JSST-RL

Journal of Sustainable Science and Transformative Research– Reviews and Letters, Vol 4 (1), 281-286 (2025)

Effect of foliar application on Plant growth regulators and micronutrient on fruit growth, quality and yield of ber (Zizyphus mauritiana Lamk.) cv. Banarasi Karaka

ISSN: 2583-4118
doi:https://doi.org/10.56703/OKGY7002/Fibg8949/Xmhi9997
www.jsst.uk

Keerti, Dr. S.K. Vishwakarma2 and P.K. Rajput3*
1Research scholar, Department of Horticulture
2 Assistant Professor, Department of Horticulture
3Professor, Department of Soil Conservation
Janta College, Bakewar, Etawah, Chhatrapati Shahu ji Maharaj University, Kanpur, 208024, Uttar Pradesh, India.
Corresponding author: Dr. P.K. Rajput
Email: pkrajputdr786@gmail.com

Abstract: The present investigation was undertaken on the effect of foliar application on plant growth regulators and micronutrient on fruit growth, quality and yield of ber ((*Zizyphus mauritiana Lamk*.) cv. Banarasi Karaka at horticulture orchard, department of horticulture, Janta college Bakewar, Etawah U.P. The experiment was Investigated in randomized block design known as (RBD) with ten treatments comprising of each three levels of Boron, GA_3, NAA respectively. Spray was done in month of November 2023 at the time of fruit setting stage. A field experiment was escort to assess the effect of Boron (0.04%), Boron (0.06%), Boron (0.08%), GA_3 (10ppm), GA_3 (20ppm), GA_3 (30ppm), NAA (10ppm), NAA (20ppm) and NAA (30ppm) The results clearly showed that the foliar application of treatment T_7 (GA_3 30ppm) proved most effective followed by T_{10} (NAA 30ppm) in all the treatment enhance the fruiting characteristics like fruit set, fruit retention, fruit drop, physical characteristics like fruit length, fruit weight, fruit volume, weight of pulp, pulp stone ratio, yield per tree and chemical characteristics like T.S.S., sugar contains like reducing sugar, non-reducing sugar, total sugar and ascorbic acid. However, the control showed minimum value in all the treatments.

1.Introduction

The ber (*Ziziphus mauritiana Lamk*.), a tree in the Rhamnaceae family, is a fast-growing, spreading tree with drooping branches that resemble vines. The young, developing branches of the current year bear the ber fruits in the leaf axil. Therefore, to promote healthy growth and maximize the tree's fruit-bearing area, regular annual pruning is required. Apart from that GA_3 is the most effective in breaking dormancy and causing rapid germination of seeds. Gibberellin influences bolting by stimulating cell division and cell elongation in the sub-apical meristems. Gibberellins have been found very reliable in producing parthenocarpy. Since GA_3 directly regulates elongation, enlargement and growth of cells thus increasing the fruit length and diameter of the olive fruits. **Ramezani and Tiwari (2015)**

Therefore, it is known as “King of Arid Fruits”. It requires less care and grows well even in neglected condition and can be successfully grown under the most unfavourable conditions of the soil, water and climate. Ber is important because it is a hardy fruit crop that can be grown in a variety of soils, including deep sandy loam with neutral or slightly alkaline reaction soil. It can also flourish in soil with a pH of 9.2 or even higher. The riped ber fruits have high nutritive value due to which it is conventionally considered as “poor man’s fruit”. It is richer in protein, phosphorus, calcium and vitamin c than apple. Various growth regulators and nutrients play an important role in many physiological phenomena like vegetative propagation, induction of seedlessness, increase fruit set, prevention of pre-harvest fruit PGRs (Plant Growth Regulators) are involved in a variety of physiological processes, including vegetative propagation, induction of seed lessens, increased fruit set, prevention of pre-harvest fruit drop, blooming regulation, fruit size inhibition, flower and fruit thinning. In the present investigation the applying foliar application on plant growth regulators and dr regulation of flowering, fruit size, thinning of flower and fruits, as well as yield in many tree crops. Auxin concentration in the plant is increased to prevent abscission. Fruit drop is also prevented by N AA (Auxin), which strengthens the pedicle. Fruit drop is prevented by a high auxin level in the abscission zone. Application of NAA reduces excess number of fruits on the branch thus promoting the growth of evenly spaced fruits on branch and directly plays a major role in increasing the overall fruit quality of **Olive Arnon *et al.*, (2017)**.

2. Materials and Methods

The current research work was carried out at the horticulture orchard of department of horticulture, Janta College, Bakewar (U.P.), during the research year November 2023 a field experiment was escort to assess the “Effect of foliar application on plant growth regulators and micronutrients on fruit growth, quality and yield of ber (*Zizyphus mauritiana Lamk*.) cv. Banarasi Karaka”. The experiment was laid out in R.B.D. with 10 treatment, three replication, the statistical analysis of the data w,as calculated as suggested by **Panse and Sukhatme (1985).** The application of boron, GA_3 and NAA enhance fruiting characteristics like fruit set, fruit retention, fruit drop, physical characteristics like fruit length, fruit weight, fruit volume, weight of pulp, pulp stone ratio, yield per tree and chemical characteristics like T.S.S., sugar contains like reducing sugar, non-reducing sugar, total sugar and ascorbic acid.

3. Result and discussion

micronutrients proved singnificantly e f Defective in raising the percentage of all the character of fruit. During the research work, the application of various treatments proved significantly effective in treatment T_7 GA_3 (30ppm). Yet, the control showed comparatively least fruit set (27.42) is measured during the investigation of ber fruit. The outcomes are in similar with the

findings of **Sharma *et al.,* (2011)** in ber. The highest value of fruit retention (24.75 %) was noticed in GA_3 (30ppm), followed by fruit retention (22.78%) have observed in NAA (30ppm). While, the smallest value conducted during the investigation of fruit retention (7.86%) shown in the control plants. Similar patterns in respect to **Indrani Majumder *et al.,* 2017** in ber. The lowest value of the fruit drop was (72.11%) was shown in GA_3. Hence, over the control showed highest value of fruit drop (91.15%). These results are partially consistent with findings by **Raj Bala Choudhary *et al.,* 2020** in ber crop. The ongoing investigation the application of various treatments proved significantly effective an improving the fruit length, it also clearly indicates in Chinese date (ber) fruit that the effect of Boron, GA_3 and NAA on the physical parameters in ber fruit. The data revealed that all the treatments had significant effects on fruit length (cm) over control plants. The largest value of fruit length was (4.96 cm) found in GA_3 (30ppm). While, the fruit length of control (3.24 cm) shown the lowest value. These results are corroborated by the findings of **Vishwakarma *et al.,* (2015) in ber.** The maximum fruit weight was reported with the foliar application (18.72 gm) was recorded in GA_3 (30ppm). Thus, the minimal value over the control was (14.30 gm) is measured during the investigation of ber fruit. The results are further supported by the findings of **Raj Bala Choudhary *et al.,* 2020 in ber.** The value of fruit volume (cc) showed that all the treatments increased except the control plants. The supreme value of fruit volume was (13.79) have noticed in GA_3 (30ppm), However, the control (11.75) showed minimum value of fruit volume. These findings supported previously by **Sheel Priya *et al.,* (2023)** in ber

Table -1: Effect of foliar application on plant growth regulators and micronutrients on fruiting characteristics of fruits in ber (*Zizyphus mauritiana Lamk.*) cv. Banarasi Karaka.

Sr. No.	Notation	Treatment	Fruit set (%)	Fruit retention (%)	Fruit drop (%)
1.	**T_1**	**Control**	**27.42**	**7.86**	**91.15**
2.	T_2	Boron (0.04%)	25.87	11.68	90.19
3.	T_3	Boron (0.06%)	27.33	12.49	88.26
4.	T_4	Boron (0.08%)	29.73	13.57	85.53
5.	T_5	GA_3 (10ppm)	31.07	18.50	82.39
6.	T_6	GA_3 (20ppm)	32.47	20.10	77.69
7.	**T_7**	**GA_3 (30ppm)**	**34.17**	**24.75**	**72.11**
8.	T_8	NAA (10ppm)	30.27	15.62	83.26
9.	T_9	NAA (20ppm)	31.17	19.52	80.49
10.	T_{10}	NAA (30ppm)	33.21	22.78	75.10

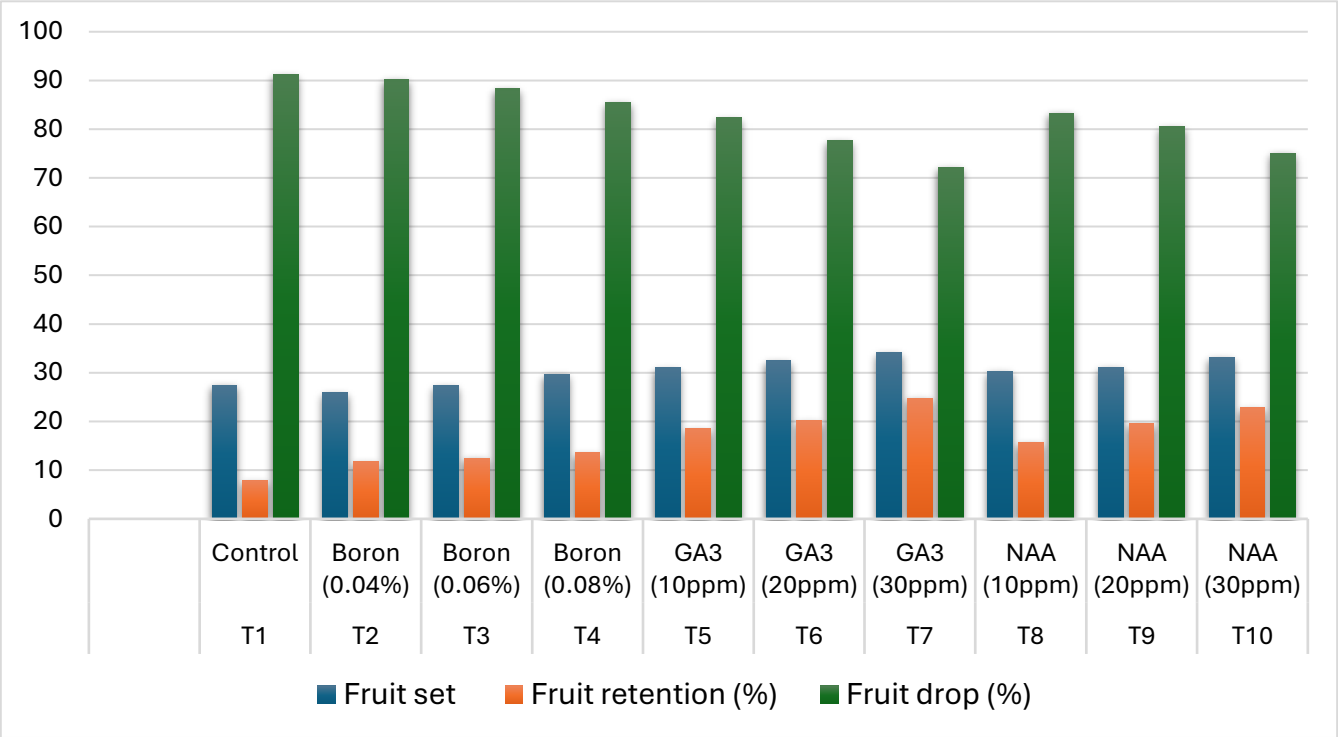

Fig. -1: Effect of foliar application on plant growth regulators and micronutrients on fruiting characteristics of fruits in ber (*Zizyphus mauritiana Lamk*.) cv. Banarasi Karaka

Table -2: Effect of foliar application on plant growth regulators and micronutrients on physical characteristics of fruits in ber (*Zizyphus mauritiana Lamk*.) cv. Banarasi Karaka.

Sr. No.	Notation	Treatment	Fruit length (cm)	Fruit weight (gm)	Fruit volume (cc)	Weight of pulp (gm)	Pulp stone ratio	Yield (Kg/tree)
1.	**T_1**	**Control**	**3.24**	**14.30**	**11.75**	**12.05**	**5.36**	**23.10**
2.	T_2	Boron (0.04%)	3.31	16.26	12.40	13.71	5.37	24.06
3.	T_3	Boron (0.06%)	3.43	16.48	12.69	13.87	5.31	26.70
4.	T_4	Boron (0.08%)	3.63	15.37	12.85	12.75	4.86	27.06
5.	T_5	GA_3 (10ppm)	4.04	16.89	13.45	14.28	5.47	30.53
6.	T_6	GA_3 (20ppm)	4.62	17.73	13.68	15.16	5.90	31.55
7.	**T_7**	**GA_3 (30ppm)**	**4.96**	**18.72**	**13.79**	**16.10**	**6.14**	**33.17**
8.	T_8	NAA (10ppm)	3.83	16.65	12.92	14.03	5.35	30.44
9.	T_9	NAA (20ppm)	4.33	17.47	13.63	14.87	5.71	31.54
10.	T_{10}	NAA (30ppm)	4.75	18.64	13.77	16.05	5.94	32.45

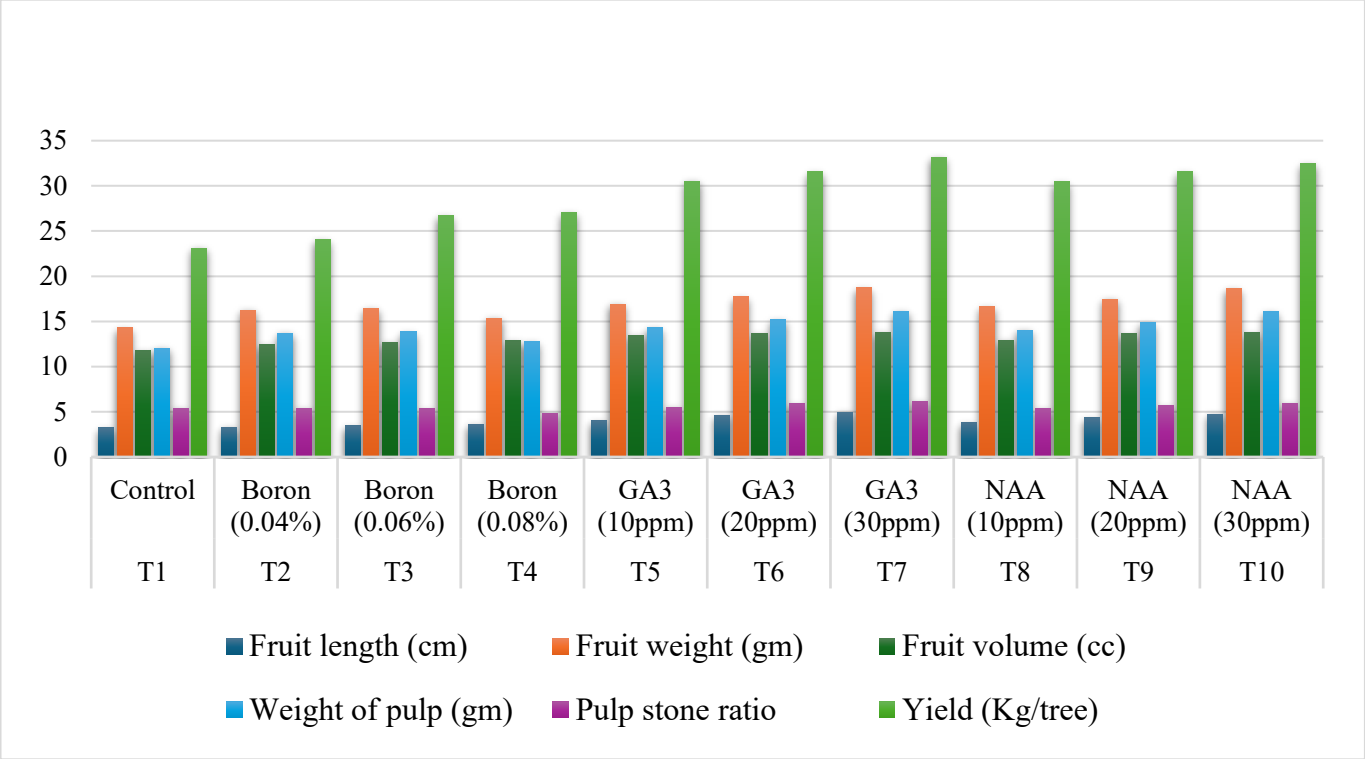

Fig. -2: Effect of foliar application on plant growth regulators and micronutrients on physical characteristics of fruits in ber (*Zizyphus mauritiana Lamk.*) cv. Banarasi Karaka.

The higher weight of pulp (16.10 gm) was observed in treatment GA_3 (30ppm) and the control showed comparatively lower weight of pulp (12.05 gm) respectively. The combination of different treatment of PGR and micronutrients are significantly affected by pulp stone ratio, the maximum pulp stone ratio (6.14) was noticed in treatment GA_3 (30ppm). However, the control showed minimum value of pulp stone ratio (5.36). These results are in similar with the findings of **Yadav *et al.*, (2014) in ber.** The supreme value of fruit yield was (33.17 Kg/tree) have noticed in application of GA_3 (30ppm), Hence, over control showed minimal value of fruit yield (23.10 Kg/tree) respectively. These results are in similar with the findings of **Bhosale and Singh (2017)** in ber. The application of plant growth regulators and micronutrients in chemical characters are significantly increased the percentage of T.S.S. (^{0}Brix) in ber fruits. The critical observation of the data showed that the most extreme value of T.S.S. (15.65 ^{0}Brix) was obtained in GA_3 (30ppm), Thus, the bottom value of T.S.S. (10.04 ^{0}Brix) recorded in the control respectively. These results are in similar with the findings of **Sheel Priya *et al.*, (2023)** in ber. The superior value of reducing sugar (6.01) was identified in treatment GA_3 (30ppm). Yet, the control showed comparatively least value of reducing sugar is (4.85). The uttermost value of the non - reducing sugar (4.35) in all the treatment which is taken in the research work of ber fruit was shown in higher in GA_3 (30ppm). Hence, over the control showed minimal value of non- reducing value (2.52) respectively. The largest value of total sugar was (10.07) found in GA_3 (30ppm). While, the total sugar of control plant (7.40) shown the lowest value. These outcomes are comparable to the findings of **Ritesh Singh *et al.*, (2023).** The supreme value of ascorbic acid was (45.17mg/100g) have noticed in application of GA_3 (30ppm). Hence, over control showed minimal value of ascorbic acid was (39.12mg/100g) respectively.

4. Future Prospects

The goal of the study is to assess how foliar utilisation of Plant growth regulators and micronutrient on fruit growth, quality and yield of ber cv. Banarasi Karaka. By applying PGR and nutrients topically to the ber plant, this study will help standardize the nutrient dosages and PGR and provide a lucrative yield.

5. Conclusion

Studied thus, suggests that the foliar application of GA_3 (30ppm), increasing in all the parameters like fruiting characteristics, physical characteristics and chemical characteristics. After that followed by showed the second most superior value NAA (30ppm) and at last the minimum value shown in all the treatment over control plants and

these results should be recommended for the commercial production for the farmers field.

Table -3: Effect of foliar application on plant growth regulators and micronutrients on chemical characteristics of fruits in ber(*Zizyphus mauritiana Lamk.*) cv. Banarasi Karaka.

Sr. No.	Notation	Treatment	T.S.S.	Reducing	Non-Reducing	Total sugar	Ascorbic acid
1	**T_1**	**Control**	**10.04**	**4.85**	**2.52**	**7.40**	**39.12**
2	T_2	Boron (0.04%)	10.81	4.88	2.96	7.88	39.35
3	T_3	Boron (0.06%)	11.40	4.90	2.94	7.90	39.43
4	T_4	Boron (0.08%)	12.21	5.03	3.09	8.15	39.50
5	T_5	GA_3 (10ppm)	13.78	5.20	3.70	8.93	39.75
6	T_6	GA_3 (20ppm)	14.87	5.52	4.14	9.69	41.25
7	**T_7**	**GA_3 (30ppm)**	**15.65**	**6.01**	**4.35**	**10.07**	**45.17**
8	T_8	NAA (10ppm)	13.50	5.15	3.20	8.39	39.63
9	T_9	NAA (20ppm)	14.65	5.38	3.81	9.21	40.07
10	T_{10}	NAA (30ppm)	15.00	5.63	4.16	9.85	43.85

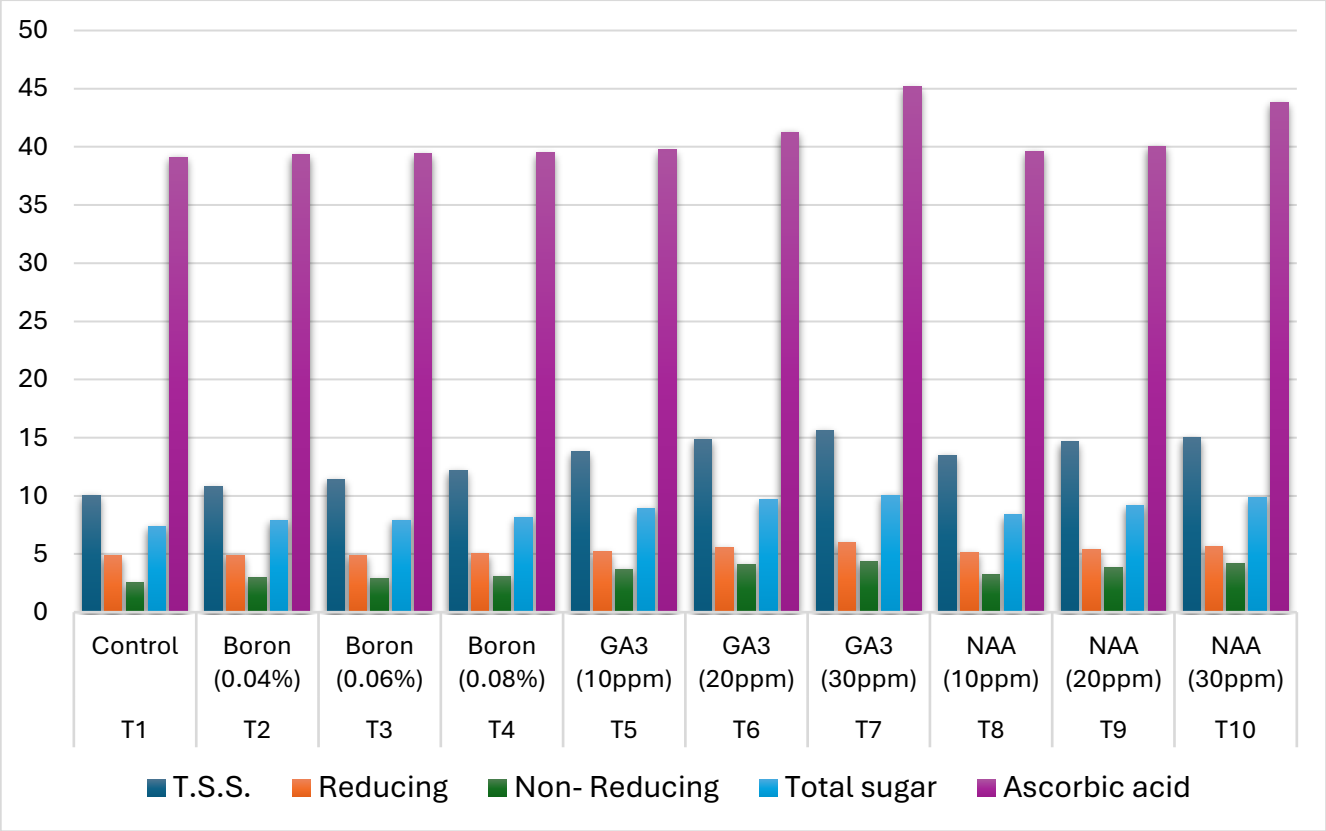

Fig. -3: Effect of foliar application on plant growth regulators and micronutrients on chemical characteristics in ber(*Zizyphus mauritiana Lamk.*) cv. Banarasi Karaka.

6. References

1. **Bhosale GH and Singh V. (2017),** Effect of plant growth regulators on growth, yield and quality of ber (*Zizyphus mauritiana Lamk*.) cv. Mehrun under Saurashtra region, krishikosh.egranth.ac.in/handle/1/5810023628.
2. **Bonyanpour AR, Moafpourian GR and Jamali B. (2017),** Responses of "Belidi" Olives to foliar and soil applied iron, manganese and zinc fertilizers. *J Appl Hortic*.;19(2):125-9.
3. **Majumder I, Sau S, Ghosh B, Kundu S, Roy D and Sarkar S. (2017),** Response of growth regulators and micronutrients on yield and physico-chemical quality of Ber *(Zizyphus mauritiana Lamk)* cv. BAU Kul-1. Journal of Applied and Natural Science; 9(4):2404-2409.
4. **Pankaj Kumar, Vikram Singh, Vishal Johar, Akshay Kumar and Suprikesh Suresh Kadlag (2022),** Uses of Plant Growth Regulators and Biofertilizers in Fruit Crops: A Review: International Journal of Environment and Climate Change. 12(11): 314-326.
5. **Panse, V.G. and Sukhatme, P.V. (1985),** Statistical methods of agricultural workers, Indian Council of Agricultural Research, New Delhi. 2:197.
6. **Raj Bala Choudhary, LN Bairwa, OP Garhwal and Priya Negi (2020),** Effect of plant growth regulators and nutrients on yield attributing characters and yield of ber (*Zizyphus mauritiana Lamk*.) cv. Gola Journal of Pharmacognosy and Phytochemistry; 9(4): 1968-1972.
7. **Rajkumar JPT and Shant Lal. (2014),** Effect of foliar application of zinc and boron on fruit yield and quality of winter season guava (*Psidium guajava*) cv. pant Prabhat *Annals of Agri. Biol Res*.;19(1):105-8.
8. **Ritesh Singh, Sanjay Pathak, Lavkush Pandey and Alok Kumar (2023),** Effect of Plant Growth Regulators and Micro Nutrient on Quality of Ber *(Zizyphus mauritiana Lamk.)* cv. Gola, *International Journal of Plant & Soil Science* volume 35, issue 18.
9. **Sharma J, Sharma SK, Panwar RD and Gupta RS. (2011),** Fruit retention, yield and leaf nutrient content of ber as influence by foliar application of nutrient and growth regulators. Environment and Ecology; 29:627-631.
10. **Sheel Priya, A. K. Dwivedi, V. K. Tripathi and Somendra Verma (2023),** Effect of Foliar Application of Various Concentrations of NAA and GA3 on Fruiting, Yield and Quality Attributes of Ber cv. Banarasi Karaka, India; *Current Journal of Applied Science and Technology;* Volume 42, Issue 48, Page 43-51.
11. **Vishwakarma SK, Ram RB and Kumar A. (2015),** Effect of preharvest application of GA3 and Ca (NO3)2 on fruit quality of Ber *(Zizyphus mauritiana Lamk.)* cv. Banarasi Karaka. Research in Environment and Life Sciences. 8(1):31-32.
12. **Yadav D, Singh SP and Singh S. (2014),** Effect of foliar application of potassium compounds on yield and quality of ber (*Zizyphus mauritiana Lamk.)* cv. Banarasi Karaka. International Journal of Research in Applied, Natural and Social Sciences. 2(2):89-92.