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### Effect of foliar spray of micronutrients on yield of cauliflower (*Brassica oleracea* L. var. Botrytis)

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#### Abstract

The experiment was conducted during *rabi*, 2016-2017 at Regional Horticultural Research Station, Navsari Agricultural University, Navsari, Gujarat, India to evaluate the Effect of foliar spray of Micronutrients on Yield of Cauliflower (*Brassica oleracea* L. var. Botrytis). The experiment was arranged over 9 treatments comprising, micronutrient sources T1: Ammonium molybdate (0.1%), T2: Boric acid (0.2%), T3: Zinc sulphate (0.5%), T4: Copper sulphate (0.5%), T5: Ferrous sulphate (0.5%), T6: Manganese sulphate (0.5%), T7: 1% General grade-1 (Fe-2.0, Mn-0.5, Zn-4.0, Cu-0.3, B-0.5), T8: 1% General grade-1 + T1 and T9: control which was laid out in a Randomized Block Design with three replications.

The application of 1% General grade-1 + T1 had shown significant impact on yield parameters viz. marketable curd yield per plot (37.11 kg), marketable curd yield per hectare (28.64 t), curd diameter (19.16 cm), Gross weight of curd (2.65 kg/plant) and Net weight of curd (883.33 g/plant).

**Keywords:** Cauliflower, Micronutrients, Curd yield, curd diameter

#### Introduction

Cauliflower (*Brassica oleracea* L. var. Botrytis) belongs to family Brassicaceae, is one of the most important winter vegetables grown in India. It is a European origin probably developed from broccoli (Swaroop and Chatterjee, 1972)<sup>[8]</sup>.

The micronutrients though required in small quantities are as important as macronutrients. The role of micronutrients in regulation plant growth and yield is established. Different micronutrients have specific role in cauliflower production. Micronutrients although required in trace amount, play vital role in completion of life cycle of this crop. Among all (Boron, Molybdenum, Iron, Copper, Chlorine, Zinc and Manganese), Boron and Molybdenum are more important than others due to its availability in soil, mobility in plants and soil and more dependency upon pH in soil.

#### Materials and Methods

The experiment was carried out at Regional Horticultural Research Station (RHRS), ASPEE College of Horticulture and Forestry (ACHF), Navsari Agricultural University, Navsari, Gujarat during *Rabi*, 2016-

17 in cauliflower cv. Snowball-16. The experiment was planned with nine treatments viz., 0.1% Ammonium molybdate (T<sub>1</sub>), 0.2% Boric acid (T<sub>2</sub>), 0.5% Zinc sulphate (T<sub>3</sub>), 0.5% Copper sulphate (T<sub>4</sub>), 0.5% Ferrous sulphate (T<sub>5</sub>), 0.5% Manganese sulphate (T<sub>6</sub>), 1% General grade-1 (T<sub>7</sub>), 1% General grade-1+Ammonium molybdate (T<sub>8</sub>) and Control (T<sub>9</sub>) in a Randomized Block Design (RBD) with three replications. Cauliflower plants were grown at the spacing of 60 x 45 cm and fertigated with recommended dose of FYM 20 t/ha at the time of land preparation and fertilizers N:P:K at the rate of 125: 80: 60 kg/ha at the time of planting. Two spray of each treatment were made during cropping season of cauliflower, first at the 45 DATP and second at 60 DATP. Plants in control plots were sprayed with ordinary water. The data were taken from randomly selected five plants from each plot on various characters viz., curd diameter (cm), gross weight of curd (kg/plant), net weight of curd (g/plant), yield of curd per plot (kg) and yield of curd per hectare (t).

## Results and Discussion

The Effect of foliar spray of Micronutrients on Yield of Cauliflower (*Brassica oleracea* L. var. Botrytis) cv. Snowball-16 is presented as mean values with statistical notation in the different tables.

### Yield and attributes

The results on effect of foliar application of micronutrients on various yield and attributes viz., curd diameter, gross weight of curd, net weight of curd, yield of curd per plot and yield of curd per hectare in cauliflower as influenced by foliar application of micronutrients are presented in Table 1. The maximum diameter of curd (19.16 cm) was recorded in T<sub>8</sub> (1% General grade-1+T<sub>1</sub>) followed by T<sub>7</sub> treatment. The occurrence of higher curd diameter upon T<sub>8</sub> treatment was combination of Fe, Mn, Zn, Cu and B, which is the best for production of highest diameter of curd. This could be due to the application of micronutrient induced the synthesis of chlorophyll which in turn resulted in higher vegetative growth. This is in accordance with Narayanamma *et al.* (2007) [7], Yadav *et al.* (2009) [9], Kotecha *et al.* (2011) [4] in cabbage. The observations revealed that differences in the average gross weight were significantly influenced by micronutrients spray during the period of investigation and T<sub>8</sub> noticed highest gross weight of curd (2.65 kg/plant), which was at par with T<sub>2</sub> (2.23 kg/plant) and T<sub>7</sub> (2.46 kg/plant). Zinc increases curd diameter and curd weight due to the improved physiological activities like photosynthesis during which food is manufactured by the plant translocation of assimilates from

leaves to curd and their storage in curd for which zinc was a responsible factor (Lashkari *et al.* 2008) [5]

The treatment T<sub>8</sub> produced significantly maximum net weight of curd per plant (883.33 g), which was at par with T<sub>2</sub> (811.67 g/plant), T<sub>3</sub> (807.00 g/plant) and T<sub>7</sub> (860.67 g/plant). Among various treatments, T<sub>8</sub> (1% General grade-1+T<sub>1</sub>) recorded maximum curd yield per plot and yield of curd per hectare 37.11 kg and 28.64 t, respectively which was statistically at par with T<sub>2</sub> (34.97 kg and 26.99 t), T<sub>3</sub> (33.39 kg and 25.77 t) and T<sub>7</sub> (36.16 kg and 27.90 t) respectively. Improvement in yield characters as a result of foliar application of micronutrients might be due to the enhancement in photosynthesis and other metabolic activity which led to an increase in various plant metabolites responsible for cell division and elongation (Hatwar *et al.* 2003) [3]. Molybdenum had significant effect on yield characters may be due to the increase of the estimated attributed in leaves. In addition, the promotion in plant weight reflected in a significant increase of curd yield. Furthermore the stimulatory effect of molybdenum application could be due to the increase of the metabolic pools required for the synthesis of saccharides, along with the enhanced photosynthetic capacity (Mohamed El-Sayed Ahmed *et al.* 2011) [1]. The higher curd yield may be due to synergetic interaction effect between applied boron and phosphorous in the plant (Dhakal *et al.* 2009) [2]. The synergetic effect of Zn with P which may serve as a source of energy for the synthesis of auxin in the presence of Zn. Enhanced photosynthetic reaction in the presence of zinc and boron was also reported by Mallick and Muthukrishnan (1980) [6].

**Table 1:** Effect of foliar application of micronutrients on yield and attributes of cauliflower

Treatments	Curd diameter (cm)	Gross weight of curd (kg/plant)	Net weight of curd (g/plant)	Yield of curd per plot (kg)	Yield of curd per hectare (t)
T <sub>1</sub> : Ammonium molybdate (0.1%)	16.31	2.10	725.00	30.24	23.34
T <sub>2</sub> : Boric acid (0.2%)	17.15	2.23	811.67	34.97	26.99
T <sub>3</sub> : Zinc sulphate (0.5%)	17.14	2.11	807.00	33.39	25.77
T <sub>4</sub> : Copper sulphate (0.5%)	14.90	2.02	719.67	29.67	22.90
T <sub>5</sub> : Ferrous sulphate (0.5%)	16.19	2.07	726.67	30.04	23.18
T <sub>6</sub> : Manganese sulphate (0.5%)	16.12	2.04	732.00	30.57	23.59
T <sub>7</sub> : General grade-1 (1%)	18.00	2.46	860.67	36.16	27.90
T <sub>8</sub> : 1% General grade-1+T <sub>1</sub>	19.16	2.65	883.33	37.11	28.64
T <sub>9</sub> : Control	14.01	1.95	668.67	27.24	21.02
S.E.m. ±	0.953	0.143	44.872	2.063	1.591
C.D. <sub>0.05</sub>	2.86	0.43	134.51	6.18	4.77
C.V. %	9.97	11.34	10.09	11.11	11.11

### Conclusion

The result inferred that the foliar spray of micronutrients of 1% General grade-1 (Fe-2.0, Mn-0.5, Zn-4.0, Cu-0.3 and B-0.5) +T<sub>1</sub> (Ammonium molybdate) is favorably influenced plant growth and yield attributes. Results clearly emphasized the importance of foliar spray of micronutrients for higher yield produce hence, gave a remunerative return. Based on the trend of curd yield and economical aspect of cauliflower observed in the present study; it is concluded that for getting higher yield of cauliflower curd treatment (T<sub>8</sub>) i.e. General grade-1 + T<sub>1</sub> two spray of micronutrients at 45 days after transplanting and 60 days after transplanting was found better.

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