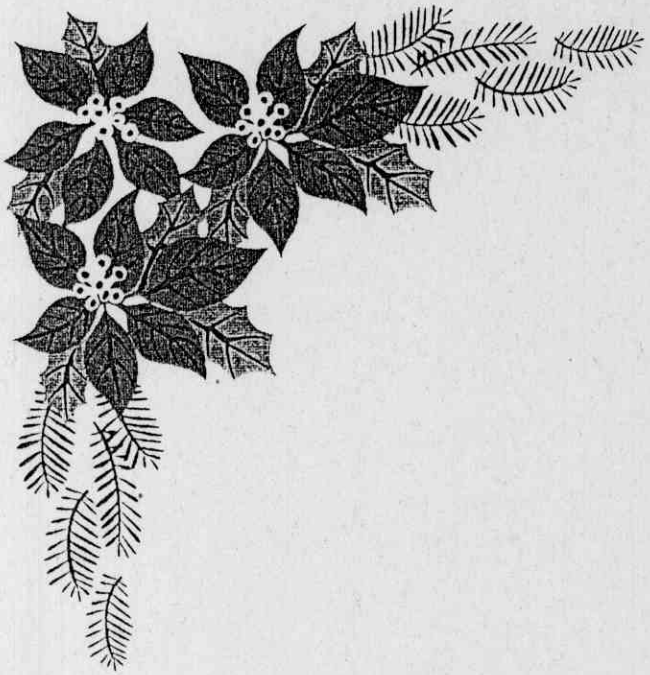
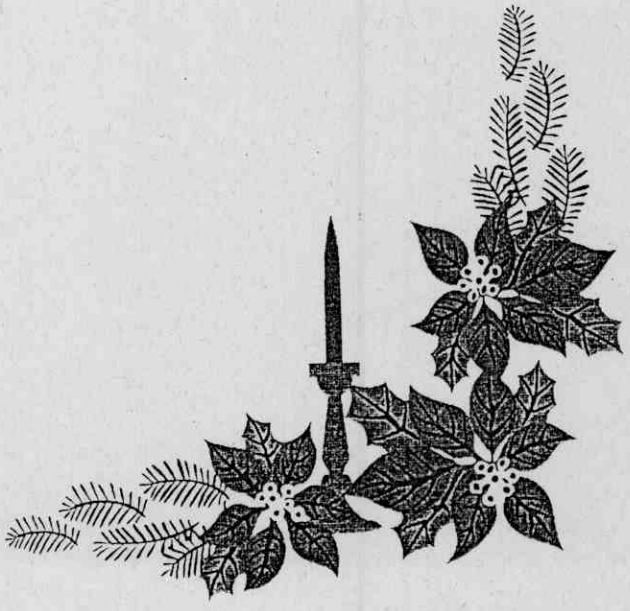


SUMMARY



SUMMARY

This investigation was carried out during the seasons of 2001/2002 and 2002/2003 at the Experimental Farm Station of Faculty of Agriculture, Moshtohor, Zagazig University, Banha Branch. Bird of paradise plants (*Strelitzia reginae*, Ait.) located at the Experimental Farm were used in these studies.

This study includes two main parts: -

V.1-The first part (pot experiments)

The first part of this study can be divided into these studies as follows:

V.1.A - Offsets study:

This study aimed to investigate the effect of some growth retardants i.e., paclobutrazol, cycocel and uniconazole on growth, flowering and chemical composition of *Strelitzia reginae* plants. The objective was to find out which of these growth retardants had the most pronounced positive effect on producing the plants to be used as a flowering pot plants.

Plants were treated with paclobutrazol, (100, 200, and 300 ppm), cycocel (500, 1000, and 2000 ppm) and uniconazole (50, 100, and 150 ppm) in addition to tap water as a control. All treatments were applied four times either by spray method or drench method (100 ml/pot).

V.1.B- Seedlings study.

The purpose of this study was to accelerate the transition of *Strelitzia reginae* seedlings from juvenility to maturity stage

by using stimufol as a complete fertilizer containing macro and micro elements and tryptophan as amino acid.

The treatments which were used in this work were as follows:

Tryptophan at 100 and 200ppm, stimufol at 2, 4 and 6 (g/L), tryptophan at 100 ppm + stimufol at 2 g/L, trypotophan at 100 ppm + stimufol at 4 g /L, Tryptophan at 100 ppm + stimufol at 6 g/L, Trypotophan at 200 ppm + stimufol at 2 g/L, trypotophan at 200 ppm + stimufol at 4 g/L. trypotophan at 200 ppm + stimufol at 6 g/L.

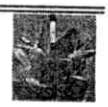
Pot plants were treated four times using the abovementioned treatments. All check treatments of tryptophan were applied by spray method, while stimufol treatments were applied by drench method (500 ml /pot).

V.2-The second part: (Field experiment):

The main purpose of this experiment was to study the effect of some growth regulators i.e., kinetin, GA_3, paclobutrazol and thiourea on growth and flowering of *Strelitzia reginae* plants.

Plants were treated with four times with each of the following treatments:

Kinetin at 25, 50 and 100 ppm , GA_3 at 100, 200 and 300 ppm, paclobutrazol at 25, 50 and 100 ppm and thiourea at 1000, 2000 and 3000 ppm.



The obtained results can be summarized as follows:

V.1-The first part: Pot experiments:

V.1.A - Offsets study:

V.1.A -1- Vegetative growth measurements:

1- The obtained results indicated that most tested treatments of the three used growth retardants and their interactions significantly increased the number of leaves and offsets / plant in both seasons, however treating *S. reginae* plant with PP_{333} at the high and low rates (eight times) by the two methods of application (spray or drench) induced the highest number of leaves and offsets / plant at the end of experiments.

2- Furthermore, plant height was significantly reduced due to using all growth retardant treatments in both seasons especially PP_{333} at 300 ppm either applied as spray or drench; hence it gave the shortest plants in both seasons.

3- In addition, most treatments of the three tested growth retardants decreased leaf surface area / plant in both seasons; however 300 PP_{333} treated plants, regardless of application method showed to be the most effective treatments for producing the smallest leaf surface area at the end of experiment.

4- Moreover, most growth retardant treatments resulted in highly significant decreases in the length of leaf petiole and their fresh and dry weights, but they increased the thickness of top flower petiole in both seasons, since pp_{333} at 300 ppm applied as a drench soil appeared to be the most effective treatment

for reducing the length of leaf petiole and their fresh and dry weights, but it increased the thickness of top leaf petiole

5- Additionally, most tested growth retardant treatments succeeded in reducing the length of leaf blade and their fresh and dry weights, but they succeeded in increasing the width of leaf blade in both seasons of this study.

V.1.A. 2- Flowering growth measurements:

1- It was found that the number of flowers formed on plants was increased due to most growth retardant treatments with highly significant increments when control plants were compared. In this respect, the application of pp_{333} at 300 ppm with the two methods of application proved to be the most promising treatments for producing the greatest number of flowers per plant in both seasons

2- Moreover, the number of opened florets / flower was greatly increased as well as the fresh and dry weights of the first opened floret on flower as a result of using most treatments of the three used growth retardants especially pp_{333} treatments in both seasons.

3- On the other side, the duration of flower on plant in both seasons was greatly extended due to the treatments with tested growth retardant, thereupon 200 and 300 ppm PP_{333} treated plants applied by drench method showed to be the most effective treatments for producing the highest duration of flower on plant (days).

4- The gained results indicated that all treatments of the three used growth retardants and their interactions succeeded in decreasing the length of flower stalk and their fresh and dry weights, but they increased the thickness of top flower stalk in both seasons, however treating bird of paradise plants with pp_{333} at 300 ppm applied by the two methods of application (drench or spray) showed to be the most effective treatments in this concern.

5- It was observed that most treatments of the three used growth retardants decreased the length of flower spathe, but they succeeded in increasing the width of flower spathe as well as their fresh and dry weights, however using pp_{333} at the high rate with the two methods of application showed its superiority in this respect.

6-The number of days to start flowering of *S. reginae* plants as affected by using all treatments of the three used growth retardants was greatly increased in both seasons. The number of days to start flowering was linearly increased with increasing the used growth retardants concentration. Thereupon, 300 ppm pp_{333} treated plants with the two methods of application showed the maximum retardation in the time of showing color of the first opened floret.

V.1.A. 3 - Root growth measurements:

The obtained data declared that all the three tested growth retardants and their interactions succeeded in increasing the number and thickness of roots per plant and their fresh and dry weights in both seasons. However, treated *S. reginae* plants with

PP_{333} at the high rate with the two methods of application showed to be the most effective treatments for increasing the number and thickness of roots / plant and their fresh and dry weights in both seasons. On the other hand, the mean length of roots / plant was reduced due to using all treatments of the three tested growth retardants in both seasons.

V.1.A. 4 - Chemical composition measurements:

1- The obtained results showed that most treatments of the three used growth retardants significantly increased N, P, K and total carbohydrates contents in the leaves of *S. reginae* plants in both seasons similarly, chlorophyll a, b and carotenoids greatly increased by using all treatments of the three used growth retardants.

2- All applied treatments of the three tested growth retardants increased leaf total phenols content with the exception of using the low rate of CCC (500 ppm) applied by the two methods of application which significantly decreased leaf total indoles content. On the other hand leaf total indoles content was decreased due to using all treatments, except for the treatment of uniconazole at the low rate (50 ppm) applied by the two methods of application as they succeeded in increasing total indoles content in the leaves of *S. reginae*.

***Endogenous phytohormones study:**

Endogenous phytohormones analysis by using "HPLC" exhibited great increase in cytokinins (Zeatin, kinetin and benzyladenine) contents in the leaves of *S. reginae* plants as affected by using PP_{333} at 300 ppm applied by drench method,

but it showed a high decrease in leaf GA_3, IAA and ABA content.

***Anatomical study:**

Data obtained on anatomical features of the leaves of *S. reginae* in response to different treatments showed that all selected treatments succeeded in increasing the thickness of midrib, phloem tissue and lamina and mesophyll tissues when compared with control.

V.1. B- Seedling study.

The obtained results could be summarized as follows:

V.1. B. 1-Vegetative growth measurements:

1- All stimufol, tryptophan and their combinations increased the mean number of leaves and offsets per plant over control, especially for the treatment of tryptophan at 100 ppm which gave the highest records in this concern.

2- The combined treatment of stimufol at 2 g/L + tryptophan at 100 ppm showed to be the most effective treatment for producing the tallest plant when compared to the other treatments.

3- Most treatments of stimufol, tryptophan and their combinations increased the mean leaf area per plant. Meanwhile, the largest mean leaf area per plant was resulted from the combined treatment of stimufol at 4g/L+ tryptophan at 100 ppm.

4- All treatments in most cases increased leaf petiole measurements (length, fresh and dry weights), especially the

treatment of stimufol at 2g/L + tryptophan at 100 ppm which registered the greatest values in this connection. Similar trend was gained with regard to the mean thickness of top leaf petiole, where, the thickest top leaf petiole was obtained by using the applications of stimufol at 4g and tryptophan at 200 ppm.

5- The highest mean values of leaf blade measurements (length and fresh and dry weights) was obtained by using the combined treatment of stimufol at 2g/L + tryptophan at 100 ppm. Meanwhile, the largest width of leaf blade was gained by using the treatment of stimufol at 4g/L + tryptophan at 100 ppm (combined treatment).

V.1. B. 2-Flowering growth measurements:

The obtained data of the flowering growth measurements at the beginning of flowering stage exhibited that:

1- All treatments of stimufol, tryptophan and their combinations significantly accelerated flowering date of *S. reginae* seedlings raised from seeds when compared with control which did not flower yet. Out of all treatments, the combined treatment of stimufol at 4 g/L + tryptophan at 100 ppm appeared to be the most effective treatment for inducing the earliness flowering. Besides, the prementioned treatment showed its superiority over all other treatments in increasing flower stalk thickness (cm), flower spathe width, number of opened floret / spathe and duration of flower on plant (days).

2- The longest flower stalk / plant was obtained by treating the plants with stimufol at 4g/L, whereas the longest flower

spathe / plant was gained on plants treated with stimufol at 2 g/L.

V.1. B. 3- Root growth measurements:

Data obtained at the end of both seasons showed that all treatments of stimufol, tryptophan and their combinations succeeded in increasing the studied root measurements (number, length, thickness, fresh and dry weights of roots). However, the applications of tryptophan at 100 and 200 ppm approved to be the most pronouncing treatments in this respect.

V.1. B. 4- Chemical composition measurements:

Generally, all treatments of stimufol, tryptophan and their combinations markedly increased chemical compositions measurements of the leaves of *Strelitzia reginae* plants (N, P, K, chlorophylls (a, b), carotenoids, total carbohydrates and total indoles). However, the combined treatment of stimufol at 4g/L + tryptophan at 100 ppm showed its superiority in this concern over the other tested treatments. On contrary, the prementioned treatment showed to be the most effective treatment for decreasing total phenols content in the leaves of *S. reginae* plants, while, the highest leaf total phenols content was produced by control plants.

***Endogenous phytohormones studies:**

Endogenous phytohormones analysis by using "HPLC" showed a great increase in GA_3, IAA and ABA contents in the leaves of *S. reginae* seedlings as affected by the combined treatment of stimufol at 4g/L + tryptophan at 100 ppm, but such

treatment decreased leaf cytokinins (Zeatin, kinetin and bezyladenine) contents when compared with control.

V.2- Second part: Field experiment

Data obtained could be summarized as follow:

V.2.1-Vegetative growth measurements:

1- All vegetative growth measurements were responded to all the investigated growth regulators. Since, the greatest number of leaves and offsets/plant was significantly related to the medium and high rates of kinetin and PP_{333} in both seasons.

2- Spraying *S. reginae* plants with GA_3 at 300 ppm and kinetin at 100 ppm showed to be the most effective treatments for producing the tallest plants as compared with other treatments and control. On the contrary, the shortest plants was obtained by treating the plants with PP_{333} at 100 ppm.

3- It was found that sprayed the plants with the high rates of kinetin and GA_3 induced the highest mean values of leaf blade measurements (leaf area – length, fresh and dry weights of leaf blade), while the highest mean value of leaf blade width was coincided with the high and medium rates of kinetin and PP_{333}.

4- the mean values of leaf petiole measurements (length, fresh and dry weights) was increased due to kinetin and GA_3 treatments, especially the medium and high rates, whereas PP_{333} at 100 ppm proved to be the superior in increasing the thickness of top leaf petiole.

V.2.2--Flower growth measurements:

1- The obtained results showed that spraying *S. reginae* plants with all kinetin and PP_{333} treatments showed effectiveness in producing the highest number of flower / plant.

2- The highest mean value of vase life of flower (days) was contaminant with kinetin and GA_3 treatments in both seasons.

3- GA_3 and kinetin induced early flowering in both seasons as compared to control and other treatments. On the other hand, thiourea and PP_{333} treatments succeeded in delaying flowering in both seasons.

4- The heaviest fresh and dry weights of first opened floret on flower spathe was produced by using the high rates of GA_3 and kinetin.

5- It was obvious that the highest values of flower stalk measurements (length, fresh and dry weights) was recorded by using the high rates of kinetin and GA_3. On the contrary, the least mean values of the prementioned measurements of flower stalk was gained by using PP_{333} at the high rate. Whereas, the maximum thickness of flower stalk was recorded by using the high rate of kinetin.

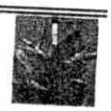
6- With regard to flower spathe measurements (length, width and fresh and dry weights of spathe), it was found that using the medium rate of GA_3 and kinetin caused highly significant increments in this concern.

V.2.3- Chemical composition measurements:

1- N, P, K and total carbohydrates content in the leaves of *S. reginae* plants were increased by using all the four used growth regulators treatments. While, the greatest values in this respect was obtained by using the medium and high rates of kinetin, GA_3 and PP_{333}.

2- Most tested treatments increased leaf chlorophyll a, b and carotenoids content, whereas the highest value in this respect was observed by using the high rate of kinetin, PP_{333} and GA_3.

3- The lowest value of total phenols content in the leaves of *S. reginae* plants was gained by the medium and high rates of kinetin and GA_3 which also, resulted in highly increments of leaf total indoles content.



RECOMMENDATION

- Based on our results, to obtain a good display of flowering pot of bird of paradise plants with optimum vegetative and flowering characteristics from the commercial point of view, it is recommended to treat the plants four times (two applications in spring and two in fall) for two years with pp_{333} at 200 and 300 ppm applied either as spray or drench.

- To induce early flowering of *S. reginae* seedlings raised from seed, it is recommended to treat the plants with stimufol at 4g/L + tryptophan at 100 ppm.

- In view of our results of field experiment, it can be concluded that spraying *S. reginae* plants with kinetin and pp_{333} at 50 and 100 ppm will produce the highest number of leaves, offsets and flowers. Also, it was found that spraying the plants with pp_{333} at 50 and 100 ppm and thiourea at 2000 and 3000 ppm succeeded in delaying the flowering date, while the earlier flowering date was obtained by using the medium and high rates of GA_3 and kinetin. Besides, we can safely recommended that spraying the plants with pp_{333} at 100 ppm to produce the least length and fresh weight of flowers, or with kinetin and GA_3 at the high rate to produce the highest length and fresh weight of flowers.