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Evaluation of different ber (*Ziziphus mauritiana* L.) genotypes under the Bastar plateau of Chhattisgarh, India

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Abstract
An experiment was conducted at the Research cum instruction farm Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur, MGUVV, Durg, Chhattisgarh, India, during the year 2023-24 to study the physical characters of 16 randomly selected ber (*Ziziphus mauritiana* L.) genotypes. The results showed that the maximum fruit weight (3.78), length of fruit (3.14), breadth of fruit (2.03), pulp weight (6.12 g), stone weight (3.78 g) was registered under BB-7 genotype of ber which was superior among the genotype.

Keywords: Ber, genotype, chromosome, inflorescence, maturity

Introduction
Ber (*Ziziphus mauritiana* L.) is a hardy fruit tree commonly known as Chinese date or Chinese fig, poor man's food, belonged to family Rhamnaceae consist of 45 genera and 550 species, it is tetraploid in nature with chromosome number 2n (4x)=48, edible part of fruit is pericarp with inflorescence fascicle. India is considered as origin place of ber. Ber can provided food security, due to sustained production of the fruit, irrespective of drought, as the tree is drought and saline tolerant and can grow on poor degraded land (Pareek, 2001) [11]. The primary ber-growing states include Haryana, Punjab, Uttar Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Bihar, Maharashtra, Andhra Pradesh, and Tamil Nadu. These states collectively account for a total cultivation area of 51.73 thousand hectares, yielding a production of 548.27 thousand MT (Department of agriculture and farmers welfare). In Chhattisgarh, Korba, Raigarh, Dhamtari and Janjgir-Champa District are major contributor in total area of 4.343 thousand ha with production of 69.590 thousand MT of ber fruit (Department of Agriculture, Govt. of C.G. Raipur). The ber is arid and semi-arid region fruit crop can be cultivated on wide range of soils. It can grow well up to a height of 100m above sea level. The area receiving annual rainfall of 400-650 mm are ideal for its cultivation. It is known for its ability with stand adverse conditions such as salinity drought and water logging condition. The ripe fruit of this plant has high nutritional value and is very good source of vitamin C, vitamin B, vitamin A and calcium. Ber fruits are commonly consumed fresh but can also be enjoyed in various other forms, including dried, candied, pickled, as juice or processed into ber butter. It consists energy-5.92 kcal, total fat-0.007 mg, protein-00.80 mg, ascorbic acid-65.8-76 mg moisture-81.6-85 g, phosphorus-3.0 mg, riboflavin 0.02-0.038 mg per 100 g of ber fruit (Singh and Singh, 2020) [19]. Selected ber genotypes fruit physical characters variability is more. Such variability is a great opportunity for genetic improvement of this crop.

Materials and Methods
An experiment was carried out at the Research cum instruction farm Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur, MGUVV, Durg, Chhattisgarh, India, during the year 2023-24. The material for current study consists of 16 randomly selected ber genotypes. The observations were recorded on several physical parameters *viz*., mature fruit weight (g), fruit length (cm), fruit width (cm), pulp weight (g) and stone weight

(g) were recordedas per DUS guidelines (Anonymous, 2013) [1]. The statistical analysis was carried out for each observed character under the study using MS-Excel, OPSTAT and book by Gomez and Gomez (1983) [6] by applying Randomized Block Design.

Results and Discussion

1. Fruit colour, fruit shape and fruit weight

The data recorded for the fruit colour, fruit shape of ber genotypes has been presented in table-1. Based on data the ripe fruit colours of various germ plasms varied, exhibiting yellow, green and greenish-yellow hues. The fruits of BB-12, BB-13, BB-14, BB-15, BB-16 were seen to be yellow, while the fruits of BB-1, BB-2, BB-3, BB-4, BB-7, BB-9and BB-10 to be greenish yellow, BB-5and BB-6 to be green. According to Ezhilarasi and Tamilmani (2009) [5], the loss of chlorophyll, the coalescence of carotenoids and pigmental phenolic substances like anthocyanins, β carotenes, etc., may all contribute to the colour change of fruit during ripening. Similar results regarding the colour and surface of mature fruit were also reported by Krishna *et al.* (2016) [7].

The mature fruit shapes of various germplasm, including oval, ovate, oblong, round, and oblate, varied. Fruits of BB-1, BB-5, BB-6, BB-9, BB-12, BB-14 were found to be oval in shape; those of BB-2, BB-3, BB-4, BB-10, BB-12 and BB-14 were found to be oblong; those of BB-7, BB-8, BB-11, BB-13, BB-15and BB-16 were found to be round. Raja (2004) [12] and Torahi (2004) [20] also noted comparable differences in fruit and stone morphology. The genetic composition of the germplasm may potentially be the cause of these differences in fruit and stone morphology (Saran, 2005) [16].

The fruit weight of the various germplasm ranged from 5.93 g to 9.63 g, which is a significant variation. Among the different ber genotype significantly the highest fruit weight was registered under BB-7 (9.63) but it was statistically at par with BB-6 (9.33) whereas lowest fruit weight was noted in BB-1 (5.93). The fruits of higher weight had more size also. This may be due to fruits remained on the plant for a longer time to attain maturity/ ripening. Climatic factors and inherent characters of germplasm may be the other probable reason for these variations (Saran, 2005) [16]. These types of variation in ber fruits were also recorded by Ram *et al.* (2008) [13], Kumari *et al.* (2015) [9], Ahmad *et al.* (2016) [2], Krishna *et al.* (2016) [7] and Sharif *et al.* (2019) [18].

Table 1: Physical parameters of ber genotypes, fruit colour, fruit shapeand fruit weight

Treatment No.	Notation	Fruit colour	Fruit shape	Fruit weight (g)
T_1	BB-1	Greenish yellow	Oval	5.93
T_2	BB-2	Greeenish yellow	Oblong	6.17
T_3	BB-3	Greenish yellow	Oblong	7.94
T_4	BB-4	Greenish yellow	Oblong	6.65
T_5	BB-5	Green	Oval	6.51
T_6	BB-6	Green	Oval	9.33
T_7	BB-7	Greenish yellow	Round	9.63
T_8	BB-8	Yellow	Round	6.73
T_9	BB-9	Greenish yellow	Oval	6.60
T_{10}	BB-10	Greenish yellow	Oblong	8.26
T_{11}	BB-11	Green	Round	7.36
T_{12}	BB-12	Yellow	Oblong	6.13
T_{13}	BB-13	Yellow	Round	7.47
T_{14}	BB-14	Yellow	Oblong	6.29
T_{15}	BB-15	Yellow	Round	7.73
T_{16}	BB-16	Yellow	Round	8.18
	S.E.(m)	-	-	0.32
	C.D. at 5 %	-	-	0.91

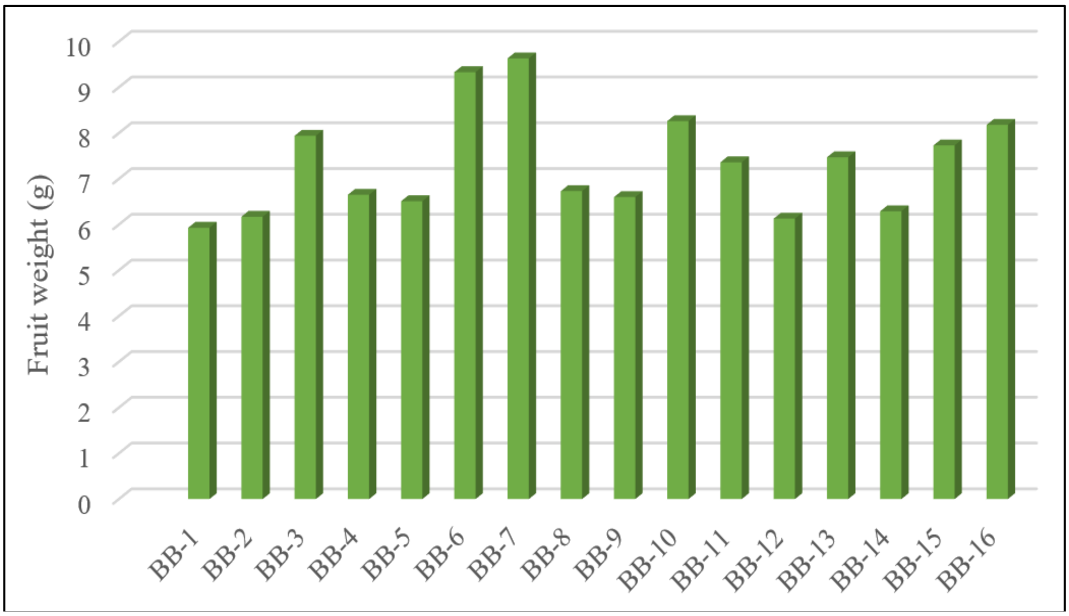

Fig 1: Graphical representation of fruit weightof different ber genotypes

2. Fruit length, fruit breadth, pulp weight and stone weight

The data recorded for the fruit weight**,** fruit length, fruit breadth, pulp weight, stone weight of ber genotypes has been presented in table-2. According to data the fruit length values of several germplasm varied significantly and ranged between 1.55 cm to 3.14 cm. Among the different ber genotypes significantly the maximum length of fruit was recorded under the ber genotype BB-7 (3.14) which was superior over all genotype whereas the lowest length of fruit was noted under ber genotype BB-1 (1.55). Torahi (2004) [20], Kumari *et al.* (2015) [9] and Krishna *et al.* (2016) [7] also documented these kinds of differences in ber cultivars.

The fruit breadth values were from 1.45 to 2.03 cm and varied considerably throughout Genotype. Among the different ber genotype significantly the highest breadth of fruit was recorded under ber genotype BB-7 (2.03 cm) but it was statistically at par with BB-6 (1.93), BB-8 (1.89), BB-3 (1.88), BB-5 (1.80), BB-10 (1.80), BB-12 (1.80) and BB-15 (1.80) whereas, the lowest breadth of fruit was noted in BB-14 (1.45 cm). Singh *et al*. (1971) [17], Singh *et al*. (2001) [15] and Raja (2004) [12] also noted similar findings in Ber. The genetic characteristics of specific germplasm may be the cause of the variations in fruit and stone length and breadth among the genotypes, but up to a certain limit, the climate may have an impact on these (Saran, 2005) [16]

The pulp weight of various genotype varied significantly, ranging from 3.39g to 6.12 g. The ber genotypes BB-7 was recorded the highest pulp weight (6.12 g) which was statistically at par with BB-6 (5.85), BB-16 (5.75) and BB-3 whereas the lowest pulp weight was registered under BB-1. The weight of the fruit directly affects the pulp weight of various germplasm and an increase in fruit weight may result from food material being deposited in the fruit Kumar *et al.* (2016) [8], Ram *et al*. (2008) [13] and Navjot *et al.* (2010) [10] have noted similar differences in the pulp and stone weight of ber.

The stone weight of different ber genotype showed significant variation. Stone weight varied from 1.26 g to 3.78 g. The maximum stone weight (3.78 g) was recorded in BB-7, followed by BB-6 while, the minimum stone weight (1.26 g) was recorded in BB-1. The variation in seed weight was also observed by Torahi (2004) [20] and Singh *et al.* (2015) [14].

Table 2: Physical parameters of ber genotypes, fruit length (cm), fruit breadth (cm), pulp weight (g), stone weight (g)

Treatment No.	Notation	Fruit length (cm)	Fruit breadth (cm)	Pulp weight(g)	Stone weight(g)
T_1	BB-1	1.55	1.53	3.39	1.26
T_2	BB-2	1.82	1.57	4.67	2.78
T_3	BB-3	2.03	1.88	5.62	2.32
T_4	BB-4	1.93	1.75	5.24	1.41
T_5	BB-5	2.35	1.80	4.29	2.22
T_6	BB-6	2.65	1.93	5.85	3.21
T_7	BB-7	3.14	2.03	6.12	3.78
T_8	BB-8	1.85	1.89	4.28	2.45
T_9	BB-9	1.95	1.75	4.89	1.71
T_{10}	BB-10	1.88	1.80	5.17	3.09
T_{11}	BB-11	1.55	1.60	4.59	2.77
T_{12}	BB-12	1.93	1.80	4.46	1.67
T_{13}	BB-13	1.78	1.68	5.24	2.23
T_{14}	BB-14	1.73	1.45	3.82	2.47
T_{15}	BB-15	1.82	1.80	4.86	2.87
T_{16}	BB-16	1.59	1.73	5.75	2.43
	S.E.(m)	0.1	0.092	0.299	0.113
	C.D. at 5%	0.286	0.262	0.853	0.322

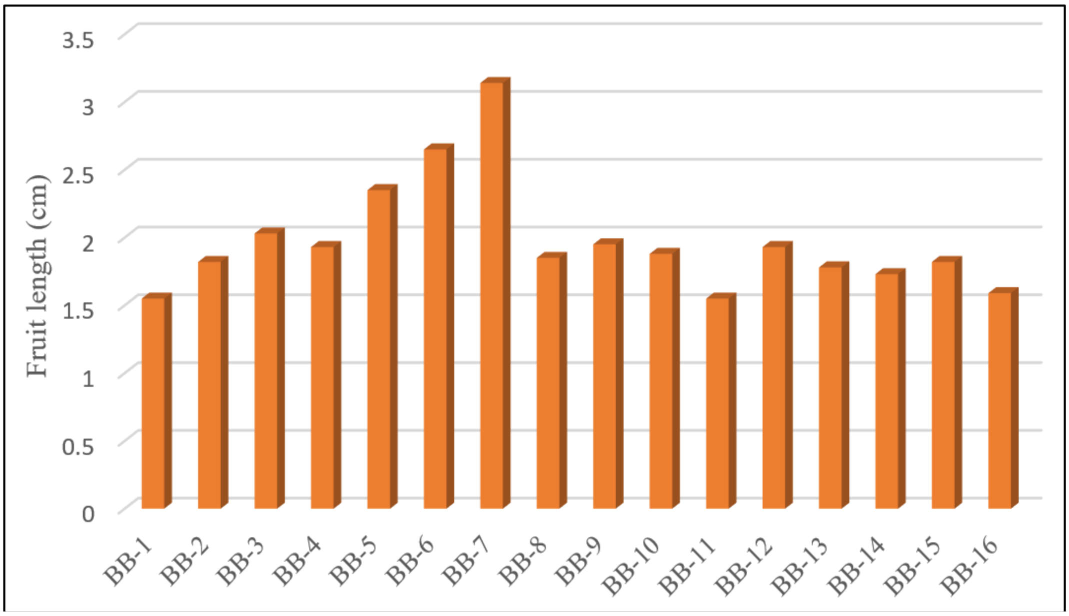

Fig 2: Graphical representation of Fruit length (cm) of different ber genotypes

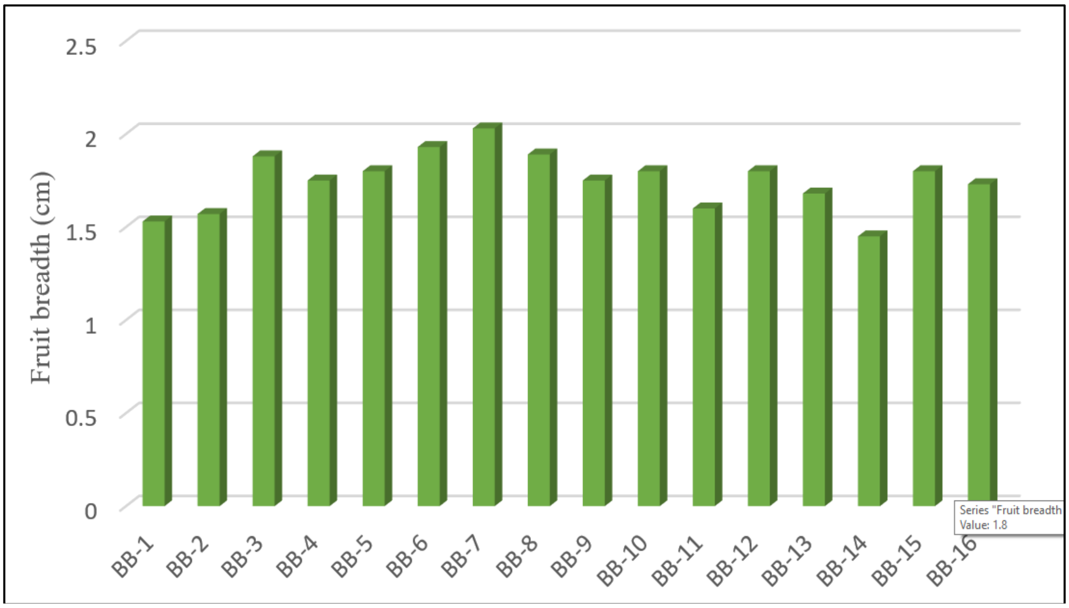

Fig 3: Graphical representation of fruit breadth (cm) of different ber genotypes

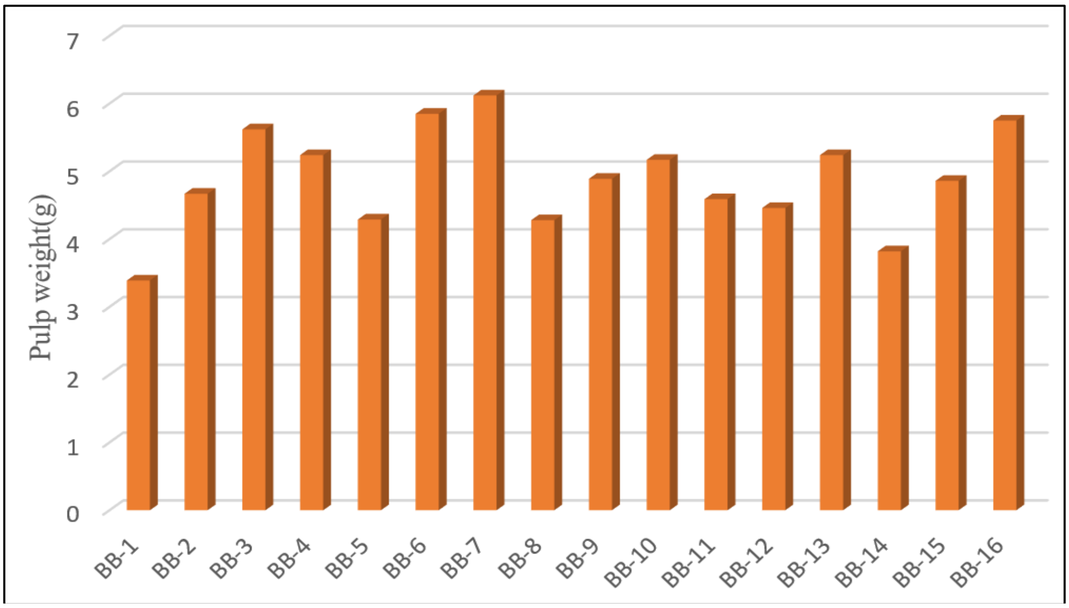

Fig 4: Graphical representation of pulp weight (g) of different ber genotypes

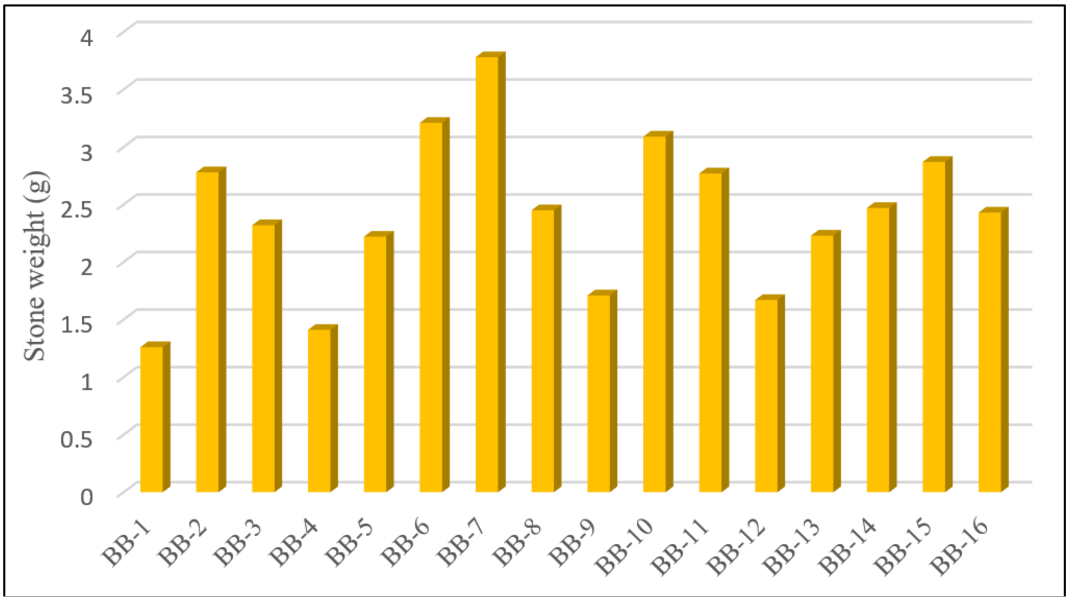

Fig 5: Graphical representation of stone weight (g) of different ber genotypes

Conclusion

Based on the findings, it can be concluded that there is significant variation among the genotypes. The results indicate that the BB-7 genotype of ber exhibited the highest values for fruit weight, fruit length, fruit breadth, pulp weight, and stone weight, making it the superior genotype.

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References

1. Anonymous. DUS test guideline for ber (*Ziziphus mauritiana* Lamk.). Plant Varieties Journal of India; 2013.
2. Ahmad I, Nafees M, Ashraf I, Khayri JM, Yousaf MM, Ahmad B, *et al*. Fruit morphological attributes to assess genetic diversity in jujube (*Ziziphus mauritiana* L.) germplasm of Bahawalpur. Pure and Applied Biology. 2016;5(4):1-8.
3. Anonymous. Department of Agriculture and Farmers Welfare; 2024 [cited 2024 Apr 9]. Available from: https://agriwelfare.gov.in/en/StatHortEst
4. Anonymous. Department of Agriculture, Govt. of Chhattisgarh, Raipur; 2024 [cited 2024 Apr 9]. Available from: https://agriportal.cg.nic.in/horticulture/Statistics/Area_Production_2023-24.pdf
5. Ezhilarasi A, Tamilmani C. Influence of paddy husk on the ripening of fruit of *Ziziphus mauritiana* Lamk. ARPN Journal of Agricultural and Biological Science. 2009;4(6):29-42.
6. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. New York: John Wiley and Sons Inc.; 1983. p. 357-359.
7. Krishna H, Bhargava R, Chauhan N, Sharma SK. Morphological descriptor for DUS testing of Indian jujube (*Ziziphus mauritiana* L.). Indian Journal of Agricultural Sciences. 2016;86(6):809-814.
8. Kumar M, Singh S, Pathak DV, Godara RK. Impact of natural ripening on physicochemical characteristics of ber fruits. Agriculture International. 2016;3(2):12-18.
9. Kumari S, Bhat DJ, Wali VK, Bakshi P, Jasrotia A. Physico-chemical studies of different ber (*Ziziphus mauritiana* Lamk.) germplasm under rainfed conditions of Jammu. Bioscan. 2015;10(3):1427-1430.
10. Navjot VP, Brar KS, Thakur A, Dalal RP. Stability analysis for fruit yield and its components in ber (*Ziziphus mauritiana* Lamk.). Indian Journal of Genetics and Plant Breeding. 2010;70(3):304-306.
11. Pareek OP. *Ber*. Southampton, UK: International Centre for Underutilized Crops; 2001. p. 248-266.
12. Raja S. Morphological and molecular characterization of ber germplasm [MSc thesis]. Hisar: CCS Haryana Agricultural University; 2004. p. 1-75.
13. Ram RB, Ganesh S, Deepa H, Dwivedi, Abdul K. Physico-chemical studies on ber (*Ziziphus mauritiana* L.) germplasm under sodic soil conditions of Lucknow. Indian Journal of Agroforestry. 2008;10(1):78-80.
14. Singh B, Pathak S. Comparative study of physico-chemical attributes of ber (*Ziziphus mauritiana* Lamk.) fruits from different cultivars grown in Eastern Uttar Pradesh. Environment and Ecology. 2015;33(4):1539-1541.
15. Singh O, Mishra KK, Lal RL. Studies on the fruit quality of some important cultivars of ber under tarai conditions. Progressive Horticulture. 2001;33(2):151-156.
16. Saran PL. Studies on genetic divergence in ber (*Ziziphus mauritiana* Lamk.) germplasm [PhD thesis]. Hisar: CCS Haryana Agricultural University; 2005. p. 1-160.
17. Singh P, Bakhshi JC, Singh R. Identification of some ber (*Ziziphus mauritiana* Lamk.) cultivars through vegetative characters. Punjab Horticultural Journal. 1971;11:176-187.
18. Sharif N, Jaskani MJ, Naqvi SA, Awan FS. Exploitation of diversity in domesticated and wild ber (*Ziziphus mauritiana* Lamk.) germplasm for conservation and breeding in Pakistan. Scientia Horticulturae. 2019;249:228-239.
19. Singh R, Singh BK. Textbook on Horticulture. New Delhi: New India Publishing Agency (NIPA); 2020. ISBN: 978-989.
20. Torahi A. Identification and evaluation of *Ziziphus* germplasm from south of Iran. Acta Horticulturae. 2004;864:45-48.