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Integrated nutrient management in bird of paradise (*Strelitzia reginae*)

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Abstract

An experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, The Nilgiris to standardize the nutrient management in Bird of Paradise (*Strelitzia reginae*) during the year 2015-2018. The experiment was conducted in Randomised Block Design with comprises of nine treatments replicated thrice. Uniform sized suckers were planted in the spacing 1.25 x 1.25 m under open conditions. In each replication five plants from each treatment were used as tester for recording observations on characters like plant height (cm), number of leaves (Nos), leaf length (cm), leaf width (cm), spike length (cm), spike diameter (cm), length of the spike head (cm) and number of flowers /year/plant. The data revealed that the highest plant height was recorded in treatment T₈ (87.10 cm) followed by treatment T₄ (84.00 cm), whereas the lowest plant height was recorded in treatment T₂ (57.80 cm). The number of leaves ranged from 4.10 to 8.75 nos. The treatment T₈ recorded maximum leaf length (45.00 cm) followed by treatment T₃ (40.50 cm) and minimum leaf length was observed in T₁ (28.00 cm) and maximum leaf width (14.00 cm) was observed in the treatment T₂. However, treatment T₈ (91.65 cm) recorded maximum spike length, spike diameter (5.55 cm) and length of the spike head (22.35 cm). The number of flowers per plant per year ranged from 11.05 to 16.50. The maximum number of flowers per plant per year (16.50 Nos) was recorded in the treatment T₈ followed by T₅ (15.25 Nos) and the treatment T₆ (14.75 Nos) whereas, the lowest number of flowers per plant per year was noticed in T₁₀ (11.05 Nos). The highest net return was obtained in the T₈ (1:3.50) followed by T₅ (1: 3.40). It could be concluded from the present investigation that T₈ : 37.5 g N₂: 20g P₃ :37.5 g K₂ have performed better in terms of vegetative and yield characters for Bird of Paradise under Nilgiris condition.

Keywords: Standardization, nutrition, INM, bird of paradise

Introduction

Bird of Paradise (*Strelitzia reginae*) is an evergreen perennial herbaceous plant and belongs to the family Strelitziaceae. It occupies a pride place in the garden and is an important choice for landscaping. It grows up to a height of 90 cm. The leaf stalk is about 45 cm long with the same length of the leaf blade. The flowers are orange and purple coloured and very brilliant, emerging from the purplish spathes on a stem of about 90cm long. The bird of paradise flowers and leaves are also used for arrangement.

Bird of Paradise are commercial cultivated in large scale in America, Israel and South Africa. In temperate areas like Netherlands, Poland, China and Japan. In India, Bird of Paradise is grown in sub-temperate and sub-tropical regions like Himachal Pradesh, Kalimpong and Darjeeling in West Bengal, Bangalore and adjoining areas in Karnataka, etc.,

In Tamil Nadu, it is cultivated in the Nilgiris and the entire part of transitional belt seems to be very ideal for cultivation of most of the flowers on account of favourable climate, soil and other factors. The Nilgiris is endowed with varied agro climatic conditions suitable for raising a wide variety of Horticultural crops. The condition prevailing in Nilgiris is suitable for growing different lands of cut flowers like carnation, cut gerbera, liliun, alstroemeria and limonum, etc. Lately by the increase in the cost of production of cut flowers grown under protected conditions has led the farmers for open cultivation of flowers like bird of paradise, alstroemeria and gladiolus etc., Considering the above results, application of balanced sources of nutrients to obtain high yield and good quality cut stems, this research was concentrated more on nutrient management in Bird of Paradise.

Materials and Methods

An experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, The Nilgiris to standardize the nutrient management in Bird of Paradise (*Strelitzia reginae*) during the year 2015-2018.

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The experiment site which is located at 11.4025°N Latitude, experiment site which is located at 11.4025°N Latitude, 76.735° E Longitude and at an Altitude of 2635 m above the Mean Sea Level. The mean annual rainfall of The Nilgiris is 1632 mm. The average maximum and minimum temperature is 26.0°C and 2°C respectively. The average relative humidity is 75 per cent. Uniform sized suckers were planted in the spacing of 1.25x 1.25 m. The experiment was conducted in Randomised Block Design with comprises of nine treatments replicated thrice. The details of the treatment is furnished below:

Treatment details T1: 25g N1 : 10g P1 : 25 g K1, T2 :37.5g N2: 10g P1 : 37.5 g K2, T3 :50 g N3: 10g P1 :50 g K3, T4 :25 g N1: 15g P2 : 25 g K1, T5:37.5 g N2: 15g P2:37.5 g K2, T6 :50 g N3 :15g P2 :50 g K3, T7 : 25 g N1: 20g P3: 25 g K1, T8 : 37.5 g N2: 20g P3 :37.5 g K2, T9: 50 g N3: 20g P3: 50 g K3. Application of Biofertilizers – Azospirillum 2g/plant, Phosphobacteria 2g/plant, *Pseudomonas fluorescens* 2g/plant and VAM 2 g/plant was applied uniformly for all the treatments. Uniform sized suckers were planted in the spacing 1.25 x 1.25 m in Randomized Block Design (RBD) with three replication. In each replication five plants from each treatment were used as tester for recording observations on characters like plant height (cm), number of leaves (Nos), leaf length (cm), leaf width (cm), spike length (cm), spike diameter (cm), length of the spike head (cm), and number of flowers per year per plant. The data generated during the course of study was subjected to statistical analysis as prescribed by Panse and Sukhatme (2000) [6].

Results and Discussion

The observations were recorded on the vegetative and floral traits and is presented in table 1. The significant differences were noticed for all the characters under study. The data revealed that the highest plant height was recorded in treatment T8 (87.10 cm) followed by treatment T4 (84.00 cm), whereas the lowest plant height was recorded in treatment T2 (57.80 cm). The increase in plant height in treatment T8 which might be due to availability of combined application of nitrogen and phosphorus. Nitrogen plays a vital role in metabolic activities of plants. It is responsible for synthesis of protein, amino acids, nucleic acids, chlorophyll and protoplasm of cell which help in harvesting solar energy through chlorophyll compounds. This finding was also supported Dishaben *et al* 2017 and Dorajeero (2013) [3, 4] in gladiolus.

The number of leaves ranged from 4.10 to 8.75 nos. The treatment T8 recorded the maximum number of leaves per plant (8.75 Nos) followed by the treatment T5 (6.25 Nos), T1 (6.20Nos) and the lowest was observed in T6 (4.10 Nos). It is

due to the supply of nitrogen which increases the availability of cytokinins that are known to promote the growth of plant and intensifies the production of significantly longer shoots with more number of leaves as reported by Singh *et al.* (2017) [8]

The treatment T8 recorded maximum leaf length (45.00 cm) followed by Treatment T3 (40.50 cm) and minimum leaf length of 28.00 cm was observed in T1. Maximum leaf width of 14.00 cm was observed in the treatment T2. Phosphorus also stimulates early growth and encourages cell wall and length of plant resulting in maximum plant spread in gerbera. Similar result was reported by (Barad *et al.*, 2010) [1].

The quality characters like spike length, spike diameter and length of the spike head were statistically significant with various levels of fertilizers. However, treatment T8 (91.65 cm) recorded the maximum spike length followed by the treatment T6 (81.80 cm) and treatment T7 (81.63cm) and the lowest spike length (62.43 cm) was observed in the treatment T3. Significantly increased level of potassium will increase the effect on stalk length. Potassium triggers activation of enzymes and is essential for production of (ATP) Adenosine Triphosphate which is an important energy source for many chemical causes and this result in maximum stalk length. Similar results were obtained by Usha *et al.*, 2019 and Bhatia *et al.*, 2004) [9, 2] in carnation. The maximum spike diameter (5.55 cm) was recorded in the treatment T8 and minimum was observed in treatment T6 3.95 cm. Maximum length of the spike head (22.35 cm) was recorded in treatment T8 followed by the treatment T5 (21.40 cm). The drastic increase in stem girth was due to application appropriate combination of organic manure, inorganic fertilizers biostimulants and biofertilizers. Similar effects have also been documented in gladiolus (Prabhat & Arora, 2000) [7].

Number of flowers per plant per year in bird of paradise ranged from 11.05 to 16.50. The maximum number of flowers per plant per year (16.50 Nos) was obtained in the treatment T₈ followed by T₅ (15.25 Nos) and the treatment T₆ (14.75 Nos) whereas the lowest number of flowers per plant per year was noticed in T₁₀ (11.05 Nos). Balanced dose of nitrogen, phosphorus and potassium seems to be increased the flower quantity. Potassium nitrate for flower growth in the growing soil might be one of the reasons for the production of flowers with better size. This is well supported by Gayathri *et al.* 2004 [5] in Limonium. Among the treatments, the highest net return was obtained in the T₈ (1:3.50) followed by T₅ (1: 3.40). It could be concluded from the present investigation that T8: 37.5 g N2: 20g P3 :37.5 g K2 have performed better in terms of vegetative and yield characters in Bird of Paradise under Nilgiris condition.

Table 1: Effect of Nutrient management on Vegetative and Floral characters of Bird of Paradise (Pooled Mean 2016-2018)

Treatments	Plant height (cm)	Number of leaves	Leaf length (cm)	Leaf width (cm)	Spike length (cm)	Spike diameter (cm)	Length of the Spike head (cm)	Number of flowers/ year/plant	B:C ratio
T ₁	70.65	6.20	28.00	13.85	69.75	5.15	19.00	12.80	2.95
T ₂	57.80	5.25	36.20	14.00	72.95	5.15	21.35	13.75	3.12
T ₃	64.25	4.65	40.50	12.80	62.43	5.05	19.30	12.05	2.90
T ₄	84.00	5.35	35.80	12.15	78.20	5.40	19.75	13.25	3.09
T ₅	75.65	6.25	30.60	10.15	76.15	4.55	21.40	15.25	3.40
T ₆	64.20	4.10	27.65	11.80	81.80	3.95	19.15	14.75	3.30
T ₇	68.65	5.20	39.65	10.80	81.63	4.15	18.15	14.35	3.10
T ₈	87.10	8.75	45.00	11.73	91.65	5.55	22.35	16.50	3.50
T ₉	78.60	6.00	34.35	10.00	79.73	4.10	20.05	12.00	2.75
T ₁₀	77.20	6.00	29.15	10.15	74.68	4.20	18.75	11.05	2.60
SE.d	4.27	0.39	1.65	0.79	5.13	0.36	1.34	0.69	-
CD(p=0.05)	8.97	0.82	3.47	1.68	10.79	0.75	2.81	1.45	-

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