SUMMARY AND RECOMMENDATION

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Nowadays, with Egypt participation in General Agreement Tariffa Trade (GATT), cut flowers is considered one of the most important products for export to foreign markets. Also, cut flowers occupy an important position in the local and foreign markets. Because of their importance as a source of national income. Tuberose (*polianthes tuberose* L.) and bird of paradise (*Strelitzia reginae Ait*) cut flowers are very important flower crops for local and foreign markets.

This study was conducted at postharvest laboratory of Horticulture Department, Faculty of Agriculture, Benha University during the two seasons (2007-2008 , 2008-2009). The aim of this study was to investigate the effects of some chemical preservative as preharvest and postharvest combined with cold storage, pulsing and Holding solutions as well as their interaction treatments on (*Polianthes tuberosa* L. and *Strelitzia reginae* Ait. plants in order to improve quality , shelf life periods and postharvest characters.

This study includes two main parts:-

The first part (*Polianthes tuberosa*)

The first part of this study can be divided into two experiments:

The first experiment: (growth regulators and storage periods)

The present work study two factors and their interactions. The first factor was growth regulators treatments

i.e., GA_3 at 200 and 300ppm, BA at 25 and 50ppm and kinetin at 50 and 100ppm.Whereas, the second factor was storage period treatments, since tuberose cut flower spikes were stored at 4±1°C for 0, 7, 14 or 21days.

In addition, the data recorded were vegetative growth measurements (number of leaves/plant, plant height / cm, fresh weight of leaves /g and dry weight of leaves /g) , flowering growth measurements (number of floret/spike, length of flower stalk , the thickness flower stalk, fresh weight of total flower stalk, fresh weight of flower stalk with floret, fresh weight of flower stalk without floret, fresh weight of the third floret, dry weight of total flower stalk, dry weight of flower stalk with floret, dry weight of flower stalk without floret , dry weight of the third floret, Chemical composition determinations (Chlorophyll a, Chlorophyll b, caroteniods, total nitrogen, phosphorus and potassium content in leaves), postharvest characters (longevity; floret opening and wilting percentages and change percentage in fresh weight of cut flower spike), water relation characters (water uptake, water loss and water balance), and some chemical constituents (chlorophyll "a", chlorophyll "b", carotenoids in leaves/spike, the percentages of each of total, reducing and non reducing sugars, total phenols ,total nitrogen, total protein, total phosphorus and potassium in petals and flower stalks) as well as correlation coefficients between some preharvest and post harvest characters, water relation characters, and chemical constituents of tuberose cut flower spikes as affected by growth regulators treatments ,storage periods, as well as and their interaction treatments.

The obtained results could be summarized as follows:

I. Effect of some growth regulators treatments:

1-All tested growth regulators treatments succeeded in increasing all the studied vegetative growth parameters in both seasons of this study. However, 50ppm BA- treated plants showed to be the most effective treatment for inducing the greatest number of leaves/plant, whereas the tallest plant was recorded by treated the plants with kinetin at 100ppm. While, the heaviest fresh and dry weights of leaves/plant were registered by 300ppm GA_3 treated plants.

2- All tested pre-harvest treatments improved all the studied flowering parameters in both seasons of this study. However, the highest values of fresh weight of total flower stalk, fresh weight of flower stalk with floret, dry weight of total flower stalk, dry weight of flower stalk with floret and dry weight of the third floret were recorded by using the treatment of GA_3 at 300ppm in both seasons. Also, using the treatments of kinetin at 100ppm and GA_3 at 200ppm resulted highly increments of these parameters in both seasons. However, the thickest flower stalk was gained by using 100ppm kinetin-treated plants, followed descendingly by using the treatment of kinetin at 50ppm in both seasons. While, the highest values of number of floret/spike, length of flower stalk and dry weight of flower stalk without floret were recorded by using the treatments of GA_3 at 300ppm and Kin at 100ppm, respectively.

The heaviest dry weight of flower stalk without floret and fresh weight of the third floret were recorded by using the

treatment of GA_3 at 300ppm as an average of both seasons of this study. Whereas, the heaviest fresh weight of flower stalk without floret was obtained by using the treatment of kinetin at 100ppm as an average of both seasons of this study. Additionally, the greatest values of number of floret/stalk and length of flower stalk were recorded by using the treatment of kinetin at 100ppm as an average of both seasons.

3- All tested pre-harvest growth regulators treatments increased leaves chlorophyll a, chlorophyll b, caroteniods, total nitrogen, total phosphorus and potassium content in both seasons. However, the richest leaves chlorophyll a and chlorophyll b were recorded by using the treatment of GA_3 at 300ppm, followed descendingly by using 100ppm Kinetin-treated plants in both seasons. Whereas, the highest values of leaves carotenoids, nitrogen, phosphorus and potassium contents were recorded by using the treatments of kinetin at 100ppm and GA_3 at 300ppm in most cases as an average of both seasons.

4- All pre-harvest treatments increased the vase life, change percentage in fresh weight, floret opening percentage of tuberose cut flower spikes and decrease floret wilting percentage when compared to control in the two seasons. The treatments of GA_3 at 300ppm and kinetin 100ppm showed to be the most effective treatments for inducing the highest values of highly significant vase life , change percentage in fresh weight , floret opening percentage of tuberose cut flower spikes and recorded the lowest values of

floret wilting percentage compared to control, and other treatments under study.

5- The treatment of GA_3 at 300ppm and kinetin at 100ppm is being the best treatments for increasing the water uptake, water loss and water balance of tuberose cut flower spike when compared to control and other treatments in both seasons.

6- Most growth regulators treatments succeeded in increasing chlorophyll a and chlorophyll b, carotenoids in leaves/spike (mg/g f.w.), the percentages of each of total, reducing , non reducing sugars ,total nitrogen, total protein, phosphorus and potassium percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons , However the highest significant increase of these parameters were recorded by using GA_3 at 300ppm as compared to control in the two seasons, followed descendingly by kinetin at 100ppm in the two seasons in most cases, whereas all growth regulators treatments decreased total phenols percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the highest significant reduce of these parameter was recorded by using GA_3 at 300ppm as compared to control in the two seasons in most cases, followed descendingly by kinetin at 100ppm in the two seasons.

2. Effect of storage periods treatments

7. Longevity of tuberose cut flower spikes was decreased as the storage period increased, whereas tuberose cut flower spikes stored at 4±1°C for 21 days decreased flower longevity and

produced an increase in floret wilting percentage as compared to storage at 4±1°C for 0 or 7 and 14 days treatments.

8. Tuberose cut flower spikes stored at 4±1°C for 0 or 7 days recorded highly significant increase in flower longevity; floret opening percentage, fresh weights compared to storage at 4±1°C for 14 and 21 days treatment.
9. Tuberose cut flower spikes stored at 4±1°C for 0 or 7 days recorded highly significant increase in water uptake, water loss and improvement in water balance as compared to storage at 4±1°C for 14and 21 days treatment.
10. Tuberose cut flower spikes stored at 4±1°C for 0 or 7 days recorded highly significant increase in chlorophyll "a", chlorophyll "b" as well as coroteniods in leaves/spike (mg/g f.w.), the percentages of each of total, reducing , non reducing sugars ,total nitrogen, total protein, phosphorus and potassium content in petals and flower stalks as compared to storage at 4±1°C for 14and21 days treatments, on contrary tuberose cut flower spikes stored at 4±1°C for 21 or 14 days decreased percentages of total phenols in petals and flower stalks as compared to storage at 4±1°C for 0 or 7 days treatments.

Effect of interaction treatments between growth regulators treatments and storage periods treatments:

11-All the interactions between growth regulators and storage periods increased flower longevity; floret opening percentage, the change percentage in fresh weight of tuberose cut flower spikes as compared to control in the two

seasons. However, the interactions treatments between (GA_3 at 300ppm or kinetin at 100ppm) and different storage periods at 4±1°C for (0,7,14 and 21days) recorded the highest increases values of this parameter, especially the interaction between GA_3 at 300ppm then kinetin at 100ppm and storage period at 4±1°C for 0-time after 3,6,9,12 and 15days from the treatment during the two seasons under this study.

12- All the combinations between growth regulators and storage periods succeeded in decreasing the floret wilting percentage of tuberose cut flower spikes when compared to control in the two seasons. However, the combinations between (GA_3 at 300ppm or kinetin at 100ppm) and storage periods at 4±1°C for (0,7 days) were recorded the highest decreases of floret wilting percentage of tuberose cut flower spikes after 3, 6, 9, 12 and 15days from the treatment as compared to control in the two seasons.

13- All the interaction between growth regulators and storage periods of tuberose cut flower spikes resulted increases of water uptake, water loss and water balance as compared to control in the two seasons. However, the interaction treatments between kinetin at 100ppm then GA_3 at 300ppm and storage periods at 4±1°C for 0,7days recorded the highest significant increase of these parameters, after 3, 6, 9, 12 and 15days from the treatment when compared to the other ones study in the two seasons.

14- all the combinations treatments between growth regulators and storage periods (0-time, 7, 14 and 21days) at 4±1°C

increased chlorophyll "a", chlorophyll "b" as well as coroteniods in leaves/spike (mg/g f.w.) in the leaves, the percentages of each of total, reducing , non reducing sugars, total nitrogen, total protein, phosphorus and potassium content in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between GA_3 at 300ppm or kinetin at 100ppm and storage periods at 4±1°C for (0-time days) showed to be the most effective one for inducing the highest values of these parameters of tuberose cut flower spikes as compared to control in the two seasons in most cases, while all the combinations treatments between growth regulators and different storage periods at 4±1°C 0-time,7, 14 and 21days decreased total phenols percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, using the combinations between GA_3 at 300ppm or GA_3 200ppm in the first and second season respectively and different storage periods at 4±1°C for O-time, 7, 14 and 21days resulted the lowest values in this parameter when compared to control of this study, especially the combined treatment between GA_3 at 300ppm or GA_3 200ppm and storage periods at 4±1°C for 21day as compared to control in the first and second seasons, respectively.

The second experiment: (pulsing solutions and holding solutions treatments):

The present work study two factors and their interactions. The first factor was pulsing solution treatments i.e.,

distilled water for 24 hours, sucrose at 10% (S 10%) for 24 hours, benzyladenine (BA) (10ppm) for 24 hours, kinetin at 20ppm (kin) (20ppm) for 24 hours and silver thiosulphate (STS) (1: 4 mM) for 15 minutes. While, the second factor was holding solution treatments i.e., (D.W), (40 g/l sucrose), (40 g/l sucrose + 200 mg / l citric acid), (40 g/l sucrose + 200 mg / l 8-HQS +) and (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) besides to the interaction treatments between them.

In addition, the data recorded were postharvest characters (longevity; floret opening and wilting percentages and change percentage in fresh weight of cut flower spike), water relation characters (water uptake , water loss and water balance), and some chemical constituents (chlorophyll "a", chlorophyll "b", carotenoids in leaves, the percentages of each of total, reducing and non reducing sugars, total phenols ,total nitrogen, total protein, total phosphorus and potassium in petals and flower stalks), water relation characters, and chemical constituents of tuberose cut flower spikes as affected by pulsing solution treatments , holding solution treatments, as well as and their the interactions .

The obtained results could be summarized as follows:

15- It was found that all tested pulsing solution , holding solution and their interactions treatments succeeded in increasing the flower longevity, floret opening percentage and change percentage in fresh weight but decreased in floret wilting percentage of tuberose cut flower spikes when compared to control in the two seasons. However, the interaction treatment between pulsing solution of STS

at 1:4mM for 15minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) recorded the highest significant increase in longevity of tuberose cut flower spikes, floret opening percentage as well as increased change percentage in fresh weight of tuberose cut flower spike and resulted the highest significant decrease in floret wilting percentage as compared to control (D.W treatment).

16- All tested pulsing solution , holding solution and their interactions treatments increasing water uptake, water loss and water balance in both seasons, however the interaction treatment between pulsing solution of STS at 1:4mM for 15minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) recorded the highest significant increase in these parameters as compared to the other treatments.

17- All tested pulsing solution , holding solution and their interactions treatments increasing chlorophyll a and chlorophyll b, carotenoids in leaves/spike (mg/g f.w.), the percentages of each of total, reducing , non reducing sugars ,total nitrogen, total protein, phosphorus and potassium percentages in petals and flower stalks as compared to the other treatments under study and control, while total phenols content (%) decreased in petals and flower stakes of tuberose cut flower spikes as compared to the other treatments under study and control, however the interaction treatment between pulsing solution of STS at 1:4mM for 15minutes and holding solution contained (40

g/l sucrose + 200 mg / 1 8-HQS + 200 mg / 1 citric acid) recorded the highest significant increase in chlorophyll a and chlorophyll b, carotenoids in leaves/spike (mg/g f.w.), the percentages of each of total, reducing and non reducing sugars in petals and flower stalks of tuberose cut flower spikes and recorded increase in total nitrogen, total protein, phosphorus and potassium percentages in petals and flower stalks as compared to the other treatments under study and control, on contrary the interaction treatment between pulsing solution of STS at 1:4mM for 15minutes and holding solution contained (40 g/l sucrose + 200 mg / 1 8-HQS + 200 mg / 1 citric acid) or (sucrose 4% + CA 200ppm) recorded the highest significant decrease in of total phenols content (%) in petals and flower stakes of tuberose cut flower spikes as compared to the other treatments under study and control.

Part II::(*Strelitzia reginae*):

This part included two experiments:

The first experiment: (growth regulators and storage periods)

The present work study two factors and their interactions. The first factor was growth regulators treatments i.e., GA_3 at 200 and 300ppm, BA at 25 and 50ppm and kinetin at 50 and 100ppm, whereas, the second factor was storage period treatments, since bird of paradise cut flower spikes were stored at 7±1°C for 0, 7, 14,21,28,35 or 42 days.

In addition, the data recorded were vegetative growth measurements (number of leaves/plant, plant height / cm, fresh

weight of one leaf /g and dry weight of one leaf/g), flowering growth measurements (fresh weight of flower stalk with spathe, fresh weight of flower stalk without spathe, fresh weight of spathe, fresh weight of one floret , length of flower stalk/cm, the thickness flower stalk, spathe length /cm ,spathe width/cm, spathe thickness/cm, dry weight of one floret ,dry weight of flower stalk with spathe, dry weight of flower stalk without spathe, dry weight of spathe), chemical composition determinations (chlorophyll a, chlorophyll b, caroteniods mg/g f. w., the percentage of total nitrogen, phosphorus and potassium in leaves), postharvest characters (longevity; floret opening and wilting percentages and change percentage in fresh weight of cut flower spike), water relation characters (water uptake , water loss and water balance), and some chemical constituents (carotenoids percentage in petals, the percentages of each of total, reducing and non reducing sugars, Total phenols ,total nitrogen, total protein, total phosphorus and potassium in petals and flower stalks), water relation characters, and chemical constituents of bird of paradise cut flower spikes as affected by growth regulators treatments ,storage periods, as well as and their the interactions .

The obtained results could be summarized as follows:

I. Effect of some growth regulators treatments:

18- All tested growth regulators treatments succeeded in increasing all the studied vegetative growth parameters in both seasons of this study. However, 100ppm kinetin-treated plants showed to be the most effective treatment for inducing the greatest number of leaves/ plant, whereas the

tallest plant was recorded by treated the plants with kinetin at 100ppm. While, the heaviest fresh and dry weight of one leaf/plant were registered by 300ppm GA_3 treated plants.

19- All tested pre-harvest treatments improved all the studied flowering parameters in both seasons of this study. However, the highest values of fresh weight of flower stalk with spathe, fresh weight of flower stalk without spathe, fresh weight of spathe, fresh weight of one floret, length of flower stalk/cm dry weight of flower stalk with spathe, dry weight of flower stalk without spathe, dry weight of spathe and dry weight of one floret were recorded by using the treatment of GA_3 at 300ppm in both seasons. Also, using the treatments of GA_3 at 200ppm and kinetin at 100ppm resulted highly increments of these parameters in both seasons. However, the thickness flower stalk was gained by using 50ppm BA-treated plants, followed descendingly by using the treatment of BA at 25ppm in both seasons. While, the highest values of spathe width/cm and spathe thickness/cm were recorded by using the treatments of Kinetin at 100ppm and BA at 50ppm, respectively in both seasons.

The greatest values of spathe length /cm was recorded by using the treatment of GA_3 at 300ppm and GA_3 at 200ppm as compared to control of both seasons.

20- All tested pre-harvest growth regulators treatments increased leaves chlorophyll a, chlorophyll b, caroteniods, total nitrogen, phosphorus and potassium content in both seasons. However, the richest leaves chlorophyll a,

chlorophyll b, carotenoids and potassium percentage were recorded by using the treatment of GA_3 at 300ppm, followed descendingly by using 100ppm Kinetin-treated plants in both seasons. Whereas, the highest values of leaves total nitrogen contents was recorded by using the treatments of kinetin at 100ppm and GA_3 at 300ppm in most cases as an average of both seasons. Furthermore, the highest values of leaves total phosphorus contents was registered by using the treatments of GA_3 at 300ppm in the first season and GA_3 at 200ppm in the second season, followed descendingly by using 100ppm Kinetin-treated plants in both seasons .

21- All pre-harvest treatments increased the vase life, change percentage in fresh weight, floret opening percentage of bird of paradise cut flower spikes and decrease floret wilting percentage when compared to control in the two seasons. The treatments of GA_3 at 300ppm and kinetin 100ppm showed to be the most effective treatments for inducing the highest values of highly significant vase life, Change percentage in fresh weight, floret opening percentage of Bird of paradise cut flower spikes after 4,8,12,16,20,24,28 days of shelf life periods in the two seasons and recorded the lowest values of floret wilting percentage after 4, 8, 12 and 16 days of shelf life periods after that till the end of longevity when compared with control in the two seasons.

22- The treatment of GA_3 at 300ppm and kinetin at 100ppm is being the best treatments for increasing the water uptake,

water balance and decrease water loss of bird of paradise cut flower spike when compared to control and other treatments in both seasons.

23- All growth regulators treatments succeeded in increasing carotenoids in leaves/spike (mg/g f.w.), the percentages of each of total, reducing, non reducing sugars, total nitrogen, total protein, total phosphorus and potassium percentage in petals and flower stalks of bird of paradise cut flower spikes as compared to control in the two seasons. However, the highest significant increase of these parameters were recorded by using kinetin at 100ppm and GA_3 at 300ppm as compared to control in the two seasons in most cases, whereas all growth regulators treatments decreased total phenols percentage in petals and flower stalks of bird of paradise cut flower spikes as compared to control in the two seasons. However, the highest significant reduce of these parameter was recorded by using kinetin at 100ppm as compared to control in the two seasons in most cases, followed descendingly by GA_3 at 300ppm in the two seasons.

2. Effect of storage periods treatments

24. Longevity of bird of paradise cut flower spikes was decreased as the storage period increased. Whereas, bird of paradise cut flower spikes stored at 7±1°C for 42 days recorded a decrease in flower longevity and an increase in floret wilting percentage as compared to storage at 7±1°C for 0 or 7,14,21,28, and 35 days treatments.

25. Bird of paradise cut flower spikes stored at 7±1°C for 0 or 7 days recorded highly significant increase in flower longevity; floret opening percentage, fresh weights compared to storage at 7±1°C for 14,21,28,35, and 42 days treatment.

26. Bird of paradise cut flower spikes stored at 7±1°C for 0 or 7 days recorded highly significant increase in water uptake, water loss and water balance as compared to storage at 7±1°C for 14,21,28,35, and 42 days treatment.

27. Bird of paradise cut flower spikes stored at 7±1°C for 0 or 7 days recorded highly significant increase of carotenoids in petals as well as the percentages of each of total, reducing , non reducing sugars, total nitrogen, total protein, total phosphorus and potassium in petals and flower stalks as compared to storage at 7±1°C for 14,21,28,35, and 42 days treatment, while bird of paradise cut flower spikes stored at 7±1°C for 42 or 35 days recorded decrease in percentages of total phenols in petals and flower stalks as compared to storage at 7±1°C for 0, 7, 14, 21 and 28, days treatment.

Effect of interaction treatments between growth regulators treatments and storage periods treatments:

28-All the interactions between growth regulators and storage periods increased flower longevity; floret opening percentage, the change percentage in fresh weight of bird of paradise cut flower spikes as compared to control in the two seasons. However, the interactions treatments between(GA_3 at 300ppm or kinetin at 100ppm and different storage periods at 7±1°C for (0,7,14,21,28,35 and

42days) recorded the highest increases values of this parameter, especially, the interaction between GA_3 at 300ppm and kinetin at 100ppm and storage period at 7±1°C for 0-time after 4,8,12,16,20,24,28 and 32days from the treatment during the two seasons under this study.

29- All the combinations between growth regulators and storage periods succeeded in decreasing the floret wilting percentage of bird of paradise cut flower spikes when compared to control in the two seasons. However, the combinations between (GA_3 at 300ppm or kinetin at 100ppm) and storage periods at 7±1°C for (0,7 days) recorded the highest decreases of floret wilting percentage of bird of paradise cut flower after 4,8,12,16,20,24,28 and 32 days from the treatment in the two seasons.

30- All the interaction between growth regulators and storage periods of bird of paradise cut flower spikes increased water uptake, water loss and water balance as compared to control in the two seasons. However, the interaction treatments between kinetin at 100ppm then GA_3 at 300ppm and storage periods at 7±1°C for 0,7days recorded the highest significant increase of these parameters, after 4,8,12,16,20,24 and 28 days from the treatment in the two seasons.

31- All the combinations treatments between growth regulators and storage periods (0-time, 7, 14, 21, 28, 35 and 42days) at 7±1°C increased carotenoids in petals as well as, the percentages of each of total, reducing , non reducing sugars, total nitrogen, total protein, total phosphorus and

potassium in petals and flower stalks of bird of paradise cut flower spikes as compared to control in the two seasons. However, the combinations treatments between GA_3 at 300ppm or kinetin at 100ppm and storage periods at 7±1°C for (O-time days) showed to be the most effective one for inducing the highest values of these parameters of bird of paradise cut flower spikes as compared to control in the two seasons in most cases, on contrary total phenols was decreased by using the abovementioned treatments, However, using the combinations between kinetin at 100ppm or GA_3 at 300ppm and different storage periods at 7±1°C (0-time, 7, 14,21,28,35 and 42days) resulted the lowest values in this parameter when compared to control of this study, especially the combined treatment between kinetin at 100ppm and storage periods at 7±1°C for 42day as compared to control in the two seasons.

The second experiment: (pulsing solutions and holding solutions treatments):

The present work study two factors and their interactions. The first factor was pulsing solution treatments as distilled water for 24 hours, sucrose at 10% (S 10%) for 24 hours, benzyladenine (BA) (10ppm) for 24 hours, kinetin at 20ppm (kin) (20ppm) for 24 hours and silver thiosulphate (STS) (1: 4 mM) for 15 minutes. While, the second factor was holding solution treatments as (D.W), (40 g/l sucrose), (40 g/l sucrose + 200 mg / l citric acid), (40 g/l sucrose + 200 mg / l 8-HQS +) and (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) besides to the interaction treatments between them.

In addition, the data recorded were postharvest characters (longevity; floret opening and wilting percentages and change percentage in fresh weight of cut flower spike), water relation characters (water uptake, water loss and water balance), and some chemical constituents (chlorophyll "a", chlorophyll "b", carotenoids in leaves, the percentages of each of total, reducing and non reducing sugars, Total phenols ,total nitrogen, total protein, total phosphorus and potassium in petals and flower stalks), water relation characters, and chemical constituents of bird of paradise cut flower spikes as affected by pulsing solution treatments, holding solution treatments, as well as and their the interaction between pulsing solution treatments and holding solution treatments used.

The obtained results could be summarized as follows:

32- It was found that all tested pulsing solution , holding solution and their interactions treatments succeeded in increasing the flower longevity, floret opening percentage and change percentage in fresh weight but decrease in floret wilting percentage as of bird of paradise cut flower spikes when compared to control in the two seasons. However, the interaction treatment between pulsing solution of STS at 1:4mM for 30minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) recorded the highest significant increase in longevity of bird of paradise cut flower spikes, floret opening percentage as well as increased change percentage in fresh weight of bird of paradise cut flower spike and resulted the highest significant decrease in floret wilting percentage as compared to control.

33- All tested pulsing solution, holding solution and their interactions treatments increasing water uptake, water loss and water balance in both seasons, however the interaction treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) recorded the highest significant increase in water uptake , water loss and water balance as compared to the other treatments.

34-The interaction treatment between pulsing solution of STS at 1:4mM for 15minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) recorded the highest significant increase in coroteniods petals, the percentages of each of total, reducing , non reducing sugars in petals and flower stalks of bird of paradise cut flower spikes and recorded increase in total nitrogen, total protein, total phosphorus and potassium percentages in petals and flower stalks as compared to the other treatments under study and control, while total phenols was decreased by using the aforesaid treatments, however the interaction treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (40 g/l sucrose + 200 mg / l 8-HQS + 200 mg / l citric acid) or (sucrose 4% + CA 200ppm) recorded the highest significant decrease in of total phenols content (%) in petals and flower stakes of Bird of paradise cut flower spikes as compared to the other treatments under study and control.

Recommendations

35. Generally, the highest quality and the longest vase life of tuberose and bird of paradise cut flower spikes were obtained by using the interaction treatments between GA_3 at 300ppm or kinetin at 100ppm and storage periods at 4±1°C of Tuberose or at 7±1°C of Bird of paradise for (O-time and 7 days) as Compared to the other ones under study.

36-Furthermore, the higher quality and the longest vase life of Tuberose and Bird of paradise cut flower spikes were obtained by using the interaction treatments between pulsing solutions of STS (1: 4 mM) for 15 minutes of Tuberose or 30 minutes of Bird of paradise and holding solution contained (sucrose at 40 g/l + 8-hydroxy-quinolene sulfate at 200 mg/l + citric acid at 200 mg/l) Compared to the other ones under study.