

Effect of soaking tuberose bulb (*Polianthes tuberosa* L.) in growth regulators and thiorea on growth and flowering

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ABSTRACT

A field experiment were conducted to study the effect of soaking tuberose bulb in aqueous solutions of GA₃ (200 ppm) or BA (300 ppm) or thiorea at 1% for one hour and planted directly in the field. Days taken to sprouting decreased significantly by the application of thiorea than the other treatments. BA significantly induced early flowering than all the other treatments. Also, BA significantly increased the number of bulbs per plant than all the other treatments. The number of florets increased by GA₃ than the other treatment but not significant. The weight of spike increased significantly with thiorea or GA₃ treatments. The length of spike increased with GA₃ than all treatments but not significantly.

Key words: Tuberose bulb, BA, GA₃, Thiorea.

Introduction

Tuberose (*Polianthes tuberosa* L.) Fam. Amaryllidacea is an important cut flower crop in Egypt due to its fragrance and long keeping quality of flower spike.

According to the demand of market it is important to control the flowering time and the flower characteristics. In order to achieve this point, we have to adopt modern production techniques. The application of plant growth regulators has become an essential part of the cultural practices (Larson *et al.*, (1987) stated that soaking of bulbs in solution of PGRs is an efficient method to obtain good results.

Soaking of bulbs in GA₃, BA and thiorea solution before planting improve the growth and flowering of tuberose. Nagaraja *et al.*, (1999) found that soaking tuberose bulbs in solution of GA₃ or BA resulted in earlier plant emergence.

Raja *et al.* (2001) stated that soaking tuberose bulb in solution of thiorea at 1000ppm resulted an early emergence.

Singh *et al.* (2010) showed that soaking tuberose bulb in aqueous solution of GA₃ at 200ppm induced early flowering and reduced number of days taken for spike emergence as compared to the control.

Materials and Methods

This study was carried out in the open field in the ornamental farm of the Dept. of Hort., Faculty of Agriculture, Ain Shams Univ., at Shoubra El-Kheima in Cairo, Egypt for the two seasons of 2016-2017. The bulbs of tuberose were obtained from the experimental farm of Horticulture Department. Uniform tuberose bulbs were chosen with a diameter of 3-3.5 cm. On March 28th 2016 and 2017 bubs were soaked in distilled water for 24 hours before starting the experiment except the control treatment, were kept dry. Then bulbs were subjected to the following treatments:

1. Control (dry bulb).
2. Soaking wet bulbs in solution of GA₃ at 200 ppm for one hour.
3. Soaking wet bulbs in solution of BA at 300 ppm for one hour.
4. Soaking wet bulbs in solution of thiorea at 1% for one hour.

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After that the bulbs were planted directly in the soil at 5 cm depth general cultural practices were adopted in this experiment. The experiment was a randomized complete block design with 3 replicates and every replicate have 10 bulbs.

The following data were recorded:

1. Days taken to sprouting (D.T.S.)
The number of days taken for the bulb to sprout was counted starting from the day of planting.
2. days to full flowering:
The number of days taken for the bulb to flower from the planting day.
3. Length of spike (cm.)
4. Diameter of spike stem at base (cm).
5. Number of leaves on spike stem.
6. Number of florets per spike.
7. Fresh weight of cut spike at harvest (g).
8. Number of new corms per plant.

Statistical Analysis

The data were subjected to analysis of variance according to Steel and Torrie, (1981) and the method Duncan's was used to compare among differentiate means (Duncan, 1955).

Results

Growth characteristics:

Days taken to sprouting (D.T.S): Data presented in Table (1) showed that thiorea treatment recorded significantly the fastest sprouting in the two seasons than control or the other treatments.

Length of spike (cm):

Data presented in Table (1) reveal that GA₃ treatment recorded the longest spike in the first season while BA treatment recorded the longest spike in the second season, but the differences between all treatments were not significant.

- Diameter of spike stem at base (cm):

Data presented in Table (1) showed that control treatment resulted the biggest diameter compared with the other treatment in the two seasons but the differences were not significant.

Number of Leaves on spike stem:

Data presented in Table (1) showed that BA treatment in the first season resulted significantly the highest number of leaves than the other treatments. While in the second season thiorea treatment gained the highest number of leaves than the other treatments but the differences were not significant.

Number of florets per spike:

Data resented in table (1) showed that GA₃ treatment resulted the highest number of florets per spike than the other treatments in the two seasons but the differences were not significant.

Fresh weight of cut spike at harvest:

Data presented in Table (1) resulted that Thiorea and GA₃ treatments gave significantly the high lest fresh weight than the other treatments.

Days to full blooming:

Data presented in Table (1) showed that the shortest period from planting till bloom significantly was BA treatment in the two seasons.

Number of new corms / plant:

Data presented in Table (1) showed that BA treatment significantly gave the highest number of corms / plant in the two seasons.

Table 1: Effect of soaking tuberose bulb (*Polianthes tuberosa* L.) in GA₃ or BA or thiorea on growth and flowering during the seasons of 2016- 2017.

Treatments	Length of spike		Diameter of spike		No. of leaves	
	First Season	Second season	First Season	Second season	First Season	Second season
1. Control	57.6 A	57.7 A	1.6 A	1.06 A	5.3 AB	4.9 A
2. Thiorea	61.6 A	61.0 A	0.96 A	1.03 A	5.8 AB	5.6 A
3. BA	60.5 A	61,5 A	0.93 A	0.9 A	6.4 A	5.3 A
4. GA ₃	62.2 A	62.5 A	1.0 A	1.03 A	4.9 B	4.5 A

Table 1: Cont.

Treatments	Spike fresh weight		No. florets		D.T.S	
	First Season	Second season	First Season	Second season	First Season	Second season
1. Control	52.03 B	61.4 A	13.5 A	14.2 A	48.1 A	46.3 A
2. Thiorea	66.2 A	67.1A	14.5 A	14.6 A	39.3 B	39.1 A
3. BA	57.0 AB	59.4 A	13.7 A	14.0 A	43.4 AB	42.4 A
4. GA ₃	64.03 A	65.1 A	14.8 A	14.8 A	44.3 AB	44.3 A

Table 1: Cont.

Treatments	Days to flowering		No. new bulbs	
	First Season	Second season	First Season	Second season
1. Control	123.1 A	120.2 A	3.5 B	3.4 C
2. Thiorea	117.1 A	116.1 A	5.4 A	5.8 B
3. BA	88.1 B	92.3 B	6.5 A	6.8 A
4. GA ₃	121.4 A	119.3 A	5.5 A	5.8 B

Means with the same letters are not significantly different.

Discussion

In order to improve flowering time and floral characteristics according to the demand of market, it was necessary to use chemicals (GA₃, BA and thiorea).

The results showed that thiorea decreased days taken to sprouting, these results are in agreement with Raja *et al.* (2001) who found that soaking tuberose bulb in aqueous solution of thiorea at 1000 ppm resulted early emergence with 20 days.

Also, BA induced early flowering than all the other treatments, and increased the number of bulbs per plant than the other treatments.

These results are in agreement with Ram *et al.* (2002) who reported that BA increased corm diameter, weight and cormel number of Gladiolus. Hartmann *et al.* (2001) showed that cytokinin known to increase cell division, GA₃ increased the number of florets, the weight and the length of spike. These results are in agreement with Mukhopadhyay and Banker, (1983).

Conclusion

Application of thiorea at 1% decreased days to sprouting. BA at 300 ppm treatment increased the number of bulbs GA₃ at 200 ppm application increased the number of florets, the weight and the length of spike.

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