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Effect of paclobutrazol as foliar spray on bulb yield parameters of tuberose (*Polianthes tuberosa. L*) var. Prajwal

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Abstract

A field experiment was carried out in Horticulture Research Farm, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, to study the effect of paclobutrazol as foliar spray at different dates, on growth, flowering and bulb yield of tuberose (*Polianthes tuberosa L.*) var. Prajwal. The experiment was carried out during the year 2016 - 2018 (March - March) to find out the suitable dose of paclobutrazol and suitable time of its spraying to get maximum flower production. The experiment was laid out in augmented factorial randomized block design with three replications. The first factor contains three different doses of Paclobutrazol application P₁ (100 ppm), P₂ (200 ppm), P₃ (300 ppm) as foliar spray and the second factor is with three different times of Paclobutrazol application i.e., S₁ (45 DAP), S₂ (65 DAP), S₃ (85 DAP). A control plot is made without any application of paclobutrazol to observe the difference in the treatment effect. The results reveal that, compared to all other treatments control produced more number of bulbs per plot. With respect to paclobutrazol treatments, foliar application of 100 ppm of Paclobutrazol (P₁) on the tuberose plants had given the maximum bulb yield regarding small, medium, large and total number of bulbs. With respect to different spraying times, foliar application of paclobutrazol at 45 DAP (S₁) on the tuberose plants had given the maximum number of small bulbs whereas, foliar application of paclobutrazol at 85 DAP (S₃) had given maximum number of medium large and total number of bulbs. Significantly maximum total number of bulbs per plot were observed with the treatment combination P₁S₃ (100 ppm PBZ and 85 DAP).

Keywords: Tuberose, paclobutrazol, spraying time, bulb yield and days after planting

Introduction

Tuberose (*Polianthes tuberosa L.*), is an important commercial flower crop and is extensively cultivated in many sub-tropical and tropical parts of the world including India. It is a native of Mexico, belongs to the family Amaryllidaceae. Tuberose is a bulbous perennial plant with tuberous roots producing long spikes, which bear waxy white and fragrant flowers profusely throughout the year. In India, commercial tuberose cultivation is confined to one species *Polianthes tuberosa*, which is basically a white flowered type. There are four tuberose cultivars popularly grown in India viz., single, double, semi double and variegated. The cultivar single occupies the foremost position than the other. Apart from domestic consumption, tuberose cut spikes has got a very good export potential to other countries. Tuberose floral concrete and essential oil are fetching higher price than any other floral concretes and essential oils. Paclobutrazol the so called growth retardant is generally used widely in the orchard plants like mango which regulates its alternate bearing habit but it is used very rarely in the flower crops. Paclobutrazol indirectly helps in increasing the flower quality and yield in the flower crops by regulating the gibberellin activity (Khan and Pal, 2009) [1]. There is very mere information regarding paclobutrazol effect in the floriculture sector hence we conducted this experiment to assess effect of paclobutrazol in different spraying times.

Material and Methods

The experiment was carried out during the year 2016 - 2018, at the Horticulture Research Farm, Mondouri, at the Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur. The experiment was laid out in augmented factorial randomized block design with three replications. First factor comprises of three different doses of paclobutrazol application P₁ (100 ppm), P₂ (200 ppm), P₃ (300 ppm) as foliar spray and the second factor is with three different times of Paclobutrazol application i.e., S₁ (45 DAP), S₂ (65 DAP), S₃ (85 DAP). Along with these

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treatments one control plot is made. During the field preparation, well rotten farm yard manure @ 1.5 kg/m² was applied as basal dose 15 days before planting and mixed properly with soil. N: P: K @ 150: 200: 200 kg/ha was applied, in which, half N, full P and K applied as basal, remaining N applied as split doses, 30 and 45 days after planting. The size of the plot was 1.5 m x 1.0 m with a spacing of 30 cm x 30 cm.

Bulbs of tuberose cv. Prajwal were provided by Horticulture Research Farm, Mondouri, Bidhan Chandra Krishi Vishwavidyalaya. Before planting the bulbs were stored in well ventilated semi shady place for two months. Older leaves emerging from the neck of the bulbs were trimmed off. Before planting, the bulbs were treated with fungicide copper oxychloride (0.1%) and the individual bulbs weighing 15-30 g with 1.5- 2.5 cm in diameter were selected for planting.

In this article the data was furnished for the parameters like total number of bulbs per plot, number of small bulbs, number of medium bulbs and number of large bulbs. Five plants were selected randomly from each plot for recording data on the above mentioned yield attributes. The data on flowering were recorded during the course of investigation and subjected to statistical analysis as per Panse and Sukhatme (1967) [2]. The appropriate standard error of mean S.E. (m) and the critical difference (C.D.) were calculated at 5% level of probability.

Results

The data relating to number of bulblets per clump was presented in the Table 1. It is divided into small, medium and large bulbs based up on their sizes.

Number of Small bulbs

The effect of paclobutrazol on total number of small bulbs per clump was found significant. The total number of small bulbs per clump (22.73) was maximum in P₁ (Paclobutrazol 100 ppm) which was at par with P₂ (21.99), while the total number of small bulbs per clump (20.68) was minimum in P₃ (Paclobutrazol 300 ppm).

The spraying time, S₁ (Spraying 45 DAP) had given maximum total number of small bulbs per clump (24.61) and it was followed by S₃ (20.43) and the minimum number of bulbs per clump (20.35) was observed in the treatment S₂ (Spraying 65 DAP).

Interaction effect of paclobutrazol and spraying time was significant. The data shows that the maximum total number of small bulbs per clump (29.70) was observed in the treatment P₂ S₁ (200 ppm PBZ and 45 DAP), while the minimum total number of small bulbs per clump (15.31) was found in P₃ S₂ (300 ppm PBZ and 65 DAP). Similar findings were reported by Rana *et al.* (2005) [3] in gladiolus.

Number of Medium bulbs

The effect of paclobutrazol on total number of medium bulbs per clump was found significant. The total number of medium bulbs per clump (6.68) was maximum in P₁ (Paclobutrazol 100 ppm) which was at par with P₂ (5.13), while the total

number of medium bulbs per clump (4.90) was minimum in P₃ (Paclobutrazol 300 ppm).

The spraying time, S₃ (Spraying 85 DAP) had given maximum total number of medium bulbs per clump (6.00) and it was followed by S₁ (5.50) and the minimum number of bulbs per clump (5.21) was observed in the treatment S₂ (Spraying 65 DAP).

The interaction effect of paclobutrazol and spraying time was found non-significant. Similar findings were found by Khan and Pal (2009) [1] in tuberose.

Number of Large bulbs

The total number of large bulbs per clump (4.94) was maximum in P₂ (Paclobutrazol 200 ppm) which was at par with P₃ (4.14), while the total number of large bulbs per clump (3.82) was minimum in P₁ (Paclobutrazol 100 ppm).

The spraying time S₃ (Spraying 85 DAP) had given maximum total number of large bulbs per clump (5.55) and it was followed by S₂ (4.75) and the minimum number of bulbs per clump (2.60) was observed in the treatment S₁ (Spraying 45 DAP).

Interaction effect of paclobutrazol and spraying time on the total number of large bulbs was found significant. The data shows that the maximum total number of small bulbs per clump (5.84) was observed in the treatment P₂ S₃ (200 ppm PBZ and 85 DAP), while the minimum total number of small bulbs per clump (1.69) was found in P₁ S₁ (100 ppm PBZ and 45 DAP). Similar findings were also reported by Singh (1999) [4] in tuberose

Total number of bulbs per clump per plot

The data presented in Table 1 on total number of bulbs per clump revealed that there was significant effect of paclobutrazol, the total number of bulbs per clump decreases with increasing of the doses of paclobutrazol. The effect of paclobutrazol on total number of bulbs per clump was found significant. The total number of bulbs per clump (37.34) was maximum in P₁ (Paclobutrazol 100 ppm) which was at par with P₂ (36.17), while the total number of bulbs per clump (32.56) was minimum in P₃ (Paclobutrazol 300 ppm).

The total number of bulbs per clump varied significantly with different spraying times of paclobutrazol. The data shown in the Table 1 reveals that the spraying time, S₃ (Spraying 85 DAP) had given maximum total number of bulbs per clump (37.81) and it was followed by S₁ (34.65) and the minimum number of bulbs per clump (33.60) was observed in the S₂ (Spraying 65 DAP).

Interaction effect of paclobutrazol and spraying time on total number of bulbs per clump was significant. The maximum total number of bulbs per clump (46.43) was observed in the control treatment, it was at par with control treatment P₁S₃ (40.53), while the minimum total number of bulbs per clump (29.90) was found in P₃ S₂ (300 ppm PBZ and 65 DAP). Similar results were reported by Khan and Pal (2009) [1] in tuberose.

Table 1. Effect of Paclobutrazol and Spraying time on number of bulblets per clump of Tuberose cv. Prajwal.

Treatments	Number of small bulblets per clump	Number of medium bulblets per clump	Number of large bulblets per clump	Total number of bulbs per clump
Paclobutrazol (P)				
P ₁ (100 ppm)	22.73	6.68	3.82	37.34
P ₂ (200 ppm)	21.99	5.13	4.94	36.17
P ₃ (300 ppm)	20.68	4.90	4.14	32.56
S. Em (±)	0.271	0.074	0.054	0.743
C.D at 5%	0.805	0.219	0.159	2.207
Spraying time (S)				
S ₁ (45 DAP)	24.61	5.50	2.60	34.65
S ₂ (65 DAP)	20.35	5.21	4.75	33.60
S ₃ (85 DAP)	20.43	6.00	5.55	37.81
S. Em (±)	0.271	0.074	0.054	0.743
C.D at 5%	0.805	0.219	0.159	2.207
Paclobutrazol x Spraying time				
Control	23.01	8.63	5.49	46.43
P ₁ S ₁	26.07	8.49	1.69	40.44
P ₁ S ₂	18.00	5.24	4.19	34.63
P ₁ S ₃	24.13	6.32	5.59	40.51
P ₂ S ₁	29.70	6.11	3.24	34.01
P ₂ S ₂	20.96	5.46	5.74	32.19
P ₂ S ₃	22.09	3.85	5.84	36.98
P ₃ S ₁	18.08	1.93	2.88	33.65
P ₃ S ₂	15.31	4.93	4.33	29.90
P ₃ S ₃	21.87	7.84	5.21	30.04
S. Em(±)	0.469	0.128	0.093	1.286
C.D at 5%	1.394	N. S	0.276	3.822

Discussion

The above results reveal that the number of bulbs decreases with the increase in the paclobutrazol doses. Regarding the spraying times early application of paclobutrazol decreased the bulb yield but it increased the quality of bulbs. These results are in conformity with Singh *et al.* (2010) ¹ who reported that the bulb weight increased and number of bulbs decreased with increase in doses of growth retardant in tuberose. The decrease in bulb yield might be due to bulbs used for planting serve as reserved food material in the initial stage and photosynthesize in leaves. Likewise, it has two competing sinks i.e. flower spike or inflorescence and development of bulbs. High concentration of growth retardant treatment promoted the sink activity of developing bulbs at the expense of flower spike or inflorescence.

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