Effect of different doses of nitrogen and boron on the performance of cauliflower (*Brassica oleracea* var. *botrytis* L.) in Chitwan, Nepal

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ABSTRACT

A field experiment was conducted at Agriculture and Forestry University, Chitwan, Nepal during winter of 2017 to find out the effect of different doses of Nitrogen and Boron on the performance of cauliflower. A completely randomized block design (RCBD) with four replications and nine treatments were used with three different doses of Nitrogen (260, 200 and 140 Kg ha⁻¹) as factor A, and three doses of Boron (1.7, 1.1 and 0.5 Kg ha⁻¹) as factor B. In case of Nitrogen, all the morphological and yield parameters were recorded maximum from 260 Kg Nitrogen ha⁻¹ at harvest and those parameters were recorded minimum from 140 Kg Nitrogen ha⁻¹ at harvest. In case of Boron, all the morphological and yield parameters except curd diameter were recorded maximum from 1.7 Kg Boron ha⁻¹ at harvest and those parameters were recorded minimum from 0.5 Kg Boron ha⁻¹ at harvest. In case of combined effect, the highest curd yield (40.55 t ha⁻¹) and lowest curd yield (34.05 t ha⁻¹) were obtained from N1B2 and N3B3 respectively. Meanwhile, maximum curd dry matter (7.04 %) and minimum curd dry matter (5.39%) were obtained from N3B1 and N3B3 respectively. N1B3 accounted for the highest (19.33 cm) curd diameter which was statistically identical with all the other treatments except N3B3. N3B3 accounted for the minimum curd diameter (15.35 cm). Therefore, it can be concluded that the maximum curd yield and maximum curd diameter can be obtained from treatment N1B2 (260 Kg ha⁻¹ + 1.1 Kg ha⁻¹).

INTRODUCTION

Cauliflower, *Brassica oleracea* var. *botrytis* L. (2n=2x=18) is a cole crop that belongs to the family Cruciferae. It is also called the king of cole crops. It is widely cultivated all over Nepal and abroad for its special nutritive values, high productivity and wider adaptability under different ecological conditions. Cauliflower is cultivated for its attractive curd (shortened and flower part) which is rich in high-quality protein

and used for making vegetable, soup, curry and pickles.

The annual production of cauliflower in Nepal is worth NRs 6.5 billion (Prasai 2011). With the productivity of 10.4 tons per hectare and 352535 tons of production, cauliflower is being grown in Nepal in an area of around 33880 hectares. (ABPSD 2014). In Chitwan, the annual production of cauliflower is 5172 tons in an area of 431 hectares, with productivity 12 metric tons per hectare (MOALD 2016/17).

Among various essential plant nutrients, nitrogen is essential for plant growth, development and reproduction. An increase in protein content and a decrease in bolting is achieved with higher levels of nitrogen. Nitrogen is associated with vigorous vegetative growth. It is a constituent of protein, nucleic acid, chlorophyll etc. It is helpful in large size compact curd development. The vegetative growth and production of cauliflower

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depend upon the role of minor and micronutrients. The most effective nutrients for enhancement of growth and yield of cauliflower are Boron, molybdenum and magnesium. Boron (B) requirement of cauliflower is higher and it responds positively to its application.

The threshold between deficiency and toxicity is very narrow which makes boron unique among the other micronutrients (Han et al. 2009). Basically in Nepal, boron is being applied at the rate of 5-10 Kg ha⁻¹ in several vegetable crops to control the browning problem as well as to increase the yield (Kumar et al. 2014). No doubt, Boron is an essential constituent of the soil solution for normal plant growth, but the difference between adequate and toxic concentration is very narrow.

There have been several types of research conducted on the effect of nitrogen and boron on growth and yield attributes of cauliflower all over the globe. Yet, on this prospect, we have limited pieces of evidence and works going on Nepalese soil conditions. The present research was therefore undertaken to scrutinize the different doses of nitrogen and boron on cauliflower to rectify the performance of cauliflower.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the horticulture farm of Agriculture and Forestry University (AFU), Rampur, Chitwan, Nepal from November 2017 to March 2018. Geographically, the experimental site is located at 27°37' N latitude and 84°25' E longitude, at an altitude of about 256 m above mean sea level. The soil of the experimental area is dominated by sandy loam structure.

Planting Material

The experiment was conducted using a late-season hybrid variety of cauliflower 'Indam 9803'. Seedlings were raised on nursery beds.

Experimental Design and Treatments Details

The experiment was conducted in a Randomized Complete Block Design (RCBD) consisting of 9 treatment combinations with four

replications. The experiment consisted of two factors, with Factor A consisting of 3 Nitrogen doses (N1: 260 Kg ha⁻¹ Nitrogen, N2: 200 Kg ha⁻¹ Nitrogen, N3: 140 Kg ha⁻¹ Nitrogen) and Factor B consisting of 3 boron doses as (B1: 1.7 Kg ha⁻¹ Boron, B2: 1.1 Kg ha⁻¹ Boron, B3: 0.5 Kg ha⁻¹ Boron). The individual experimental plot consisted of 25 plants with an area of 3 m × 2.5 m (7.5 m²). Row to row distance was 60 cm and plant to plant distance was 50 cm. The treatment details used in the experiment are presented in Table 1. Well decomposed Farm Yard Manure (FYM) along with a small amount of fertilizer were mixed in the nursery bed for raising the seedlings. Fertilizer incorporation into the experimental plot was done three days before transplantation in the first week of December 2017. The recommended dose of chemical fertilizer 200:120:100 NPK was applied. A full dose of P₂O₅ and K₂O and 2/3rd of N was applied as a basal dose. A full dose of boron according to the treatment requirement was also incorporated in the plots at the same time. The remaining 1/3rd of N was applied at 25 DAT during intercultural operation. At the early growth stage, the irrigation was done every 3 days to ensure proper soil moisture in the sandy loam soil while at the later growth stage of the crop; the irrigation was done on a weekly basis.

Soil and weather condition

Composite soil samples were taken from each replication from the plough layer (0-15 cm) before transplanting the cauliflower seedlings. There were four composite samples for chemical analysis. The samples were air-dried and sieved through 2 mm for analysis. Average data on different weather parameters such as maximum and minimum temperature, total rainfall, and relative humidity during cauliflower growing period was collected from the office of the National Maize Research Program (NMRP), Rampur, and Chitwan which is represented by the Figure 1. The physical and chemical characteristics of the soil at the research site are presented in Table 2.

Observation and Statistical analysis

Morphological characters viz. plant height, leaf length, leaf breadth, canopy diameter, leaf

Table 1. Treatment combinations of the field experiment at Rampur, Chitwan, Nepal

Treatments	Treatment combination		Treatment symbol
	Nitrogen(Kg ha ⁻¹)	Boron(Kg ha ⁻¹)	
T1	260	1.1	N1B2
T2	140	0.5	N3B3
T3	200	1.7	N2B1
T4	140	1.7	N3B1
T5	200	1.1	N2B2
T6	260	1.7	N1B1
T7	140	1.1	N3B2
T8	200	0.5	N2B3
T9	260	0.5	N1B3

number were measured at 30 DAT, 50 DAT, 70 DAT and final harvest (90 DAT). Yield parameters viz. curd yield, biological yield, curd height, curd diameter, curd dry matter, leaf dry matter were the harvest parameters that were measured at the harvest time (90 DAT). Statistical analysis was carried out using Microsoft Excel, R-studio version 0.98.501.

Table 2. Physical and chemical characteristics of soil at the research site, Rampur, Chitwan, Nepal (2017-2018)

Parameters	Mean value
pH	5.83
Total nitrogen (%)	0.14
Phosphorous (kg ha ⁻¹)	28.87
Potassium (kg ha ⁻¹)	150.75
Organic matter (%)	2.78
Soil boron(ppm)	0.11
EC(mmho/cm) at 25°C	0.11
Soil type	Sandy Loam

RESULTS AND DISCUSSION

Plant height

Plant height was significantly affected by different doses of boron and different doses of nitrogen application on cauliflower at harvest (Table 3). Maximum plant height 58.98 cm were recorded from nitrogen dose N1 (260 Kg ha⁻¹ N) and minimum plant height 55.28 cm was recorded from N3 (140 Kg ha⁻¹ N) respectively. As the application of nitrogen increases cell protein content increases and the size of plant cells also increases, resulting in the rise of leaf area and photosynthesis which ultimately makes the plant taller (Wysocki et al. 2007). Application of boron showed a significant effect on the height of cauliflower at harvest (Table 3). Maximum (58.17 cm) plant heights was recorded under boron dose B1 (1.7 Kg B ha⁻¹) which was statically at par to B2 (1.1 Kg B ha⁻¹) (57.27 cm) and minimum plant

height (56.64 cm) was recorded from B3 (0.5 Kg B ha⁻¹). This result is in partial agreement with the findings of Thapa et al. (2016) in broccoli.

Leaf number

The individual effect of nitrogen significantly affected the leaf number at harvest (Table 3). Nitrogen dose N1 (260 Kg N ha⁻¹) resulted the maximum number of leaves (10.32) and the leaves number due to nitrogen dose N1 and N2 were statistically similar to each other. The result was in accordance with Shahbazi (2005) on lettuce cultivars. Increase in leaf number due to the increase in nitrogen dose may be credited to the fact that nitrogen increases plant height along with the subsequent growth of internodes which resulted in more number of leaves.

The individual effect of boron was not found significant at harvest (Table 3). This may be because the effect of boron is found to be influential at reproductive parts rather than vegetative parts.

Largest Leaf length

Nitrogen doses had a significant influence on the length of leaves of cauliflower plants at harvest (90 DAT) (Table 3). Longest leaf (55.94 cm) was measured from nitrogen dose N1 (260 Kg N ha⁻¹) while the shortest (52.19 cm) was recorded from N3 (140 Kg N ha⁻¹). Allahdadi and Farzane (2018) on their experiment on artichoke recorded maximum leaf length from the highest nitrogen dose.

The leaf length of cauliflower responded significantly due to different boron doses at the final harvest (Table 3). Maximum leaf length (55.56 cm) was recorded from boron dose B1 (1.7 Kg B ha⁻¹) and minimum leaf length (52.92 cm) was recorded from B3 (0.5 Kg B ha⁻¹) which was statically identical with leaf length (53.69 cm) from

Table 3. Effect of different doses of nitrogen and boron on morphological parameters of cauliflower at harvest time at Rampur, Chitwan, in 2017-2018

Treatments	Morphological parameters				
	Plant height (cm)	Leaf number	Leaf length (cm)	Leaf breadth (cm)	Canopy diameter (cm)
Dose of Nitrogen					
N1	58.98 ^a	10.32 ^a	55.94 ^a	29.27 ^a	78.23 ^a
N2	57.83 ^a	10.27 ^a	54.02 ^b	28.18 ^a	77.57 ^a
N3	55.28 ^b	9.57 ^b	52.19 ^c	26.54 ^b	73.95 ^b
LSD _{0.05}	2.128**	0.506**	1.413**	1.357**	2.298**
Dose of Boron					
B1	58.17 ^a	10.17	55.56 ^a	28.03	78.19 ^a
B2	57.27 ^{ab}	9.75	53.69 ^b	27.57	76.98 ^a
B3	56.64 ^b	10.23	52.92 ^b	28.41	74.58 ^b
LSD _{0.05}	1.214*	ns	1.413**	ns	2.298*
SEm±	00.41	0.17	0.48	0.46	0.79
CV (%)	2.5	6.0	3.1	5.8	3.6
Grand mean	57.36	10.05	54.05	28.00	76.58

Means followed by the same letter in column and row are not significantly different by DMRT (P<0.05). *significant at 5% (P<0.05) **significant at 1% (P<0.01) ns not significantly different (P>0.05)

Table 4. Effect of different doses of nitrogen and boron on the yield parameters of cauliflower at Rampur, Chitwan, in 2017-2018

Treatments	Leaf dry matter	Curd dry matter	Curd height	Curd diameter	Curd yield (t ha ⁻¹)	Biological yield (t ha ⁻¹)
Dose of Nitrogen						
N1	16.54 ^a	6.77 ^a	14.18 ^a	19.17 ^a	38.12 ^a	73.84 ^a
N2	16.22 ^a	6.50 ^{ab}	13.97 ^a	18.38 ^a	36.67 ^b	70.18 ^b
N3	15.42 ^b	6.18 ^b	12.93 ^b	17.43 ^b	35.20 ^b	68.76 ^b
LSD _{0.05}	0.783*	0.347**	0.940*	0.885**	1.232**	1.848**
Dose of Boron						
B1	16.87 ^a	6.72 ^a	14.17 ^a	18.70 ^a	36.97 ^a	72.60 ^a
B2	16.04 ^b	6.61 ^a	13.90 ^{ab}	18.78 ^a	37.97 ^a	70.63 ^b
B3	15.28 ^b	6.12 ^b	13.02 ^b	17.51 ^b	35.56 ^b	69.45 ^b
LSD _{0.05}	0.783**	0.343**	0.940*	0.885*	1.232**	1.848**
SEm±	0.268	0.117	0.322	0.303	0.422	0.633
CV (%)	5.8	6.3	8.1	5.7	4.0	3.1
Grand mean	16.06	6.48	13.70	18.33	36.84	70.93

Means followed by the same letter in column and row are not significantly different by DMRT ($P < 0.05$). *significant at 5% ($P < 0.05$) **significant at 1% ($P < 0.01$) ns not significantly different ($P > 0.05$)

B2 (1.1 Kg B ha⁻¹). These findings are in agreement with the findings of Miwa et al. (2007).

Largest Leaf breadth

A significant variation was recorded in leaf breadth of cauliflower at harvest (Table 3). The highest leaf breadth (29.27 cm) was measured from N1 (260 Kg N ha⁻¹) dose which was statistically similar with N2 dose while the lowest (26.54 cm) was recorded from N3 (140 Kg N ha⁻¹) dose. The result was in accordance with the findings of Hasan et al. (2017) on lettuce. The possible reason for the increase in the leaf breadth by the application of nitrogen might be due to the nitrogen, promoting the synthesis of nucleic acids, amino acids, amide substances in growing regions of meristematic tissues ultimately enhancing cell division.

The individual effect of boron was not found significant on cauliflower leaf breadth (Table 3). This may be because the effect of boron is found to be constructive at reproductive parts during

flowering rather than vegetative stages. Hegazi et al. (2018) in olive reported that reproductive organs accumulated more boron than vegetative organs concluding its effectiveness to be more in reproductive stage rather than in vegetative stage.

Canopy diameter

The canopy diameter of cauliflower showed significant differences due to application of nitrogen irrespective of its doses at harvest (Table 3). The minimum canopy diameter i.e. 73.95 cm were recorded from N3 (140 Kg N ha⁻¹). Meanwhile, maximum canopy diameter (78.23 cm) was recorded from N1 (260 Kg N ha⁻¹) which was statically similar to N2 (200 Kg N ha⁻¹) nitrogen dose i.e. 77.57 cm. Ullah et al. (2008) reported that application of inorganic nitrogen fertilizer can solely affect the vegetative spread due to the increase in leaf length and breadth.

Statically significant variation was recorded from various boron doses in cauliflower at harvest

Figure 1. Weather condition during the experimentation period in Rampur, Chitwan from November 2017 to March 2018 (Source: NMRP, Rampur, Chitwan, Nepal)

Table 5. Combined effect of nitrogen and boron on curd diameter of cauliflower at Rampur, Chitwan in 2017-2018

Treatments	Curd diameter (cm)		
	B1	B2	B3
N1	19.23 ^a	18.95 ^a	19.33 ^a
N2	18.63 ^a	18.68 ^a	17.85 ^a
N3	18.25 ^a	18.70 ^a	15.35 ^b
LSD _{0.05}	1.534*		
SEm±	0.525		
CV (%)	5.7		
Grand mean	18.33		

Means followed by the same letter in column and row are not significantly different by DMRT ($P < 0.05$). *significant at 5% ($P < 0.05$) **significant at 1% ($P < 0.01$) ns not significantly different ($P > 0.05$)

Table 6. Combined effect of nitrogen and boron on curd yield of cauliflower at Rampur, Chitwan in 2017-2018

Treatments	Curd yield (t ha ⁻¹)		
	B1	B2	B3
N1	36.85 ^b	40.55 ^a	36.98 ^b
N2	36.92 ^b	37.42 ^b	35.65 ^{bc}
N3	37.15 ^b	35.95 ^{bc}	34.05 ^c
LSD _{0.05}	1.534*		
SEm±	0.731		
CV (%)	4.0		
Grand mean	36.84		

Means followed by the same letter in column and row are not significantly different by DMRT ($P < 0.05$). *significant at 5% ($P < 0.05$) **significant at 1% ($P < 0.01$)

(Table 3). Maximum canopy diameter 78.19 cm was noticed due to B1 (1.7 Kg B ha⁻¹) which was statically identical to B2 (1.1 Kg B ha⁻¹) i.e. 76.98 cm while the minimum canopy diameter i.e. 74.58 cm was recorded from B3 (0.5 Kg B ha⁻¹) dose of boron. A similar increase in growth parameters have been reported by Prasad and Yadav (2004) on cauliflower.

Curd height

Different nitrogen doses had a significant effect on the curd height of cauliflower (Table 4). Maximum curd height (14.18 cm) was recorded from the nitrogen dose N1 (260 Kg N ha⁻¹) which was statistically identical with N2 (200 Kg N ha⁻¹) measuring 13.97 cm, while minimum curd height (12.93 cm) was obtained from the nitrogen dose N3 (140 Kg N ha⁻¹). Bashyal (2011) found that maximum curd height from the highest dose of nitrogen fertilizer.

The application of boron doses significantly influenced the curd height of cauliflower (Table 4). The maximum curd height (14.17 cm) was recorded in the boron dose B1 (1.7 Kg B ha⁻¹) which was significantly at par with B2 (1.1 Kg B ha⁻¹) measuring 13.90 cm, while the minimum curd height (13.02 cm) was recorded from the boron dose B3 (0.5 Kg B ha⁻¹). Singh et al. (2011) reported that increasing levels of boron from 1.0 Kg ha⁻¹ to 2.50 Kg ha⁻¹ showed a linear increase in all the characters including curd height which was in close harmony with our findings.

Curd diameter

The effect of nitrogen on curd diameter was found significant (Table 4). The highest curd diameter of 19.17 cm was found from N1 (260 Kg N ha⁻¹) which was statistically identical with N2 measuring 18.38 cm, whereas the lowest curd diameter of 17.43 cm was found from N3 (140 Kg N ha⁻¹). These findings were in close harmony with the result of Neethu et al. (2015).

The effect of boron on curd diameter was also found significant (Table 4). The highest curd diameter of 18.78 cm was found from B2 (1.1 Kg B ha⁻¹) which was statistically similar with B1 (1.7 Kg B ha⁻¹) measuring 18.70 cm whereas the lowest curd diameter of 17.51 cm was recorded from B3 (0.5 Kg B ha⁻¹). Similar results have been reported by Devi et al. (2012).

Combined effect nitrogen and boron doses showed the maximum curd diameter (19.33 cm) under the treatment N1B3 (260 Kg N ha⁻¹ + 0.5 Kg B ha⁻¹) which was statistically at par with rest of the treatments except N3B3 (Kg N ha⁻¹ + 0.5 Kg N ha⁻¹) providing the minimum curd diameter i.e. 15.35 cm (Table 5). Hussain et al. (2012) in a field experiment on broccoli reported that minimum curd diameter was found on treatment with the lowest dose of boron.

Curd yield

Different nitrogen doses had a significant effect on the curd yield (t ha⁻¹) of cauliflower (Table 4). Maximum curd yield (38.12 t ha⁻¹) was spotted from the nitrogen dose N1 (260 Kg N ha⁻¹)

while minimum curd yield (35.20 t ha^{-1}) was obtained from the nitrogen dose, N3. The present findings are in consonance with the findings of Neethu et al. (2015). This result can be attributed to the fact that there were positive impact of higher doses nitrogen application to all growth parameters thus promoting the accumulation of photosynthates, hence increasing curd yield.

Different boron doses significantly influenced the curd yield and indicated that curd yield of cauliflower was increased significantly with an increase in boron doses (Table 4). Maximum curd yield (37.97 t ha^{-1}) was recorded in the boron dose B2 (1.1 Kg B ha^{-1}) which was statistically at par with the highest boron dose B1 (1.7 Kg B ha^{-1}) i.e. 36.97 t ha^{-1} , while the minimum curd yield (35.56 t ha^{-1}) was recorded from the boron dose B3 (0.5 Kg B ha^{-1}). Hassan et al. (2018) on an experiment on cauliflower reported that maximum curd yield was recorded from the highest dose of boron.

The combined effect of nitrogen and boron on curd yield was found significant and the maximum yield (40.55 t ha^{-1}) was noticed under the treatment N1B2 (260 Kg N ha^{-1} and 1.1 Kg B ha^{-1}) whereas minimum yield (34.05 t ha^{-1}) was found under the treatment N3.B3 (140 Kg N ha^{-1} and 0.5 Kg B ha^{-1}) (Table 6). Debhnath et al. (2014) on their experiment on the effect of nitrogen and boron on the performance of wheat found that with increase in dose of nitrogen and the highest dose of boron produced maximum yield in wheat. The acidity of soil increases with an increase in dose of nitrogen and the availability of boron in acidic soil is less which might be the reason for lower curd yield with a higher dose of nitrogen in combination with boron.

Biological yield

Biological yield of cauliflower showed significant differences due to different nitrogen doses (Table 4). The maximum biological yield (73.84 t ha^{-1}) was observed from N1 (260 Kg N ha^{-1}), while lowest biological yield (68.76 t ha^{-1}) was observed from N3 which was statistically at par with N2 (200 Kg N ha^{-1}) nitrogen dose yielding 70.18 t ha^{-1} . These findings are in accordance with the findings of Ghobadi et al. (2010).

Different doses of boron significantly affected the biological yield (Table 4). Maximum biological yield (72.60 t ha^{-1}) was recorded from the boron dose B1 (1.7 Kg B ha^{-1}) while minimum biological yield (69.45 t ha^{-1}) was recorded with the boron dose B3 (0.5 Kg B ha^{-1}) which was statistically at par with B2 (1.1 Kg B ha^{-1}) yielding 70.63 t ha^{-1} . Farooq et al. (2018) on their experiment on broccoli revealed that there was a significant and a linear increase in the biological yield of cauliflower when highest dose of boron was applied.

Dry matter content

The leaf dry matter percent was significantly influenced by different nitrogen doses (Table 4). Highest dry matter of leaf (16.54%) was noticed from N1 (260 Kg N ha^{-1}) dose of nitrogen which was statistically similar (16.22%) to N2 (200 Kg N ha^{-1}), while the lowest dry matter of leaf (15.42%) was found in N3 (140 Kg N ha^{-1}) dose. Razzaque et al. (2010) observed that the application of supra optimum nitrogen increased leaf dry weight of rice almost double compared to control treatment. Increasing dose of boron significantly increased the dry matter of leaf being maximum under boron dose B1 (1.7 Kg B ha^{-1}) i.e. 16.87% followed by the recommended boron dose B2 (1.1 Kg B ha^{-1}) i.e. 16.04 % which was statistically similar with the boron dose B3 (0.5 Kg B ha^{-1}) i.e. 15.28% (Table 4). The result was in accordance with the findings of Shaghali et al. (2013) in maize.

The dry matter content of curd was significantly affected by the different nitrogen doses (Table 4). The maximum dry matter content of curd (6.77%) was observed from N1 (260 Kg N ha^{-1}) which was statistically at par (6.50%) to N2 (200 Kg N ha^{-1}), while the lowest dry matter (6.18%) from N3 (140 Kg N ha^{-1}). Shree et al. (2014) stated that it may be because of mineralization which produces a sufficient amount of nutrients which ultimately produced higher dry matter content. Statistically significant variation was recorded for boron in terms of dry matter content of leaves of cauliflower (Table 4). The highest dry matter content of curd (6.72%) was reported from B1 (1.7 Kg B ha^{-1}) which was statistically identical (6.61%) to B2 (1.1 Kg B ha^{-1}), while the lowest dry matter (6.12%) from B3 (0.5 Kg B ha^{-1}). Islam et al. (2015) found the significant effect of boron application on curd dry matter of broccoli with highest dry matter percent in highest boron level.

CONCLUSIONS

From the experiment, it is vividly seen that the growth and yield of cauliflower mainly depend upon the nitrogen and boron doses. These two factors either individually or in combination influenced the performance of cauliflower. Morphological and yield parameters were found maximum under the highest individual doses of nitrogen and boron. From the experiment, maximum curd yield per hectare was obtained from the treatment combination N1B2 ($260 \text{ Kg ha}^{-1} + 1.1 \text{ Kg ha}^{-1}$) and the highest curd diameter was obtained from N1B3 which was statistically similar with treatment combination N1B2 as well. Henceforth, the results of the experiment suggest that the maximum curd yield and fine curd diameter can be obtained from treatment combination N1B2 ($260 \text{ Kg ha}^{-1} + 1.1 \text{ Kg ha}^{-1}$). Meanwhile, the application of nitrogen and boron

fertilization may be obliging for better performance of cauliflower.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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