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Response of nutrients level and pruning intensity on vegetative growth of Apple ber (*Ziziphus mauritiana* L.) under sodic soil condition

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ABSTRACT

The experiment was carried out at the Main Experiment Station, Department of Fruit Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, U.P., during the years 2023-24 to 2024-25. To find out the response of nutrient level and pruning intensity on vegetative growth of Apple ber (*Ziziphus mauritiana* L.) under sodic soil conditions. reproductive growth, and yield of Apple ber (*Ziziphus mauritiana* L.) under sodic soil conditions. The treatments investigated the effects of varying pruning intensities 4 buds, 6 buds, and 8 buds combined with foliar application of nutrient, time of spraying July-August (Pre-flowering stage), and Oct. (Fruit set stage) application, including boric acid, and zinc sulphate, both were used at 0.2%, 0.4% concentration, and control. The treatment interaction with P_4: 8 buds pruning intensity and Nutrient RDF NPK 19: 19: 19 + boron 0.2% and zinc 0.4% ($P_4 \times N_3$) demonstrated the most significant increase in vegetative growth, showing such as shoot length cm (278.49 and 280.79) in 2023-24 and 2024-25 respectively. The study provides valuable insights into optimizing the Ber plant vegetative growth through targeted pruning and nutrient management practices.

INTRODUCTION

Ber (*Ziziphus mauritiana* Lamk.), a deciduous fruit tree of the Rhamnaceae family, native place is India and china is the native place of *Ziziphus jujube* L. Ber can be grow up to 1000 mean sea level, with optimally below 600 meters in subtropical and subtropical regions with annual rainfall exceeding 400 mm (Singh *et al.*, 2017). Ber is poor man's fruit because its nutritional composition, it is rich source of Vitamin-C, A and B, minerals like, calcium, potassium, phosphorus and iron, also contain moisture, carbohydrate, protein, fats, carotene, thiamine, riboflavin, ascorbic acid, sugar and fiber (Morton, 1987).

Apple Ber is a Thai ber cultivar that was created by crossing Thailand green apple with Thai native ber. This variety's fruits have the appearance of a green apple and taste like ber, hence the name Apple Ber. It is also known as Apple Plum or Jujube Berry (Saritha *et al*. 2021). The fruit's shape, as well as its juiciness and crispness, are similar to that of an apple. This cultivar has various advantages over traditional ber cultivars (Mathangi and Maran, 2020), including fruit size, bearing potential, precocity in bearing, earliness, and crisp fruit texture. The major feature of this fruit is its massive size. Apple ber cultivation started in Arid and Semiarid regions due to it's bearing potential, precocity in bearing, earliness, large fruit size etc.

Annual pruning is mandatory in ber as it bears fruit on current season growth (Singh et al., 2017). Micronutrients play a vital role in fruit set, fruit retention, fruit development, yield and quality of ber. Zinc is an essential micronutrient for human health. involved in the enzymatic process of protein synthesis Plants mature at different rates and generate seeds. Tryptophan, which is necessary for metabolism, is changed into indole acetic acid. By improving blooming, fruit set, fruit size, and reducing fruit drop, zinc spraying on trees eventually boosts production. By improving citrus fruit output and quality, foliar zinc spray may lessen early fruit drop. The most important activity of boron is to facilitate the movement and transfer of the products of photosynthesis from the leaves (source) to the active areas (sink) in the plant. This element has a role in regulating cell membrane activity and gene expression (Shireen *et al.*, 2018). Also stimulates the biosynthesis of protein, DNA synthesis, increasing vitamin-C and B.

Materials and methods

The experiment was carried out at the Main Experiment Station,

Department of Fruit Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, U.P., during two successive seasons, 2023-24 to 2024-25. To examine the effect of nutrients and pruning levels on yield and quality attributes of apple ber (*Ziziphus mauritiana* under sodic soil conditions. The trees were about Five-years-old with spacing of 6×6 m and one tree per treatment. Pruning of secondary branches were pruned on 26th of May during both the years. Pruning treatment consist of four treatment (T1) no pruning, (T2) 4 buds, T3 (6 buds) and T4 (8 buds), and nutrients treatments were N_1 (Nano NPK + Boron 0.2%), N_2 (Nano NPK + Zinc 0.4%), N_3 (Nano NPK + Boron 0.2% + Zinc 0.4%), N_4 (Nano NPK + Boron 0.4%), N_5 (Nano NPK + Zinc 0.2%), and N_6 (Nano NPK + Boron 0.4% + Zinc 0.2%). Data were recorded on shoot girth (mm) with the help of a digital vernier caliper, shoot length (cm) by measuring tape, The data on production were analyzed annually, while data on vegetative parameters were pooled and analyzed.

Table: 1. Interaction Shoot length (cm)

Result and discussion

The data shown in table 1. Maximum shoot length was recorded in the interaction of (P_4×N_3) 8 buds and RDF NPK + Boron 0.2% + Zinc 0.4% (279.64 cm) and lowest shoot length were recorded in (P_3×N_6) 6 buds and RDF NPK + Boron 0.4% + Zinc 0.2% (173.74 cm). The optimal pruning intensity significantly influenced the vegetative growth of Indian jujube (*Ziziphus mauritiana* L.) in semi-arid conditions. There were prominent differences among cultivars in terms of the development and productivity of primary, secondary, and tertiary branches. 50% of pruning intensity has a significant effect on the maximum shoot length cm (278.49 and 280.79) in 2023-24 and 2024-25 respectively. (Kumar, 2002; Gill *et al.*, 2006; Saritha *et al.*, 2021) also obtained results in the same line in their studies with pomegranate and ber, respectively. Zinc sulphate and borax significantly increased vegetative characteristics in mango.

Pruning Intensity (P)	Nutrient (N)					
	N1	N2	N3	N4	N5	N6
2023-24						
P1	176.79	194.19	210.19	195.80	198.89	170.80
P2	201.30	256.59	278.49	272.29	259.10	261.40
P3	182.73	240.60	235.30	267.19	207.39	215.90
P4	180.70	197.70	219.76	200.40	204.50	212.19
SE(d)	4.96	**C.D.**	10.02	**SE(m)**	3.51	
2024-25						
P1	175.88	192.30	204.36	192.27	199.54	176.69
P2	204.57	252.36	280.79	272.91	256.25	261.79
P3	184.85	245.83	236.59	259.98	215.69	205.53
P4	181.22	199.33	222.43	204.15	209.81	201.80
SE(d)	4.30	**C.D.**	8.68	**SE(m)**	3.04	

Figure 1. Interaction Shoot length 2023-24

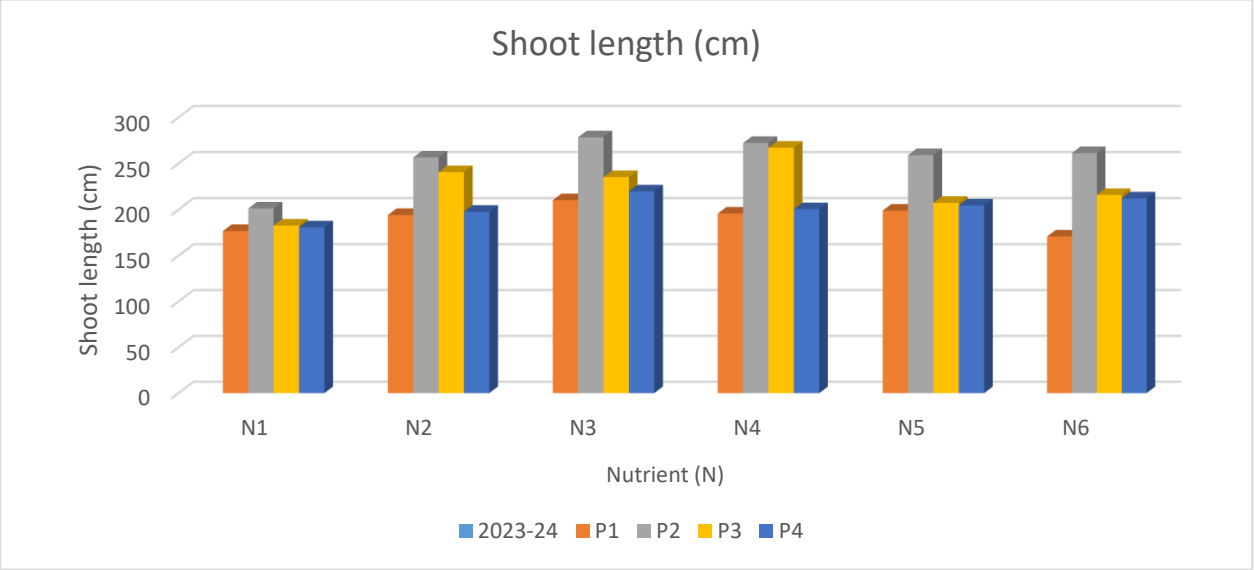
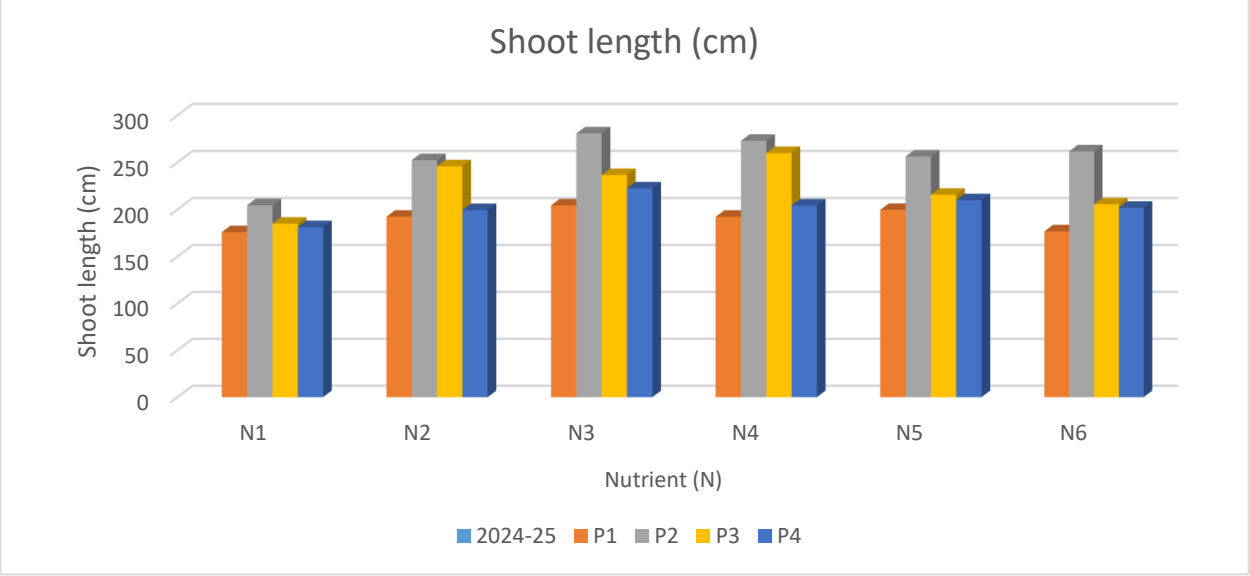


Figure 2. Interaction Shoot length 2024-25



CONCLUSION

Pruning intensity and nutrient combination interaction on vegetative parameter, flowering parameter, quality and yield parameter showed significant difference. $P_4 \times N_3$ showed best result in term of vegetative parameter like Shoot length (cm).

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