

EFFECT OF BORON ON GROWTH AND YIELD OF CAULIFLOWER (*BRASSICA OLERACEA* VAR. *BOTRYTIS*)

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Abstract: Cauliflower (*Brassica oleracea* L. var. *botrytis*) is one of the most important winter season vegetable crops in India which belongs to the family Brassicaceae. It is herbaceous annual vegetable grown for its white tender 'curd' and biennial for seed production. The crops have spread all over Europe from Mediterranean region. In India, area under cauliflower is 248.3 thousand hectares with production potential of 4717.8 thousand metric tonnes and productivity level of 20-40 tonnes ha (NHB, 2008).

Keywords: Cauliflower, Brassicaceae, Crop

INTRODUCTION

Cauliflower is heavy feeder of nutrients and it requires large amount of macronutrient as well as micronutrient for better development and quality of curd. The application of optimum dose of nitrogenous, phosphorus and potassic fertilizers along with some micronutrients viz. boron are essential for higher production. Micronutrients are important for the growth and development with major plant nutrients. Crops grown on micronutrient deficient soil can exhibit similar reduction in plant growth and yield as macro nutrients. Cauliflower has a high micro nutrient requirement particularly for boron. The deficiency of B in crops is more wide spread than that of any other micronutrient in many region of the world. Under deficiency conditions B application results in increased crop yields as well quality of many vegetable crops. Most of the vegetables and legumes have a higher requirement of B than to other crops. Generally the rates of applied B to correct B deficiency vary from 0.5 to 3.0 kg ha.

Boron is very important role for growth and development of cauliflower. Boron is involved in cell division and hence helps in root elongation and shoot growth. It is associated with several physiological processes such as calcium metabolism, auxin synthesis, sugar metabolism translocation of N, P and protein synthesis.

MATERIALS AND METHODS

The present field experiment during Rabi season of year 2007-08 followed by laboratory analysis of the

plant and soil in the Department of Agricultural Chemistry and Soil Science Udai Pratap Autonomous College, Varanasi, Uttar Pradesh. The experiment was conducted under Randomized Block Design (R.B.D.) including four treatments T_0 (control), T_1 (10), T_2 (15), T_3 (25) ratio and three replications with a total number of twelve plots.

RESULTS AND DISCUSSION

An experiment was conducted to explain the response of boron on growth, yield and quality of cauliflower. The experiment has been carried out during rabi season of year 2007-2008. The observations were recorded in relation to plant growth and yield attributes, critically analysed and discussed in this chapter under following headings.

Effect of treatments on plant height

It is evident from the plant height at 15 days after transplanting varied from 10-13. The foliar application of boron increased the plant height as compared to control. The plant height at 30 DAT varied from 15 to 23 cm. The maximum plant height was recorded with T_3 (23), followed by T_2 (21), T_1 (19) and T_0 (15). The plant height at 45 DAT varied from 30-38. Application of boron increased the plant height at this stage also as compared to control. Maximum plant height was recorded with T_3 (38), followed by T_1 (35), T_2 (34) and minimum was with T_0 (30). However, the effect was statistically non significant. The plant height at the time of harvesting

varied from 45 to 53 cm. Application of different levels of boron increased the plant height as compared to control. However, the effect was statistically non significant. Maximum plant height obtained with T_3 (53) followed by T_2 (52) T_1 (48) and T_0 (45). Ghosh and Hasan (1997) also observed similar results. The application of borex @ 15 kg ha⁻¹ in cauliflower significantly influenced the plant height and number of leaves per plant.

Effect of treatments on number of leaves

The data pertaining to number of leaves per plant as influenced by various treatments have been presented the application of boron increased the number of leaves as compared to control. The maximum numbers of leaves were recorded with the treatment T_3 (22) and minimum was found in T_0 (18). The overall treatments effect was found to be significant. Application of B proved to be beneficial effect on number of leaves per plant. The number of leaves at 15 days varied from 4-6. Foliar application of boron no significantly increased the number of leaves as compared to control. The number of leaves at 30 days after transplanting ranged from 8 to 13. Foliar application of boron significantly increased the number of leaves. Maximum numbers of leaves were counted with treatment T_3 and minimum with T_0 treatment. The number of leaves at 45 days after transplanting ranged between 13 and 19. Foliar application of boron none increased the number of leaves up to T_3 as compared to control but effect was statistically non significant. The finding of Taker *et al.* (1991) also proved that boron application was beneficial in increasing the number of leaves.

Effect of treatments on fresh weight of leaves

It is evident from the table - 5 that fresh weight of leaves varied from 303-327g. Application of boron increased the fresh weight as compared to control. However, the effect was statistically non significant. Maximum fresh weight of leaves was obtained with T_1 followed by T_2 , T_3 and T_0 . Singh and Rajput (1974) also reported the beneficial effect of boron on fresh weight of leaves.

Effect of treatments on stem length

Data related to the stem length of cauliflower the maximum stem length was observed in case of

treatment supplying @ 25 kg ha⁻¹ of boron ha⁻¹ and minimum was recorded in case of control. Stem length ranged between 16.6 and 19.0 cm. The overall effect of different treatments was found to be non significant during the course of investigation.

Effect of treatments on stem weight

Data recorded on the stem weight of cauliflower have been presented values that application of different levels of boron significantly increased the stem weight of cauliflower when compared with control. T_3 recorded highest weight (138.0g) and was found significantly superior over other treatments. Minimum weight was recorded with control and varied from 108.3 to 138.0g. Saha *et al.*, (1991) also reported similar results with application of 60 kg of P_2O_5 and 25 kg boron ha⁻¹.

Effect of treatments on curd diameter

It is evident from that curd diameter varied from 11 to 15 cm. Application of boron levels increased the curd diameter as compared to control and the effect was statistically significant. Maximum curd diameter of cauliflower was obtained with T_3 followed by the T_2 , T_1 and T_0 .

Effect of treatments on plant weight

It is evident from that whole weight of cauliflower plant varied from 765-883g. Application of boron in different levels significantly increased the weight as compared to control. The maximum fresh weight of plant was obtained with T_3 followed by T_2 , T_1 and T_0 . T_3 was significantly superior over all the treatments. Bose *et al.*, 2000 also reported that the application of boron @ 0.03% increased the weight of plant.

Effect of treatments on curd yield

It is evident from that curd yield of cauliflower varied from 331.6-367.1 q ha⁻¹. Application of boron levels increased the yield as compared to control. The effect was statistically significant. Maximum curd yield was obtained with T_3 followed by T_2 ; T_1 and T_0 . The results obtained from the present study revealed that application of boron in the form of foliar spray significantly affected the growth and yield of cauliflower. Results indicated that growth

attributed like plant height, number of leaves, number of roots, stem length, and stem weight increased significantly due to application of boron when compared with control. The favorable effects of B might be attributed to its involvement in cell division and cell expansion. Boron plays an essential role in the development of growth of new cells in the plant meristem. Therefore increased cell division and cell elongation led to better crop growth. Similar to growth attributes yield attributes' such as curd diameter curd weight and yield significantly increased by the foliar application of boron. Actually boron is also required for flowering and fruit development and are restricted by a shortage of this nutrient (Tisdale and Nelson 1991). Moreover, it is associated with of the reproductive phase and carbohydrate metabolism, particularly is the translocation of photosynthesize increasing the curd weight and consequently yield is increased. Prasad and Singh (1998) and Thakur *et al.*, (1994) also reported the similar results in their study with cauliflower.

SUMMARY AND CONCLUSION

On the basis of present investigation it can be concluded that foliar application of boron @ 25 kg ha⁻¹ with recommended dose of N:P:K produced maximum yield.

Table 1. Effect of different levels of boron on various traits in Cauliflower

Treatment	No of outer leaf	Stem wt. (g)	No of root	Stem length (cm)	Curd length (cm)	Curd diameter (cm)	Total plant wt. (g)	Plant height (cm)	Yield/plot (Kg)
R ₁ T ₀	17	112	32	17	95	10	810	45	19.45
R ₁ T ₁	20	123	35	19	110	12	920	49	22.80
R ₁ T ₂	18	134	28	21	120	11	900	48	21.60
R ₁ T ₃	22	117	29	18	109	10	890	47	21.10
R ₂ T ₀	18	119	26	19	98	10	875	51	21.23
R ₂ T ₁	19	126	27	15	140	9	750	43	18.00
R ₂ T ₂	22	130	31	19	120	11	980	52	23.52
R ₂ T ₃	20	138	34	20	150	10	950	50	22.80
R ₃ T ₀	19	135	33	22	110	12	790	51	18.96
R ₃ T ₁	22	132	36	20	125	9	850	50	25.50
R ₃ T ₂	20	127	24	15	130	10	825	45	19.80
R ₃ T ₃	21	126	29	19	140	11	810	53	19.44
SEm_±	2.84	3.30	2.39	3.19	2.06	3.07	2.53	2.34	3.52
CD at 5% level	5.45	6.86	4.13	6.55	5.18	5.19	4.52	4.56	6.52

varieties

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