

ISSN Print: 2663-1067
 ISSN Online: 2663-1075
 NAAS Rating (2026): 4.74
 IJHFS 2026; 8(10): 15-22
www.hortijournal.com
 Received: 18-08-2026
 Accepted: 25-09-2026
 Published: 10-10-2026

Anita Haritwal

M.Sc. Scholar, Fruit Science
 Department of Horticulture,
 School of Agriculture, Suresh
 Gyan Vihar University, Jaipur,
 Rajasthan, India

Kanchan Meena

M.Sc. Scholar, Floriculture and
 Landscaping Department of
 Horticulture, College of
 Horticulture and Forestry,
 Jhalawar, Rajasthan, Agriculture
 University, Kota, Rajasthan,
 India

Rahul Yadav

M.Sc. Scholar, Vegetable Science
 Department of Horticulture,
 School of Agriculture, Suresh
 Gyan Vihar University, Jaipur,
 Rajasthan, India

Manoj Kumar Bundela

Department of Horticulture,
 School of Agriculture, Suresh
 Gyan Vihar University, Jaipur,
 Rajasthan, India

Usha Shukla

Department of Horticulture,
 School of Agriculture, Suresh
 Gyan Vihar University, Jaipur,
 Rajasthan, India

Dipayan Sarkar

Department of Horticulture,
 School of Agriculture, Suresh
 Gyan Vihar University, Jaipur,
 Rajasthan, India

Corresponding Author:

Anita Haritwal

M.Sc. Scholar, Fruit Science
 Department of
 Horticulture, School of
 Agriculture, Suresh Gyan
 Vihar University, Jaipur,
 Rajasthan, India

Effect of integrated nutrient management on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.)

Anita Haritwal¹, Kanchan Meena², Rahul Yadav³, Manoj Kumar Bundela⁴, Usha Shukla⁵,
 Dipayan Sarkar⁶

DOI: <https://www.doi.org/10.33545/26631067.2026.v8.i10a.871>

ABSTRACT

A field experiment was conducted during 2025–26 at the Agricultural Research Farm, Suresh Gyan Vihar University, Jaipur, Rajasthan, to study the effect of integrated nutrient management (INM) on growth, yield, fruit quality, and economics of ber (*Ziziphus mauritiana* Lamk.). Twelve treatments comprising sole and combined application of farmyard manure (FYM), vermicompost, inorganic NPK, and biofertilizers (PSB and Azotobacter), viz., T_0 : Control, T_1 : 100% RDF through NPK, T_2 : 100% RDF through FYM, T_3 : 100% RDF through Vermicompost, T_4 : 50% RDF NPK + 50% RDF FYM, T_5 : 50% RDF Vermicompost + 50% RDF NPK, T_6 : 50% RDF FYM + 50% RDF NPK + PSB + Azotobacter, T_7 : 50% RDF Vermicompost + NPK + PSB + Azotobacter, T_8 : 75% RDF NPK + 25% RDF FYM, T_9 : 75% RDF Vermicompost + 25% RDF NPK, T_{10} : 75% RDF FYM + 25% RDF NPK + PSB + Azotobacter, and T_{11} : 75% RDF Vermicompost + 25% RDF NPK + PSB + Azotobacter, were evaluated in a Randomized Block Design with three replications. Results revealed that T_{10} (75% RDF through FYM + 25% RDF through NPK + PSB + Azotobacter) recorded the maximum increase in plant height (85.93 cm), leaf length (9.81 cm), number of primary (15.67) and secondary branches (22.67), fruit weight (16.26 g), fruit diameter (2.81 cm), fruit length (4.02 cm), fruit volume (13.20 cm³), specific gravity (0.95), number of fruits per tree (5560.34), yield per tree (72.33 kg), and ascorbic acid content (65.99 mg/100 g), significantly superior to the control and sole nutrient sources. TSS and titratable acidity did not differ significantly among treatments. The study concludes that T_{10} (75% RDF through FYM + 25% RDF through NPK + PSB + Azotobacter) is a promising and economically viable INM schedule for enhancing productivity and profitability of ber under semi-arid conditions of Rajasthan.

Keywords: Ber, *Ziziphus mauritiana*, Integrated nutrient management, FYM, Vermicompost, Biofertilizer, Growth, Yield, Quality, Economics

Introduction

Ber (*Ziziphus mauritiana* Lamk.) belongs to the family Rhamnaceae and is one of the most important and hardy fruit crops of arid and semi-arid regions, popularly known as the “poor man’s fruit” owing to its low input requirement and wide adaptability. The crop is valued for its nutritional richness, being a good source of ascorbic acid, vitamin A, minerals, and carbohydrates, and is consumed fresh as well as processed into candy, jam, and dried products. In India, ber is cultivated over about 54 thousand hectares with an annual production of around 530 thousand tonnes, while in Rajasthan the crop occupies roughly

1.16 lakh hectares with a productivity of 10–15 t/ha (Anonymous, 2026) [1]. Its deep root system, drought tolerance, and ability to thrive on marginal and degraded soils make it highly suited to the semi-arid agroecosystem of Rajasthan.

Nutrient management is among the most critical factors determining the growth, yield, and fruit quality of ber, yet in many commercial growing tracts of Rajasthan, farmers continue to rely on sole inorganic fertilization or apply nutrients in inadequate and imbalanced quantities, resulting in poor vegetative growth, low fruit set, and declining soil fertility over successive years. Integrated Nutrient Management (INM), which combines organic manures, inorganic fertilizers, and biofertilizers, offers a scientifically sound alternative: organic sources such as farmyard manure (FYM) and vermicompost improve soil physical properties, organic carbon status, and microbial activity, while inorganic NPK ensures immediate nutrient availability, and biofertilizers such as Phosphate Solubilizing Bacteria (PSB) and *Azotobacter* enhance nutrient-use efficiency through phosphorus solubilization, biological nitrogen fixation, and the production of plant growth-promoting substances (Srivastava *et al.*, 2021; Sande *et al.*, 2024) [2]. While the benefits of INM are well documented in several fruit crops, comparable and comprehensive information on ber, particularly encompassing growth, yield, quality, and economic attributes together, remains limited (Katiyar *et al.*, 2012) [3]. The

present investigation was therefore undertaken to evaluate the effect of different combinations of FYM, vermicompost, inorganic fertilizer, and biofertilizers on the growth, yield, fruit quality, and economics of ber under the semi-arid conditions of Jaipur, Rajasthan.

Materials and methods

The present investigation was carried out during 2025–26 at the Agricultural Research Farm, Suresh Gyan Vihar University, Jaipur, Rajasthan, situated in a semi-arid climatic zone characterized by hot, dry

summers and mild winters, with mean annual rainfall of 550–650 mm received predominantly during the South-West Monsoon. The experi-

mental soil was loamy sand in texture, slightly alkaline (pH 8.2), non-saline (EC 0.12 dS/m), and low in organic carbon (0.14%), available nitrogen (122 kg/ha) and available phosphorus (23.5 kg/ha), with medium available potassium (294.0 kg/ha).

The experiment was laid out in a Randomized Block Design (RBD) with twelve treatments, replicated thrice, on uniform, healthy, bearing ber trees of more than five years of age. The treatments comprised sole and combined application of the recommended dose of fertilizer (RDF: 200 g N + 100 g P₂O₅ + 200 g K₂O and 6 kg FYM per plant) through NPK, FYM, and vermicompost, alone and in combination with PSB and *Azotobacter* as detailed in Table 1.

Table 1. Treatment combinations used in the study

Symbol	Treatment details
T ₀	Control
T ₁	100% RDF through NPK (200 g N : 100 g P ₂ O ₅ : 200 g K ₂ O per plant)
T ₂	100% RDF through FYM (6 kg per plant)
T ₃	100% RDF through Vermicompost (2.5 kg per plant)
T ₄	50% RDF through NPK + 50% RDF through FYM
T ₅	50% RDF through Vermicompost + 50% RDF through NPK
T ₆	50% RDF through FYM + 50% RDF through NPK + PSB + <i>Azotobacter</i>
T ₇	50% RDF through Vermicompost + NPK + PSB + <i>Azotobacter</i>
T ₈	75% RDF through NPK + 25% RDF through FYM
T ₉	75% RDF through Vermicompost + 25% RDF through NPK
T ₁₀	75% RDF through FYM + 25% RDF through NPK + PSB + <i>Azotobacter</i>
T ₁₁	75% RDF through Vermicompost + 25% RDF through NPK + PSB + <i>Azotobacter</i>

Growth parameters (increase in plant height, leaf length, number of primary and secondary branches), yield parameters (fruit weight, fruit diameter, fruit length, fruit volume, specific gravity, number of fruits per tree, and yield per tree), and fruit quality parameters (TSS, titratable acidity, and ascorbic acid content, estimated following Ranganna, 2000) [4] were recorded using standard procedures. Data were subjected to analysis of variance (ANOVA) as per Cochran *et al.* (1950) [5] / Fisher (1950) [6], and treatment means were compared using Critical Difference (CD) at the 5% level of significance.

Results and discussion

Analysis of variance revealed significant differences among the twelve INM treatments for all growth, yield, and most quality parameters studied in ber. Among the treatments, T₁₀ (75% RDF through FYM + 25% RDF through NPK + PSB + *Azotobacter*) consistently recorded the highest values for nearly all the characters studied, followed by T₁₁ (75% RDF through Vermicompost + 25% RDF through NPK + PSB

+ *Azotobacter*) and T₇ (50% RDF through Vermicompost + NPK + PSB + *Azotobacter*), whereas the control (T₀) and sole inorganic fertilization (T₁) generally recorded the lowest values.

Growth parameters

The maximum increase in plant height (85.93 cm) was recorded under T₁₀, significantly superior to all other treatments, followed by T₁₁ (81.93 cm) and T₁ (77.14 cm); the minimum was recorded under T₉ (72.74 cm), which was statistically at par with the control (73.70 cm) (Table 2, Fig. 1 & 2). The synergistic action of FYM (soil condition-

ing and improved microbial biomass), residual inorganic nitrogen (readily available for shoot elongation), and PSB/*Azotobacter* (phosphorus solubilization, biological nitrogen fixation, and phytohormone-like activity) explains the superior performance of T₁₀, corroborating the findings of Bohane *et al.* (2016) [7] and Meena *et al.* (2025) [8] in ber. Similar improvement in plant height with balanced NPK and organic nutrition in ber cv. Umran was also reported by Sharma *et al.* (2002) [9], who recorded maximum height increment with graded doses of N, P, and K in combination.

Leaf length followed a similar trend, being maximum under T₁₀ (9.81 cm) and minimum in the control

(8.41 cm), a pattern consistent with the findings of Dhandar *et al.* (2004) [10] and Choudhary *et al.* (2015) [11] in ber cv. Umran, who reported significantly greater leaf length under combined organic and inorganic nutrition compared with sole sources, attributing the response to improved nitrogen and potassium availability governing cell elongation and chlorophyll synthesis.

The number of primary branches was maximum under T₁₀ (15.67), statistically at par with T₇ (15.00) and T₁₁ (15.00), while secondary branches were also maximum under T₁₀ (22.67), followed by T₆ (21.67) and T₁₁ (21.00), against the lowest values recorded in the control (11.67 and 18.33, respectively) (Table 2, Fig. 3). A similar enhancement in branching under biofertilizer-integrated nutrient schedules was reported by Wali *et al.* (2006) [12] and Jat *et al.* (2020) [13] in ber cv. Umran and Gola, respectively, who attributed the increase to *Azotobacter* and PSB-mediated production of cytokinin- and gibberellin-like growth substances that promote the release of apical dominance and stimulate axillary bud break.

Table 2. Effect of integrated nutrient management (INM) on growth parameters of ber

Treatment	Plant height increase (cm)	Leaf length (cm)	Primary branches	Secondary branches
T ₀	73.70	8.41	11.67	18.33

(continued on next page)

Treatment	Plant height increase	Leaf length	Primary	Secondary
T_1	77.14	9.17	13.67	19.33
T_2	72.40	9.11	13.00	19.00
T_3	74.37	8.75	13.00	19.67
T_4	74.64	9.40	13.67	19.00
T_5	74.66	8.76	13.33	19.00
T_6	76.00	9.10	14.33	21.67
T_7	73.86	9.51	15.00	20.00
T_8	75.31	9.72	12.67	20.00
T_9	72.74	9.54	13.67	20.67
T_{10}	85.93	9.81	15.67	22.67
T_{11}	81.93	8.72	15.00	21.00
S.Em $\pm$	2.65	0.28	0.58	0.82
CD ($P = 0.05$)	7.60	0.80	1.67	2.36
CV (%)	6.03	5.29	7.36	7.11

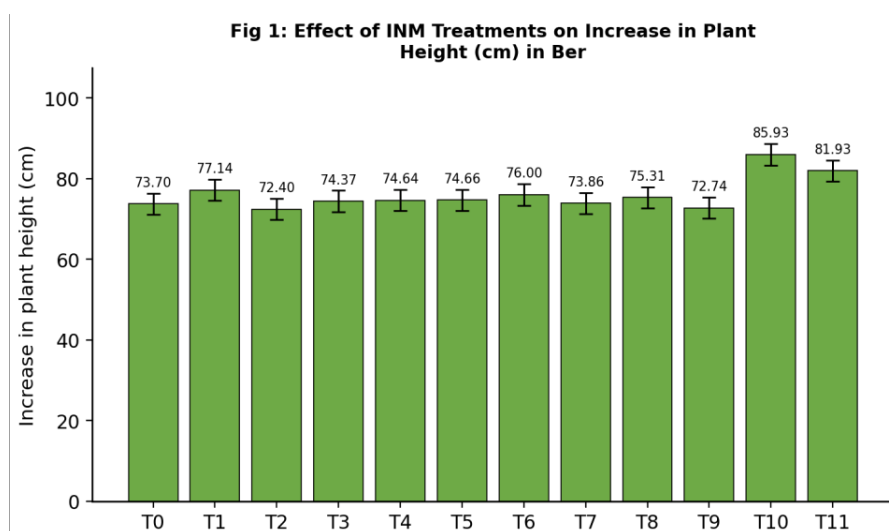


Figure 1. Effect of INM Treatments on Increase in Plant Height (cm) in Ber

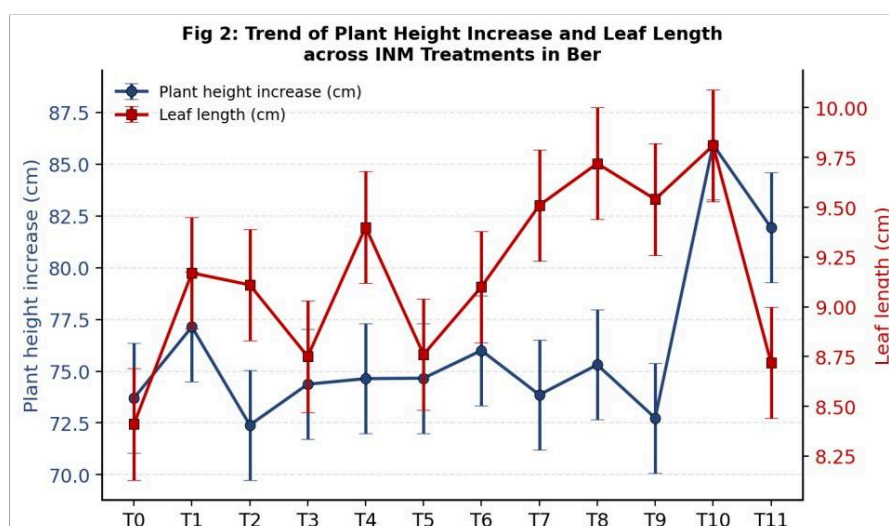


Figure 2. Trend of Plant Height Increase and Leaf Length across INM Treatments in Ber

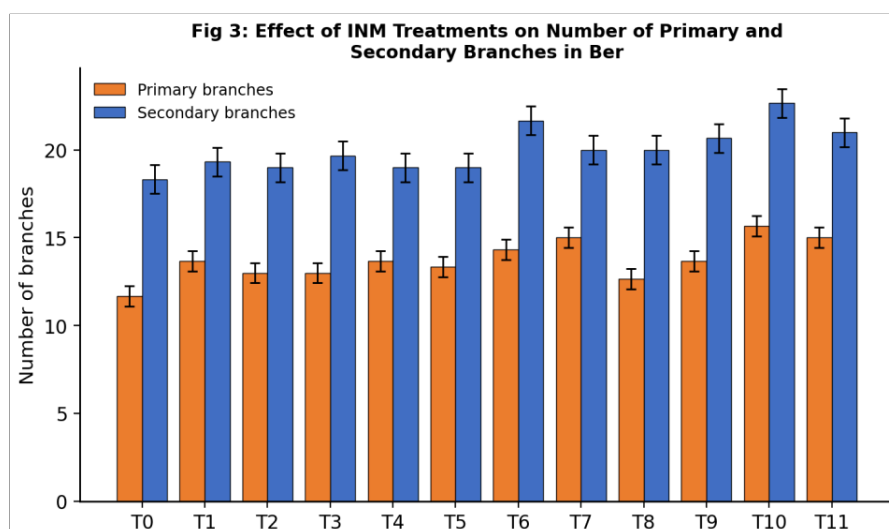


Figure 3. Effect of INM Treatments on Number of Primary and Secondary Branches in Ber Yield Parameters

Fruit weight, being a cumulative expression of cell number and cell size, was maximum under T_{10} (16.26 g), significantly higher than all other treatments, followed by T_7 (14.72 g) and T_6 (14.58 g), while the minimum (10.85 g) was recorded in the control, *i.e.*, T_0 produced fruit roughly 50% heavier than the untreated control (Table 3, Fig. 4). A similar increase in fruit weight of ber under integrated application of organic manures, inorganic fertilizer, and biofertilizers was reported by Das *et al.* (2016) [14] in cv. Gola and Kumari *et al.* (2021) [15] in cv. Umran, both attributing the response to enhanced photosynthate availability and improved translocation of assimilates to developing fruit.

Fruit diameter was maximum under T_{10} (2.81 cm), followed by T_7 (2.64 cm) and T_4 (2.63 cm), while the minimum was recorded in T_8 (2.43 cm), even lower than the control (2.44 cm). Fruit length was

likewise maximum under T_{10} (4.02 cm), followed by T_{11} (3.82 cm) and T_3 (3.81 cm), with the minimum recorded in T_6 (3.33 cm) (Table 3, Fig. 5). These findings are in close agreement with Dhiman *et al.* (2023) [16] and Kumar *et al.* (2013) [17] in ber cv. Umran similarly recorded the largest fruit dimensions under combined FYM, vermicompost, and inorganic fertilizer application and attributed the improvement to greater calcium and boron availability influencing cell wall extensibility.

Fruit volume and specific gravity followed a similar trend, being maximum under T_{10} (13.20 cm³ and 0.95, respectively) and minimum under T_8 (11.55 cm³) and T_1 (0.82) (Table 4), corroborating the observations of Choudhary *et al.* (2015) [11] in ber, who reported that integrated nutrient sources produced denser, better-filled fruit with higher specific gravity than sole inorganic fertilization.

Table 3. Effect of integrated nutrient management (INM) on fruit weight, diameter and length in ber

Treatment	Fruit weight (g)	Fruit diameter (cm)	Fruit length (cm)
T_0	10.85	2.44	3.38
T_1	11.74	2.61	3.55
T_2	11.94	2.62	3.72
T_3	12.07	2.56	3.81
T_4	11.12	2.63	3.75
T_5	12.46	2.60	3.80
T_6	14.58	2.60	3.33
T_7	14.72	2.64	3.39
T_8	13.76	2.43	3.73
T_9	13.39	2.65	3.64
T_{10}	16.26	2.81	4.02
T_{11}	14.55	2.56	3.82
S.Em $\pm$	0.46	0.06	0.11
CD ($P = 0.05$)	1.32	0.18	0.32
CV (%)	6.07	4.22	5.22

(continued on next page)

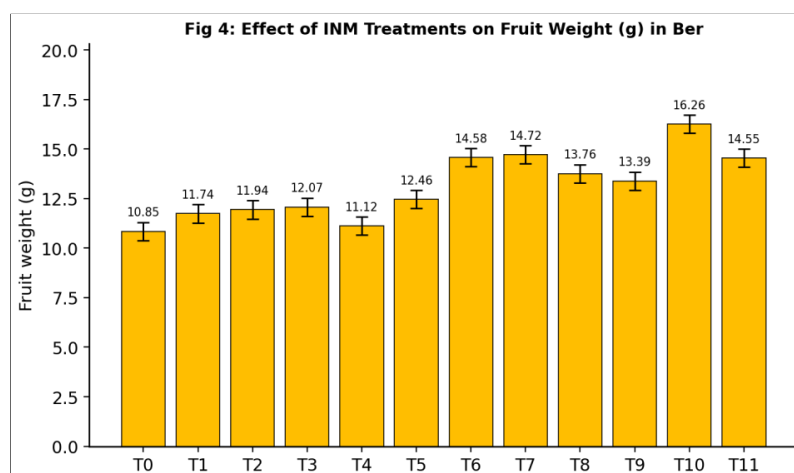


Figure 4. Effect of INM Treatments on Fruit Weight (g) in Ber

Table 4. Effect of integrated nutrient management (INM) on fruit volume and specific gravity in ber

Treatment	Fruit volume (cm ³)	Specific gravity
T ₀	11.79	0.84
T ₁	12.49	0.82
T ₂	12.32	0.88
T ₃	12.23	0.89
T ₄	12.71	0.91
T ₅	12.73	0.90
T ₆	12.15	0.93
T ₇	12.79	0.94
T ₈	11.55	0.92
T ₉	11.58	0.91
T ₁₀	13.20	0.95
T ₁₁	12.48	0.91
S.Em±	0.34	0.03
CD (P = 0.05)	0.96	0.07
CV (%)	4.71	4.84

Number of fruits per tree, the product of flower number, fruit set per percentage, and fruit retention, was

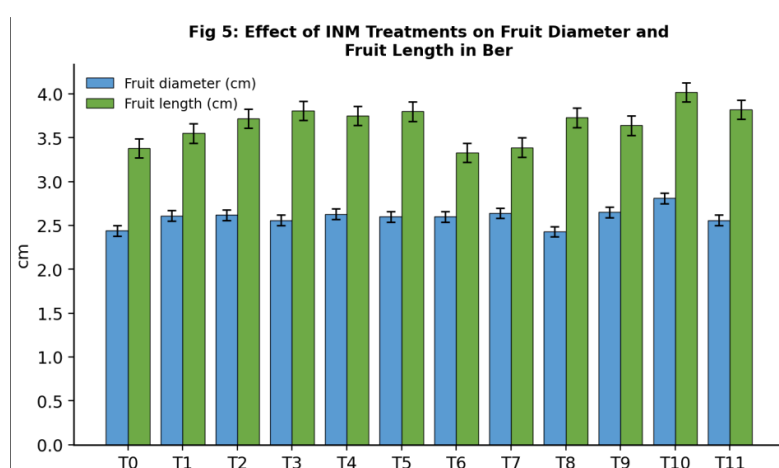


Figure 5. Effect of INM Treatments on Fruit Diameter and Fruit Length in Ber

maximum under T₁₀ (5560.34), statistically at par with T₃ (5128.52), T₁ (5069.27), and T₂ (5062.86). At the same time, the minimum was recorded under T₅ (4190.53), at par with the control (4353.02) and T₁₁ (4666.27) (Table 5, Fig. 7). Yield per tree, being the product of fruit number and average fruit weight, was maximum under T₁₀ (72.33 kg), statistically at par with T₇ (71.26 kg), T₁₁ (69.15 kg), T₈ (67.21 kg), and T₉ (66.82 kg). In comparison, the minimum was

recorded under T₁ (56.13 kg), at par with the control (58.01 kg) and several other sole-source treatments (Table 5, Fig. 6). This confirms that T₁₀ achieved simultaneous improvement in both yield components. This outcome arises when nutrient supply is well synchronised with crop phenological demand throughout the growing season. Similar superiority of integrated organic–inorganic–biofertilizer schedules for fruit number and yield per tree in ber has been reported

by Mahendra *et al.* (2009) [18] in cv. Banarasi Dhandar *et al.* (2004) [10] in cv. Umran, who likewise recorded the lowest yield under sole

inorganic fertilization, underscoring the limitation of chemical fertilizer use unsupported by organic matter or biofertilizers.

Table 5. Effect of integrated nutrient management (INM) on number of fruits per tree and yield per tree in ber

Treatment	Fruits per tree	Yield per tree (kg)
T ₀	4353.02	58.01
T ₁	5069.27	56.13
T ₂	5062.86	60.36
T ₃	5128.52	61.87
T ₄	4950.99	61.62
T ₅	4190.53	61.33
T ₆	4786.09	59.72
T ₇	4844.19	71.26
T ₈	4885.06	67.21
T ₉	4994.20	66.82
T ₁₀	5560.34	72.33
T ₁₁	4666.27	69.15
S.Em±	185.41	2.58
CD (<i>P</i> = 0.05)	532.32	7.42
CV (%)	6.59	7.02

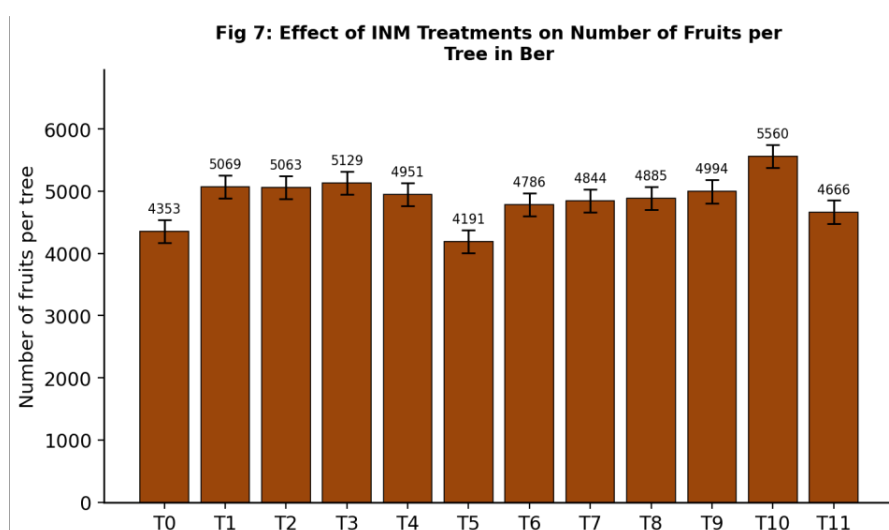


Figure 7. Effect of INM Treatments on Number of Fruits per Tree in Ber

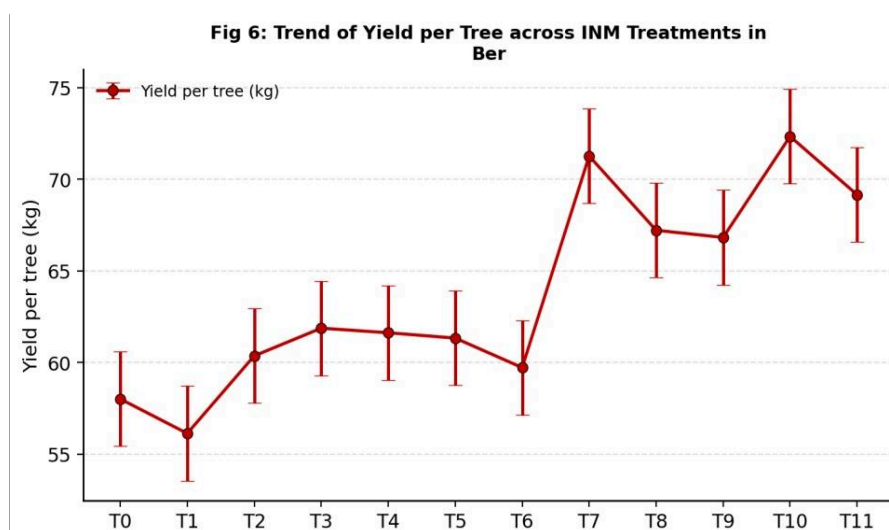


Figure 6. Trend of Yield per Tree across INM Treatments in Ber

Fruit quality parameters

TSS ranged from 13.30°Brix (T₁) to 15.80°Brix (T₁₀), and titratable acidity ranged from 0.11% (T₁₀) to 0.28% (T₃), but the differences among treatments were not statistically significant for either parame-

ter, suggesting these traits were governed more by seasonal and cli

matic conditions during fruit maturation than by nutrient source, a non-significant response also reported by Das *et al.* (2016) [14] in ber cv. Gola. Ascorbic acid content, however, differed significantly among treatments, being maximum under T_{10} (65.99 mg/100 g), followed by T_{11} (64.72 mg/100 g) and T_7 (64.51 mg/100 g), while the minimum was recorded in the control (56.83 mg/100 g), consistent with improved zinc and iron availability mediated by PSB and *Azotobacter* activity in the rhizosphere (Table

6). A similar significant increase in ascorbic acid content of ber under integrated nutrient management was recorded by Choudhary *et al.* (2015) [11] and Kumari *et al.* (2021) [15], and the underlying micronutrient-mediated mechanism is further supported by evidence of PSB- and *Azotobacter*-facilitated micronutrient bioavailability in other fruit crops (Mahdi *et al.*, 2020; Kumar *et al.*, 2024; Bhadauria *et al.*, 2023) [20, 21, 19].

Table 6. Effect of integrated nutrient management (INM) on TSS, acidity, and ascorbic acid content in ber

Treatment	TSS (°Brix)	Acidity (%)	Ascorbic acid (mg/100 g)
T_0	14.74	0.19	56.83
T_1	13.30	0.22	58.65
T_2	15.13	0.19	59.18
T_3	13.51	0.28	59.91
T_4	15.23	0.26	58.84
T_5	15.22	0.22	57.90
T_6	13.66	0.22	63.26
T_7	14.72	0.24	64.51
T_8	14.02	0.26	60.06
T_9	15.30	0.23	62.81
T_{10}	15.80	0.11	65.99
T_{11}	15.41	0.26	64.72
S.Em±	0.92	0.05	1.78
CD ($P = 0.05$)	NS	NS	5.10

Conclusion

Based on the results of the present investigation, it may be concluded that integrated nutrient management significantly improved the growth, yield, fruit quality, and economics of ber under semi-arid conditions of Jaipur, Rajasthan. Among the twelve treatments evaluated, T_{10} (75% RDF through FYM + 25% RDF through NPK + PSB + *Azotobacter*) proved to be the most effective, recording the maximum plant height increase, leaf length, number of primary and secondary branches, fruit weight, fruit diameter, fruit length, fruit volume, specific gravity, number of fruits per tree, yield per tree and ascorbic acid content significantly outperforming both the untreated control and sole nutrient sources. Therefore, the combined application of 75% RDF through FYM, 25% RDF through NPK, along with PSB and *Azotobacter* can be recommended as an effective and economically viable integrated nutrient management schedule for enhancing the productivity and profitability of ber under the agro-climatic conditions of Jaipur and similar semi-arid regions.

References

- Anonymous. Fruit statistics. Horticulture Statistics Division, Ministry of Agriculture and Farmers Welfare, Government of India; 2026.
- Srivastava AK, Malhotra SK, Krishna Kumar NK. Integrated soil fertility management in fruit crops: An overview. Indian Journal of Agricultural Sciences. 2021;91(1):3–11.
- Katiyar PN, Tripathi VK, Sachan RK, Singh JP, Chandra R. Integrated nutritional management affects the growth, flowering and fruiting of rejuvenated ber. Hort Flora Research Spectrum. 2012;1:38–41.
- Ranganna S. Handbook of analysis and quality control for fruit and vegetable products (2nd ed.). Tata McGraw-Hill; 2000.
- Cochran WG, Cox GM. Experimental designs. John Wiley & Sons; 1950.
- Fisher RA. Statistical methods for research workers (11th ed.). Oliver and Boyd; 1950.
- Bohane L, Tiwari R, Gautam KK. Integrated nutrient management in ber (*Ziziphus mauritiana* Lamk.) cv. Gola under Malwa Plateau conditions. Indian Journal of Horticulture. 2016;73(1):128–132.
- Meena A, Jatav MK, Balai RC, Kumar A. Optimization of organic manure-based technology to enhance soil quality, growth, yield, and fruit quality of ber (*Ziziphus mauritiana*) in arid regions. Journal of Soil Salinity and Water Quality. 2025;17(2):221–227.
- Sharma G, Sharma RR. Effect of nitrogen, phosphorus and potassium on growth, yield and quality of Umran ber (*Ziziphus mauritiana* Lamk.). Indian Journal of Horticulture. 2002;59(2):150–157.
- Dhandar DG, Bhatt RG. Effect of integrated nutrient management on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Umran under arid conditions. Indian Journal of Horticulture. 2004;61(1):17–22.
- Choudhary R, Meena OP, Sharma RK, Meena BL. Effect of vermicompost, FYM and NPK on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Umran. Journal of Applied Horticulture. 2015;17(3):231–236.
- Wali VK, Bhat MA, Kak R, Ahmad N. Effect of biofertilizers and chemical fertilizers on growth and yield of ber (*Ziziphus mauritiana* Lamk.) cv. Umran. Journal of Applied Horticulture. 2006;8(1):65–68.
- Jat ML, Meena OP, Meena RK, Dhaker R. Effect of biofertilizers and chemical fertilizers on growth and yield of ber (*Ziziphus mauritiana* Lamk.) cv. Gola. Rajasthan Journal of Agricultural Sciences. 2020;11(1):22–28.
- Das B, Bhagat A, Mondal D, Sadhukhan R, Biswas S. Integrated nutrient management on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Gola. Indian Journal of Horticulture. 2016;73(4):524–529.

15. Kumari R, Meena RS, Chaudhary A, Sharma OP. Effect of vermi-compost and NPK on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Umran. Horticultural Journal. 2021;34(2):134–140.
16. Dhiman T, Sood A, Sharma SD, Gupta A. Integrated nutrient management effects on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Umran. Horticultural Journal. 2023;36(1):1–8.
17. Kumar A, Srivastava K, Pandey A. Influence of FYM and NPK on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Umran. Bihar Journal of Agricultural Sciences. 2013;5(2):61–67.
18. Mahendra H, Singh K, Singh JK. Effect of integrated nutrient management on yield and quality of ber (*Ziziphus mauritiana* Lamk.) cv. Banarasi Karaka. The Asian Journal of Horticulture. 2009;4:47–49.
19. Bhadauria AS, Tripathi VK. Effect of bio-enhancers and bio-fertilisers on growth and quality of mango cv. Amrapali under subtropical plains of Central Uttar Pradesh, India. International Journal of Plant & Soil Science. 2023;35(19):1260–1267.
20. Mahdi I, Fahsi N, Hafidi M, Allaoui A, Biskri L. Plant growth enhancement using rhizospheric halotolerant phosphate solubilizing bacterium *Bacillus licheniformis* QA1 and *Enterobacter asburiae* QF11 isolated from *Chenopodium quinoa* Willd. Microorganisms. 2020;8(6):948.
21. Kumar A, Sharma DD, Sharma DP, Shylla B, Singh U, Verma P, et al. Integrated nutrient management as a low cost and eco-friendly strategy for sustainable fruit production in apricot (*Prunus armeniaca* L.). International Journal of Fruit Science. 2024;24(1):18–32.
22. Meena HR, Somasundaram J, Kaushik RA, Sarolia DK, Singh RK, Meena GL. Integrated nutrient management affects fruit yield of sapota (*Achras zapota* L.) and nutrient availability in a Vertisol. Communications in Soil Science and Plant Analysis. 2019;50:2848–2863.
23. Meena LR, Kumar D, Meena LK, Singh S. Productivity and economics of ber (*Ziziphus mauritiana*) based horti-pasture system as influenced by integrated nutrient management under rainfed condition of Rajasthan. The Indian Journal of Agricultural Sciences. 2019;89(2):322–326.

How to cite this article: Haritwal A, Meena K, Yadav R, Bundela MK, Shukla U, Sarkar D. Effect of integrated nutrient management on growth, yield and quality of ber (*Ziziphus mauritiana* Lamk.). *International Journal of Horticulture and Food Science*. 2026;8(10):15-22. doi: <https://www.doi.org/10.33545/26631067.2026.v8.i10a.871>