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Sushil Kumar Kasnia
M.Sc. (Ag) Horticulture,
Faculty of Agriculture, Tanta
University, Sri Ganganagar,
Rajasthan, India

Alka
M.Sc. (Ag) Horticulture,
Faculty of Agriculture, Tanta
University, Sri Ganganagar,
Rajasthan, India

Jayant Chhabra
M.Sc. (Ag) Horticulture,
Faculty of Agriculture, Tanta
University, Sri Ganganagar,
Rajasthan, India

Akashdeep Sihag
Assistant Professor,
Department of Horticulture,
Faculty of Agriculture, Tanta
University, Sri Ganganagar,
Rajasthan, India

Corresponding Author:
Sushil Kumar Kasnia
M.Sc. (Ag) Horticulture,
Faculty of Agriculture, Tanta
University, Sri Ganganagar,
Rajasthan, India

Effect of mycorrhiza and liquid boron fertilizer on growth, flowering and yield of brinjal (*Solanum melongena* L.)” in sandy loam of Sri Ganganagar district in Rajasthan

Sushil Kumar Kasnia, Alka, Jayant Chhabra and Akashdeep Sihag

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Abstract

The experiment entitled “Effect of Mycorrhiza and Liquid Boron Fertilizer on Growth and Yield of Brinjal (*Solanum melongena* L.)” was conducted at the Department of Horticulture, Faculty of Agriculture, Tanta University, Sri Ganganagar during Kharif 2024. The study aimed to evaluate the effect of Mycorrhiza and Liquid Boron fertilizer on growth and yield parameters of brinjal. Seven treatments were laid out in a Randomized Block Design with three replications. The results indicated that T₃ (Mycorrhiza 250 g/plot) recorded maximum values for all growth and yield parameters, while the control (T₇) recorded the lowest. The plant height (cm) was recorded (39.97 cm) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (21.44 cm) in T₇ (Control), The no. of branches was recorded (7.49) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (4.08) in T₇ (Control), The no. of leaves was recorded (41.33) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (23.11) in T₇ (Control), The stem diameter (cm) was recorded (17.56 cm) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (13.11 cm) in T₇ (Control). The average fruit weight (gm) was recorded (122.11 g) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (89.15 g) in T₇ (Control), The no. of fruits/plant was recorded (39.52) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (21.17) in T₇ (Control), The fruit yield per plant (kg) was recorded (2.56 kg) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (1.42 kg) in T₇ (Control), The fruit yield (q/ha.) was recorded (81.92) highest in T₃ (Mycorrhiza 250 g/plot) and lowest (48.31) in T₇ (Control). The study revealed that Mycorrhiza application significantly improved growth and yield performance of brinjal plants.

Keywords: Brinjal, Mycorrhiza, Liquid Boron, Growth, Yield

Introduction

Brinjal (*Solanum melongena* L.) is a plant of the family solanaceae. It is also known as eggplant or aubergine. The green leaves of plant are the main source of the supply of anti-ascorbic acid (vitamin- C). It is used in Ayurveda as appetizer, aphrodisiac and cardiogenic and fruit exhibits laxative property and provides relief from inflammation. The unripe fruit of brinjal primarily used as cooked vegetable for the preparation of various dishes. It has got much potential as raw material in pickle making and dehydration industry. The white brinjal is said to be good for diabetic patients. It can also cure toothache and liver complains (Chouhan, 1981). Brinjal is also used for the treatment of bronchitis, asthma, dysentery, etc. it is also helpful for decreasing the level of blood cholesterol. Brinjal is low in energy (30 kcal/100 g), protein (1.4%) and vitamin C (5 mg/100 g), but is a very good source of dietary fiber, potassium, calcium, manganese, copper and vitamin A and B also possess antioxidant ability (Anonymous, 2012) [6]. The foremost challenge to the existence of mankind has always been to produce adequate quantity of food from the available acreage to meet the requirements of ever expanding world population. The rate of yield gain in crop improvement programme must match the rate of population growth so, as to avoid malnutrition and hunger. It can be grown in wide range of agroclimatic zones, which provides a tremendous scope and potential for cultivation of this crop. However, low productivity of this crop has created the necessity to breed new high yielding varieties and improved technique, which may fulfill the needs of the growers and enhance the productivity. Vegetables are being cultivated in an area of 49 million hectares with the

production potential of 487 million tons in the world. India is the second largest producer of vegetables in the world, accounting for 10 percent of the world's production. The maximum number of vegetable crops are grown in India due to diversity of agroclimatic conditions. In India vegetables occupy nearly 10.23 million hectares with a production of 17.82 million tons in the year 2016- 2017 (Anonymous, 2021) ^[4]. This accounts for 2.8 percent of total cropped area in the world. In India, Brinjal is cultivated in an area of about 0.728 million hectares with the production of 12.66 million tons and the productivity of 17.39 metric tons per hectare (Anonymous, 2021) ^[4]. However, Brinjal is producing almost all state and West Bengal is the largest producer of Brinjal followed by Maharashtra and Bihar. In Rajasthan, Brinjal cultivated under 5,138 ha area with 23,356 metric tons production (Anonymous, 2021) ^[4].

Boron also plays an important role in flowering and fruit formation (Nonnecke, 1989). Several studies have been already conducted on effect of boron on flowering and fruit setting in tomato and potato. Boron deficiency symptoms will often appear in the form of thickened wilted, or curled leaves, a thickened, cracked, or water-soaked condition of petioles and stems, and discoloration, cracking or rotting of fruit, tubers or roots. (Tisdale *et al.*, 1985). Boron deficiency may cause sterility i.e. less fruits per plant attributing lower yield (Islam and Anwar, 1994) ^[8]. Deficiency of B causes restriction of water absorption and carbohydrate metabolism, which ultimately affects fruit and seed formation and thus reduces yield. In fertilizer schedule, an inclusion of B often decides the success and failure of the crops. This emphasizes the need for a judicious use of B fertilizer. Information in our country to that end is practically meager.

Materials and Methods

The experiment was conducted during Kharif 2024 at the Department of Horticulture, Faculty of Agriculture, Tanta University, Sri Ganganagar, Rajasthan. The experimental design was Randomized Block Design (RBD) with seven treatments and three replications.

Experimental Site

Department of Horticulture, Faculty of Agriculture, Tanta University, Sri Ganganagar, 335002, Rajasthan, which is situated at 24°34' N latitude and 73°40' E longitudes at an elevation of 583.5 meters above mean sea level. The field

topography of the experimental site was fairly leveled with an adequate surface drainage and the field soil was having clay loam texture.

3.2 Treatments

Symbols	Treatment
T ₁	Mycorrhiza 150 gm/plot
T ₂	Mycorrhiza 200 gm/plot
T ₃	Mycorrhiza 250 gm/plot
T ₄	Liquid boron fertilizer 1 ml / liter water
T ₅	Liquid boron fertilizer 2 ml / liter water
T ₆	Liquid boron fertilizer 3 ml / liter water
T ₇	Control

Observation recorded

Growth parameter

1. Plant height (cm)
2. Number of branches per plant
3. Number of leaves per plant
4. Stem diameter (cm)

Yield Parameters

1. Average fruit weight (gm)
2. Number of fruits per plant
3. Fruit Yield per plant (kg)
4. Fruit yield per plot (kg)

Results and Discussion

The results of the field experiment carried out on “Effect of Mycorrhiza and Liquid Boron Fertilizer on Growth, Flowering and Yield of Brinjal (*Solanum melongena* L.)” in 2024-25 at the experimental field of the present experiment was conducted at Department of Horticulture, faculty of Agriculture, Tanta University, Sri Ganganagar, 335001, Rajasthan are presented in this chapter. The data pertaining to the effect of different treatments on growth, flowering and yield parameters were statistically analysis for test of significance of the results. In addition to tabular presentation, data also depicted through graphs for better understanding wherever necessary. The analysis of variance for different characters is given in the appendices.

Growth parameter

Table 1: The effect of Mycorrhiza and Liquid Boron fertilizer on growth parameters of brinjal.

Treatment	Plant Height (cm)	No. of Branches	No. of Leaves	Stem Diameter (mm)
T ₁	36.39	6.8	36.32	15.19
T ₂	38.12	7.09	39.38	16.55
T ₃	39.97	7.49	41.33	17.56
T ₄	29.35	5.81	28.77	14.29
T ₅	31.33	6.01	29.08	15.01
T ₆	34.55	5.56	33.11	15.88
T ₇	21.44	4.08	23.11	13.17
S.Em. ±	0.42	0.09	0.52	0.20
CD (P=0.05)	1.31	0.28	1.60	0.64

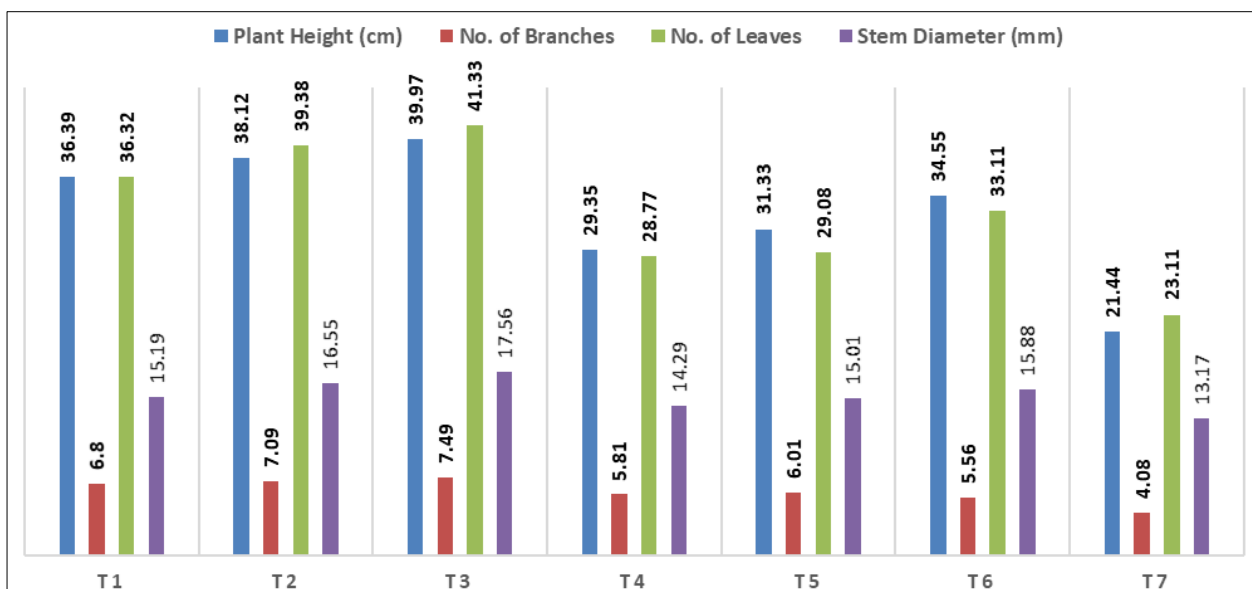


Fig 1: The effect of Mycorrhiza and Liquid Boron fertilizer on growth parameters of brinjal

Table 2: The yield attributes as influenced by Mycorrhiza and Liquid Boron fertilizer.

Treatment	Avg. Fruit Wt. (g)	No. of Fruits/Plant	Fruit Yield/Plant (kg)	Fruit yield per plot (kg)
T ₁	115.12	34.25	2.12	77.44
T ₂	119.33	37.18	2.32	78.72
T ₃	122.11	39.52	2.56	81.92
T ₄	101.24	27.17	1.81	69.12
T ₅	104.44	29.14	1.92	71.04
T ₆	110.21	31.12	2.01	75.52
T ₇	89.15	21.17	1.42	48.96
S.Em. ±	1.60	0.21	0.02	1.20
CD (P=0.05)	4.94	0.67	0.06	3.71

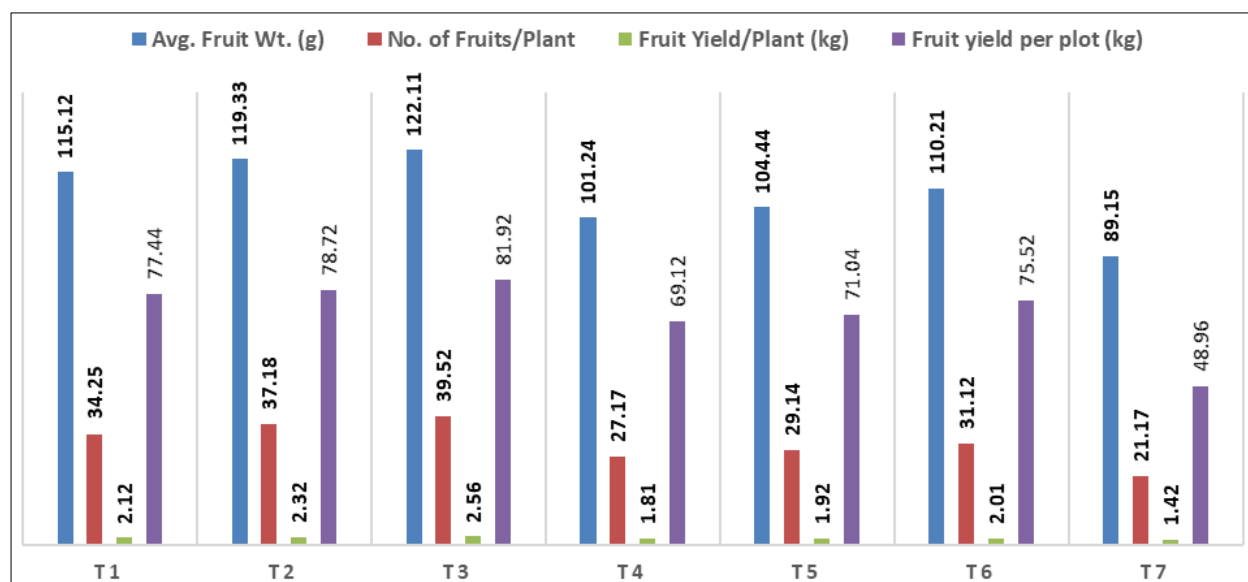


Fig 2: The effect of Mycorrhiza and Liquid Boron fertilizer on growth parameters of brinjal

Discussion

The study revealed that Mycorrhiza and Liquid Boron fertilizers significantly enhanced the growth and yield performance of brinjal. The treatment T₃ (Mycorrhiza 250 g/plot) exhibited the highest growth and yield values, mainly due to improved nutrient uptake and root-soil interactions. Boron also contributed to better fruit set and weight, but Mycorrhiza proved more effective overall. Thus, biological enhancement through Mycorrhiza application is

recommended for improving brinjal productivity under field conditions.

The findings of the present investigation clearly indicate that the application of Mycorrhiza and Liquid Boron fertilizer significantly influenced the growth and yield parameters of brinjal. Among all treatments, T₃ (Mycorrhiza 250 g/plot) recorded the highest plant height, number of branches, number of leaves, and stem diameter, indicating that the presence of Mycorrhiza improved root-soil interactions,

nutrient uptake, and physiological activity of the plant. Mycorrhiza is known to enhance phosphorus and micronutrient absorption, which leads to better vegetative growth. These results are in line with the findings of Ramakrishnan and Selvakumar (2012), who reported that Mycorrhizal inoculation improved root growth and overall vigor in Solanaceous crops.

However, the superiority of Mycorrhiza (250 g/plot) indicates that the biological enhancement of root nutrient absorption provided more consistent benefits compared to liquid boron fertilization alone. This aligns with the work of Anisha *et al.* and Thingujam *et al.*, who also reported that Mycorrhiza-treated plants exhibited higher fruit yield and nutrient use efficiency. Thus, it can be concluded that integrating biofertilizers like Mycorrhiza into brinjal cultivation can sustainably increase productivity while minimizing chemical fertilizer dependence.

Conclusion

It was concluded that Mycorrhiza and Liquid Boron fertilizer treatments significantly improved growth and yield performance of brinjal. Among all treatments, T₃ (Mycorrhiza 250 g/plot) recorded the maximum plant height, number of branches, leaves, stem diameter, fruit weight, number of fruits, and overall yield. Hence, Mycorrhiza 250 g/plot may be recommended for better growth and higher productivity of brinjal under semi-arid conditions of Sri Ganganagar, Rajasthan.

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