Effect of Gibberelic acid, IBA and NAA as Foliar Spray on the Growth, Yield and Quality of Cauliflower (*Brassica oleracea* var. *botrytis* L.)

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1. ABSTRACT

A field experiment was conducted at the Gwalior (Madhya Pradesh) during kharif-2009 to study the effect of gibberelic acid, IBA and NAA as foliar spray of cauliflower. The result indicated that growth characters like plant height (cm), diameter of the stem (cm), spread of the plant (cm) and number of leaves per plants were increased significantly under different treatments. Yield attributing characters viz., diameter of curd (cm), weight of curd per plant (kg), weight of the head per plant (kg), length of head per plant (cm), yield (q/ha) and dry weight of curd per 100 g of fresh weight were also increased significantly with different treatments. Among growth regulators GA_3 was most promising in effect followed by NAA and IBA. The higher concentration of growth regulators were found more effective than their respective lower concentrations but statistically significant difference between medium and higher concentration is very less of nil than lower and medium concentration of different hormone under tested. The growth regulator GA_3 at 150 ppm slowed significantly higher performance over the remaining treatment in all the growth characters viz., plant height etc. Growth regulator GA_3 at 150 ppm performed significantly better than the other treatments regarding the yield and yield attribute characters. Growth regulator GA_3 at 15 ppm with recommend fertilizer dose of NPK gave highest additional net profit over control followed by GA_3 at 100 ppm.

Keywords: Cauliflower, Gibberelic acid, IBA and NAA

1. INTRODUCTION

Cauliflower (*Brassica oleracea* Var. *botrytis* L.) belongs to natural order of crucifereae and is one of the important members of *Cole* crop group of vegetables cultivated in India for its flesh, compact curds that are used as raw cooked vegetables, curries, soups and pickles. The tender curd of cauliflower is very popular for its nutritive value, digestibility, descent dishes, and richness in minerals, protein and vitamin.

During the recent years, growth regulator is an outstanding achievement, which has contributed a great deal of progress to the agricultural science. These substances affect various metabolic

processes and growth phenomenon of plants, which have direct bearing on growth, yield and quality of the crop. It has been discovered that the growth behaviors of many plants could be modified and often controlled by applying growth regulators in small quantities. They are used by several methods such as seed treatment, seedling dipping and plant spray. Some of the research workers (Balyan *et al.*, 1994) have recommended the use of growth regulators to improve the yield and quality of cauliflower. The growth regulators and their uses are considered to be most technical and scientific in crop production. The selection of right hormones, their appropriate concentration and their time and method of application are most essential. Therefore, present studies were under taken. To determine the best growth regulator, optimum concentration of GA_3, IBA and NAA for better growth, yield and quality of cauliflower and economics of the treatment.

Method and material

A field experiment was conducted at Research Farm, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur ($26^0$13' N and $78^0$14' E and 207 meters above the mean sea level) during *kharif* season 2008-09. The soil of the experimental plot was sandy loam and slightly alkaline in reaction (pH 7.9) as well as low in available nitrogen (178 kg/ha.), medium in available phosphorus (12.6 kg/ha.) and medium in available potash (281 kg/ha.). The experiment comprising of thirty treatment combinations consisting three growth regulators and three different concentrations were laid out in randomized block design with three replications. The crop was sown on June 20, 2008 and using spacing of 50 cm. The complete dose of phosphatic and potassic fertilizers and half dose of urea were applied in rows before transplanting the seedlings, whereas the remaining dose of urea was given by top dressing in two split doses after 25 and 50 days of sowing. Crop was grown under fully irrigated conditions and harvested in October, 2009. Five plants were selected randomly from each experimental unit to measure the growth and yield attributes. Economic analysis of the data was done based on the prevailing cost of inputs/operations and price of the marketable produce. No serious incidence of any insect-pest or disease was observed in the crop.

2. RESULT AND DISCUSSION

Effect of GA_3, NAA and IBA on growth character

All the growth regulators GA_3, IBA and NAA proved significant by effecting in improving the plant height, number of leaves per plant, spread of plant (cm) and diameter of stem as compared to control. GA_3 was found to be more effective followed by NAA and IBA. Amongst the growth regulator treatments, GA_3 150 ppm resulted in best growth character. Similarly, NAA and IBA at their higher concentrations also gave the better growth character over to control. It was observed that the higher concentrations of all growth regulators were found to be more effective than their respective lower concentrations. There was either small or no significant difference in all growth

character receiving spray of medium and higher concentration of each plant growth regulator except, the lower concentration, but the data further revealed that there was an increase in all the growth characters with increase in the concentration of each growth regulator. Findings of Salam *et al.* (2004), Kumar and Ray (2000), Reddy (1989), have also exhibited a similar trend in the growth characters of cauliflower plants.

Effect of different hormones (GA_3, NAA and IBA) on yield and yield attributes

All the plant growth regulator treatments significantly increase the yield of cauliflower over control. Foliar application of GA_3 at 150 ppm resulted in significantly maximum yield attribute and maximum yield over rest of the plant growth regulator treatments. Furthermore, with each increase in concentration of all growth regulators there was increase in yield and all the yield attributing. But the successive increase in this character with increase in concentration of GA_3 was statistically more significant. Maximum dry weight per 100 gm fresh weight was recorded when there were foliar sprays of GA_3 with 150 ppm on the crop.

Quality parameters

Maximum dry weight of curd/ per 100 gm fresh weight was recorded when there were foliar sprays of GA_3 with 150 ppm on the crop. Stem thickness and plant spread were important growth characters and thus, they helped in getting the higher dry weight. Findings of Semerolzjan (1966) and Hossib (1972) also showed higher dry weight due to GA_3.

Economical parameters

The B:C ratio eventually followed the same trend because it was obtained by dividing the excess gross return with the cost of excess return incurred under each treatment. The maximum B:C ratio was 2.61 with 150 ppm of GA_3 followed by medium concentration of GA_3, respectively over control.

3. CONCLUSION

On the basis of one year field experimentation, it can be conclude that most effective growth regulator (GA_3, NAA and IBA) can be secured by sowing of cauliflower growth, yield and net return at higher concentration under the agro-climatic conditions of Gwalior region of Madhya Pradesh in India.

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Table 1 Effect of Gibberelic acid, IBA and NAA as foliar spray on the growth, yield and quality of cauliflower

Treatment	Plant height (cm)	Spread of plant	Diameter of stem	No. of leaves	Diameter of Curd (cm)	Weight of curd	Weight of the head	Length of the head	Yield q/ha.	Dry weight of curd per 100 fresh weight
G_1 (GA_3 50 ppm)	34.60	44.20	1.55	21.40	13.80	0.56	0.58	20.37	120	8.20
G_2 (GA_3 100 ppm)	35.26	46.23	1.65	23.40	15.30	0.58	0.61	21.68	140	9.50
G_3 (GA_3 150 ppm)	36.98	47.76	1.70	25.10	15.80	0.62	0.63	22.87	160	10.50
G_4 (NAA 100 ppm)	33.30	42.83	1.55	20.20	13.10	0.52	0.56	19.88	130	8.13
G_5 (NAA 120 ppm)	33.60	44.03	1.60	21.16	14.50	0.56	0.59	20.35	140	9.43
G_6 (NAA 140 ppm)	33.83	45.00	1.65	22.10	15.10	0.61	0.60	21.58	155	10.40
G_7 (IBA 5 ppm)	33.23	42.30	1.53	19.83	12.86	0.51	0.54	18.88	107	8.10
G_8 (IBA 10 ppm)	33.53	43.43	1.60	20.76	13.80	0.55	0.58	19.40	110	9.27
G_9 (IBA 15 ppm)	33.76	44.43	1.63	21.53	14.53	0.60	0.59	20.68	112	10.23
G_{10} (Control)	30.46	36.96	1.48	18.86	11.63	0.45	0.50	16.96	105	8.03
SE(m)±	0.34	0.41	0.006	0.25	0.176	81.79	0.010	0.28	1.853	0.037
C.D. at 5 %	1.028	1.235	0.019	0.77	0.520	0.560	0.029	0.85	5.548	0.109