Original Article

Comparison of Nutrient Management Practices along with application of Novel Fytovita on Plant Height of Brinjal

Anishya Sruthi K[1], Prathiba R[2]

[1]Research Scholar, Department of Agricultural Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India. Pincode: 602105.
[2]Project Guide, Corresponding Author, Department of Agricultural Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India. Pincode: 602105.

Abstract

Aim: The aim of the study is to compare the nutrient management practices along with the application of novel fytovita on the plant height of brinjal. **Materials and Methods:** The experimental land area was 570×330 cm. NPK along with water spray was used as a control group. Foliar application with NPK fertilizers was used as an experimental group. The plant height was measured from the lower cotyledonary node to the growing tip using a ruler. The sample size for each group was 20 and the total sample size was 40. The G-power is 80% with a threshold value of 0.05, and a confidence interval at 95%. **Results:** From this study, the result shows that treatment T2 has the highest mean value for plant growth of 53.26 cm on 60 DAT. Treatment T1 showed the lowest mean value for plant growth of 37.19 cm. **Conclusion:** The comparison of nutrient management practices along with the application of novel fytovita on plant height was experimentally studied and novel fytovita as foliar application increased the plant height. The independent sample t-test was done which revealed that both the groups are statistically significant with a p-value 0.020 for plant height on 60 DAT.

Keywords: Brinjal, Plant Height, Number of Leaves, Novel Fytovita, Biostimulant, Foliar Application.

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INTRODUCTION

The aim of the study is to compare the nutrient management practices for the plant height of brinjal. India is the second-largest producer of brinjal and can be cultivated in all seasons (B. K. Singh, Singh, and Yadav 2014). Brinjal has the productivity potential of 12 lakh tonnes, whereas only 20-30 tonnes/hectare has the potential to be harvested due to poor nutrients in the soil and excess fertilizer treatments, the productivity obtained low (Patel et al. 2010). Thus, these deficiencies can be easily overcome by foliar application. Foliar application is a new methodology, in which a novel fytovita is directly sprayed on the leaves. Plants absorb essential nutrients from the leaves (Haytova 2013). Foliar has wide applications such as helping in the fixation of phosphorus and potassium, it can be applied to control diseases such as root rot disease and compensates the nutrient loss of soil, and maximizes the crop yield (Patil and Chetan 2018). Novel fytovita (Biostimulant) is a plant vitalizer made up of a mix of vital vitamins and amino acids.

There are 68 research articles in Google Scholar and 58 articles in Science Direct for foliar application. GOEMAR BM-86 is a biostimulant used as a foliar application to improve the fruit weight and yield potential of brinjal. The brinjal variant Epic F1 and Flavine F1 produced more brinjal yield by foliar application method (Pohl et al. 2019). Evaluation of three different types of brinjal was studied by using randomized complete block design (RCBD). The three variants are 2014/BRLVAR-1, 2013/BRLVAR-5, and 2013/BRLVAR-6. Among the three variances, 2013/BRLVAR-6 produced a higher number of fruits (2.80) (Tripathy et al. 2017). The foliar application was given to increase the number of leaves of brinjal. Four foliar application treatment methods were applied: control (T0), natura one (T1), neem oil (T2), neem oil natura (T3). Among the four treatments (T3) produced a higher number of leaves (41.0) (Rakibuzzaman et al. 2019). An aqueous solution of chitosan and yeast elicitor was used for foliar application to control the altered leaf blight of brinjal. Four concentrations of foliar application were administered to brinjal plants such as 0.02, 0.05, 0.1, and 0.2 %. Among the four concentrations, 0.2 % of chitosan and yeast elicitor showed the better performance to reduce blight disease (Tumpa and Khokon 2020). From the above studies "The eggplant yield and fruit composition as affected by genetic factors and biostimulant application" is the best study (Pohl et al. 2019).

Our team has extensive knowledge and research experience that has translate into high quality publications(Bhansali et al. 2021; Jayanth et al. 2021; Sudhakar, Ravel, and Perumal 2021; Sathiyamoorthi et al. 2021; Deepanraj et al. 2021; Raju et al. 2021; Arun Prakash et al. 2020; Kamath et al. 2020; Shanmugam et al. 2021; Rajasekaran et al. 2020; Adhinarayanan et al. 2020; Rajesh et al. 2020; Aurtherson et al. 2021). Based on the studies from the literature, the identified problems are the use of hybrid varieties, the high cost of hybrid stimulants, and nutrient loss in soil. Hence the aim of this study is to compare the nutrient management practices by the application of foliar application and measure the plant height.

MATERIALS AND METHODS

The experimental work was carried out in Saveetha farm field, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai. The experimental land area was 570×330 cm. NPK along with water spray was used as a control group and considered as a treatment 1(T1). NPK with foliar application was used as an experimental group and considered as a treatment 2(T2). The sample size for each treatment with respect to plant height was 20. The sample size for each treatment with respect to the number of leaves was 20. The G-power is 80% with a threshold value of 0.05 and a confidence interval at 95% (Panda 2015).

Foliar application using novel fytovita (biostimulant) (0.2%) and a garden sprayer of 5 liters were purchased from an online platform as shown in Fig 1. Brinjal seeds (PLR(BR)2) and NPK fertilizers (2 kg) were purchased. The recommended dose of fertilizer (RDF) was 150:100:100 kg of N:P:K/ha for 100% of RDF (Ndereyimana et al. 2014). The experimental plot was designed as a randomized block design (RBD) with a split-plot arrangement. PLR(BR)2 variety was selected for the study. It is divided into five splits with a plant spacing of (30×30 cm). Brinjal seeds were raised in portrays and moistured using a sprinkler. When the seed germinated with 4 to 6 leaves it was transplanted to the experimental plot (V. K. Singh et al. 2015). The crop brinjal was cultivated from June-October 2021. The experimental plot soil type was sandy soil. Treatment 1 (T1) consisted of NPK fertilizer with water spray and was applied to the plants using a sprayer.

Biostimulants such as novel fytovita enhance the production, it interacts with plants which reduces the non-productive metabolism. Treatment 2 (T2) consists of NPK fertilizers with foliar application of novel fytovita (biostimulant). Novel Fytovita was sprayed in the plant leaves at an interval of 25 and 50 DAT after transplantation.

For each treatment 1 and 2 in the experimental field, the plant height was measured on 60 DAT with the help of ruler (Muhammad et al., n.d.). The plant height was measured from the lower cotyledonary node to the growing tip using a ruler as shown in Fig 2. For each treatment 1 and 2 in the experimental field, the number of leaves was counted physically after 60 DAT (Kumar, Sumathi, and Kanal 2019).

The experimental data was obtained from treatment 1 (NPK with water spray) and treatment 2 (NPK with novel fytovita). The plant height and number of leaves are the experimental datas obtained from the field for these studies. Forty datas were obtained for plant height from treatment 1 and 2. Another forty datas were obtained for the number of leaves from treatment 1 and 2.

STATISTICAL ANALYSIS

The statistical software used in this research work was SPSS v.26. The statistical analysis was used to calculate the mean, standard deviation, standard error, and significant difference of the data obtained for plant height and number of leaves. In total, 20 experiments were conducted for analysis of each group. 95% confidence level can be achieved with p value less than 0.05. Treatment methods are the independent variables and plant height and the number of leaves are the dependent variables (Muhammad et al., n.d.). Independent sample t-test was used to analyze the outputs of this experiment.

RESULTS

Table 1, shows the measurement of plant height and the number of leaves on 60 DAT, with respect to treatment T1 and T2. Table 2, shows the group statistical value for plant height and number of leaves for treatments T1 and T2. The mean value of plant height for T2 is 53.26 and for T1 is 37.19. The mean value of the number of leaves for T2 is 86.09 and 68.64. Table 3, shows the independent sample-t test in which both the treatments are statistically significant with a probability value less than 0.05**.** Fig. 3, shows the number of leaves available by the application of T1 and T2. A bar chart is used to represent the comparison of plant height and number of leaves using NPK fertilizer and foliar application as shown in Fig. 4.

DISCUSSIONS

From the results, it is observed that foliar application of novel fytovita (T2) to the brinjal increased the plant height and number of leaves. This increase was due to the good absorption of nutrients, moisture, space, and light. The

plant's leaves absorb the nutrients and transfer them to the shoot by which crop productivity was increased. The lower plant height was noticed due to poor absorption of soil nutrients for the treatment T1 (Bangi, Lal, and Sattigeri 2014). This study shows a statistically significant value of $p = 0.020$ for plant height and $p = 0.032$ for the number of leaves.

From the bar chart Fig. 4, by the application of foliar (T2) was recorded higher plant height of 54 cm, when compared with NPK fertilizer (T1) which has a lower plant height of 38 cm. The number of leaves for foliar application (T2) was 87 which was larger in numbers than the NPK fertilizer (T1) of 69.90. The eggplant productivity was increased by the application of biostimulant "GOENMAR BM-86" (Ascophyllum nodosum extract) studied by (Pohl et al. 2019). Different concentrations of aqueous garlic extracts (AGE) were used to enhance the growth of eggplant. By the application of (AGE), germination of seeds and vegetable production increased (M. Ali et al. 2019). The above two researchers findings are similar to this study. The use of chemical biostimulants to eggplant should be applied safely with precautions (Ruban et al. 2019). Allelochemicals were used to improve the defense response of eggplant under protected conditions such as the use of glasshouses and plastic tunnel systems which makes the process high in cost (Muhammad Ali et al. 2021). Hence, the above two studies describe the use of chemicals with safety precautions as disadvantages and do not inline with this experimental study.

From this experimental study, the limitations are the application of biostimulants to the plants at restricted hours such as early morning and evening hours. The scope of this study relies on the application of other types of stimulants such as seaweed extracts, chitosan, and beneficial fungi. Moreover, it can also be applied to other crops such as tomato, potato, and cabbage.

CONCLUSION

The comparison of nutrient management practices by the application of novel fytovita on the brinjal plant was studied. The results showed that the plant height was 54.00 cm by fytovita treatment (T2). The number of leaves was 86.78 and the absorption of nutrients also increased by the application of novel fytovita on plant leaves. The mean values of plant height were 53.26 and 86.09 for the number of leaves. It can be concluded that the application of novel fytovita to the brinjal plant will improve photosynthesis, increase the yield and quality of the product. his study shows a statistically significant value of $p = 0.020$ for plant height and $p = 0.032$ for the number of leaves.

DECLARATIONS:

Conflict of Interest

The authors of this paper declare no conflict of interest.

Author Contribution

Author **(**AS) was involved in data collection, data analysis, and manuscript writing. The author (PR) was involved in conceptualization, data validation, and critical review of the manuscript.

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TABLES AND FIGURES

Table 1. Comparing plant height and number of leaves with respect to treatment 1and 2 with respect to 60

No.of Trial	Plant height on 60 DAT		Number of leaves on 60 DAT	
	T1	T2	T1	T2
1	37.10	53.26	69.10	86.20
2	37.10	53.26	69.10	86.20
3	37.10	53.26	69.10	86.20
4	37.10	53.26	69.10	86.20
5	37.10	53.26	69.10	86.20
6	38.00	54.00	68.00	85.00
7	38.00	54.00	68.00	85.00
8	38.00	54.00	68.00	85.00
9	38.00	54.00	68.00	85.00
10	38.00	54.00	68.00	85.00
11	37.67	53.00	69.90	87.00
12	37.67	53.00	69.90	87.00
13	37.67	53.00	69.90	87.00
14	37.67	53.00	69.90	87.00
15	37.67	53.00	69.90	87.00
16	36.00	52.78	67.56	86.78
17	36.00	52.78	67.56	86.00
18	36.00	52.78	67.56	86.00
19	36.00	52.78	67.56	86.00
20	36.00	52.78	67.56	86.00

Table 2. Statistical mean values and standard deviation values given with respect to plant height on 60 DAT for the treatment 1and 2.

	Treatment	N	Mean	Std. Deviation	Std. Mean Error
Plant height on 60 DAT	T1	20	37.1925	0.77979	0.17437
	T2	20	53.2600	0.47173	0.10548

Number of leaves on 60 DAT	T1	20	68.6400	0.94245	0.21074
	T2	20	86.0890	0.74868	0.16741

Table 3. Tabulation for independent sample t-test. The outcome of the independent sample t- test shows a significant difference between the control group and experimental group. The significance value P=0.020 ($p<0.05$, t-value is -78.884 and df is 38, 31.264 and 36.151) statistically significant.

INDEPENDENT SAMPLE TEST					
hypothesis		F	significance	t	df
Plant height on 60 DAT	Equal variance assumed	5.894	0.020	-78.844	38
	Equal variance not assumed			-78.884	31.264
Number of leaves on 60 DAT	Equal variance assumed	4.263	0 .032	-64.832	38
	Equal variance not assumed			-64.832	36.151

Fig. 1. Fytovita and the sprayer are used in the experiment for treatment 2 purchased on an online platform.

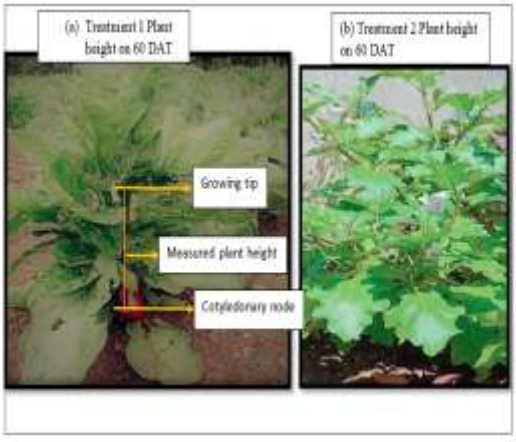

Fig. 2. Comparison of a plant height on 60 DAT in respect to treatment 1NPK and treatment 2 foliar application fytovita by using fytovita biostimulant.

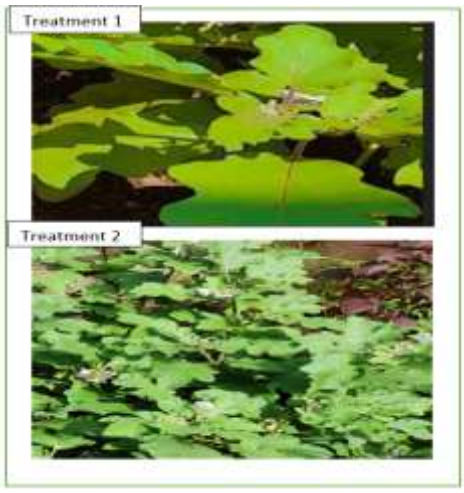

Fig. 3. The number of leaves available by the application of treatment 1NPK and treatment 2 foliar application fytovita by using fytovita biostimulant.

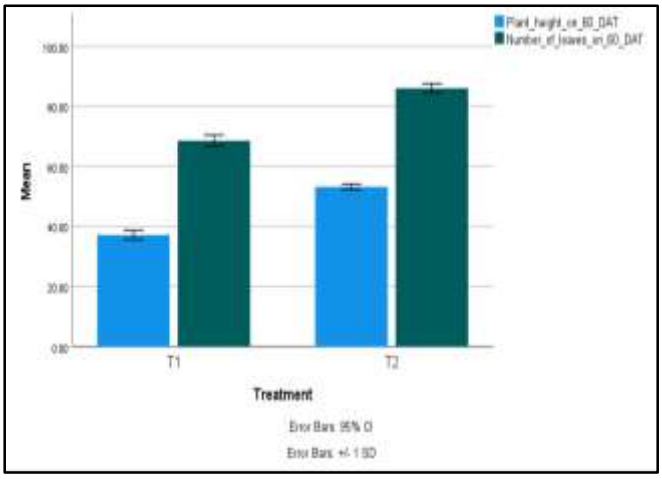

Fig. 4. Comparison of treatment 1 and treatment 2 which shows the measurement of plant height of brinjal and number of leaves on 60 DAT with respect to treatment 1 and 2, X-axis is treatment methods T1 and T2 and Y axis: mean accuracy of deviation ± 1 SD.