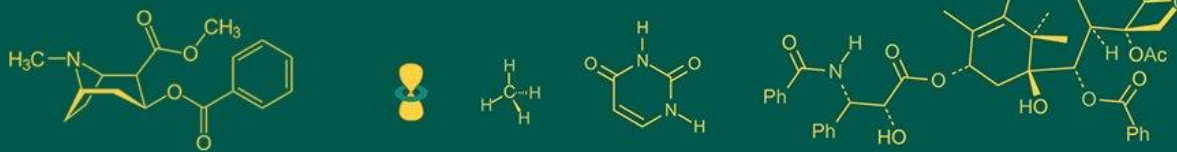


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Foliar application of Boron and Molybdenum in cauliflower under west central table land zone of Odisha

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Abstract

The field experiment was conducted to study the “Foliar application of boron and molybdenum in cauliflower under west central table land zone of Odisha”. The treatments taken are farmers practice, sole application of 100 ppm Boron at 10 days interval as treatment-1 and combine application of 50 ppm Boron & 50 ppm Molybdenum at 10 days interval as treatment-2. The results indicated that the foliar application of 50 ppm Boron in addition with 50 ppm molybdenum at 10 days interval given higher curd weight(917g), curd length (10.8 cm) and curd diameter (18.4 cm) in comparison to the only application of 100 ppm Boron at 10 days interval. Similarly, the combine application of boron and molybdenum given higher yield (328q/ha) in comparison to the sole application of boron. The highest economic study was seen in the TO2 (50 ppm Boron + 50 ppm Molybdenum) i.e. highest net return (Rs. 112690) and B:C ratio (2.34). Irrespective of the treatment tested, the combine application of 50 ppm Boron with 50 ppm Molybdenum was recommended for micronutrient application in cauliflower for higher crop growth and yield.

Keywords: Boron, molybdenum, cauliflower, curd, yield etc.

Introduction

Cauliflower (*Brassica oleracea* var. *botrytis* L.), which belongs to family Brassicaceae and genus Brassica, is a fast growing annual and herbaceous vegetable crop (Anonymous, 2020) ^[1]. The curd which is the edible part, white in colour and enclosed by inner leaves before its exposure (Dixit *et al.* 2020) ^[2]. In India cauliflower was grown in 453 thousand hectares area having a total production of 8668 thousand metric ton (Anonymous, 2017) ^[3]. Cauliflower very well grown in macronutrients like Nitrogen, Phosphorous and Potassium. However, micronutrients are also very much required specially Boron and molybdenum for growth and increasing the yield of cauliflower (Rahman *et al.* 2007) ^[4]. Application of Boron increased plant height, number of leaves per plant, length and width of the leaf, plants spread, main head weight and head yield both per plant and per hectare (Moniruzzaman *et al.* 2007) ^[5]. In Boron deficiency, water soaked areas appear on the stem and head surface, hollow seen on the stem and brown colour shown in curd. In molybdenum deficiency chlorosis of leaf margins appears on young plant and white colour seen in whole leaf (Ningawale *et al.*, 2016) ^[6]. In Odisha application of fertilizer rate has already increased then earlier in crop production but micronutrient application in soil has totally neglected. Therefore, rational and optimum use of micronutrient coupled with soil test recommended fertilizer would be beneficial for increasing the curd yield per unit area.

Materials and Methods

A field experiment was conducted during rabi 2021-22 at village Bargaon and Brahmanidunguri of Bolangir and Loisingha block of Bolangir district of Odisha to study the “Foliar application of boron and molybdenum in cauliflower under west central table land zone of Odisha” under On-farm testing programme of Krishi Vigyan Kendra, Bolangir, Odisha. The experiment was laid out is a Randomized block design (RBD) with seven replications. The treatments drawn in farmers practice as recommended dose of fertilizer (120:40:50) only, in TO1 as soil test-based fertilizer dose with three foliar spray of 100 ppm boron (as borax) at 10 days interval and in TO1 as soil test-based fertilizer dose with three

foliar spray of 50 ppm boron with 50ppm molybdenum (as Ammonium Molybdate) at 10 days interval. The soil of the experimental field was sandy loam in texture with pH 6.1, 0.30% organic carbon, 228 kg/ha nitrogen, 14 kg/ha phosphorous and 121 kg potassium and 0.41% boron respectively. The curds were collected after harvest the data were recorded on various parameters like curd weight, yield and economics etc.

Results and Discussion

Study on physiological parameters

The foliar application of boron and molybdenum has been increased the curd weight from 761 to 917g, curd length from 8.3 to 10.8 cm and curd diameter from 14.2cm to 18.4cm (Table-2). However, the lowest data recorded in the farmers practice whereas highest data recorded in the treatment 2.

Table 1: Effect of Boron and Molybdenum on curd weight, length and diameter

Treatments	Weight of curd (g)	Curd length (cm)	Curd diameter (cm)
FP	761	8.3	14.2
TO1	903	10.1	17.9
TO2	917	10.8	18.4
CD (0.05)	51.3	0.38	0.21
CV (%)	7.32	1.23	2.86

The application of 10 ppm boron increases 18.6 percent curd weight (903g), 21.6 percent curd length (10.1cm) and 26 percent curd diameter (17.9cm) over farmer's practice. The combine application of 50ppm boron and 50 ppm molybdenum increases 20.4 percent curd weight over farmer practice and 1.6 percent over TO1; 30.1 percent curd length over farmer practice and 6.9 percent over TO1; 29.5 percent curd diameter over farmer practice and 2.7 percent over TO1 (Table-1). The combine application of boron and molybdenum significantly increases the curd weight, length and diameter, similar results found by the Rahman *et al.* (2021)^[7].

Study on yield

The curd yield varied significantly between 281 to 328 q/ha whereas the lowest was seen in farmers practice 281q/ha and highest was seen in TO2 328q/ha (Table-2). The farmers practice recorded 281q/ha. The application of 100 ppm Boron recorded 311q/ha curd yield which is 10.6% increase in yield over farmer practice. The combine application of 50 ppm boron and 50 ppm molybdenum recorded 328 q/ha curd yield which is 16.7 percent increase in yield over farmer practice and 5.46% over TO1 (Table-2). The combine application of 'B' and 'Mo' recorded significantly highest curd yield over the only application of boron, This findings are in confirmation with the findings of Mahmud (2005)^[8].

Table 2: Effect of Boron and molybdenum on curd yield

Treatment	Curd yield (q/ha)
FP	281
TO1	311
TO2	328
CD (0.05)	3.13
CV (%)	6.32

Study on economic parameters

The application of micronutrients significantly increases the economic return. The cost of cultivation varied between Rs. 77850 to Rs. 84110, gross return from Rs. 168600 to Rs.196800, net return Rs. 90750 to Rs. 112690 and B:C ratio from 2.16 to 2.34 (Table-3). The lowest was seen in the farmer practice whereas highest was seen in the TO2.

Table 3: Effect of Boron and molybdenum on Economic study

Treatment	Cost of cultivation	Gross return	Net return	B:C ratio
FP	77850	168600	90750	2.16
TO1	82170	186600	104430	2.27
TO2	84110	196800	112690	2.34

In farmer practice the cost of cultivation was Rs. 77850 where as application of Boron increases 5.5 percent i.e. Rs. 82170 and application of both boron, molybdenum increases 2.36 percent over sole application of boron. The gross return increases 10.67 percent i.e., Rs. 186600 in TO1 over FP and 5.46 percent i.e. Rs. 196800 in TO2 over TO1. The net return increases 15.77 percent i.e., Rs. 104430 in TO1 over Farmer practice and 7.90 percent i.e. Rs. 112690 in TO2 over TO1. Similarly, the B:C increases 5.09 percent i.e. 2.27 in TO1 over FP and 3.08 percent i.e. 2.34 in TO2 over TO1.

Conclusion

The foliar application of 50 ppm Boron in addition with 50 ppm Molybdenum at 10 days interval given higher curd weight (917g), curd length (10.8 cm) and curd diameter (18.4 cm) in comparison to the only application of 100 ppm Boron at 10 days interval. Similarly, the combine application of boron and molybdenum given higher yield (328q/ha) in comparison to the sole application of boron. The highest economic study was seen in the TO2 (50 ppm Boron + 50 ppm Molybdenum) i.e. highest net return (Rs. 112690) and B:C ratio (2.34). Irrespective of the treatment tested, the combine application of 50 ppm Boron with 50 ppm Molybdenum was recommended for micronutrient application in cauliflower for higher crop growth and yield.

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