

## Effect of Gibberllic Acid on Earliness of Cauliflower Curd Initiation under Assuit Conditions

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### Abstract

This work was carried out to study the effect of using gibberllic acid on earliness of curd in two cauliflower genotypes. Seeds were sown on August 6 in a nursery in 2007/2008 and 2008/2009 seasons respectively. The obtained transplants were planted on September 17 in both seasons. Plants were sprayed twice, first at 2 months after transplanting with gibberllic acid (GA<sub>3</sub>) at 0, 50, 100, 200, 400, 800 ppm concentrations, and the second time was after one month from the first spray. The results revealed that, gibberllic acid stimulate plant growth as it increase the height, number of leaves per plant and the fresh weight of whole plant. The results showed that GA<sub>3</sub> at 800ppm concentration was the most appropriate one for floral induction and this concentration also gave the highest total yield in both cultivars.

**Key Words:** Growth regulators, GA<sub>3</sub>, Yield, *Brassica oleracea* var., *botrytis*, *Brassicaceae*.

### Introduction

Gibberllic acids are a group of plant growth regulators that have been identified in different plants (MacMillian *et al.*, 1961). Gibberllic acid (GA<sub>3</sub>)

is used extensively in Egypt to increase the growth of some vegetables such as tomatoes, cabbage and cauliflower (Weaver *et al.*, 1961). Application of gibberellins induced early flowering and affected flower morphology (Richards *et al.*, 2001). It is a stimulant for physiological processes, including flowering, stem growth and seed production. It also is involved in sex expression, development of seedless fruits and retention of foliage.

Gibberllic acid is used by plants to induce growth and, in some cases, flowering and seed germination. As days lengthen, gibberllic acid acts to induce flowering, as in the case of plants in the mustard family like radish, cauliflower and broccoli.

### Materials and Methods

The present work was carried out at the Experimental farm of the Faculty of Agriculture, Assiut University, Assiut during 2007/2008 and 2008/2009 seasons respectively. The soil of the farm was clay. Cauliflower cultivar, Amsherey and cauliflower ecotype from El-sharkia governorate were used in this work. Seeds were sown on August 6 in a nursery in 2007/2008 and 2008/2009

respectively. The obtained transplants were done on September 17 in both seasons. Transplants were planted on rows of 3 m long and at 50 cm space between plants. Three rows were included in each plot. Plants were sprayed twice, two months after transplanted and the second time was after one month from the first spray with gibberellic acid (GA<sub>3</sub>) at concentrations of 0, 50, 100, 200, 400, 800 ppm in both seasons. The concentrations of gibberellic acid (GA<sub>3</sub>) were arranged in Randomized Complete Block Design with three replicates.

**Data records:**

1. Vegetative characters:-

1.a- Plant height (cm):

1.b- Fresh weight of whole plant (gm):

1.c- Number of leaves/ plant: All visible leaves were counted (dry leaves were excluded).

2- Yield and its components:-

2.a- Earliness of curd formation: Days number from transplanting to the day of first harvest were recorded.

2.b- Average weight of marketable curd (kg): The average weight of 5 curds were recorded.

2.c- Curd diameter (cm): The average of the two dimensions of 5 curds were measured.

2.d- Total yield (kg/plot): All marketable curds in each plot were weight and yield/ fed. was calculated.

Statistical analysis:

Data were subjected to statistical analysis according to

Snedecor and Cochran (1980) and means of treatments were compared using L.S.D.

**Results and Discussion**

**1- Vegetative characters:**

1.a- Plant height (cm):

Data presented in (Table 1), showed that, application of GA<sub>3</sub> resulted in elongation in plant in both genotypes. Plant that sprayed by 800ppm of GA<sub>3</sub> showed the highest plant height and there is no difference between GA<sub>3</sub> using 200 ppm or 800 ppm on plant height. It could be, generally noted that, the highest concentration of GA<sub>3</sub> were used, the highest plant height will be obtain. There is an exception on 400ppm treatment so there no significant different between using 50 ppm and 400ppm on plant height. Gibberellic acid (GA<sub>3</sub>) is used extensively to increase the growth of some vegetables such as tomatoes, cabbage and cauliflower (Weaver *et al.*, 1961). This could be due to the role of GA<sub>3</sub> in stimulating both cell elongation and cell division.

1.b- Fresh weight of whole plant (kg):

Data on fresh weight of whole plant as affected by concentration of GA<sub>3</sub> treatments are shown in (Table 1). It could be generally, noted that, application of GA<sub>3</sub> improve the value of fresh weight of whole plant in both genotypes. There was an increase in fresh weight of whole plant by increasing the concentration of GA<sub>3</sub> except in 400 ppm treatment so there was

no difference between this treatment and 50 ppm treatment. Sachs (1965) and Sauter and Kende (1992) reported that gibberellins increased both cell elongation and division.

1.c- Number of leaves/ plant:

As shown in Table (1), leaves number per plant was responded to varying GA<sub>3</sub>

treatments. Using GA<sub>3</sub> has an important role in increment the number of leaves. There is no significant difference between using 50 ppm or 100ppm on number of leaves in both the cultivar and the ecotype. Also there is no difference between using 200 ppm or 800 ppm on number of leaves per plant.

Table (1): Effect of some concentration of GA<sub>3</sub> treatments on some vegetative characters of two cauliflower genotypes during 2007/2008 and 2008/2009 seasons under Assiut conditions.

		2007/2008 season		
		Vegetative characters		
Cultivar/ Ecotype	GA <sub>3</sub> Concentration ( ppm)	Plant height (cm)	F.W. of whole plant(kg)	Number of leaves/ plant
El- Sharkia	0	81.38	4.839	23.28
	50	89.33	5.651	25.05
	100	93.40	5.763	27.01
	200	100.13	6.016	28.40
	400	91.22	5.300	23.39
	800	106.13	6.700	27.58
Amshery	0	84.66	3.916	17.91
	50	90.00	4.483	24.33
	100	92.00	4.566	24.66
	200	103.00	5.716	27.66
	400	94.22	3.985	21.57
	800	105.33	6.316	27.50
	L.S.D. 0.05	4.214	0.497	2.258
2008/2009 season				
El- Sharkia	0	81.83	5.266	23.66
	50	87.83	5.750	25.83
	100	92.50	6.033	26.83
	200	103.00	6.400	28.50
	400	91.66	5.100	24.50
	800	107.00	6.830	28.66
Amshery	0	84.00	3.966	18.83
	50	92.00	4.466	24.50
	100	96.66	4.733	24.16
	200	104.16	5.466	27.66
	400	95.66	4.133	22.00
	800	107.66	6.383	28.16
	L.S.D. 0.05	4.304	0.429	1.562

**Yield and its components:-**

2.a- Earliness of curd development(day):

Data presented in Table (2) showed that, number of days from transplanting to the first harvest were affected by using gibberellic acid. Using 200ppm

or 800ppm gave the least number of days from transplanting to the first harvest. Application of gibberellins induced early flowering and affected flower morphology (Richards *et al.*, 2001). It is a

stimulant for physiological processes, including flowering.

2.b- Average weight of marketable curd (kg):

As shown in Table (2), application of gibberellic acid increasing average weight of marketable curd as comparing with control treatment. Using 800ppm gave the highest value for average weight of marketable curd with El- sharkia ecotype. On other hand, using 200 ppm with Amshery cultivar gave the highest value for this character. Caser (2009), showed that improving curd fresh weight might be referred to the actions of gibberellins on protein and nucleic acid synthesis.

2.c- Curd diameter (cm):

Data on curd diameter as affected by GA<sub>3</sub> concentration

treatments are shown in Table (2), the results showed that, using both 200 ppm and 800 ppm gave the highest value for curd diameter. However, non-significant difference were detected neither between 50 ppm, 100ppm nor 400 ppm

2.d- Total yield (kg/plot):

Data presented in Table (2), showed that, GA<sub>3</sub> application substantially increased the yield of cauliflower particularly 800ppm, which gave the highest yield. However, plant growth regulators play an important role in high value horticultural crop, it could be increase yield, enhance crop quality and management as reported by Caser (2009), showed that, application of GA<sub>3</sub> resulted in an increase in yield of cauliflower.

Table (2): Effect of some concentration of GA<sub>3</sub> treatments on yield and its components characters of two cauliflower genotypes during 2007/2008 and 2008/2009 seasons under Assiut conditions.

		2007/2008 seas			
		Yield and its components			
Cultivar / Ecotype	GA <sub>3</sub> Concentration (ppm)	Earliness of curd development (day):	Average weight of marketable curd (kg):	Curd diameter (cm):	Total yield (kg/plot)
El-Sharkia	0	151.00	2.355	39.93	14.633
	50	148.33	2.450	41.33	15.66
	100	141.00	2.533	42.16	19.900
	200	135.00	2.566	43.37	20.766
	400	138.33	2.450	41.16	16.300
	800	122.66	2.733	45.16	24.500
Amshery	0	133.00	1.333	31.33	10.566
	50	133.00	1.633	34.75	12.300
	100	130.33	1.766	36.50	13.933
	200	123.33	2.255	40.36	15.266
	400	125.00	1.383	32.00	12.733
	800	118.00	1.866	38.50	18.966
	L.S.D. 0.05	7.621	0.144	2.664	2.901
		2008/2009 season			
El-Sharkia	0	156.00	2.450	41.66	13.900
	50	152.66	2.566	42.66	16.670
	100	146.00	2.733	44.66	18.800
	200	140.00	2.783	46.00	21.560
	400	144.00	2.500	42.66	17.800
	800	122.00	2.822	48.16	24.670
Amshery	0	130.00	1.233	31.50	9.400
	50	130.00	1.316	32.50	10.970
	100	128.00	1.700	36.66	13.100
	200	121.00	2.342	42.16	15.670
	400	124.00	1.616	35.66	13.933
	800	115.00	2.033	39.66	19.030
	L.S.D. 0.05	4.878	0.210	2.305	2.622

**Conclusion**

Both of cauliflower genotypes used in this study (cv. Amshery and ecotype El-sharkia) have a determinate growth habit. Gibberellic acid application to cauliflower plants has many

effects on a plant, but primarily stimulates elongation growth. Spraying a plant with gibberellins will usually cause the plant to grow to a larger than normal.

Increasing plant height by using the GA<sub>3</sub> was attributed to the role of gibberellins in increasing cell elongation and division. Taiz and Zeiger (2002) and Sachs (1965) reported that gibberellins increased both cell elongation and division, as evidenced by increase in cell length. Cauliflower plants applied with GA<sub>3</sub> had significantly higher leaf number/plant.

In general, the increase in yield and its components in GA<sub>3</sub>-treated plants was attributed to the increasing in vegetative growth.

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