



RESEARCH ARTICLE

EFFECT OF GROWTH REGULATORS TREATMENTS WITH DIFFERENT WEIGHT OF TUBERS ON POD YIELD AND QUALITY OF GLORY LILY (*GLORIOSA SUPERBA* L.)

***Sivasankar, S., Manivannan, K. and Muruganandam, C.**

Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar – 608 002, Tamilnadu, India

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ABSTRACT

The present investigation was carried out to study the effect of growth regulators treatments with different weight of tubers on pod yield and quality of glory lily. A field trial was conducted in a Factorial randomized block design with various tuber weight (100-125 g, 175-200 g and above 250 g) and different levels of growth regulators (GA₃ @ 250 ppm, cycocel @ 500 ppm and ethrel @ 500 ppm). The results of the present study revealed that tuber weighed above 250 g treated with GA₃ @ 250 ppm was found to be superior in improving the number of flowers, pod setting percentage, pod length, pod girth, pod yield per plant and pod yield per plot in glory lily.

Key words: Tuber weight, Growth regulator, Glory lily, Pod yield.

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INTRODUCTION

Gloriosa superba L. is a native of tropical Africa belonging to liliaceae family and now found growing naturally in many countries of tropical Asia including Bangladesh, India, Srilanka, Malaysia and Myanmar. In India, it occurs commonly in tropical forests of Bengal and Karnataka (sivakumar and krishnamoorthy 2002). In Tamil Nadu, it is known as kalappaikilangu, kanvalikizhangu, kandhalmalar, karthigai kizhangu and is recognized as the state flower of Tamil Nadu. The medicinal properties of the drug is due to the presence of alkaloids, chiefly 'colchicine' and 'gloriosine' colchicines extracted from the tubers and seeds it used in the treatment of 'gout' and rheumatism, Besides colchicines is frequently used to induce polyploidy in crop plants. Glory lily is commercially propagated by 'V' or 'L' shaped tubers which sprout during the month of July under typical dry belt in Tamil Nadu. But the sprouting of tubers is irregular and in a period of 30 days they sprout to an extent of 60 per cent. The role of plant growth regulators in various physiological and biological processes in plants is well known, which enable a rapid change in the phenotype of the plant. Growth regulators are known for influence on vegetative growth, flowering, fruit set tuber yield and quality. In addition to that, *Gloriosa superba* and other tuberous annual plants have indicated the existence of a relationship between tuber weight with growth and productivity.

The tubers obtained from medium and larger tubers may be expected to grow vigorously with higher production of flowers and pods (Farooqi and Sreeramu, 2004) Hence, there is an imperative need to standardize the optimum tuber weight and accurate quantity of growth regulator in *Gloriosa superba* for better sprouting, growth and yield.

MATERIALS AND METHODS

The present experiment was carried out in the Orchard Department of Horticulture, Faculty of Agriculture, Annamalai University during 2012. Healthy *Gloriosa* tubers of different size were procured from a farmer's field in Vedaranyam. The tubers were transported and stored temporarily in a thick layer of river sand under cool dry shady place. Tubers of various weights viz., 100-125 g, 175-200 g and above 250 g were soaked for 12 h in appropriate growth regulator solutions as per treatment schedule. For control treatment the tubers were immersed in water for 12 hours. Then the treated tubers were spread over a thick layer of moist river sand in a cool dry shady place and covered with gunny bag until 20 days for sprouting. The sprouted tubers were immediately planted in the experimental field. The experiment was laid out in factorial randomized block design with three replications. Regular cultural practices were adopted to raise the crop successfully. Observations were recorded on the number of flowers, pod setting percentage, pod length, pod girth, pod yield per plant and pod yield per plot. The treatment details are as follows

***Corresponding author:** Sivasankar, S.,

Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar – 608 002, Tamilnadu, India.

Factor 1: Weight of the tuber (3 Levels)

W₁- 100 to 125 g
 W₂-175 - 200 g
 W₃-> 250 g

Factor 2:Tuber treatment with Growth regulators (4 Levels)

G₁- GA₃ @ 250 ppm
 G₂-Cycocel @ 500 ppm
 G₃-Ethrel @ 500 ppm
 G₄-Control

Treatment details

T. No.	Treatment Details
T ₁	W ₁ ×G ₁ - 100 to 125g of tuber + GA ₃ @ 250 ppm
T ₂	W ₁ ×G ₂ - 100 to 125g of tuber + Cycocel @ 500 ppm
T ₃	W ₁ ×G ₃ - 100 to 125g of tuber + Ethrel @ 500 ppm
T ₄	W ₁ ×G ₄ - 100 to 125g of tuber + water (control treatment)
T ₅	W ₂ ×G ₁ - 175 - 200 g of tuber + GA ₃ @ 250 ppm
T ₆	W ₂ ×G ₂ - 175 - 200 g of tuber + Cycocel @ 500 ppm
T ₇	W ₂ ×G ₃ - 175 - 200 g of tuber + Ethrel @ 500 ppm
T ₈	W ₂ ×G ₄ - 175 - 200 g of tuber + water (control treatment)
T ₉	W ₃ ×G ₁ - > 250 g of tuber + GA ₃ @ 250 ppm
T ₁₀	W ₃ ×G ₂ - > 250 g of tuber + Cycocel @ 500 ppm
T ₁₁	W ₃ ×G ₃ - > 250 g of tuber + Ethrel @ 500 ppm
T ₁₂	W ₃ ×G ₄ - > 250 g of tuber + water (control)

RESULTS AND DISCUSSION

In the present study, the effect of growth regulators treatments with different weight of tubers on pod yield and quality characters of glory lily are presented in the Table 1.

Similar trend was observed in interaction studies. The bulb size has been reported to play an important role on growth and flowering of tuberose. It influenced the sprouting of bulbs and the time required was inversely proportional to size of bulb (Sadhu and Das, 1978; Pathak et al., 1980). Similar reports were earlier reported in Gloriosa (Rajaram *et al.*, 2002) and Suh (1989) and Puja *et al.* (2003). The pod setting percentage was found to be higher in tuber treated with G₁ 75.54 per cent which was followed by G₃ 73.60 per cent. The interaction effect of tuber weight along with the growth regulator treatment recorded a pod setting percentage of 81.35 per cent. The maximum number of flowers observed by GA₃ 250 ppm in the present study might be due to its role in cell division and cell enlargement and are largely controlled by endogenous level of gibberellic acid which has been proved in number of crops. The increased cell division and cell elongation reflected in increased flower yield was observed in hybrid lilies (Gorden *et al.*, 1980). Tallest plants with more number of flower spikes and florets were produced in gladiolus when the corms were treated with 300 ppm GA₃ as reported by Rajesh and Ajaykumar (2007). Similar results were obtained with GA₃ in day lily (Das *et al.*, 1992), *Lilium longiflorum* (Sujatha and Bhattacharjee, 1992), gladiolus (Bhattacharjee, 1984) and in *Zephyranthes* (Sujatha and Bhattacharjee, 1990). Application of growth regulator G₁ (GA₃ @ 250 ppm) recorded maximum length and girth of pod (5.59 and 4.60 cm respectively) followed by G₃ (Ethrel @ 500 ppm) which recorded the length and girth of pod was 5.36 and 4.37 cm respectively. Tuber weight of W₃ (>250 g) recorded the length and girth of pod was 5.84 and 4.84 cm. The maximum length and girth of pod was found to be more in the interaction W₃ x G₁ (6.26 and 5.24 cm) with tuber weight of (>250 g) treated with GA₃ @ 250 ppm.

Table 1. Effect of growth regulators treatments with different weight of tubers on pod yield and quality of glory lily

Treatments	Number of flowers per plant	Pod setting percentage	Pod length(cm)	Pod girth(cm)	Pod yield per plant(g)	Pod yield per plot(Kg)
W1 X G1	21.49	69.83	4.96	3.99	90.48	1.12
W1 X G2	19.05	65.98	4.50	3.54	63.24	0.83
W1 X G3	20.24	67.87	4.72	3.76	76.39	0.98
W1 X G4	16.95	63.46	4.12	3.16	42.73	0.46
W2 X G1	24.53	75.45	5.55	4.55	126.75	1.64
W2 X G2	21.81	70.90	5.03	4.05	93.54	1.16
W2 X G3	23.31	73.52	5.32	4.33	113.42	1.43
W2 X G4	20.55	68.88	4.79	3.82	76.63	0.89
W3 X G1	28.26	81.35	6.26	5.24	187.52	2.43
W3 X G2	25.81	77.47	5.80	4.79	149.57	1.95
W3 X G3	27.04	79.42	6.03	5.02	167.82	2.17
W3 X G4	23.15	73.00	5.29	4.30	108.72	1.36
SE(d)	0.50	0.79	0.09	0.09	19.45	0.05
CD (P=0.05)	1.03	1.63	0.19	0.19	38.98	0.12
W Mean						
W1	19.43	66.78	4.57	3.62	68.21	0.85
W2	22.54	72.18	5.17	4.19	102.59	1.28
W3	26.06	77.81	5.84	4.84	153.41	1.98
SE(d)	0.25	0.39	0.05	0.05	9.42	0.03
CD (P=0.05)	0.52	0.81	0.10	0.09	19.49	0.06
G Mean						
G1	24.75	75.54	5.59	4.60	134.92	1.73
G2	22.22	71.45	5.11	4.13	102.12	1.31
G3	23.53	73.60	5.36	4.37	119.21	1.53
G4	20.21	68.45	4.73	3.76	76.03	0.90
SE(d)	0.29	0.45	0.05	0.05	10.87	0.03
CD (P=0.05)	0.59	0.94	0.11	0.11	22.51	0.07

It was found that the number of flowers was more in the tubers treated with G₁ (GA₃ @ 250 ppm) (24.75) which was followed by G₃ (Ethrel @ 500 ppm). Tuber weighed above 250 g recorded more number of flowers per plant W₃ (26.06) followed by W₂ (22.54).

The favorable effect of GA₃ and NAA on enhancing the length and girth of pod could be attributed to the increased in GA₃ which might have triggered the activity leading to length and girth of pod as suggested by Malik (1999) and the results are in consonance with the findings of present study.

Growth regulator G₁ (GA₃ @ 250 ppm) application recorded maximum pod yield per plant and pod yield per plot (134.92 g and 1.73 kg respectively) followed by G₃ (Ethrel @ 500 ppm) which recorded 119.21 g and 1.53 kg of pod yield per plant and pod yield per plot. Tuber weight W₃ (>250 g) recorded pod yield per plant and pod yield per plot was 153.41 g and 1.98 kg. The pod yield per plant and pod yield per plot was found to be more in the interaction W₃xG₁ (187.52 g and 2.43 kg) with tuber weight (>250 g) treated with GA₃ @ 250 ppm. The production of more number and quality of pods are directly correlated with the food supplement from bigger sized mother tuber of glory lily it forms an important parameters involved in enhancing the pod yield (Bankar and Mukhopadhyay 1980). The flowering effect can be attributed to the suppression of vegetative growth by the growth retardants and diversion of food resources to the flowering sites leading to early flowering as suggested by Krishnamoorthy and Sandooja (1981); Srivastava (1996). In support of the findings, Sidhu *et al.* (1981) has reported early flowering due to application of MH and CCC. On the other hand, combination effect indicate the tuber weight has exerted marked influence in accelerating the flowering process, besides enhancing the flower production. This may be attributed to the growth of the plant and the accompanying physiological changes that had occurred due to growth regulator application, which have transformed the vegetative phase in to a reproductive phase. The findings of this experiment clearly brought out that using tubers with a weight of more than 250g and treatment of tubers with growth regulator GA₃ @ 250 ppm was found to be optimum for increasing the pod yield and quality characters in glory lily.

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