

Effect of Boron and Zinc on growth and yield attributes in early cauliflower (*Brassica oleracea* var. *botrytis* L.)

**ABSTRACT**

The present experiment was carried out ~~with-in~~ cauliflower ~~with a view~~ to study the effect of ~~Boron-boron~~ and zinc on growth and yield in the early cauliflower having ~~combinations~~ of four levels of ~~Boron as:~~ 0, 1, 2, 3 kg ha<sup>-1</sup> of boron and four levels of ~~Zn as:~~ 0, 2.5, 5.0, 7.5 kg ha<sup>-1</sup> of zinc ~~constituting sixteen treatments were applied~~ in a ~~Factorial factorial~~ ~~Randomized-randomized Block-block Design-design~~ with three replications during the year 2016 and 2017 respectively. The results of the experiment with applied boron and zinc had significant ~~effect on~~ growth and yield ~~in-of~~ cauliflower. The highest curd depth (8.69 cm) and curd equatorial diameter (16.45 cm) was found with applied boron (2 kg ha<sup>-1</sup>) and zinc (2 kg ha<sup>-1</sup>+ 2.5 kg ha<sup>-1</sup>) respectively. While as, maximum net curd weight (368g) and marketable curd weight (485g) was found with sprayed boron and zinc (1 kg ha<sup>-1</sup>+ 2.5 kg ha<sup>-1</sup>) respectively. ~~Another characters like~~, Maximum harvest index (63.58 %) and ~~calculated~~ yield (123.33 q ha<sup>-1</sup>) was found when applied with boron and zinc (1 kg ha<sup>-1</sup>+ 5 kg ha<sup>-1</sup>) and (0 kg ha<sup>-1</sup>+ 5 kg ha<sup>-1</sup>) respectively. ~~The other important traits like maximum~~ ~~Maximum~~ curd compactness (34.34) and dry matter compactness (14.48) were found with application of boron (1 kg ha<sup>-1</sup>) and zinc (2 kg ha<sup>-1</sup>+5 kg ha<sup>-1</sup>) respectively. ~~Hence, on the basis of overall~~ Overall findings of the present investigation ~~stated indicated~~ that ~~with the increase ing in~~ concentration of micronutrients like boron and zinc ~~which increases the vegetative growth as well as and~~ reproductive stage of cauliflower ~~increases~~ respectively.

Formatted: Superscript

**Keywords:** Boron, cauliflower, yield, ~~growth quality~~, zinc.

**Introduction**

Cauliflower is one of the important cool season vegetable crop grown for its flavour, nutrition, delicious taste and more sensitive to soil and climatic requirements (Thakur *et al.* 2019). ~~which is botanically known as Brassica oleracea var. botrytis L. having chromosome number 2n=18 comes under the family cruciferae.~~

Among many factors responsible for low productivity of cauliflower, inadequate and imbalanced nutrition occupy the top position causing nutrient deficiency, particularly of boron, which are more responsible for deteriorated soil health and yield stagnation (Yadav *et al.* 2015). ~~Hence, soil~~ Soil application of micronutrients may not ~~be~~ readily available to the plants. The foliar sprays could be beneficial to cover up the ~~related~~ deficiencies of these nutrients. Every micronutrient has specific role to play in the plant and its presence in optimum concentration is necessary for the plant to complete its life cycle, which ends with maturity and harvesting of the

economic produce. Over the years, with intensive cultivation, Indian agriculture has moved from an era of single element deficiency to more complex multiple nutrient deficiencies [\(add reference\)](#). This is true especially in the case of micronutrients. The widespread deficiency of micronutrients has increased with the introduction of high yielding varieties of crops which ~~was known to~~ remove higher amount of nutrients and [the](#) adoption of modern agricultural technology such as multiple cropping system, irrigation, intensive use of high analysis fertilizers with concomitant decrease in recycling of crop residues and use of animal manures. Full benefits of applied nitrogen, phosphorus and potassium fertilizer can only be obtained provided the availability of micronutrients is adequately ensured [\(add reference\)](#). Among the micronutrients, occurrence of zinc (Zn) deficiency is quite common and widespread, followed by boron (B) in the soils of northem Karnataka [\(Pulakeshi et al. 2012; Manojkumar, 2011, Pujari, 2012 and Karajanagi, 2013\)](#) ~~these are not found in references~~.

Formatted: Font color: Red

Formatted: Font color: Red

Zinc is an indispensable micronutrient for proper plant growth and development. It plays an important role in different plant metabolic processes such as enzyme activity, development of cell wall, respiration, photosynthesis, chlorophyll formation and other biochemical functions [\(add reference\)](#). It is essential component of many enzymes such as carbonic anhydrase, alcohol dehydrogenase, superoxide dismutase and RNA polymerase etc and also involved in nitrogen metabolism. The deficiency of Zn in plants disrupts these processes resulting in reduced plant growth, yield and quality.

The magnitude of Zn deficiency varies widely with the soil types, while the rate of application varies with crops, soil type and climatic conditions. Zinc deficiency occurs commonly in coarse textured, calcareous or alkaline pH, low organic carbon and highly eroded soils. Zinc deficiency in Indian soils occurred in 46 per cent soils [\(Murthy et al., 1999 not found in references\)](#). In Zn deficient plants, middle leaves show development of golden yellow or orange colour in the interveinal portion. The young leaves remain small in size and often termed as “little leaf” or “rosetting” [\(reference\)](#).

Formatted: Font color: Red

Boron is required for the translocation of sugars, root extension and growth of meristematic tissues, the pyrimidine biosynthetic pathway and the ATPase; it is also involved in translocation of sugars, synthesis of amino acid, protein and carbohydrate metabolism. Further, it plays a vital role in pollen enlargement, fertilization and flowering processes of plants. Boron

deficiency affects development of terminal bud of shoots and growing root tips in plants, since it is immobile in plants. Therefore its deficiency, adversely affects the yield and quality of the seeds and fruits. The effects on the yield can occur despite no deficiency symptoms are evident on the foliage. This physiological phenomenon is referred to as 'hidden hunger' which is the reason for B deficiency being an unsuspected enemy of crop production for a long time.

Boron deficiency is most widespread next to Zn causing heavy yield reduction in horticultural crops ([Singh, 1999-not found in references](#)). Incidence of B deficiency is very high in the States of West Bengal, Bihar, Uttar Pradesh, Madhya Pradesh and Tamil Nadu. ~~By and large, The~~ B deficiency is critical for crop productivity in highly calcareous, sandy, leached, lime applied acidic and laterite soils. According to All India Coordinated Research Project on Micronutrients (ICAR), B deficiency in Indian soils ranged from 0 to 68 per cent with a mean of 33 per cent ([Shrotriya and Phillips, 2002-not found in references](#)).

Formatted: Font color: Red

Formatted: Font color: Red

Boron deficiency occurs in wide array of cruciferous crops such as cauliflower (brown heart), beetroot (heart rot), turnip (brown heart), and also groundnut (hollow heart). Cole crops including cauliflower require higher quantities of B for proper growth and development ([Gupta, 1979- not found in references](#)). In cauliflower, boron deficiency first appears as water-soaked patches on the developing head of cauliflower which soon turn brown and may rot. The leaves curl down and become brittle. Blistering may occur on the petiole and along the midrib. The pith stem below the curd breaks down and develops the cracks which later on form an elongated cavity. [\(add brief objectives of the experiment\)](#)

Formatted: Font color: Red

### Material & Methods

Field experiment was ~~performed-conducted~~ to test the impact of zinc and boron on cauliflower production, yield and quality (*Brassica oleraceae* var. botrytis L.) in 2016 and 2017 at Noorsarai Horticulture College, i.e. in the southern part of Bihar. The study site's soil was coarse sandy loam with an estimated 903.5 mm annual rainfall having 4°C-44°C temperature spectrum and 30 to 95% relative humidity. The experiment was performed with three replications in a factorial ~~Randomized-randomized Block-block configuration~~ design as per treatment details in Table 1. Seedlings were transplanted into the main field twenty-five days ago, at spacing of approximately 60 cm [\(what is the row to row and plant to plant spacing?\)](#). For three replications,

the trial consisted of ~~twelve~~ ~~sixteen~~ treatments; each distributed arbitrarily according to the random number table process.

**Table 1. Description of the treatments ~~are given below~~**

S.No.	Treatment	Details	S.No.	Treatment	Details
1.	<del>T<sub>1</sub> - B<sub>0</sub> Zn<sub>0</sub></del>	0 kg ha <sup>-1</sup> + 0 kg ha <sup>-1</sup>	9.	<del>T<sub>9</sub> - B<sub>2</sub> Zn<sub>0</sub></del>	2.0 kg ha <sup>-1</sup> + 0 kg ha <sup>-1</sup>
2.	<del>T<sub>2</sub> - B<sub>0</sub> Zn<sub>1</sub></del>	0 kg ha <sup>-1</sup> + 2.5 kg ha <sup>-1</sup>	10.	<del>T<sub>10</sub> - B<sub>2</sub> Zn<sub>1</sub></del>	2.0 kg ha <sup>-1</sup> + 2.5 kg ha <sup>-1</sup>
3.	<del>T<sub>3</sub> - B<sub>0</sub> Zn<sub>2</sub></del>	0 kg ha <sup>-1</sup> + 5.0 kg ha <sup>-1</sup>	11.	<del>T<sub>11</sub> - B<sub>2</sub> Zn<sub>2</sub></del>	2.0 kg ha <sup>-1</sup> + 5.0 kg ha <sup>-1</sup>
4.	<del>T<sub>4</sub> - B<sub>0</sub> Zn<sub>3</sub></del>	0 kg ha <sup>-1</sup> + 7.5 kg ha <sup>-1</sup>	12.	<del>T<sub>12</sub> - B<sub>2</sub> Zn<sub>3</sub></del>	2.0 kg ha <sup>-1</sup> + 7.5 kg ha <sup>-1</sup>
5.	<del>T<sub>5</sub> - B<sub>1</sub> Zn<sub>0</sub></del>	1.0 kg ha <sup>-1</sup> + 0 kg ha <sup>-1</sup>	13.	<del>T<sub>13</sub> - B<sub>3</sub> Zn<sub>0</sub></del>	3.0 kg ha <sup>-1</sup> + 0 kg ha <sup>-1</sup>
6.	<del>T<sub>6</sub> - B<sub>1</sub> Zn<sub>1</sub></del>	1.0 kg ha <sup>-1</sup> + 2.5 kg ha <sup>-1</sup>	14.	<del>T<sub>14</sub> - B<sub>3</sub> Zn<sub>1</sub></del>	3.0 kg ha <sup>-1</sup> + 2.5 kg ha <sup>-1</sup>
7.	<del>T<sub>7</sub> - B<sub>1</sub> Zn<sub>2</sub></del>	1.0 kg ha <sup>-1</sup> + 5.0 kg ha <sup>-1</sup>	15.	<del>T<sub>15</sub> - B<sub>3</sub> Zn<sub>2</sub></del>	3.0 kg ha <sup>-1</sup> + 5.0 kg ha <sup>-1</sup>
8.	<del>T<sub>8</sub> - B<sub>1</sub> Zn<sub>3</sub></del>	1.0 kg ha <sup>-1</sup> + 7.5 kg ha <sup>-1</sup>	16.	<del>T<sub>16</sub> - B<sub>3</sub> Zn<sub>3</sub></del>	3.0 kg ha <sup>-1</sup> + 7.5 kg ha <sup>-1</sup>

~~Explain boron and zinc treatments as per their dose in subscript like B<sub>0</sub>Zn<sub>5</sub> instead of B<sub>0</sub>Zn<sub>1</sub>~~

#### Soil Sampling and Laboratory Analysis

Samples of composite soil were taken before the cauliflower seedlings were transplanted from each block. The samples were air-dried and processed using 2 mm sieve. Testing was performed ~~with~~ ~~for~~ nitrogen, phosphorus, potassium, boron, and zinc. Table 2 described the chemical properties of the ~~experimental~~ ~~soil in experimental map~~. General application of manures and fertilizers, distributed according to soil properties i.e. urea @ 260kg / ha, single super phosphate @ 178kg / ha and ~~murite of Potash~~ ~~potash Murate~~ @ 133kg / ha.

**Table 2: Chemical properties of the soil**

Soil parameter	Values	Status
Soil pH (1 : 2.5)	7.6	
EC (dS/m)	0.10 <del>(dS/m)</del>	
Organic carbon (%)	0.61 %	Medium
Available N (kg/ha)	181.88 <del>Kg</del>	Low
Available P <sub>2</sub> O <sub>5</sub> (kg/ha)	34.93 <del>kg/ha</del>	Medium
Available K (kg/ha)	138 <del>kg/ha</del>	Medium
Available S (ppm)	18.2 <del>ppm</del>	Medium
Boron (ppm)	0.60 <del>ppm</del>	Medium
Zinc (ppm)	1.85 <del>ppm</del>	Medium

Each bed's upper layer of 5 cm was combined with equivalent quantities of well-rotten ~~ed~~ ~~farm yard manure~~ (FYM) and sieved dirt. ~~Seeds~~ ~~seeds~~ were ~~sewn~~ ~~sown~~ 10 cm apart in

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font color: Red

Formatted: ... [1]

Formatted: Font color: Red

Formatted: ... [2]

Formatted: Font color: Red

Formatted: ... [3]

Formatted: Font color: Red

Formatted: ... [4]

Formatted: Font color: Red

Formatted: ... [5]

Formatted: Subscript

Formatted: Subscript

sheets. Watering was performed by rose may daily. Weeding periodically rendered the raised beds tidy. Using two sprays of pesticides (which pesticide for what?) when appropriate held the seedlings safe. The data were taken from randomly selected five plants on various characteristics from each plot (what is the plot size?): plant height (~~cm~~), stem length (~~cm~~), amount of leaves per field (what does it mean?), leaf area, Days-days to 50 percent curd Formationformation, Curd curd depth (Polar-polar diameter)(cm), Curd-curd compactness, gross curd weight (kg / field), net curd weight (g / plant), Marketable-marketable curd weight ( g), Marketable-marketable curd yield (q / ha) and Dry-dry matter ~~The data were taken from randomly selected five plants from each plot on various characters viz., plant height (cm), stem length (cm), number of leaves per plant, leaf area, Days to 50 % curd Formation, Curd depth (Polar diameter)(cm), Curd compactness, gross weight of curd (kg/plant), net weight of curd (g/plant),Marketable curd weight (g),Marketable curd yield (q/ha), and Dry matter content of curd (%) and Harvest harvest index (%)~~.

## Results

### Growth parameters

Significant variation was observed for all the growth parameters except for stem length and days to 50% curd initiation. The plant height showed-was significantly influenced at different levels of boron and zinc application. ~~It was observed by random selection of five plants and presented in~~ (Table 3). The significantly superior plant height was observed in treatment T<sub>7</sub>(68.25) which was statistically similar to T<sub>6</sub> (65.98) and T<sub>8</sub> (64.76). There was remarkable variation found in leaves per plant at harvest. The number of leaves per plant was-were observed highest in treatment T<sub>11</sub>, T<sub>6</sub>, T<sub>7</sub> and T<sub>8</sub> (21) which was significantly at par with all other treatment whereas control treatment represented the minimum number of leaves per plant (16). It is evident from the table that leaf area showed considerable amount of variation. The maximum leaf area was observed in treatment T<sub>10</sub> (697.11) followed by T<sub>3</sub> (696.99) and T<sub>12</sub> (657.13) (what is significance?)-

### Yield components

A significant effect of micronutrient application was observed on yield components. The curd depth responded significantly to different micronutrients treatments (Table 1) and it increases as micronutrient was applied at varying rates. Maximum curd depth was recorded in treatment T<sub>10</sub>(8.69) and was statistically at par with treatment T<sub>12</sub>(8.57), ~~-)and~~ T<sub>6</sub> (8.49). Among different

sources of micronutrient, treatment T<sub>10</sub> proved its superiority over others as the maximum ~~Curd~~ curd equatorial diameter (16.45). The curd diameter was statistically at par with treatment T<sub>9</sub> (16.36) and T<sub>11</sub> (16.12). Net curd weight, varied significantly due to the application of different doses of boron and zinc treatments. Maximum net curd weight was observed highest in treatment T<sub>6</sub>(368) followed by treatment T<sub>7</sub>(358) and T<sub>15</sub>(350). On the other hand, control treatment-T<sub>1</sub> (234). A significant effect of micronutrient treatments on marketable curd weight was observed. It varied from 345g to 485g. Maximum marketable curd weight was observed highest in treatment T<sub>6</sub> (485). Marketable curd weight was statistically at par with the treatments T<sub>15</sub>, T<sub>3</sub> and T<sub>4</sub>. Lowest marketable curd weight was observed in treatments T<sub>1</sub>.

Formatted: Font color: Red

(Revise as per statistical analysis)

Formatted: Not Superscript/ Subscript

Formatted: Not Superscript/ Subscript

### **Total dry matter and curd yield**

Formatted: Font color: Red

Significant amount of variation was observed for total dry matter and curd yield due to different doses of boron and zinc. Harvest index was observed maximum in treatment T<sub>7</sub> (63.58) which was statistically at par with the treatments T<sub>13</sub> and T<sub>5</sub>. Calculated yield was observed maximum in treatment T<sub>3</sub>(123.33) and minimum in treatment T<sub>1</sub>(86.37). Curd compactness varied from 29.36 to 34.34. Treatment T<sub>5</sub> (34.34) observed maximum curd compactness which was significantly at par with treatment T<sub>10</sub> (32.77) and T<sub>14</sub> (32.68). Dry Matter content in cauliflower varied significantly. It varied from 12.07 to 14.48 and was observed highest in treatment T<sub>11</sub> (14.48) whereas rest of the treatment was significantly at par.

(Revise with statistical significance)

Formatted: Font color: Red

### **Discussions**

It was found that zinc and boron combinations play an active role in cauliflower vegetative growth. Because of their involvement in physiological processes and cellular functions inside plants, the beneficial impact of micronutrients on growth parameters and they also played an important role in enhancing plant growth via the biosynthesis of endogenous hormones responsible for promoting plant development (rewrite the sentence in meaningful way). With the combined application of boron and zinc, the number of leaves per plant and leaf area increased significantly in growth, the parameters plant height. Applying foliar plant nutrients, especially boron and zinc, which play a major role in vigorous vegetative growth, may

Formatted: Font color: Red

Formatted: Font color: Red

have beneficial effects by imparting deep green color to the leaf. These nutrients play an essential role in the formation of chlorophyll which has influenced cell division, meristematic tissue activity, cell expansion, and cell wall formation( [reference?](#)). It has stimulating and catalytic effects on metabolic processes which ultimately affect cauliflower's growth traits. These [results](#) are in line with the Chowdhury and Sikder [investigation](#) (2017) [investigation study](#) that micronutrients play vital roles in plant growth and production, which ultimately enhance flower yield and quality ([Alloway and Brai \(correct it\)](#) 2008 & Khosa et al 2011).

[Result indicates that foliar application of various levels of zinc and boron varies considerably. Owing to the application of micronutrient the curd diameter and curd weight increase significantly. It stimulated chlorophyll synthesis, increased physiological activities such as those that photosynthesize from leaves to curd for translocation of plant assimilates, and their deposition in curd. Improvement in photosynthesis and other metabolic activity resulted in an increase in the various plant metabolites responsible for cell division and elongation. The higher curd yield may be due to the synergetic effect between boron and zinc applied to the plant. This can act as energy source for auxin synthesis. Chaudhari et al \(2017\) and Hasan et al 2018 have documented an improved photosynthetic reaction in the presence of zinc and boron.](#)

[Absolute dry matter and curd compactness of rise coupled with zinc and boron production at various stages. The primitive influence of B and Zn on the transfer of further carbohydrates, proteins along with their function in improving their translocation from the synthesis site to the storage organs.it helps to improve development by using adequate nitrogen and phosphorus amounts. The results above were in consonance with Chaudhari et al 2017 and Rene et al 2017. \(Revise red paragraphs with supporting references\)](#)

## Conclusion

[There was significantly higher gross plant weight \(kg\), ~~Curd~~ curd diameter \(cm\), curd depth \(cm\), ~~Net~~ net curd weight \(kg\) among different rates of B and Zn use. Treatment T<sub>15</sub> — B<sub>3</sub>Zn<sub>2</sub> — \(3.0 kg / ha + 5.0 kg / ha\) found a maximum yield of 152.22 q / ha for T<sub>11</sub> — B<sub>2</sub> Zn<sub>2</sub>- \(2.0 kg / ha + 5.0 kg / ha\) of 148.88 q / ha for calculated yield \(q / ha\). It can be concluded from the "Impact of application of boron and zinc supplements on growth, yielding characteristics and cauliflower quality" investigation. \(Rewrite as per results\)](#)

Formatted: Font color: Red

Formatted: Font: Bold, Font color: Red

Formatted: Font: Bold

Formatted: Font color: Red

Formatted: Font color: Red

Formatted: Font color: Red

Formatted: Font color: Red

## Reference

Thakur D. Kumar P and Shukla A K.(2019).Impact of Foliar Feeding of Boron Supplements on Growth, Yield Contributing Characters and Quality of Cauliflower.Biological Forum – An International Journal.11 (2): 77-82.

Alloway.and Brain, J. (2008)).An Introduction- Micronutrient and crop production, Micro-nutrient deficiency in global crop production. Springer Netherlands.1-39.

Khosa, S.S., Younis, A., Rayit, A., Yasmeen, S. and Riaz, A. (2011).Effect of Foliar Application of Macro and Micro Nutrients on Growth and Flowering of Gerbera jamesoniiL. Amer. Euras. J. Agric.Environ. Sci. 11: 736-757.

Chowdhury, R.S. and Sikder.S.(2017).Study the Manifestation of Growth and Yield Attributes of Broccoli through Application of Boron, Molybdenum, Zinc and their Combination Treatments in Teraiaagro-Ecological Region of West Bengal.*Current Agriculture Research Journal*. 5(3):1-4.

Hassan, M.R.Julie, S.N. Akber, A. Kundu, P.K. and Zaman,M.S.(2018).Influence of micronutrient (boron) for the growth and yield of cauliflower.*Journal of Bioscience and Agriculture Research*.18(1):1464-1469. (Not cited in text)

Devi M, Bhanishana Devi RK, Ranjan Das. (2012).Enhancement of physiological efficiency of cabbage (*Brassica oleracea* L. var. Capitata) using foliar nutrition of boron. *Crop Res*. 43(1-3):76-80. (Not cited in text)

Chaudhari,V.J. Patel, N.K.Tandel,B.M. and Vibhuti C.(2017).Effect of foliar spray of micronutrients on growth and yield of cauliflower (*Brassica oleracea* L. var. Botrytis). *International Journal of Chemical Studies*. 5(6): 1133-1135.

René P. J. J. Rietra, Marius Heinen, Chistian O. Dimkpa&Prem S. Bindraban (2017) Effects of Nutrient Antagonism and Synergism on Yield and Fertilizer Use Efficiency, *Communications in Soil Science and Plant Analysis*, 48:16, 1895-1920, DOI: 10.1080/00103624.2017.1407429.

Yadav, H. K.Dokra P and Yadav B.(2015).Effect of foliar application of n and zn on growth and yield of cauliflower (*Brassica oleracea* var. Botrytis l.) Cv. Snowball. *Agriculture for sustainable development*. 2(1):56-58.

Revise the reference style in the text as well as reference section as per Journal requirements

Formatted: Font: Bold

UNDER PEER REVIEW

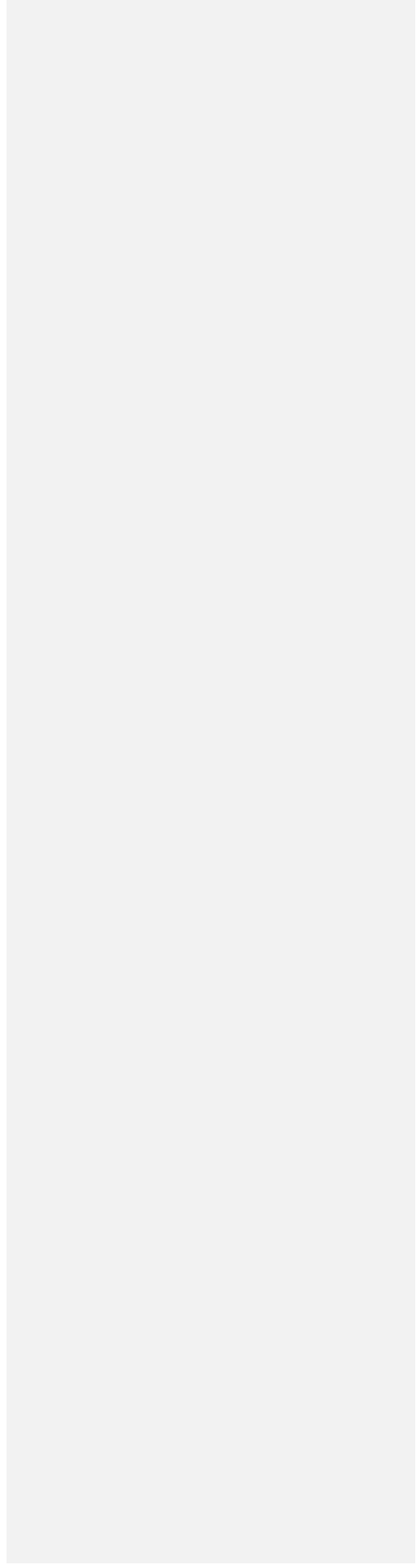


Table 3. Mean of growth and yield component of cauliflower

Characters/ Treatment	Growth parameters					Yield components				Total dry matter and curd yield			
	Plant height (cm)	Stem length (cm)	No. of leaves per plant	Leaf Size (L x B)cm <sup>2</sup>	Days to 50% curd initiation	Curd depth (cm)	Curd equatorial diameter (cm)	Net curd weight (g)	Marketable curd weight (g)	Harvest Index %	i (q/Ha)	Curd Compactness	Dry Matter (%)
T1- B0 Zn0	49.13	13.78	16	468.66	113	6.33	11.42	234	345.5	51.10	86.37	30.52	13.87
T2- B0 Zn1	53.68	16.44	17	539.10	109	7.80	12.75	320	451	57.32	112.75	30.65	12.07
T3- B0 Zn2	56.01	16.98	19	616.88	102	7.23	13.54	325	480	55.85	123.33	30.02	13.23
T4- B0 Zn3	52.26	16.58	20	590.51	105	7.57	13.54	320	480	54.71	120.00	30.16	12.35
T5- B1 Zn0	49.74	13.22	17	592.99	105	8.11	13.15	310	420	59.16	105.00	34.34	12.92
T6- B1 Zn1	65.27	14.72	21	615.45	108	8.49	14.15	368	485	62.04	121.25	32.51	13.56
T7- B1 Zn2	67.53	16.62	21	643.36	108	8.43	15.07	358	455	63.58	113.75	29.36	13.48
T8- B1 Zn3	67.47	16.28	21	580.80	104	8.19	15.00	345	462	60.96	115.50	29.74	13.30
T9- B2 Zn0	59.47	16.27	16	607.78	103	8.22	16.36	305	445	55.63	111.25	32.77	14.30
T10- B2 Zn1	60.53	17.77	19	697.11	100	8.69	16.45	310	475	54.02	118.75	32.39	14.48
T11- B2 Zn2	60.33	17.87	21	652.12	100	8.42	16.12	327	460	58.47	115.00	31.79	13.98
T12- B2 Zn3	66.04	17.52	20	657.13	98	8.57	16.00	335	455	60.62	113.75	31.35	12.13
T13- B3 Zn0	49.83	16.57	19	580.89	102	7.20	15.89	340	435	63.32	108.75	32.45	11.83
T14- B3 Zn1	60.56	17.12	19	630.46	102	7.76	15.80	335	460	59.60	115.00	32.68	12.29
T15- B3 Zn2	60.91	16.28	19	653.59	99	7.67	15.33	350	480	60.42	120.00	32.23	12.98
T16- B3 Zn3	53.51	15.39	18	590.38	99	7.11	15.33	335	450	61.13	112.50	31.5	12.45
Mean	58.26	16.21	18.93	607.32	103.56	7.86	14.74	326.06	452.40	58.62	113.30	31.52	13.07
CD @ 5 %	6.557	NA	1.979	55.23	NA	0.72	1.16	25.758	40.198	3.953	7.659	2.116	1.392
CV	7.091	5.929	6	5.45	5.557	5.43	4.69	4.284	3.745	4.216	4.586	4.006	6.354

Treatments should be self explanatory

2/25/2023 4:06:00 AM

2/25/2023 4:09:00 AM