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Influence of combined application of micro and macronutrients on vegetative growth of *Anthurium* (*Anthurium andraeanum*) cv. tropical

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Abstract

An experiment entitled “Nutritional management in *Anthurium andraeanum* cv. Tropical” was conducted to evaluate the effect of macronutrients alongwith micronutrients in agro shadenet structure of BTCC LAB, Dept of Floriculture and Landscaping, OUAT. Among the vegetative characters the highest plant height (26.94 cm), number of leaves per plant (10.33) and leaf petiole length (21.03cm) were observed with the substrate application of RDF -Urea:SSP: MOP @ (7.2:4.6:3.0 g/plant) alongwith Ca as Calcium Carbonate (1.6g/plant) and Mg as Magnesium Sulphate (1.5g/plant). For planting the tissue cultured anthurium plants 30 cm size earthen pots were used. The potting mixture comprised of substrates like charcoal, coconut husk, mango bark, coconut chops and bricks in equal proportion and placed under agro shadenet structure having 50% shade. The experiment was laid out in Completely Randomized Design and replicated thrice. The data observed revealed that the application of MS Micro and macronutrients significantly enhanced the vegetative growth in anthurium.

Keywords: Anthurium, charcoal, coconut chops, coconut husk, shadenet, vegetative growth

Introduction

Mineral nutrition of flower crops assumes fundamental importance in floriculture, while micronutrients play a vital role in quality flower production. Achieving and maintaining higher yield and quality level has become one of the focal points of sustainable production both under open and polyhouse condition. Plant nutrients are the essential elements needed for successful growth and development of flower crops. Although plants absorb more than 35 elements, only 18 elements are known to be essential to them. Iron, manganese, zinc, copper, boron, molybdenum, chlorine, cobalt and nickel are known as essential micronutrients for plant growth and development. Plant must have these micronutrient elements to complete their life cycle though it is required in small amount.

Anthurium belongs to the family Araceae and is native of tropical zones of Central and South America. Anthuriums are tropical plants grown for their showy cut flowers and attractive foliage. Anthurium has gained the importance as major cut flower of the modern world. Anthurium growing is a potential source of commercial farming and it makes best use of ready market for cut flowers with high returns both for its cut flower and whole plant. Anthurium ranks ninth in the global flower trade and commands a respectable price both for its cut flower and whole plant presently the Netherlands is the world's leading producer and exporter followed by Mauritius. It is the national flower of Mauritius. The agroclimatic conditions of Odisha alongwith abundant water availability offer a natural advantage for the commercialization of several unexploited floras in various parts of the state. Malkangiri, parts of Koraput, Rayagada in north Eastern Ghats, Ganjam, Kandhamal, Kendrapada, Jagatsinghpur, Khurda, Puri, Nayagarh are suitable for anthurium cultivation in Odisha (Beura *et al.*, 2017) [4].

Materials and Methods

The field experiment was conducted during May 2016- April 2017 in the agro shadenet of Biotechnology -cum Tissue Culture Centre, Orissa University of Agriculture and Technology Bhubaneswar, Odisha. The six months old anthurium tissue cultured plants maintained in the pots of the RKVY project running at the BTCC Lab were used for the experiment purpose. The anthurium plants were planted in potting mixture comprising of coal and coconut husk pieces, coarse sand and broken bricks in equal proportion. The coconut husks were collected from mature coconuts, cut into 2”X 2” pieces (approx.) and were washed thoroughly before being used as potting mixture. The plants were then planted in middle of the pot and watered.

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The plants were placed in shade. Urea (7.2g/plant) was applied in three splits in a month as substrate application at 10th, 20th and 30th day of the month. Single super phosphate (SSP) (4.6 g/pot) was applied twice a month through substrate application on 15th and 30th day of the month. Murate of potash (MOP) 3g/plant was applied twice a month through substrate application on 15th and 30th day of the month Ca as Calcium carbonate (1.6 g /plant) application was done once a

month through substrates. Mg as Magnesium sulphate (1.5 g /plant) was given twice a month through substrate application. Sulphur as Wettable Sulphur (1.5 mg/l) Spray was done once a month and MS Micronutrient solution was applied @ 10ml/liter once a month as foliar spray.

The observations on plant height, number of leaves per plant were recorded manually on six randomly selected plants from each treatment. The details of the experiment are given below.

Table 1: Treatment details

Sl. No.	Fertilizers	Symbol
1	RDF (30:20:50g/m ²)	T ₁
2	RDF(30:20:50)g/m ² + Ca(1.6g)/plant	T ₂
3	RDF(30:20:50)g/m ² +Mg(1.5g/plant)	T ₃
4	RDF(30:20:50)g/m ² + S(1.5mg/l)	T ₄
5	RDF(30:20:50)g/m ² + Ca(1.6g)/plant+ Mg(1.5g/plant)	T ₅
6	RDF(30:20:50)g/m ² + Ca(1.6g)/plant + S(1.5mg/l)	T ₆
7	RDF(30:20:50)g/m ² +Mg(1.5g/plant)+ S(1.5mg/l)	T ₇
8	RDF(30:20:50)g/m ² +Mg(1.5g/plant)+Ca(1.6g)/plant+ S(1.5mg/l)	T ₈
9	RDF(30:20:50)g/m ² +Ca(1.6g)/plant+MS Micronutrients(10 ml/litre)	T ₉
10	RDF(30:20:50)g/m ² +Mg(1.5g/plant)+MSMicronutrients(10 ml/litre)	T ₁₀
11	RDF(30:20:50)g/m ² +S(1.5mg/l)+MSMicronutrients(10 ml/litre)	T ₁₁
12	RDF(30:20:50)g/m ² +Ca(1.6g)/plant+Mg(1.5g/plant)+MS Micronutrients (10 ml/litre)	T ₁₂
13	RDF(30:20:50)g/m ² +Ca(1.6g)/plant+S(1.5mg/l)+MS Micronutrients(10 ml/litre)	T ₁₃
14	RDF(30:20:50)g/m ² +Mg(1.5g/plant)+S(1.5mg/l)+MS Micronutrients(10 ml/litre)	T ₁₄
15	RDF(30:20:50)g/m ² +Ca(1.6g)/plant+Mg(1.5g/plant)+S(1.5mg/l)+MS Micronutrients(10 ml/litre)	T ₁₅

Results and Discussion

Data in Table 2 shows that the treatments had significant effect on vegetative characters of anthurium.

Table 2: Effect of nutrients on vegetative growth of *Anthurium* cv. Tropical

Treatments	Plant height (cm)	Number of leaves per plant	Petiole length (cm)	Leaf Length (cm)	Leaf breadth (cm)
T ₁ RDF (Urea:SSP:MOP) (7.2:4.6:3.0 g/plant)	18.06	7.00	16.73	10.33	6.46
T ₂ RDF + CaCO ₃ (1.6g)/plant	21.53	7.66	18.66	11.20	7.16
T ₃ RDF + MgSO ₄ (1.5g/plant)	22.33	8.66	17.70	10.80	6.66
T ₄ RDF + Wettable Sulphur (1.5mg/l)	24.06	7.67	19.10	11.36	7.00
T ₅ RDF + CaCO ₃ (1.6g)/plant + MgSO ₄ (1.5g/plant)	26.94	10.33	21.03	12.00	7.90
T ₆ RDF + CaCO ₃ (1.6g)/plant + Wettable Sulphur (1.5mg/l)	23.16	9.00	20.13	12.66	7.86
T ₇ RDF + MgSO ₄ (1.5g/plant) +Wettable Sulphur (1.5mg/l)	21.20	9.33	19.60	13.10	7.20
T ₈ RDF + MgSO ₄ (1.5g/plant) + CaCO ₃ (1.6g)/plant + Wettable Sulphur (1.5mg/l)	22.30	8.50	20.26	11.60	6.86
T ₉ RDF + CaCO ₃ (1.6g)/plant + MS Micro (10 ml/litre)	24.14	7.66	20.03	12.26	7.46
T ₁₀ RDF + MgSO ₄ (1.5g/plant) + MS Micronutrients (10 ml/litre)	21.80	9.00	20.23	13.46	7.50
T ₁₁ RDF + Wettable Sulphur (1.5mg/l) + MS Micro (10 ml/litre)	23.60	8.00	18.80	12.16	6.73
T ₁₂ RDF + CaCO ₃ (1.6g)/plant + MgSO ₄ (1.5g/plant) + MS Micro (10 ml/litre)	24.33	8.66	19.53	11.70	7.30
T ₁₃ RDF + CaCO ₃ (1.6g)/plant + Wettable Sulphur (1.5mg/l) + MS Micro (10 ml/litre)	26.30	10.00	20.03	12.63	7.33
T ₁₄ RDF + MgSO ₄ (1.5g/plant) + Wettable Sulphur (1.5mg/l) + MS Micro (10 ml/litre)	24.56	8.11	18.73	13.33	7.53
T ₁₅ RDF + CaCO ₃ (1.6g)/plant + MgSO ₄ (1.5g/plant) + Wettable Sulphur (1.5mg/l) + MS Micro (10 ml/litre)	26.40	8.00	18.5	13.56	8.10
SEm(±)	0.16	0.44	0.12	0.10	0.11
C.D. 5%	0.47	1.26	0.35	0.29	0.31
CV	1.20	8.90	1.09	1.43	2.51

Plant height: Plant height varied significantly due to application of nutrients on *Anthurium* cv. Tropical. Among the different treatments, treatment T₅ RDF (Urea:SSP:MOP), Calcium Carbonate and Magnesium Sulphate showed highest plant height (26.94cm) It might be due to balanced dose of NPK which increase the vegetative growth, favourable for the synthesis of peptide bond, protein and carbohydrate metabolism that are essential for plant development. Nitrogen being important in cell division and vegetative growth resulted

better plant height. Its combining effect with calcium and other nutrients utilizes vitamins in better proportion and catalyzes enzymatic activity for greater vegetation.

Petiole length: Treatment T₅ (RDF + Ca + Mg) showed maximum petiole length (21.03cm) It might be due to proper supply of nitrogen which increases synthesis of proteins and consequence of which there is an increased meristematic activity leading to higher plant growth. Similar results were

found by Dufour *et al.* (2001) ^[6] who conducted trial on cultivation of anthurium in soil less media under polyhouse.

Number of leaves/ plant: The number of leaves per plant varied significantly among different treatments of nutrients application on *Anthurium* cv. Tropical. Plants treated with (RDF+ Ca+ Mg) treatment T₅ Similar results were obtained by Sunita Devi *et al.* (2003) who reported more number of leaves and growth in carnation due to increased level of nutrients. The availability of macronutrients reflected into better number of leaves per year. The availability of macronutrients reflected into better number of leaves per year. High dose of macro nutrients (NPK) resulted in maximum number of leaves which is confirmed by the finding of Javaid *et al.*, Qasim *et al.* and Gohar *et al.* Neerja *et al.*, (2005) who reported the response of cultivars towards the different levels of nitrogen in increasing the number of leaves per plant. T₅ showed maximum petiole length (21.03cm) leaf length (13.56 cm) and leaf breadth (8.10cm) were found maximum in T₁₅ Nitrogen is the major constituent of chlorophyll and involved in major physiological process like photosynthesis (Baboo and Singh, 2006) ^[3]. It has been observed with proper supply of nitrogen increased synthesis of proteins and consequence of which there is an increased meristematic activity leading to higher plant growth. (Arney, 1950; Salvi, 1997; Valsala kumari *et al.* 2001); (Srinivasa and Reddy, 2005) ^[12, 10].

Conclusion

From the above experiment entitled "Nutritional Management in *Anthurium andraeanum* cv. Tropical" it has been concluded that overall vegetative growth in terms of plant height (26.94 cm), number of leaves per plant (10.33) and petiole length (21.03 cm) was recorded maximum in the plants treated with RDF (Urea, SSP and MOP 7.2: 4.6:3.0 g/plant), Calcium carbonate (1.6 g/plant) and Magnesium sulphate (1.5 g/plant).

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