



## Short communication

### Evaluation of ber genotypes for fruit yield and quality attributes

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#### ABSTRACT

The objective of the study was to select promising ber genotype having least stone percentage maintained at Issapur farm, ICAR-NBPGR, New Delhi. For this purpose, 12 genotypes were selected and evaluated for their desirable horticultural traits during 2017-18 and 2018-19. Fruit maturity was recorded earliest during first week of February in Gola followed by IC-0625596 which matured during last week of February. Among all the cultivars, the Umran matured at the last. Much variation with respect to fruit shape, colour and stone size was observed in all the genotypes. The fruit shape of Umran was found as ovate oblong, Seb with oval shape, Gola with round shape and the genotypes IC-0625596 with oblong with apex as broadly pointed. Highest fruit weight (35.40 g) was recorded in Umran, while it was found minimum in Aliganj selection (17.4 g). The maximum pulp weight noticed in Umran (28.08 g) and least stone weight was found in IC-0625596 (1.70g). On pooled basis, the least pulp stone ratio was recorded in accession IC-0625596 (21.15). Highest TSS (17° Brix) was recorded in IC-0625596 genotype followed by Gola (16.8° Brix).

**Key words:** *Ziziphus mauritiana*, germplasm, stone, total soluble solids.

Ber (*Ziziphus spp*), belongs to family Rhamnaceae which consists of 45 genera and 550 species, is widely distributed across the world (Mukhtar *et al.* 6). Ber (*Ziziphus mauritiana* L.) is indigenous fruit being grown extensively in arid and semi-arid parts of India. It is highly drought tolerant having deep root system, which lowers loss of water through transpiration and makes trees more adapted to arid microclimates. *Ziziphus mauritiana* is well adapted to arid and semi-arid regions. The plants are vigorous in growth, branches are drooping, evergreen (may partially shed leaves and enter in dormancy during summer) leaves highly pubescent (tomentose) on the under surface, flowers in September to October, fruit ripen in February to April are generally round to oblong with greenish yellow colour. Ber fruits have high potential of vitamin  $\beta$ -carotene, vitamin B complex and vitamin C thereby known as the king of arid fruits. It is more nutritive than apple in term of protein, phosphorus, calcium, carotene, vitamin C and B (Bakhshi and Singh, 2). Vitamin C content ranges from 70–165 mg/100 g. The daily intake for an adult man of vitamin C should be 30 mg as recommended by the FAO. Pulp contains about 70 IU vitamin A /100 g and the  $\beta$ -carotene content ranges from 75 to more than 80 mg/100 g .

The cultivation of ber is gaining more popularity in arid/semi-arid region and also entered in tropical

region too because of its low maintenance cost, ability to grown in saline soil, less water requirement, high yield and good returns. Characterization which is generally concern with qualitative, mono-oligogenic and strongly heritable characters those are independent of the environment. It allows the morphological and biophysical identification (fruit shape, pulp colour, stone adhesion is discriminant characters between phenotypes). Usually, the lack of information about the horticultural genetic resources has the effect usefulness of a collection (Frankel, 4). Hence, different genotype were assessed for the smaller stone size, higher pulp weight with higher TSS of the germplasm conserved at Issapur farm for wider utilization of the planting material in breeding programmes.

The germplasm of 15-20 year old of ber collected from different location of India was screened for various morphological characters during 2017-2019. The 12 genotype of Ber (Banarashi Karka, Umran, Chuhara, Gola, Kaithili, Seb, Jogia, Saharanpur narnaul, Katha Phal, Aliganj, Delhi local and IC-0625596) were assessed for the present study. The experiment was carried out in a randomized block design (RBD) and the statistical analysis was done as per the procedures given by Panse and Sukhatme, 7. The soil of orchard site was sandy loam with pH (7.65), organic carbon (0.2%) and electrical conductivity (0.21dS/m). Fruit yield was taken by weighing of fruits from each plant using a digital balance and average fruit yield of each plant

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was calculated and expressed in kilogram (kg). Total soluble solid (TSS) was determined with the help of hand refractometer, while acidity was estimated by titration method (AOAC, 1). Mean over replication for each genotype and character were calculated and used for statistical analysis.

Evaluation of the germplasm is primarily first step to collect basic information of respective germplasm before initiating any breeding programme for crop improvement. Knowledge of the inter relationship of quantitative traits of economic importance with yield and among themselves is very important for the improvement in a complex character like yield and quality through selection. In the present study, ber genotypes were evaluated for their physical characteristics and findings are discussed in the forthcoming section.

In the present investigation, the genotypes Gola, Seb, S.Narnaul were found as under early maturity group, and the genotypes IC-0625596, Jogia, BanarashiKarka, Kakrola and Pamel were found as mid maturing genotype and Umran, KathaPhal, and lallachi genotype reported as late maturing genotype. These variations in flowering and fruit maturity relate to climatic variation and genetic constitution. Fruit shape varied from round, oval, ovate, obovate, oblong to oblate. The fruit shape of Umran was found to be ovate oblong, Seb had oval shape, Gola with round shape and the genotype IC-0625596 was of oblong shape with smooth surface and turn greenish yellow at

the time of maturity. These results confirmed variations in early findings of Kumudani *et al.* 10.

Data regarding fruit, pulp, and stone weight presented in Table 1. It is apparent from the data that the fruit weight significantly influenced by different ber genotypes during both the years of study as well as in pooled analysis. Further, maximum fruit weight (35.40 g) recorded in Umran followed by Gola genotype (29.8 g), while minimum (17.4 g) value observed for Aliganj selection. Among all the treatments and on pooled basis, it registered 164 and 71.26 per cent increase in fruit weight over Aliganj selection, respectively. These results confirmed variations in early findings of Pareek, 8.

IC-0625596 accession of Ber found promising in term of least stone/ kernel length (2.66 cm) and width (0.60 cm) with resistance to powdery mildew disease. This accession-attained maturity during February ends with average fruit weight (22.9 g) and stone weight (1.7 g) on pooled basis, respectively. Fruit of IC-0625596 accession were oblong in shape with smooth surface and turned greenish yellow at the time of maturity. Fruit was soft with apex as broadly pointed having white pulp colour. During the course of study, it was found that desirable trait of minimum stone size for utilization in ber breeding programme was reported from IC No. 0625596 (7%). The pulp to stone ratio (21.15), vitamin C (51.2 mg/100), and TSS 17 (°B) of same accession IC-0625596 was also found ideal. The antioxidant activity (AOX

**Table 1.** Morphological characteristic of ber germplasm.

Treatments	Fruit weight (g)			Pulp weight(g)			Stone weight (g)			Yield (kg)			TSS (°B)		
	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T1 (Control)	13.4	13.7	13.6	9.79	10.30	10.05	3.39	3.62	3.5	53.4	55.1	54.3	14.2	13.3	13.8
T2(B. Karka)	28.3	27.8	28.3	23.67	23.42	23.55	4.46	4.66	4.6	62.3	62.4	62.4	16.2	15.9	16.0
T3 (Kakrola)	21.0	20.4	20.4	15.55	16.65	16.10	4.47	4.74	4.6	59.7	60.0	59.8	15.4	15.1	15.3
T4 (Jogia)	21.8	21.2	21.2	16.67	16.96	16.82	4.50	4.87	4.7	63.5	65.3	64.4	15.3	15.3	15.3
T5(S. narnaul)	24.2	24.3	24.2	20.00	18.60	19.30	4.547	4.54	4.5	64.2	64.9	64.5	16.1	15.8	16.0
T6 (Gola )	29.8	29.2	29.5	25.00	24.47	24.74	4.78	4.78	4.8	77.2	77.1	77.1	16.7	16.8	16.8
T7 (Katha phal)	22.3	22.2	22.2	18.00	17.33	17.67	4.20	4.86	4.5	69.0	68.7	68.8	13.3	11.9	12.6
T8 (Aliganj S.)	17.4	17.0	17.2	12.61	13.67	13.14	4.10	4.10	4.1	55.5	56.5	56.0	13.0	13.0	13.0
T9 (IC-0625596)	22.9	23.1	23.0	21.40	22.70	22.05	1.60	1.73	1.7	78.9	79.9	79.4	17.0	17.0	17.0
T10 (Pamel)	21.8	22.0	21.9	18.37	17.12	17.75	3.82	3.82	3.8	69.0	68.3	68.7	15.7	15.1	15.4
T11 (Umran)	35.40	36.0	35.7	28.08	29.36	28.72	6.60	7.28	6.9	83.3	82.5	82.9	16.9	16.7	16.8
T12 (Seb)	17.9	18.1	18.0	14.02	12.67	13.35	4.33	4.76	4.5	62.9	62.6	62.7	15.5	15.5	15.5
SEM	1.43	0.25		0.40	0.91		0.21	0.25		1.0	0.96		4.49	5.00	
CD at 5%	4.1	0.7		1.2	2.7		0.6	0.7		2.90	2.8		NS	NS	
CV	8.44	1.86		3.76	8.48		8.42	9.68		2.99	2.87				

11.5 µmol trolor/g) of this desirable accession was reported to higher as compare to other genotypes. The total phenolic content (201.5 mg GAE/ 100g) was also highest in the IC No. 0625596. These results confirmed variations in early findings of Godi *et al.* 5.

In the present investigation among all genotype significant differences were noticed for this pulp stone ratio trait. The data pertaining to the pulp stone ratio (%) of ber fruits was influenced by different genotypes during development stage (Table 1.) Among all the treatments on pooled basis the least pulp stone ratio was reported from accession IC-0625596 (21.15). These results confirmed variations in early findings of Pareek, 8.

The observations reveal that breeding material possessing IC-0625596 recorded highest TSS of 17°Brix, followed by Gola (16.8° Brix) which was at par with Umran (16.70° Brix). The minimum TSS was found in katha phal (11.9° Brix). These findings are quiet in line with Faroda, 3.

Yield is the principal objectives for breeding but at the same time very complex phenomenon affected by various factors. Yield of the selected genotypes ranged from 54.3 to 88.9 kg/plant. The observations reveal that Umran genotype has highest yield (88.9kg) followed by IC-0625596 genotype (79.4 kg). This might result from different environmental conditions and genotypes. Shukla *et al.* 9 recorded observations on yield, which are in line with the present investigation.

It is quite evident from the result presented that the many quantitative and qualitative characters showed variation among different genotype. Since the fruit tree germplasm collections represent a valuable resource of useful material and in this study IC-0625596 genotype of Ber found promising in term of least stone weight (proportionally to total fruit weight) with higher TSS which can be used in breeding programme for improvement of ber fruit. It will improve the evaluation efforts, approaches, and application of modern molecular biology techniques that can be profitably applied for advanced investigation of the material.

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