Effect of Nitrogen and Boron on the Growth and Yield of Tomato (*Lycopersicon esculentum* M.)

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Article History

Manuscript No. 165
Received in 27th May, 2011
Received in revised form 5th July, 2011
Accepted in final form, 5th September, 2011

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Keywords

Nitrogen, boron, interaction, growth, yield, tomato

Abstract

A field experiment was conducted at the research farm of Sher-e-Bangla Agricultural University, Dhaka, during November 2006 to March 2007 to study the effects of nitrogen and boron on growth and yield of tomato. Four levels of each of Nitrogen (N_0=0, N_1=60, N_2=120 and N_3=180 kg N ha^{-1}) and 3 levels of Boron (B_0=0, B_1 = 0.4 and B_2= 0.6 kg B ha^{-1}) in all possible combinations were applied following a randomized block design with three replications. The individual and combined effects of nitrogen (N) and boron (B) on growth, yield and nutrient content in plants of tomato were studied. With increasing the levels of N, all the yield contributing characters and yield of tomato increased up to the 120 kg N ha^{-1}. Application of N @ 120 kg ha^{-1} gave the highest plant height (122.46 cm), flower clusters plant^{-1} (9.67), flowers cluster^{-1} (10.44), fruits cluster^{-1} (6.76), fruits plant^{-1} (52.44), fruit weight plant^{-1} (1.60 kg), fruit weight plot^{-1} (19.14 kg) and fruit yield (48.33 t ha^{-1}). On the contrary application of B @ 0.6 kg ha^{-1} gave the highest values of all these parameters. In interaction, N @ 120 kg ha^{-1} along with B @ 0.6 kg ha^{-1} produced the highest plant height (142.2 cm), flower clusters plant^{-1} (12.67), flowers cluster^{-1} (11.67), fruits cluster^{-1} (6.33), fruits plant^{-1} (67.33), fruit weight plant^{-1} (1.953 kg), fruit weight plot^{-1} (23.20 kg) and fruit yield (58.59 t ha^{-1}). The highest N and B content in plants were observed from 180 kg N ha^{-1}. However, application of N had no significant effect on B content in plant.

1. Introduction

Tomato (*Lycopersicon esculentum* Mill.), belongs to the family *Solanaceae*, is one of the most popular and quality vegetables grown in Bangladesh. It is popular for its taste, nutritional status and various uses. Tomato is cultivated all over the country due to its adaptability to wide range of soil and climate. The soil and climate conditions of winter season of Bangladesh are congenial for tomato cultivation. Among the winter vegetable crops grown in Bangladesh, tomato ranks second in respect of production to potatoes and third in respect of area (BBS, 2004).

Recent statistics showed that tomato covered 42080 acres of land and the total production was approximately 131 thousand metric tons (BBS, 2006). Thus, the average yield is quite low as compared to that of other tomato producing countries such as India (15.14 t ha^{-1}), Japan (52.82 t ha^{-1}), USA (65.22 t ha^{-1}) and Egypt (34.0 t ha^{-1}) (FAO, 2002). The low yield of tomato in Bangladesh, however, is not an indication of the low yielding potentiality of this crop. This is mainly due to the use of low yielding variety and lack of improved cultural practices including insufficient supply of required nutrient elements, water and poor disease management (Ali et al., 1994). Out of these, proper fertilizer management practices may improve this situation greatly. Ali and Gupta (1978) reported that N, P, K and B fertilizers significantly increased the yield of tomato.

In Bangladesh, there is a great possibility of increasing tomato yield unit^{-1} area with the proper use of fertilizers. The profit from the use of commercial fertilizers has been so often demonstrated by experiment that there is no doubt about the necessity of using the right fertilizer and economic returns resulting from them. Tomato requires large quantity of readily available fertilizer nutrient (Gupta and Shukla, 1977). To get 1 ton fresh fruit, plants need to absorb on an average 2.5-3 kg N, 0.2-0.3 kg P and 3.0-3.5 kg K (Hedge, 1997).

Nitrogen has the largest effect on yield and quality of tomato. It also promotes vegetative growth, flower and fruit set of tomato. It significantly increases the growth and yield of tomato (Bose and Som, 1990). Nitrogen use efficiency depends on the soil N content and method of its application. In general, starter dose of nitrogen fertilizer is being practiced in Bangladesh for the cultivation of tomato. And the average fruit weight increased markedly when the nitrogen doses were increased. Optimum plant density and nitrogen level in soil are the prerequisites for obtaining higher yield of tomato.

Tomatos in general have a high boron requirement (Mengel and Kirkby, 1987). Fruit and seed set failure is a major reason for lower yield of rabi crops and this problem can be attributed to boron deficiency, as reported in tomato (Rahman et al., 1993; Islam et al., 1997). Boron deficiency may cause sterility i.e. less fruits plant^{-1} attributing lower yield (Islam and Anwar, 1994). Deficiency of B causes restriction of water absorption and carbohydrate metabolism which ultimate affects fruit and seed formation and thus reduces yield.

2. Materials and Methods

A field experiment was conducted at Sher-e-Bangla Agricultural University Farm, Dhaka, Bangladesh during the period from November 2006 to March 2007 using tomato variety Ruma developed by Bangladesh Agricultural Research Institute (BARI), Gazipur as a test crop. The fertilizer treatments used in this experiment was based on BARC Fertilizer Recommendation Guide, 2005. Four levels of nitrogen (N_0=0, N_1=60, N_2=120 and N_3=180 kg N ha^{-1}) and three levels of B (B_0=0, B_1=0.4 and B_2=0.6 kg B ha^{-1}) in a full factorial combinations were applied. The N, P, K, S Zn and B fertilizers were applied through urea, TSP, MP, Gypsum Zinc oxide and boric acid respectively. One third (1/3) of whole amount of Urea and full amount of MP, TSP, Gypsum, Zinc oxide and Boric acid were applied at the time of final land preparation. The remaining Urea was top dressed in two equal installments- at 20 days after transplanting (DAT) and 50 DAT, respectively. The normal cultural practices including gap filling, weeding, irrigation and insecticides spray were done as and when necessary.

Fruits were harvested at 5 days intervals during maturity to ripening stage. Ten plants from each plot were selected randomly for data collection. Each plot were harvested to record the yield and different parameters like, plant height, number of flower cluster plant^{-1}, number of flower cluster^{-1}, number of fruit cluster^{-1}, number of fruit plant^{-1}, weight of fruit plant^{-1} (kg) and weight of fruit plot^{-1} (kg) were statistically analyzed by using DMRT test.

Soil samples were digested with a mixture of 4% $HClO_4$ and conc. H_2SO_4 acids[5]. The digest was used to determine N (Kjeldhal method) content. Available boron (B) content in the soil samples was determined by the method described by Hunter (1984).

3. Results and Discussion

3.1. Plant height

Plant height of tomato was significantly increased by different levels of nitrogen (Table 1). The tallest plant (122.46 cm) was produced with 120 kg N ha^{-1} which was statistically similar with that of 180 kg N ha^{-1} followed by 60 kg N ha^{-1} and shortest plant (73.94 cm) was found in control treatment. It was observed that plant height increased gradually with the increment of nitrogen doses up to 120 kg N ha^{-1}. This might be due to higher availability of N and their uptake that progressively enhanced the vegetative growth of the plant. These are in agreement with those of Ali et al. (1990), Mondal and Gaffer (1983), Gaffer and Razzaque (1983), who have reported that different levels of nitrogen significantly increased plant height.

There was positive and significant difference among the different levels of boron in respect of plant height (Table 2). Plant height increased with increasing levels of boron up to higher level. The tallest plant (112.17 cm) was produced with 0.6 kg B ha^{-1} and shortest plant (95.89 cm) was found in control treatment.

The treatment combinations of nitrogen and boron had significant effect on plant height (Table 3). The tallest plant (142.2 cm) was found in $N_{120}B_{0.6}$ treatment. The shortest plant (58.53 cm) was observed in the control treatment. The second highest plant (133.2 cm) was observed in the treatment of $N_{180}B_{0.4}$. These results revealed that higher dose of boron and medium dose of nitrogen were influential nutrients for increasing the plant height.

3.2. Number of flower cluster plant^{-1}

Table 1: Effect of N on growth and yield attributes of tomato

Treatments	Plant height (cm)	Number of flower cluster plant^{-1}	Number of flower cluster^{-1}	Number of fruit cluster^{-1}	Number of fruit plant^{-1}
N_0	73.94^{c}	7.89^{b}	7.78^{b}	4.33^{b}	33.44^{c}
N_{60}	99.26^{b}	7.89^{b}	8.55^{b}	4.66^{b}	40.00^{bc}
N_{120}	122.46^{a}	9.67^{a}	10.44^{a}	5.76^{a}	52.44^{a}
N_{180}	120.87^{a}	8.76^{ab}	10.11^{a}	5.00^{a}	43.00^{b}
LSD (p=0.01)	6.04	1.53	1.04	1.05	8.65

Values bearing different superscripts differ significantly; same for non-significant

Table 2: Effect of B on growth and yield attributes of tomato					
Treatments	Plant height (cm)	Number of flower cluster plant^{-1}	Number of flower cluster^{-1}	Number of fruit cluster^{-1}	Number of fruit plant^{-1}
B_0	95.89^c	7.57^b	8.33^b	4.33^b	33.42^b
$B_{0.4}$	104.18^b	8.33^a	9.17^a	5.08^b	44.33^{ab}
$B_{0.6}$	112.17^a	9.75^a	10.17^a	5.33^a	48.92^a
LSD (p=0.01)	2.9	2.08	1.31	0.95	10.49

Table 3: Effect of B on growth and yield attributes of tomato					
Treatments	Plant height (cm)	Number of flower cluster plant^{-1}	Number of flower cluster^{-1}	Number of fruit cluster^{-1}	Number of fruit plant^{-1}
N_0B_0	58.53^h	6.667^d	7.33^f	4.00^b	28.67^e
$N_0B_{0.4}$	71.01^g	7.000^d	7.67^{ef}	4.667^b	34.67^{cde}
$N_0B_{0.6}$	92.29^f	10.00^b	8.33^{def}	4.333^b	37.00^{cde}
$N_{60}B_0$	99.06^{def}	7.000^d	8.00^{def}	4.333^b	35.67^{cde}
$N_{60}B_{0.4}$	94.83^{ef}	7.333^d	8.33^{def}	4.333^b	43.67^{bcd}
$N_{60}B_{0.6}$	103.3^{cde}	9.333^{bc}	9.33^{cde}	5.333^{ab}	40.67^{b-e}
$N_{120}B_0$	107.5^d	8.000^{cd}	8.33^{def}	4.333^b	37.0^{bcd}
$N_{120}B_{0.4}$	117.7^b	8.333^{cd}	10.33^{abc}	6.333^a	53.00^b
$N_{120}B_{0.6}$	142.2^a	12.67^a	11.67^a	6.333^a	67.33^a
$N_{180}B_0$	118.5^b	8.60^c	9.667^{bcd}	4.667^b	32.33^{de}
$N_{180}B_{0.4}$	133.2^b	10.67^b	10.33^{abc}	5.000^{ab}	46.0^{bc}
$N_{180}B_{0.6}$	110.9^b	7.000^d	11.33^{ab}	5.33^{ab}	50.67^{bc}
LSD (p=0.01)	8.506	1.552	1.729	1.245	11.570

The effect of N on number of flower cluster plant^{-1} was influenced significantly (Table 1). The highest number of flower cluster plant^{-1} (9.67) was recorded from the treatment of 120 kg N ha^{-1}, which was statistically similar with the treatment N_{180}. Plants in control plots (N_0) produced the lowest number of flower cluster plant^{-1} (7.89), which was statistically similar with 60 kg N ha^{-1}. It is evident from the results that the application of N up to 120 kg ha^{-1} increased number of flower cluster plant^{-1}. Further addition of N decreased the number of flower cluster plant^{-1}.

Boron fertilizer had significant effect on number of flower cluster plant^{-1} (Table 2). The highest number of flower cluster plant^{-1} (9.75) was recorded from the treatment of 0.6 kg B ha^{-1}, which was statistically identical with 0.4 kg B ha^{-1} and the minimum number of flower cluster plant^{-1} (7.57) was produced in control treatment. The number of flower cluster plant^{-1} increased with increasing level of B.

Interaction effect of N and B on the number of flower cluster plant^{-1} was found positive (Table 3). Treatment $N_{120}B_{0.6}$ produced the maximum number of flower cluster plant^{-1} (12.67), which was statistically different from all other treatments. On the contrary the lowest number of flower cluster plant^{-1} (6.667) was obtained from $N_0B_{0,}$ which was similar with $N_0B_{0.4}$, $N_{60}B_0$, $N_{60}B_{0.4}$, $N_{120}B_0$, $N_{120}B_{0.4}$ and $N_{180}B_{0.6}$. It was further observed that the second highest number of flower cluster plant^{-1} was found in treatment $N_{180}B_{0.}$4, which was identical with $N_0B_{0.6,}$

3.3. *Number of flower cluster^{-1}*

Number of flower cluster^{-1} progressively increased with increasing level of N up to a certain level (Table 1). The highest number of flower cluster^{-1} (10.44) was produced by 120 kg N ha^{-1}, which was statistically similar with the treatment of 180 kg N ha^{-1}. The lowest number of flower cluster^{-1} (7.78) was observed in control. It is evident from the results that the application of N up to 120 kg ha^{-1} increased number of flower cluster^{-1}. Further addition of N decreased the number of flower cluster^{-1}. Grela et al. (1988) reported that number of flowers was increased with increasing level of N up to 160 kg ha^{-1}.

Number of flower cluster^{-1} was significantly influenced by the application of B up to higher level (Table 2). The highest number of flower cluster^{-1} (10.17) was produced by 0.6 kg B ha^{-1}, which was statistically similar with 0.4 kg B ha^{-1}. The lowest number (8.33) was produced by control treatment. These results indicated that higher dose of boron favored the higher number of flower cluster^{-1}.

Interaction effect of N and B on the number of flower cluster^{-1} was significant (Table 3). The highest number of flower cluster^{-1} (11.67) was found in $N_{120}B_{0.6}$ treatment, which was not statistically different from $N_{120}B_{0.4}$, $N_{180}B_{0.4}$ and $N_{10}B_{0.6}$ treatment. The treatment combination N_0B_0 gave the lowest number of flower cluster^{-1} (7.33), which was statistically similar with the treatment combination $N_0B_{0.4,}$ $N_0B_{0.6,}$ $N_{60}B_0$, $N_{60}B_{0.4}$ and $N_{120}B_0$.

3.4. *Number of fruit cluster^{-1}*

There were significant differences in number of fruit cluster^{-1} under the different levels of N (Table 1). Number of fruit cluster^{-1} gradually increased with increasing levels of nitrogen up to a certain level. The highest number of fruit cluster^{-1} (5.76) was recorded with the application of 120 kg N ha^{-1}, which was statistically similar with 180 kg N ha^{-1}. The lowest number of fruit cluster^{-1} (4.33) was produced by control treatment. It was observed that the application of N up to 120 kg ha^{-1} increased number of fruit cluster^{-1}. Further addition of N decreased the number of fruit cluster^{-1}. This result was similar with Sharma (1995).

The effect of boron on the number of fruit cluster^{-1} was found positive and cluster^{-1} (Table 2). Number of fruit cluster^{-1} gradually increased with increasing level of B up to higher level. The highest number of fruit cluster^{-1} (5.33) was obtained with the application of 0.6 kg B ha^{-1}. The lowest number of fruit cluster^{-1} (4.33) was found in control treatment. Further it was observed that number of fruit cluster^{-1} was increased with increasing level of boron.

The effects of treatment combinations of nitrogen and boron on number of fruit cluster^{-1} were significant (Table 3). The highest fruit cluster^{-1} (6.33) was obtained in $N_{120}B_{0.6}$ treatment combination, which was same as the treatment combination $N_{120}B_{0.4}$. The lowest number of fruit cluster^{-1} (4.0) was produced by the control treatment, which was not statistically different from the treatment combination of $N_0B_{0.4,}$ $N_0B_{0.6,}$ $N_{60}B_{0.4,}$ $N_{60}B_{0,}$ $N_{120}B_0$ and $N_{180}B_0$.

3.5. *Number of fruits plant^{-1}*

The effect of different levels of N on the number of fruits plant^{-1} was significant (Table 1). Number of fruits plant^{-1} gradually increased with increasing levels of nitrogen up to N_{120} treatment. The highest number of fruit plant^{-1} (52.44) was obtained with the application of 120 kg N ha^{-1}, which was statistically different from other treatments. The lowest number of fruits plant^{-1} (33.44) was produced by control treatment. It was observed that the application of N up to 120 kg ha^{-1} increased number of fruits plant^{-1}. Further addition of N decreased the number of fruits plant^{-1}. Sharma (1995) found highest number of fruits plant^{-1} with 120 kg N ha^{-1}.

The effect of different levels of boron on the number of fruits plant^{-1} was found positive and significant (Table 2). Number of fruits plant^{-1} gradually increased with increasing level of B up to the highest level of the present trial. The highest number of fruits plant^{-1} (48.92) was obtained with the application of 0.6 kg B ha^{-1}, which was statistically similar with 0.4 kg B ha^{-1} application. The lowest number of fruits plant^{-1} (33.42) was found in control treatment. Further it was observed that number of fruit plant^{-1} was increased with increasing level of boron up to higher level.

The interaction effect of nitrogen and boron on number of fruit plant^{-1} was significant (Table 3). The highest fruit plant^{-1} (67.33) was found in 120 kg N ha^{-1} along with 0.6 kg B ha^{-1} application, which was highly significant with all other treatments. The lowest number of fruit plant^{-1} (28.67) was produced by the control treatment, which was not statistically different from the effect of treatment combinations of $N_0B_{0.4,}$ $N_0B_{0.6,}$ $N_{60}B_0$ and $N_{60}B_{0.6}$.

3.6. *Fruit weight plant^{-1}*

Fruit weight tomato^{-1} plant was significantly affected by different levels of N (Table 4). Fruit weight plant^{-1} increased with increasing level of N up to 120 kg ha^{-1}. Further addition of N above 120 kg ha^{-1} decreased fruit weight plant^{-1} of tomato. The highest fruit weight plant^{-1} (1.61 kg) was obtained in N_{120} treatment and the lowest fruit weight plant^{-1} (1.02 kg) was obtained in control treatment.

Fruit weight plant^{-1} was not significantly affected by different levels of B (Table 5). Application of B at the rate of 0.6 kg ha^{-1} produced higher fruit weight plant^{-1} (1.40 kg) and the lowest fruit weight plant^{-1} (1.16 kg) was produced with control treatment. Further it was observed that fruit weight plant^{-1} was increased with increasing level of boron up to higher level.

Different treatment combinations of nitrogen and boron had significant effect on fruit weight plant^{-1} (Table 6). The highest fruit weight plant^{-1} (1.95 t ha^{-1}) was recorded in $N_{120}B_{0.6}$ treatment, which was highly significant compared to other treatments. The lowest fruit weight plant^{-1} (0.89 t ha^{-1}) was found by the control treatment, which was statistically similar with $N_0B_{0.4}$ and $N_{180}B_0$.

3.7. *Fruit weight plot^{-1}*

Fruit weight plot^{-1} of tomato was significantly affected by different levels of nitrogen (Table 4). Plant receiving N at the rate of 120 kg ha^{-1} produced significantly higher weight of fruit

Table 4: Effect of N on yield and yield attributes of tomato

Treatments	Fruit weight plant^{-1} (kg)	Fruit weight plot^{-1} (kg)	Fruit yield (t ha^{-1})
N_0	1.018^b	12.20^b	30.82^d
N_{60}	1.110^b	13.75^b	35.74^c
N_{120}	1.600^a	19.14^a	48.33^a
N_{180}	1.411^a	16.94^{ab}	42.77^b
LSD (p=0.01)	0.2278	5.461	3.134

Table 5: Effect of B on yield and yield attributes of tomato			
Treatments	Fruit weight plant^{-1} (kg)	Fruit weight plot^{-1} (kg)	Fruit yield (t ha^{-1})
B_0	1.16	14.04	36.32^b
$B_{0.4}$	1.29	15.72	39.71^{ab}
$B_{0.6}$	1.40	16.75	42.22^a
LSD (p=0.05)	NS	NS	3.556

plot^{-1} (19.14 kg), which was statistically similar with 180 kg N ha^{-1}. The lowest weight of fruit plot^{-1} (12.20 kg) was recorded in control treatment.

Fruit plot^{-1} was not significantly affected by different levels of boron (Table 5). Absence of B (B_0) gave the lowest weight of fruit plot^{-1} (14.04 kg) and 0.6 kg B ha^{-1} gave the highest weight of fruit plot^{-1} (16.75 kg).

The combined effect of N and B on weight of fruit plot^{-1} of tomato was significant (Table 6). The treatment combination $N_{120}B_{0.6}$ gave the highest weight of fruit plot^{-1} (23.20 kg), which was statistically similar with $N_{60}B_{0.6}$. The lowest weight of fruit plot^{-1} (10.70 kg) was obtained from the N_0B_0 treatment combination, which was not statistically different from $N_0B_{0.4}$, $N_0B_{0.6}$, $N_{60}B_0$, $N_{120}B_0$, $N_{180}B_0$ and $N_{180}B_{0.4}$.

3.8. Fruit Yield (t ha^{-1})

Fruit yield was significantly increased with increasing levels of N up to a certain level (120 kg ha^{-1}). Application of 120 kg N ha^{-1} produced the highest fruit yield (48.33 t ha^{-1}) which was significantly different from other treatments of nitrogen (Table 6). The lowest fruit yield (30.82 t ha^{-1}) was obtained in control treatment. Pandey et al., (1996) reported that fruit yield increased as N rate increased up to 80 kg ha^{-1}. Banerjee et al., (1997) found highest fruit yield with 125 kg N ha^{-1}.

The effect of B on fruit yield was found positive and significant (Table 5). Fruit yield increased with increasing level of B up to the highest level of B (0.6 kg B ha^{-1}) application, but it was not significantly higher than that noted in $B_{0.4}$ treatment. Application of 0.6 kg B ha^{-1} produced the highest fruit yield (42.22 t ha^{-1}) which was statistically similar with 0.4 kg B ha^{-1} (39.71 t ha^{-1}). The minimum fruit yield (36.32 t ha^{-1}) was recorded in control treatment. Prasad et al., (1997) found highest fruit yield with the application of 2.5 kg borax ha^{-1}. Pregno and Arour (1992) observed highest tuber yield of potato with 2 kg B ha^{-1} application.

The combined effect of N and B on fruit yield was significantly influenced (Table 6). The highest fruit yield (58.59 t ha^{-1}) was recorded in $N_{120}B_{0.6}$ treatment, which was statistically different from other treatment combination. The second highest fruit yield (49.45 t ha^{-1}) was found in $N_{60}B_{0.}$6 treatment combination, which was also significantly different from other treatments. The lowest fruit yield (27.02 t ha^{-1}) was noted in control treatment where no N and B was added. The treatment combination $N_0B_{0.6}$, $N_{60}B_0$ and $N_{180}B_0$ were statistically similar in respect of fruit yield of tomato. Sarker et al., (1996) found maximum tuber yield of potato with combined application of N @ 150 kg ha^{-1} and B @ 2 kg ha^{-1}.

Table 6: Interaction effect of N and B on yield and yield attributes of tomato			
Treatments	Fruit weight plant^{-1} (kg)	Fruit weight plot^{-1} (kg)	Fruit yield (t ha^{-1})
N_0B_0	0.89^g	10.70^e	27.02^h
$N_0B_{0.4}$	1.02^{fg}	12.19^{de}	30.79^g
$N_0B_{0.6}$	1.15^{ef}	13.72^{cde}	34.59^f
$N_{60}B_0$	1.46^{bc}	13.83^{cde}	34.64^f
$N_{60}B_{0.4}$	1.38^{cd}	17.60^{bc}	44.45^c
$N_{60}B_{0.6}$	1.36^{cd}	19.58^{ab}	49.45^b
$N_{120}B_0$	1.24^{de}	14.97^{b-e}	41.07^d
$N_{120}B_{0.4}$	1.63^b	16.62^{bcd}	41.96^{cd}
$N_{120}B_{0.6}$	1.95^a	23.20^a	58.59^a
$N_{180}B_0$	1.03^{efg}	12.40^{cde}	33.72^f
$N_{180}B_{0.4}$	1.14^{ef}	15.02^{b-e}	36.89^e
$N_{180}B_{0.6}$	1.15^{ef}	16.27^{bcd}	37.92^e
LSD (p=0.05)	0.193	4.628	2.656

4. Conclusion

From the present study, it was clear that both nitrogen and boron fertilization at different levels individually and in combination had created a significant impact on growth and yield of tomato plants and fruits. 120 kg N ha^{-1} and 0.6 kg B ha^{-1} showed the best performance on plant height, number of flower cluster plant^{-1}, number of flower cluster^{-1}, number of fruit cluster^{-1}, number of fruit plant^{-1}, fruit weight plant^{-1} (kg), fruit weight plot^{-1} (kg) and fruit yield (t ha^{-1}). However, from statistical point of view among twelve treatment combinations, 120 kg N ha^{-1} along with 0.6 kg B ha^{-1} was the best for maximum yield of tomato.

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