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Effect of zinc and boron on quality of brinjal fruits (*Solanum melongena* L.)

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Abstract
A pots experiment was conducted at Sam Higginbottom Institute of Agriculture Technology and Sciences during 2012, to study Effect of Zinc and Boron on Growth, Yield and Quality of Brinjal (*Solanum melongena* L.) cv: Rutika. The experiment consisted of 9 treatments laid out in randomized block design with three replications 3 times the important finding of present investigation is given below. The individual treatment of 5 mg Zinc, 10 mg Zinc, 5 mg Boron and 10 mg Boron and treatments combination 5 mg Zn + 5 mg B, 5 mg Zn + 10 mg B, 10 mg Zn + 5 mg B and 10 mg Zn + 10 mg B per Kg soil was given in brinjal pots the growth parameters like tallest plants, maximum number of plant, number of leaf, number of branches and highest plant maximum number of flower and yield parameters like maximum number of fruit per plant and maximum fresh weight and dry weight per fruit was obtained in yield Brinjal influenced by treatments T_8 (10 mg Zn + 10 mg B) and was significantly superior over rest of the treatments. The physiological parameters like the Chlorophyll a, b, carotenoid, anthocyanin and protein was recorded maximum in treatment T_8 (10 mg Zn + 10 mg B) and was significantly superior over rest of the treatment.

Keywords: *Solanum melongena* L. zinc, boron, anthocyanin, growth, yields quality

Introduction
In India, during the year 2005 it is cultivated in an area of 5, 10,000 ha. Area under vegetables in India is estimated around 6.2 million hectares with an annual production of about 71.66 million tons of vegetables (Anonymous, 2003) [1]. Indian population being predominantly vegetarian attributes a prominent position to vegetable in their diet to meet the protin, vitamin and carbohydrate requirement. India is the second largest producer in the world about 4 million hectare of land is occupied by vegetable in India and approximately about is 3.7 % of total cultivated land area of brinjal. Orissa is largest producer of brinjal followed by West Bengal. Plant nutrition plays an important role for enhancing yield and quality in brinjal.
Micronutrients like iron, zinc and boron are essential for plant growth and metabolism. Iron is necessary for the synthesis of chlorophyll, though it actually does not enter into its composition. Iron starved plants develop chlorosis in the young leaves and the veins remaining green. Zinc in the ionic form (Zn++) or in form of a complex with a chelating agent e.g., EDTA, is taken up by the plants. Salts or complexes of zinc can easily absorbed directly through leaves. Hence, their foliar spray is used for correcting zinc deficiency.
Therefore keeping the above points in view, the present study entitled "Effect of zinc and boron on yield and quality of Brinjal **(***Solanum melongena* L.) Was undertaken with the following objective: To study the effect of zinc and boron on Physiological parameters of brinjal.

Materials and methods
The study was carried out during *Rabi* season 2012-13, Department of Biological Sciences, SHIATS, Allahabad (U.P.) which is located at 25º 24' 42" N latitude, 81º 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated at the side of Allahabad Rewa Road about 5 km away from Allahabad city. The experiment was conducted in RBD plot design consisting of 9 treatment combinations with 3 replications and was laid out with the different treatments allocated randomly in each replication.

The treatment and Concentration of zinc and boron (mg kg-^{1} soil) are T_0 Control, T_1 5 mg Zn, T_2 10 mg Zn, T_3 5 mg B, T_4 10 mg B, T_5 5 mg Zn + 5 mg B, T_6 5 mg Zn + 10 mg B, T_7 10 mg Zn + 5 mg B, and T_8 10 mg Zn + 10 mg B. At the time of experiment some Yield and quality parameters was observed like Fruit yield (g), Fruit length (cm), Fresh weight (g), Dry weight (g) etc. Also the estimation of chlorophyll a and b, Carotenoid, Protein were estimated for brinjal quality.

Estimation of chlorophyll was done by methods given by (Arnon 1949) [2]. The chlorophyll content in the leaves was estimated by weighing 1 gm of fresh leaves and was grounded with pestle and mortar. The 10 ml of 80% acetone was added to and this much quantity of samples was taken in test tubes and and was kept overnight. Next to that those samples are homogenized at 3000 rpm for 15 minutes. The absorbance of the samples was recorded at 645 nm and 663 nm respectively. Carotenoid was determined according to method of Lichtenthaler and Welburn (1983). 0.1 gm fresh leaves weight and crushed in 80% acetone, made the volume to 10ml. with 80% acetone. Then centrifuge at 800 rpm for 5 minutes. The supernant was read under 470 nanometer against 80% acetone blank. The anthocyanin was determined according to the method of (Mirecki and Teramura 1984) [7]. The Protein was determined according to the method of (Lowry *et al*., 1951) [5]. The protein content was determined by the standard curve prepare out the Bovin Serum Albumin (BSA) protein.

Fig 1: Fruit quality after estimation of chlorophyll a and b, Carotenoid, Protein

Results

Data collected were subjected to statistical analysis based on mean values of three randomly selected plants in each pot of three replications.

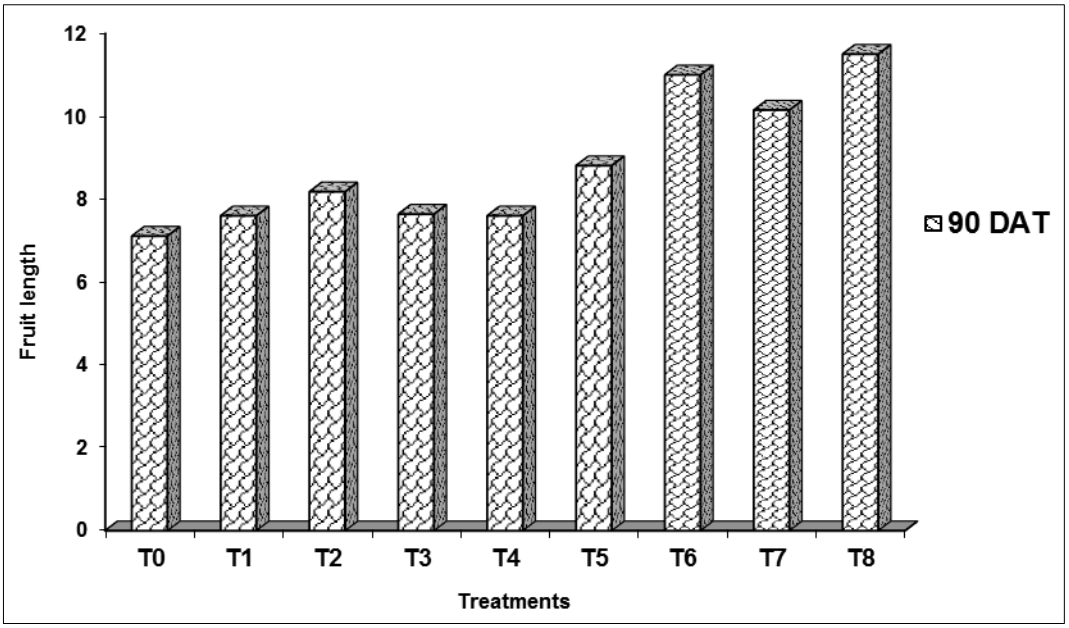

Fig 2: Effect of zinc and boron of fruit length of brinjal (*Solanum melongena* L.) cv. Rutika at different growth stages at 90 DAT.

The analysis of data presented in figure 2 showed that different levels of zinc and boron had a significant effect on the fruit length of brinjal. At 90 DAT maximum fruits length per plant was found in T_8 (11.50) and minimum was found in T_0 (7.11). The maximum length of fruit sprayed boron in the form of H3BO3 at 0.25 % to chilli reported by (Dongre *et al*., 2000).

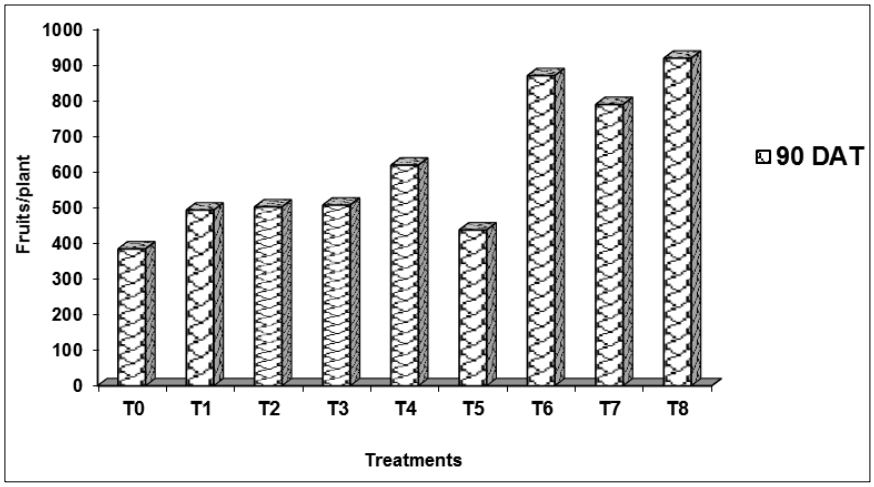

Fig 3: Effect of zinc and boron on fruits yield (g) of brinjal (*Solanum melongena* L.) cv. Rutika at different growth stage at 90 DAT.

The data presented in figure 3 show a significant positive response of different levels of zinc and boron for number of fruits yield of brinjal. At 90 DAT there effect shows these treatments maximum fruits yield plant was found in T_8 (919 g) and minimum was found in T_0 (384 g). (Niranjana *et al*., 2005) reported that, combined application of micronutrients (B, Zn and Mo) showed significantly increase in yield, oil content and growth parameters of groundnut.

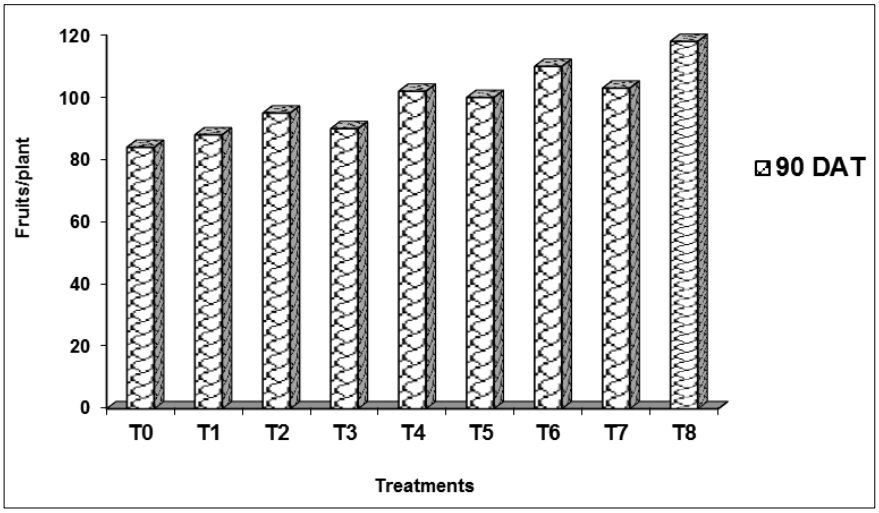

Fig 4: Effect of zinc and boron on fruit fresh weight (g) of brinjal (*Solanum melongena* L.) cv. Rutika at different growth stages at 90 DAT.

Figure 4 shows significant difference on fresh weight of brinjal due to different levels of zinc and boron. At 90 DAT and there was differences effect in fruits per plant the treatments maximum fruits was found in T_8 (118 g) and minimum was found in T_0 (84 g).

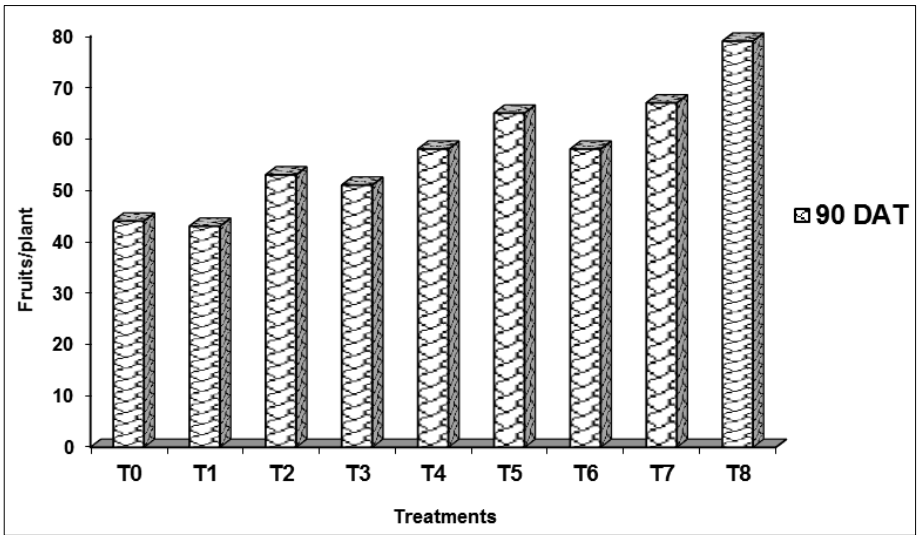

Fig 5: Effect of zinc and boron on fruit dry weight (g) of brinjal (*Solanum melongena* L.) cv. Rutika at different growth stages at 90 DAT.

The analysis of data presented in Figure 5 showed that different levels of zinc and boron had a significant effect on the fruit dry weight. At 90 DAT at found in T_8 (72 g) and minimum was found in T_0 (44 g).

Conclusions

On the basis of one trial experiment, there were 9 treatment combinations which were replicated 3 times under randomized block design (RBD) the effect of treatments on growth and yield of brinjal were independently determined. After that, it is concluded that the effect of zinc and boron on growth, yield, quality and physiological parameters of brinjal showed best performance with treatment T_8 (10 mg Zn kg-1 + 10 mg B kg-1).

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