.5	32.7	1.40	75	150	210.00
MR 886	14.5	30.5	1.10	72	310	341.00
MR 887	15.5	31.5	1.45	112	390	565.50
MR 888	15.8	12.5	1.00	105	380	380.00
MR 889	16.5	56.5	3.50	65	90	315.00
MR 890	16.5	32.5	1.80	92	210	378.00
MR 891	16.0	33.0	1.90	85	225	427.50
MR 892	14.5	29.5	2.40	82	130	312.00
MR 893	10.5	27.5	0.30	112	1250	375.00
Range	5.5	12.5	0.08	46.00	60.00	126.00
	16.5	56.5	3.50	120.00	300.00	754.00
Mean	13.65	33.46	1.60	83.50	396.04	345.36
± SE	± 0.59	±2.44	± 0.17	± 4.11	± 124.05	± 31.92
C.D.	1.72	7.10	0.49	11.96	360.98	92.88

of these genotypes causes unconsciousness, even if the smallest fruit is consumed. The genotype (MR/RD-877) is of spreading drooping habit with maximum number of fruits (about 3000 nos. per tree) which may be utilized as donor parent to increase the number of fruits. Another accession (MR/RD-879) is of tall growing habit and bore fruits having length 9.0cm, circumference 22.0cm and average weight 0.2.kg, whereas MR/RD-893 had fruits with 10.5 cm length, circumstances 27.5 cm and average weight 0.3kg.

The existence of variability for various traits can be utilised in the breeding programme of bael. Six lines described with desirable traits can be utilised in selection and further improvement of this fruit. Lines having few seeds per fruit, which is a desirable trait can be exploited directly.

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