

## Performance of ber in New Alluvial Zone of West Bengal

S. SHIVA KUMAR, S. KUNDU, P. NANDI, S. SHEKHAR,  
R, T. ADHIKARY, B. GHOSH AND P. DUTTA

Department of Fruits and Orchard Management, Faculty of Horticulture  
Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal

Received : 03-01-2017 ; Revised : 12-04-2017 ; Accepted : 16-04-2017

### ABSTRACT

The performance of ber in new alluvial zone of West Bengal with twelve varieties (Apple Kul, Banarasi Karaka, BAU-1, Dandan, Gola, Illaichi, Jogia, Kaithali, Madhavpur, Sanur- 2, Topa and Umran) was carried out at Horticulture Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya in the year 2013-14 with an objective of screening suitable ber varieties. A wide range of variation was noted in respect of yield, fruit weight, pulp weight, pulp : stone ratio, acidity, TSS : acid ratio and organoleptic rating among twelve varieties. Fruit yield was found higher in Madhavpur (50.8 kg.plant<sup>-1</sup>), Umran (47.6 kg plant<sup>-1</sup>) and Topa (42.8 kg plant<sup>-1</sup>) but pulp weight and fruit weight were found higher in BAU-1, Banarasi Karaka and Umran. The quality in respect of TSS/acid ratio of fruit was noted maximum in Madhavpur (155). It is concluded that the performance of Madhavpur, Banarasi Karaka, Umran and BAU-1 are comparatively superior in new alluvial zone of West Bengal as compared to other varieties.

**Keywords** : Ber, fruit yield, screening, underutilized crop.

Ber or Indian jujube (*Ziziphus mauritiana* Lam.) has been recognized as a useful edible fruit since antiquity in India. Its ability to stand drought makes it as a 'King of fruit' of arid region. This species is distributed throughout the warm subtropics and tropics of South Asia. Originally native to India, it adapts to warm to hot tropical climates with low to relatively high rainfall. Ber is an excellent tree for waste land development in arid and semi-arid zone. It can also be grown in inferior and marginal lands which require less input and care for its growing and can be useful plant for economic upliftment of people. The tree has a high tolerance to both water-logging and drought. Indian jujube is considered to be multipurpose plants although use of the fruits is the major focus of interest. Ber fruit have a high nutritive value, being a rich source of vitamin C, A, and B complex, and also of Ca, K, Br and Rb (Tiwari and Banafar, 1995). In general, the fruit contains 81-83 per cent moisture, 17.0 per cent carbohydrates, 0.8 per cent protein, 0.07 per cent fat, 0.76-1.8 per cent iron, 0.03 per cent each of calcium and phosphorus, 0.02 mg carotene and thiamine, 0.020-0.038 mg riboflavin, 0.7-0.9 mg niacin, 0.2-1.1 mg citric acid, 65-76 mg ascorbic acid per 100g pulp, 22 per cent sugar, 1.3 per cent fibre and 0.2 per cent fat with a calorific value of 104 per 100g pulp (Morton, 1987). The fruits are eaten fresh as well as dried and processed into the products like candy, jelly, jam, Murabba, squash, juice, powder, slices and wine. Acid types are used for pickling or for chutneys. Considering its importance and different uses, India has already included *Z. mauritiana* Lam. in its national programme on underutilized crops (Pareek, 2001). In India, cultivated ber (*Z. mauritiana* Lam.) has more than 300

varieties but only a few are commercially important (Pareek and Nath, 1996). In spite of favourable climatic condition in West Bengal, it is grown to a limited extent in this state. It is fact that ber has a great potentiality of area expansion in different agro climatic zones of West Bengal. Very little works have been done in West Bengal particularly in new alluvial zone of West Bengal (Tarai and Ghosh, 2009). The evaluation and screening of ber varieties provide the keystone of success for their commercial exploitation in ber industry. With this view the experiment to study the performance of ber in new alluvial zone of West Bengal" was undertaken with an objective of screening suitable ber varieties.

### MATERIALS AND METHODS

The experiment was carried out during 2013-14 at Horticultural Research station, Mondouri, BCKV which is situated between 22.43<sup>0</sup> N latitude and 88.34<sup>0</sup> E longitudes with an altitude of 9.75m above the mean sea level. The experiment consists of twelve varieties (Apple Kul, Banarasi Karaka, BAU-1, Dandan, Gola, Illaichi, Jogia, Kaithali, Madhavpur, Sanur- 2, Topa and Umran) with three replications and planted in randomized block design. Plants are 5 years old and spaced at a distance of 5 x 5 m. All plants received same cultural practices during the course of investigation. Twenty fully matured, healthy, disease free fruits from each replication were collected randomly from different direction for recording different observation. The physical and chemical characters of fruits were recorded after thorough washing with tap water to remove adhering impurities. Fruit and stone weight were measured by using electronic (digital) balance. Total soluble solids content of fruits was

**Table 1: Yield and fruit quality of ber varieties**

Varieties	Yield (kg plant <sup>-1</sup> )	Fruit weight (g)	Pulp weight (g)	Pulp stone ratio	Acidity (%)	TSS/acid ratio	Organo- leptic rating
Apple Kul	38.7	18.3	17.0	14.0	0.2	103.9	7.6
Banarasi Karaka	39.6	30.0	28.5	18.6	0.3	52.2	8.2
BAU-1	28.2	45.5	42.1	12.6	0.2	87.8	6.0
Dandan	20.6	15.9	14.9	15.2	0.2	81.4	6.4
Gola	29.4	16.9	15.9	16.4	0.4	38.5	5.6
Illaichi	21.6	4.6	4.3	16.9	0.1	126.7	6.1
Jogia	21.2	16.9	15.7	12.8	0.2	89.1	6.0
Kaithali	14.6	16.1	14.9	12.7	1.1	14.2	5.9
Madhavpur	50.8	19.2	17.7	12.0	0.1	155.0	5.4
Sanur-2	33.8	20.0	18.5	12.3	0.3	50.9	7.6
Topa	42.8	16.6	15.3	12.3	0.5	27.1	3.4
Umran	47.6	24.1	22.9	19.2	0.2	52.8	6.7
<b>SEm(±)</b>	<b>1.74</b>	<b>1.03</b>	<b>1.01</b>	<b>1.17</b>	<b>0.036</b>	<b>13.71</b>	-
<b>LSD (0.05)</b>	<b>5.08</b>	<b>2.99</b>	<b>2.96</b>	<b>3.41</b>	<b>0.322</b>	<b>5.82</b>	-

determined with the help of a hand refractometer. Acidity of the fruit juice was estimated by treating against standard alkali (N/10 NaOH) solution using phenolphthalein as an indicator (AOAC, 1984). Organoleptic rating was calculated based on the average score of feedback of 10 persons in a 1-9 scale where 9 rating was 'like extremely', 5 rating was 'neither like nor dislike' and 1 rating was 'dislike extremely'. The data obtained were analyzed statistically by the analysis of variance method as suggested by Panse and Sukhatme (1978) and the significance of different source of variation was tested by error mean square by Fisher's 'F' test of probability level of 0.05 per cent.

## RESULTS AND DISCUSSION

The results presented in table 1, clearly revealed that the variation was wide and significant for fruit yield (14.6-50.8 kg tree<sup>-1</sup>), fruit weight (4.6-45.5 g), pulp weight (4.3-42.1 g), pulp : stone ratio (12.0-19.2 g), acidity (0.1-1.1%) and TSS : acid ratio (14.2-155.9) and organoleptic rating (3.4-8.2) among twelve ber varieties. The fruit yield was recorded maximum in Madhavpur (50.8 kg plant<sup>-1</sup>) followed by Umran (47.6 kg plant<sup>-1</sup>) and Topa (42.8 kg plant<sup>-1</sup>). Maximum fruit yield per plant was also obtained by Mandal *et al.*, (2009) during evaluation of six ber cultivars in red laterite zone of West Bengal. Fruit weight and pulp weight were higher in BAU-1 (45.5 and 42.1 g, respectively), Banarasi Karaka (30.0 and 28.5 g, respectively) and Umran (24.1 and 22.9 g, respectively) but pulp stone<sup>-1</sup> ratio were higher in Umran (19.2), Banarasi Karaka (18.6) and Illaichi (16.9). Illaichi had least fruit weight and pulp weight but pulp : stone ratio was higher in it. The higher fruit

weight, pulp weight, pulp stone<sup>-1</sup> ratio and fruit size in Umran and Banarasi Karaka are in agreement with the earlier findings (Dhingra *et al.*, 1973; Ghosh and Mathew, 2002). However, in spite of higher fruit weight and pulp weight in BAU-1 and Banarasi Karaka, the yield (kg plant<sup>-1</sup>) was found higher in Madhavpur, Umran and Topa. This might be due to higher number of harvested fruits plant<sup>-1</sup> in these varieties. Among twelve varieties, Madhavpur and Illaichi showed higher TSS : acid ratio (155.0 and 126.7, respectively) and lesser content of titratable acidity (0.1 % and 0.1 %, respectively). More or less similar trend of observations of TSS and titratable acidity of fruits were obtained earlier by Daulta and Chauhan, (1982) irrespective of variety but Godara (1980) and Yamdagni *et al.* (1985) obtained higher content of these chemicals in fruits. The superiority of variety Illaichi in terms of TSS/acid ratio in the present study was also supported by Tarai and Ghosh (2009). The organoleptic rating was maximum in Banarasi Karaka (8.2) followed by Sanur-2 (7.6) and Apple Kul (7.6).

From the result of present investigation, it can be concluded that there was a wide range of variation among the twelve varieties of ber. The varieties Madhavpur, Banarasi Karaka, Umran and BAU-1 are superior to others and may be recommended for commercial cultivation in New Alluvial Zone of West Bengal.

## REFERENCES

- A.O.A.C. 1984. *Official Methods of Analysis*, 14th Ed. Association of Official Agricultural Chemist, Washington D. C., p. 16.

- Daulta, B. S. and Chauhan, K. S. 1982. Ber - a fruit with rich food value. *Indian Hort.*, **27** : 7-9.
- Dhingra, R.P., Singh, J.P. and Chitkara, S.D. 1973. Varietal variations in physico-chemical characters of ber (*Ziziphus mauritiana* Lamk). *Haryana J. Hort. Sci.*, **2** : 61-65.
- Ghosh, S. N. and Mathew, B. 2002. Performance of nine ber (*Ziziphus mauritiana* Lamk) cultivars on top working in the semi-arid region of West Bengal. *J. Applied Hort.*, **4** :49-51.
- Godara, N. R. 1980. Studies on floral biology and compatibility behavior in ber (*Ziziphus mauritiana* Lamk). *Ph.D. Thesis*, Haryana Agricultural University, Hisar, India.
- Mandal, K. K., Mania, M. and Hasan, M.A. 2009. Evaluation of ber cultivars for growth, yield and quality in red and laterite zone of West Bengal. *J. Crop Weed*, **5** : 171-72.
- Panase, V. G. and Sukhatme, P. V. 1978. *Statistical Methods for Agricultural Workers*. ICAR, New Delhi, pp.145-52.
- Pareek, O. P. 2001. *Fruits for the Future 2: Ber*. International Centre for Underutilized Crops, University of Southampton, Southampton, UK.
- Pareek, O. P. and Nath, V. 1996. *Ber*. Coordinated Fruit Res. Indian arid zone, NRC Arid Hort., India, pp. 9-30.
- Tarai, R. K. and Ghosh, S. N. 2009. Performance of different cultivars of ber grown in rainfed condition in the red laterite soil. *Acta. Hort.*, **840**: 181-88.
- Tiwari, R. J. and Banafar, R. N. S. 1995. Studies on the nutritive constituents, yield and yield attributing characters in some ber (*Zizyphus jujube*) genotypes. *Indian J. Pl. Physiol.*, **38** : 88-89.
- Yamdagni, R., Ahlawat, V.P. and Chauhan, V.S. 1985. Nutrient status of ber (*Ziziphus mauritiana* Lamk.) orchards in Mahendragarh district of Haryana. *Haryana Agric. Univ. J. Res.*, **15** : 94-96.