



IV.RESULTS AND DISCUSSION PART (1)

1.1.Part I: The first experiment: (growth regulators and storage periods of *Polianthes tuberosa*)

1.1. Effect of some growth regulators on:

1.1.a.- Vegetative growth measurements:

According to data presented in Table (1) on some vegetative growth measurements of tuberose plants as affected by some growth regulators treatments i.e., GA₃ at 200 and 300ppm, BA at 25 and 50ppm and kinetin at 50 and 100ppm, it could be concluded that all tested growth regulators treatments were 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 weight of leaves/plant were registered by 300ppm GA₃ treated plants.

The aforementioned results of GA₃ are in parallel with those attained by **Desouky** (1994) on *Strelitzia reginae*, El-Sallami (1997) on *Narcissus tazetta*, **Zaky** (1998) on *Strelitzia reginae*, **Devendra et al.** (1999) on tuberose, **Tawila** (2000) on *Polianthes tuberose*, **Dantuluri et al.** (2002) on *Lilium moculatum*, **Salama** (2003) on *Strelitzia reginae*, **Padaganur et. al.**, (2005) on tuberose, **Panwar et. al.**, (2006) on tuberose and **Devadanam et. al.**, (2007) on tuberose who stated that

Table (1): Effect of some growth regulators on Number of leaves / plant & plant height /cm and fresh weight of leaves/g of Polianthes tuberosa L. during the two seasons of 2007-2008/2008-2009

	L.S.D at	Kin 100 ppm	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA ₃ 300ppm	GA ₃ 200ppm	Control			L.S.D at	Kin 100 ppm	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA ₃ 300ppm	GA ₃ 200ppm	Control		reatments
1%	5 %									1%	5 %								~	
15.03	10.72	196.00	193.00	214.00	173.30	169.00	153.70	97.70	2 nd season	10.58	7.55	147.20	141.30	197.70	138.30	86.33	96.00	64.00	1 st season	No. of leaves / plant
8.57	6.11	73.33	71.00	69.00	65.67	69.30	66.00	57.33		N.S.	N.S.	67.67	65.33	64.67	62.33	67.00	66.33	54.00		Plant height / cm
7 96	5.68	586.30	580.90	410.90	390.70	590.70	560.70	220.90		6.72	4.79	420.70	390.70	263.90	333.20	430.60	340.20	213.80		f.w. of leaves / g

Table (3): Effect of some growth regulators on dry weights /g of Polianthes tuberosa L. during the two seasons of 2007-2008/2008-2009

		Dry weight of	dry weight of total	dry weight of flower	dry weight of flower	dry weight of third
Ireatments	ents	jeaves/g	flower stalk /g		stalk without floret /g	floret/g
				1st season		
Control	lo.	28.64	12.07	5.60	3.50	0.160
GA ₃ 200ppm	mdd	52.43	16.50	7.80	6.00	0.320
GA ₃ 300ppm	mdd	06.99	18.50	9.53	6.37	0.373
BA 25 ppm	mdc	37.00	14.97	08'9	4.20	0.223
BA 50 ppm	mdc	44.20	15.63	7.07	4.87	0.283
Kin 50 ppm	mdd	49.53	16.37	7.67	5.67	0.277
Kin 100 ppm	mdd	60.40	17.10	8.30	6.50	0.317
S D at	2 %	7.07	1.36	1.70	1.23	0.080
L.S.D at	1%	9.91	16.1	2.39	1.72	0.112
				2nd season		
Control	lo.	56.40	14.13	7.07	4.20	0.167
GA ₃ 200ppm	mdd	98.83	18.63	8.90	08.9	0.360
GA_3 300ppm	mdd,	104.70	20.80	10.33	7.83	0.427
BA 25 ppm	unde	71.80	16.67	7.23	5.27	0.223
BA 50 ppm	udc	92.97	17.30	8.20	6.03	0.287
Kin 50 ppm	mdd	99.53	19.43	9.30	6.63	0.307
Kin 100 ppm	mdd	102.37	20.80	9.43	7.30	0.363
I S D at	2 %	4.98	1.12	97.0	0.71	0.056
100 A	1%	66.99	1.57	1.07	66.0	0.079

flower stalk without floret were recorded by using the treatments of GA₃ 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 GA₃ 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.

The principal role of GA₃ upon flowering stimulation in many plants has been recommended to be manly due to its effect upon increasing the length of flower stalk (bolting), the process that strictly must proceeded flowering appearance process (**Devlin and Witham, 1983**). Moreover, the effects of GA₃ on flower growth measurements may be due to the fact that gibberellins play a role in flowering, probably it is further elaborated into florigen by the plant. Hence, gibberellins can not be the same substance as florigen but at least it may act as its precursor. The propounder of (Florigen concept) florigen but made up of two substances, namely gibberellins and anthesins. The latter are considered to be nitrogen rich compounds (Macleod and Millar, 1962).

The aforementioned results of flowering growth measurements i.e., flowering start, number of flowers, length and diameter of flower stalk, fresh and dry weights of flower, duration of flower on plant and flower vase life are in conformity with those obtained by Abdel Wahid (1995) on Strelitzia reginae, Zaky (1998) on Strelitzia reginae, Devendra et al. (1999) and Tawila (2000) on Polianthes tuberosa, Wankhede et al. (2002) on Polianthes tuberosa ,Dantuluri et al., (2002) and Tiwari and Singh (2002) on Lilium maculatum, Wankhede et al., (2002) on Polianthes tuberosa, Gomaa (2003) on Dahlia pinnata, Salama (2003) on Strelitzia reginae and Youssef (2004) who mentioned that treated Strelitzia reginae plants with GA₃ at 100 or 200 ppm increased number of flowers/plant, length and diameter of flower, diameter of flower (cm), fresh weight of flower/plant, duration of flower on plant and vase life of flower as well as inducing early flowering.

Davadanam et. al., (2007) and Tyagi and Singh (2008) on tuberose GA₃ at 150 ppm resulted in the greatest number of florets per spike), flower yield/ha, and number of spikes/ha and the most effective for days emergence of spikes, florets

These results might be explained according to the role of kinetin on promoting protein synthesis, cell division and enlargement (Cheema and Sharma, 1982). Also, these results might be explained according to the role of kinetin on promoting proteins, soluble and non-soluble sugars synthesis, or may be due to the ability of kinetin for making the treated area to act as a sink into which nutrients from other parts of the plant are drawn (Salisbury and Ross, 1974).

The exogenous cytokinins effectively induced floral initiation and development, especially at the early floral

initiation and flower development stages. Endogenous cytokinins were higher in early floral initiation and development stages in comparison to the vegetative stage. These results indicate that cytokinins seem to promote the development of flower buds rather than inducing flowering in tuberose (Shuo-Tsang Chang et. al., (1999)

These results might be interpreted according to the direct role of cytokinins on flowering induction processes in the flowering meristems and their ability to overcome the dominance of the main flowering shoot. Also, these results might explain the role of kinetin in inducing cell division (Cheema and Sharma, 1982) and its ability to overcome the apical dominance of many plants and hence, stimulate the lateral buds to develop into an entire new plant (Salisbury and Ross, 1974). The abovementioned results of kinetin are in harmony with those attained by Tjia (1986) on Zantedeschia elliotiana, Auda (1992) on Hippeastrum vittatum, Khalafalla et al. (1995) on Dahlia pinnata, Shuo-Tsang Chang et. al., (1999) on Polianthes tuberosa, Lee-Aekyung (2005) on Iris hollandica, mentioned that kinetin treatments significantly increased the length and thickness of flower stalk as well as their fresh and dry weights.

1.1.c.-Chemical composition determinations:

Data in Table (4) demonstrate that 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

Table (4): Effect of some growth regulators on Chlorophyll ,a, &b and Coroteniods (mg/g f. w.) & total nitrogen , phosphorus and potassium percentage in leaves of Polianthes tuberosa L. during the two seasons of 2007-2008/2008-2009

		Chlorophyll, a,	Chlorophyll,	Carotenoids	Total nitrogen	phosphorus	potassium
Treatments	ts	(mg/g f. w.)	b, (mg/g f. w.)	(mg/g f.w.)	percentage	percentage	percentage
		0		1 st season			
Control	-	0.507	0.309	0.208	2.743	0.681	2.780
CA- 200nnm	, mu	0.560	0.540	0.307	3,430	0.758	2.927
CA. 300ppm		1 107	0.823	0.258	4.700	0.965	3.260
RA 25 nnm		909.0	0.408	0.205	3.680	0.972	2.847
BA 50 ppm	III III	0.711	0.496	0.236	4.283	0.880	3.100
Kin 50 ppm	mo	0.672	0.427	0.246	4.247	0.747	3.137
Kin 100 ppm	md	0.918	0.618	0.312	5.220	0.956	3.200
	2 %	0.323	0.032	0.032	0,432	0.169	0.149
L.S.D at	1%	N.S.	0.045	0.045	9090	0.237	0.209
				2 nd season			
Control	-	0.554	0.333	0.231	2.933	0.722	2.907
Control		0.864	0.567	0.310	3.630	0.892	3.000
CA. 300ppm	muk	1.083	0.826	0.270	4.900	0.945	3.267
RA 25 nnm	mula	0.621	0.419	0.218	3.930	0.982	3.01
BA 50 ppm		0.765	0.513	0.259	4.773	0.982	3.197
Kin 50 nnm	mul	0.683	0.427	0.259	4.583	0.757	3,283
Kin 100 nnm	muu	0.957	0.667	0.310	4.920	0.990	3.370
	% 5	0.056	0.056	0.056	0.551	0.149	0.211
L.S.D at	1%	0.079	0.079	N.S.	0.773	0.209	0.295

Chlorophyll a and Chlorophyll b were recorded by using the treatment of GA₃ 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 GA₃ at 300ppm in most cases as an average of both seasons.

The aforementioned results of GA₃ are in conformity with those obtained by El-Sayed (1987) on tuberose, El-Maadawy (1988) on polianthes tuberosa, Abdel-whahid (1995) on strelitzia, Reddy et. al., (1997) on tuberose, Goma (2000) on polianthes tuberosa, Youssef (2000) on S. reginae, Tawila (2000) on Polianthes tuberose, Gomaa (2003) on Dahlia and Salama (2003) on Strelitzia reginae reveal that GA₃ treatments increased leaf chlorophylls (a, b), carotenoids content and the P and K contents compared to the untreated plants.

The aforementioned results of cytokinins are in parallel with those attained by **Reddy** et. al., (1997) on tuberose, **Shahin** (1998) on *Crinum longiflorum* and **Youssef** (2000) reported that treated *S. reginae* plant with kinetin levels (50, 100 and 200 ppm) increased leaf N, P, K, total carbohydrates, chlorophyll a, b and carotenoids contents, but decreased total phenols content in leaves.

2.1.Effect of some growth regulators as pre-treatments and storage periods on:

2.1. Flower post harvest characters:

2.1.a.-Vase life (day) or longevity of tuberose:

Data presented in Table (5) indicate that all the preharvest treatments prolonged the vase life of tuberose cut flower spikes when compared to control in the two seasons. The treatments of GA₃ at 300ppm and kinetin at 100ppm showed to be the most effective treatments for inducing the highest values of highly significant vase life of tuberose cut flower spikes when compared to control and other treatments in both seasons. The lowest means of values of vase life by tuberose cut flower spikes was registered by using the treatment of BA at 25ppm in the two seasons. The rest treatments occupied an intermediate position between the aforesaid treatments in both seasons of this study.

The aforementioned results of GA₃ are in harmony with those attained by **Dalal** *et al.* (1999) indicated that spraying *Polianthes tuberosa* plants with GA₃ at 40 ppm increased vase life.

Dantuluri et al., (2002) and Tiwari and Singh (2002) on Lilium maculatum, Wankhede et al., (2002) on Polianthes tuberosa, Gomaa (2003) on Dahlia pinnata and Youssef (2004) who mentioned that treated Strelitzia reginae plants with GA₃ at 100 or 200 ppm increased vase life of flower as well as inducing early flowering. Tyagi and Singh (2006) on tuberose GA₃ rates (40, 80, 120 and 160ppm) and four IBA rates (20, 40, 60 and 80ppm) significantly minimum days to flowering (80, 12

Table (5): Effect of some growth regulators, Storage periods (Days) and their interaction on vase life (days) of Polianthes tuberosa L. cut flower spike during the two seasons 2007-2008/2008-2009.

		LSDar	mean	Kin 100 ppm	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA3 (300ppm)	GA3 (200ppm)	Control	Growth regulators		Treatments	
0.195	5 %	Growth regulators	16.29	20.30	18.60	14.40	14.20	19.80	14.80	11.90	0	St		
0.260	1 %	vth tors	11.24	12.20	11.30	11.30	11.10	12.50	11.60	8.70	7	Storage periods (days)		V:
0.148	5 %	Storage periods	9.06	10.30	8.50	9.20	9.40	10.20	8.60	7.20	14	eriods (1 st season	Vase life
0.197	1 %	ge Is				9	4		7		22	days)	on	(days)
0.391	5 %	Inter	7.50	7.30	7.00	9.00	4.41	7.80	7.30	6.70	21			
0.520	1 %	Interaction		12.53	11.35	10.98	10.53	12.58	10.58	8.63	mean			
0.374	5 %	Growth regulators	16.86	20.20	16.30	18.70	14.70	20.10	14.40	11.60	0			
0.498	1 %	wth ators	11.40	12.30	12.00	11.30	11.00	12.30	00.11	10.00	7	Storage periods (days)		
0.283	5 %	Storage										period	2nd S	Vase life
0.377	1 %	Storage periods	10.22	10.33	11.30	10.00	9.70	10.70	10.33	9.17	14	s (days	2 nd season	e (days)
0.748	5 %		8.80	9.70	8.70	8.60	8.60	9.00	8.67	8.30	21			7S)
0.997	· 1 %	Interaction		13.13	12.58	12.15	11.00	13.00	11.10	9.77	mean			

day), and vase life (13, 85 days). Devahanam et. al., (2007)on tuberose Foliar application was conducted at 30, 60 and 90 days after planting. GA_3 at 150 ppm gave the earliest number of days required for spike emergence (43.48) and longest vase life (11, 35 days).

These results may explain the role of cytokinins on promoting proteins and pigments synthesis and their ability to delay senescence and withdraw sugars and other solutes from older parts of a plant to the new organs (Salisbury and Ross, 1974). In the same line Leopol and Kawase (1964) stated that cytokinins stimulate the movement of sugars, starch, amino acids and many other solutes from mature organs to primary tissues of other ones. Nevertheless, the means by which cytokinins exert their beneficial effect on cut flowers was not yet certain, but the application of these materials has been shown to reduce water stress damage in carnation (Paulin and Muloway, 1979), improved water uptake and maintained water turgidity in roses (Mayak and Halevy, 1977), reduced respiration rates in carnation, Anthurium and chrysanthemum (Shirakawa et al., 1964) and inhibited ethylene production and reduced sensitivity to ethylene in carnation (Eisinger, 1977). These results are in parallel with those of Auda (1992) on Hippeastrum vittatum, Nagaraja and Gowda (1998) on tuberose, and Shahin (1998) who found that treated Crinum and Hemerocallis plants with kinetin at 50 and 75ppm increased the vase life of flower.

As for the effect of storage periods on vase life (days) (longevity), it is clear from data in Table (5) that there were gradual decrease in vase life (days) of tuberose cut flower spikes

with extending storage periods at 4 ± 1°C for different days (0time, 7, 14 and 21 days). However, tuberose cut flower spikes were stored at 4 ± 1°C for 21 days recorded highly significant decrease in vase life as compared to other different storage periods in both seasons. Moreover, storage periods at 4± 1°C for 0-time treatment showed highly significant increase in vase life of tuberose cut flower spikes when compared to the other ones under study in the two seasons. These results agreed with those found by Song et al., (1992) on gladiolus cut flower spikes and Abd El-Sadek (2005) on gypsophila cut flowers. Such effect could be attributed to one or more of the following: dry packed flowers were stored at 4 °C at 70 - 75% RH for 4 and 5 days storage enhanced postharvest life and quality Palanikumar et al., (2000) on cut roses. Also, Hettiarachchi and Balas (2005) stated that cold storage at 4 °C for 7days has the potential to be used for delaying inflorescence senescence, prolonging vase life and postharvest quality of Gloriosa superba (Glory lily) cut flowers. Referring to the effect of interaction between growth regulators and storage periods on Vase life (day), data in Table (5) reveal that the interaction treatment between growth regulators of kinetin at 100ppm and storage periods at 4 ± 1°C for 0-time were recorded highly significant increase in vase life of tuberose cut flower spike compared to other treatment under study in both seasons. Regardless control, the lowest means of values of vase life of tuberose cut flower spikes were noticed by using the interaction between spraying BA at 25ppm and storage period for 21 day when compared to the other ones treatment under study in both seasons. Moreover GA₃ at 300ppm resulted highly significant increased in vase life of tuberose cut flower spike compared to control and other treatments in both seasons. The rest treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study.

2.1.b.-Change percentages in fresh weight of tuberose cut flower spikes

From the recorded data in Table (6) it can be concluded that the change percentage in spike fresh weight of tuberose cut flower spike was decreased as flower cut spikes advanced in age after 3 days to the end of longevity in the two seasons. It could be concluded that all pre-harvest treatments succeeded in increasing change percentage in fresh weight of tuberose cut flower spikes as compared with control in both seasons of this study. Moreover, using the treatments of GA₃ at 300ppm and kinetin at 100ppm resulted in highly significant increases in change percentage of fresh weight of tuberose cut flower spikes compared to the control and the other treatments under this study. The differences between the abovementioned two treatments were not significant in both seasons. The remained treatments occupied an intermediate position between the abovementioned treatments and control in the two seasons.

Regarding to the effect of storage periods on the change percentage in fresh weight data in Table (7) reveal that the change percentage in fresh weight of tuberose cut flower spikes was increased as flower cut spikes advanced in age till 6 days and then decreased after that down to the end of longevity by using 0-time storage periods at 4 ± 1 °C in both season. However storage periods at 4 ± 1 °C for 7, 14 and 21 days the change

Table (6): Effect of some growth regulators treatments, on Change percentage in fresh weight, Floret opening percentage and Floret wilting percentage of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		Chang	e percenta	ge in fresh spike	Change percentage in fresh weight of cut flower spike	t flower		Flore	Floret opening percentage	rcentage			Floret wilt	Floret wilting percentage	ge
Treat	Treatments	IS.	Shelf life		periods (days)			Shelf lif	Shelf life periods (days)	ds (days		She	If life pe	Shelf life periods (days)	Vs)
		w	6	9	12	15	3	6	9	12	15	6	9	12	15
								I _{st}	1st season						
	Control	10.62	7.82	0.26	-10.42	-9.00	9.67	15.71	22.52	32.21	36.53	47.08	82.86	96.86	
	GA ₃ 200ppm	5.31	2.85	-3.11	-11.57	-7.26	11.02	18.60	24.71	33.54	39.72	33.13	66.86	82.23	96.60
	GA3 300ppm	9.79	7.92	0.98	-6.87	-4.78	12.20	20.08	26.49	35.86	41.61	28.80	55.57	75.74	90.33
Regulators	BA 25 ppm	8.55	5.30	-2.82	-12.51	-7.35	10.89	16.21	23.75	33.44	39.04	41.00	66.27	84.60	98.36
	BA 50 ppm	7.26	4.15	-2.24	-9.41	-7.16	11.36	17.98	24.42	32.41	38.62	36.18	64.43	85.06	98.60
	Kin 50 ppm	9.49	6.60	0.24	-8.20	-4.99	10.43	16.79	23.20	32.23	38.22	39.31	68.51	83.55	97.60
	Kin 100 ppm	9.88	6.81	-1.84	-7.99	-3.65	11.93	17.48	24.73	34.38	40.36	28.82	62.92	77.06	92.60
I S D at	5 %	0.986	1.108	2.751	1.474	1.399	1.466	2.204	2.941	2.915	3.559	5.477	7.976	5.443	7.874
10.00	1%	1.313	1.476	3.663	1.963	1.862	1.952	2.935	3.916	3.883	4.738	7.294	10.62	7.249	10.556
								2 ^{nc}	2nd season						
	Control	10.09	6.39	0.14	-10.59	10.01	12.61	21.44	27.69	31.80	36,46	34.89	72.38	92.36	
	GA3 200ppm	5.38	2.37	-3.95	-11.26	-7.29	13.79	23.65	29.05	36.01	39.62	27.56	58.74	80.80	95.60
Growth	GA3 300ppm	9.05	7.67	0.58	-6.96	-5.38	15.09	25.36	31.42	38.85	42.97	24.93	51.81	75.13	90.05
Regulatos	BA 25 ppm	8.54	5.47	-2.24	-11.72	-7.68	13.34	24.03	28.81	36.23	42.46	28.34	56.99	85.49	98.66
	BA 50 ppm	7.16	4.52	-2.41	-9.46	-8.32	13.76	24.31	30.07	35.43	41.98	27.79	56.15	81.70	96.68
	Kin 50 ppm	8.91	6.36	0.05	-8.24	-5.42	13.77	24.49	30.31	35.85	40.69	27.88	54.68	81.25	96.95
	Kin 100 ppm	9.41	7.13	0.11	-7.14	-5.29	15.42	25.67	32.36	38.17	43.04	24.47	49.96	75.77	91.30
CDat	5 %	1.034	1.218	1.329	1.557	0.962	1.121	1.554	2.045	2.523	2.524	4.495	6.563	8.453	9.656
	1%	1.377	1.623	1.770	2.074	1.281	1.493	2.070	2.724	3.361	3.362	5.986	8.740	11.26	10.665

Table (7): Effect of Storage periods (Days)treatments on Change percentage in fresh weight of cut flower spike, Floret opening percentage and Floret wilting percentage of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		Chang	e percentage i	n fresh weigh	Change percentage in fresh weight of cut flower spike	spike		Floret o	Floret opening percentage	ntage		Œ.	Floret wilting percentage	g percentage	
T			Shelf life	ife periods (days)	lays)			Shelf life	Shelf life periods (days)	days)		She	Shelf life periods (days)	ods (days)	
Heatments	Sills	3	9	6	12	15	3	9	6	12	15	9	6	12	15
								1" s	1st season						
	0	15.06	17.13	7.52	1.28	-6.36	13.95	24.80	34.65	42.66	48.30	16.31	39.75	16'09	77.53
Storage	7	8.03	6.40	0.07	80.6-	-18.88	11.71	17.08	23.63	34.20	37.80	30.44	59.51	79.16	82.07
(Days)	14	6.59	2.23	-4.49	-12.84	ı.	10.27	15.04	20.49	29.71	38.38	43.21	77.73	93.91	30
*	21	5.12	-2.07	-7.98	-17.62	E	8.35	13.29	18.27	27.19	32.15	55.37	90.11	83.77	16:
	2 %	0.745	0.838	2.079	1.114	1.058	1.108	1.666	2.223	2.204	2.690	4.140	6.026	4.115	3.651
L.S.D at	1%	0.993	1.116	2.769	1.484	1.408	1.476	2.219	2.960	2.935	3.582	5.513	8.029	5.479	4.862
								2 nd	2 nd season						
	0	14.38	15.80	8.30	0.84	-8.16	17.81	31.39	39.22	47.53	54.34	14.46	37.20	60.92	75.74
Storage	7	7.56	6.23	-0.41	-8.88	-20.06	14.54	24.17	28.47	37.23	39.79	26.41	50.23	77.10	81.04
(Days	14	6.32	1.88	-4.85	-12.90	,	12.13	21.38	27.03	31.27	37.06	30.5	59.6	90.55	ř.
	21	5.19	117-	-7.45	-16.42		11.39	19.60	25.12	28.16	32.93	40.55	77.92	98.57	1
	2 %	0.781	0.921	1.005	1.177	0.727	0.847	1.175	1.546	1.908	1.908	3.398	4.961	6.390	8.858
L.S.D at	1%	1.034	1.227	1.338	1.568	0.969	1.129	1.565	2.059	2.540	2.541	4.525	6.607	8.509	11.80

percentage of fresh weight decreased after 3 days from the treatment till the end of age of longevity in the two seasons. The lowest mean of values of change percentage in fresh weight was gained by using 21 days storage periods at 4±1°C from the treatment till the end of longevity in the two seasons. Moreover, storage periods at 4±1°C for 0-time treatment showed highly significant increase in change percentage in spike fresh weight of tuberose cut flower spikes when compared with the different storage periods under study in the two seasons, Similar results by using storage periods were reported by **Hettiarachchi and Balas (2005)** on *Gloriosa superba* (Glory lily) cut flowers. **Gendy (2007)** on gladiolus cut flower spikes.

With respect to the effect of interaction between growth regulators and storage periods on the change percentage in fresh weight Data presented in Table (8) indicate that the interactions treatments between growth regulators of (GA3 at 300ppm or kinetin at 100ppm) and storage periods at 4± 1°C for 0 time recorded the highly significant increase in the change percentage in fresh weight of tuberose cut flower spikes after 3,6,9,12 and 15 days from the treatment as compared to control in the two seasons. However, the interaction treatments between GA3 at 300ppm and storage periods at 4± 1°C for O.time at the first season, or the interaction treatment between kinetin at 100ppm and storage periods at 4±1°C for 0 time at the second season resulted the highest significant increase after 3, 6, 9, 12 and 15 days from the treatment in this parameter as compared to control. On contrary, the lowest values of change percentage in fresh weight of tuberose cut flower spikes under all the

Table (8) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Change percentage in fresh weight of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Treatments Growth regulators per	,	Change nero	Change nercentage in fresh weight of cut flower snike	sh weight of c	int flower snil	7.6	Change	nercentage i	n fresh weigh	Change percentage in fresh weight of cut flower spike	r spike
	,	Summer bear	a de la companya de l	1" season			o.		2nd season		
	Storage		Shelf life	life periods (days)	days)			Shelf life	life periods (days)	days)	
	periods (days)	3	9	6	12	15	3	9	6	12	15
	0	14.44	15.42	4.97	-4.11	-17.56	14.02	14.01	5.80	-4.84	-19.55
	7	11.54	9.93	2.63	-7.44	-18.44	11.53	8.87	1.92	-6.50	-20.47
Control	14	69.6	5.70	-1:1-	-9.83		8.39	3.13	-0.95	-11.01	i
	21	6.81	0.25	-6.47	-20.30	3.5	6.43	-0.46	-6.21	-20.03	ř
	0	14.29	17.12	10.44	2.50	-4.95	13.77	15.46	9.18	2.75	-10.45
GA, 200ppm	7	2.28	1.27	-3.53	-12.18	-24.09	1.91	0.52	-4.11	-12.53	-20.28
	14	1.87	-1.36	96.6-	-18.67	į.	3.33	-0.99	-10.50	-17.32	
	21	2.80	-5.62	-9.40	-17.92	-	2.49	-5.51	-10.38	-17.92	,
	0	16.17	17.87	10.00	3.28	-2.53	14.76	14.88	9.03	2.04	-8.31
	7	10.89	6.97	2.18	-8.22	-16.58	9.94	10.32	1.62	-7.25	-24.98
GA3 300ppm	14	69'9	2.89	-4.54	-12.75	i)	6.10	3.14	-4.48	-13.33	9
	21	5.39	96.0	-3.74	-9.80	,	5.38	2.35	-3.85	-9.29	
	0	14.92	17.34	88.9	-1.88	86.6-	14.24	16.04	6.12	-2.14	-6.4
BA 25 ppm	7	7.18	5.31	-1.57	-10.48	-19.41	6.77	6.16	-1.54	-10.50	-22.90
	14	7.37	2.03	-4.33	-12.69		8.22	2.08	-3.01	-12.14	T.
	21	4.74	-3.51	-12.26	-25.02	600	4.91	-2.41	-10.53	-22.09	я
	0	15.79	17.49	8.74	3.38	-6.20	15.03	17.17	8.11	2.62	-4.09
0.00	7	4.25	2.08	-3.81	-11.60	-22.44	4.17	2.67	-3.63	-10.98	-17.44
BA 50 ppm	14	4.73	0.52	-5.13	-12.50	,	4.49	1.01	-5.05	-12.52	196
	21	4.26	-3.49	-8.76	-16.93	,	4.97	-2.78	-9.08	-16.95	t
	0	14.66	16.83	10.45	2.80	-4.53	14.46	16.15	10.33	3.00	-4.60
	7	10.4	8.14	1.97	-6.90	-15.41	9.80	8.13	1.14	-7.43	-17.06
mdd oc my	14	7.35	2.85	-4.28	-12.20	3.	6.20	2.05	-4.89	-12.24	t,
	21	5.47	-1.43	-7.18	-16.49	я	5.19	-0.89	-6.39	-16.30	-
	0	15.10	17.81	10.12	2.97	1.20	14.41	16.91	9:26	2.49	-3.86
	7	09.6	8.12	2.63	-6.75	-15.77	8.78	6.94	1.71	-6.95	-17.31
Kin 100 ppm	14	8.45	2.96	-3.11	-11.27	,	7.49	2.73	-5.09	-11.73	ì
	21	6.36	-1.64	-8.02	-16.91		6.93	1.94	-5.73	-12.35	,
. 40.	5%	1.972	2.216	5.502	2.948	2.798	2.067	2.437	2.658	3.115	1.927
L.S.D at	1%	2.626	2.952	7.327	3.926	3.727	2.753	3.245	3.540	4.148	2.563

Results and Discussion

interaction treatments between growth regulators and storage periods was registered by the combined treatment between BA at 25ppm and storage periods at $4\pm1^{\circ}$ C for 21 days after 3, 6, 9 and 12days from the treatment when compared to the other ones under this study in the two seasons.

2.1.c.-Floret opening percentage:

Data presented in Table (6) indicate that all pre-harvest treatments highly significant increased the floret opening percentage of tuberose cutflower spikes when compared to the untreated spikes after 3, 6, 9, 12 and 15 days from treatment in the two seasons. Moreover, the treatment of GA3 at 300ppm and kinetin at 100ppm gave the highest values of floret opening percentage of tuberose cut flower spikes after 6, 9, 12 and 15 days from the treatment when compared to the other ones in the two seasons. Referring the effect of storage periods on floret opening percentage Data in Table (7) demonstrate that there were gradual decrease in floret opening percentage of tuberose cut flower spikes with extending storage periods at 4±1°C for the different days (0-time, 7, 14 and 21days) after 3, 6, 9, 12 and 15 days from the treatment in the two seasons. However, the floret opening percentage of tuberose cut flower spikes was increased as flower cut spikes advanced in age after 3 day till the end of longevity by using storage periods at 4±1°C for 0, 7, 14 and 21day in both seasons under study. Moreover, tuberose cut flower spikes were stored at 4±1°C for 21 day treatment showed a highly significant decrease in floret opening percentage of cut flower spikes when compared to the different storage periods in

the two seasons. Furthermore, storage periods at $4\pm1^{\circ}$ C for 0-time resulted highly significant increase in floret opening percentage as compared to the other ones treatment under study in both seasons. These results are in harmony with those stated by **Gendy (2007)** on gladiolus cut flower spikes.

With regard to the interaction effect between growth regulators and storage periods, data in Table (9) indicate that all the interactions between growth regulators and storage periods resulted increases of the change percentage in fresh weight of tuberose cut flower spikes as compared to control in the two seasons. However, the interactions treatments between (GA₃ 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 GA₃ at 300ppm 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.

2.1.d.-Floret wilting percentage:

Data presented in Table (6) reveal that floret wilting percentage of tuberose cut flower spikes was decreased by using all pre-harvest treatments in both seasons. However, using the treatment of GA₃ at 300ppm and kinetin at 100ppm recorded the lowest values of floret wilting percentage compared to control and other treatments under study. Irrespective control, the highest mean values of floret wilting percentage of tuberose cut flower spikes was registered by using the treatment of BA at 25ppm during the most shelf wide periods 6, 9, 12 and 15 day

Table (9) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret opening percentage of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		L.S.D at				Kin 100 ppm					Kin 50 ppm				BA 50 ppm				mdd c7 Vg				GA_3 300ppm				unddoor two	C 4 300			Control		S. C. Burarot	regulators	Growth	Treatments
	1%	5%		21	14	7			21	14	7	0	21	14	7	0	21	2 4	: `	1 0	21	14	7	0	21	14	7	0	21	14	7	0	periods	Storage	6.	ents
	3.905	2.932	0.07	8 67	10.05	11.84	17.17		7.73	9.62	11.44	12.94	9.11	11.09	11.81	13.43	8.12	10.12	12.33	12.99	8.26	12.06	11.91	16.58	8.58	10.11	11.90	13.49	7.99	8.86	10.75	11.08	3			
	5.871	4.408	13.43	13.43	14.01	16.37	26.11	1441	1747	13.49	16.20	25.00	13.10	15.13	17.76	25.94	12.13	13.16	15.39	24.1	14.67	18.77	19.29	27.60	13.37	16.20	17.79	27.04	13.84	14.49	16.73	17.79	6	She		Flor
/.033	7 9 7 7	5.882	18.28	00.04	20.00	22.76	37.81	10.34	16.01	18 34	21.97	36.14	19.26	20.15	23.73	34.55	19.17	21.32	24.50	30.02	18.34	23.22	23.87	40.50	18.13	20.28	24.69	35.76	18.37	20.02	23.90	27.80	9	Shelf life periods (days)	1st season	Floret opening percentage
1.705	776	5.831	27.87	30.99	20.00	34.55	44.09	26.91	20.93	36.05	32 43	42.63	27.32	28.30	33.70	40.32	27.29	28.41	33.82	44.24	26.63	34.06	36.74	46.02	26.6	30.32	34.65	42.49	27.60	28.91	33.54	38.81	12	(days)		centage
9.477	011./	7116	33.74	40.03	07.70	37 78	50.38	31.75	36.71	36.21	36 71	48 70	32 44	38 32	36.67	47.05	31.30	37.71	37.96	49.18	32.11	45.19	38 56	50.57	31 50	38 44	39.65	40 78	32.21	32.25	38 23	43.44	15			
2.986	2.242	3343	12.13	13.02	15.79	15 70	20.73	10.78	11.30	14.0/	10.31	10.71	11146	11 60	1414	35.51	10 00	11.86	14.48	16.13	12.13	13.66	16.16	20.40	11.63	14.50	10.//	16.73	10.73	17.33	17.04	14 56	u			
4.140	3.109	-0.17	20.74	22.92	25.03	34.02	24.00	19.12	21.62	24.78	32.44	20.33	20.86	20.74	32.31	19.04	10.04	21 56	25.70	20.23	17.77	24.32	34.00	19./4	20.40	24.01	30.44	17.22	20.00	21.03	20.90	700	0	Ch.	101	Flor
5.448	4.091	41.69	77 70	29.17	30.47	42.53	13.51	7451	26.53	28.30	41.90	25.98	26.31	21.21	40.72	23.95	20.89	26.00	35.48	26.25	27.34	29.28	42.82	24.20	26.31	28.14	37.53	23.64	26.67	26.89	33.89	9	nen me periods (days)	2 Season	or obening per	Floret opening
6 731	5.047	29.28	20.20	32.29	40.52	50.57	27.40	77 45	31.56	36.39	47.98	28.72	30.66	34.34	47.98	28.20	31.41	30.93	48.39	29.28	32.41	40.40	53.33	27.29	31.67	39.64	45.44	26.90	28.89	32.41	39.01	12	(days)		centage	
6737	5.049	34.30	32,30	35 05	41.55	56.71	31.37	20.27	36.47	39.48	55.42	34.47	37.76	39.39	56.32	33.48	39.02	42.50	54.84	34.36	38.54	40.43	58.55	32.37	35.83	39.64	50.63	30.16	32.22	35.52	47.92	15				

from the treatment in the two seasons. The rest treatments occupied an intermediate position between the abovementioned treatments in both seasons under this study.

As for the effect of storage periods on floret wilting percentage Data of two seasons presented in Table (7) reveal that floret wilting percentage of tuberose cut flower spikes was increased with extending storage periods at 4±1°C for different days (0, 7, 14 and 21 days). However, storage periods at 4±1°C for 0-time treatment induced the lowest values in floret wilting percentage of tuberose cut flower spikes when compared to the other ones under study in both seasons. Moreover, tuberose cut flower spikes were stored at 4±1°C for 21 days recorded highly significant increase in floret wilting percentage as compared to other different storage periods in the two seasons.

Regarding to the interaction effect between growth regulators and storage periods, data in Table (10) demonstrate that 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 $4\pm1^{\circ}C$ for (0,7,14 and 21days) recorded the highest decreases of floret wilting percentage of tuberose cut flower spikes, especially the interaction between (GA_3 at 300ppm or kinetin at 100ppm) and storage period at $4\pm1^{\circ}C$ for 0 time after 3,6,9,12 and 15days from the treatment as compared to control in the two seasons.

Table (10) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret wilting percentage of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

			Floret wiltin	g nercentage			Floret wilting	wilting percentage	
Treatments	ents		1st season	ason				ason	
Growth	Storage		Shelf life periods (days)	riods (days)			Shelf life periods (days)	riods (days)	
regulators	periods	6	9	12	15	6	9	12	15
	0	30.83	61.16	76.39	98.81	20.50	49.66	77.53	95.56
	7	41.33	77.06	96.67		30.16	59.26	90.98	1
Control	14	53.67	93.33	98.29	r.	38.89	71.03	98.61	
	21	62.50	99.89	ř.		50.00	81.55	3.00	
	0	14.29	37.91	61.79	77.44	13.10	39.34	63.60	77.94
CA. 700nnm	7	30.10	55.98	77.27	93.86	26.19	50.00	71.72	98.93
moddoor free	14	36.11	81.39	91.00	97.29	30.16	60.65	87.88	•
	21	52.00	92.14	98.85		40.78	77.98	100.00	£
	0	13.15	29.57	52.54	68.51	12.17	35.84	53.17	66.96
	7	24.70	50.93	67.86	90.33	25.27	52.32	70.15	93.86
GA ₃ 300ppm	14	33.78	69.94	88.24	95.24	27.38	57.87	84.24	73.21
	21	43.56	71.8	94.33	,	34.92	78.57	92.96	
	0	17.79	45.39	59.86	78.69	14.54	37.82	60.32	76.54
RA 75 nnm	7	37.22	56.96	81.47	100.00	26.19	51.85	82.02	99.41
and of any	14	49.00	72.42	97.06		30.56	63.43	95.91	*))
	21	60.00	90.32	100.00		42.06	81.88	Ţ	
	0	15.60	37.18	62.94	78.91	14.55	31.87	58.89	72.47
	7	30.83	58.06	79.55	99.04	25.70	44.82	79.55	72.95
BA 50 ppm	14	41.11	73.69	97.74	•	29.70	55.56	90.30	
	21	57.17	88.89	100.00		41.21	75.00	98.05	
	0	15.52	35.51	58.08	73.30	14.55	37.92	58.89	73.64
î	7	35.56	63.39	79.55	98.83	26.71	50.00	77.78	96.54
Kin 50 ppm	14	45.50	79.37	97.74	440	29.46	55.56	88.33	
	21	60.67	95.78	98.82	4	40.78	78.24	100.00	L.
	0	6.96	31.55	54.80	67.01	11.79	30.95	54.04	67.06
	7	13.33	54.17	71.78	91.58	24.63	43.33	67.52	91.58
Kin 100 ppm	14	43.33	74.17	87.27	98.33	27.38	53.33	88.55	
	21	51.67	91.91	94.37	-	34.07	72.22	92.96	
100.	5%	10.95	15.95	10.89	9.659	8.990	13.13	16.91	23.44
L.S.D at	1%	14.59	21.24	14.50	12.362	11.97	17.48	22.51	31.21

2.2. - Water relations characters:

2.2.a-Water uptake (g) spike:

It is clear from Table (11) that the absorbed solution by tuberose cut flower spikes increased as cut flower spike advanced in age after 3 days from the treatment till 12 days then decreased till the end of longevity in the two season under this study. The treatment of GA₃ at 300ppm and kinetin at 100ppm is being the best treatments for increasing the water uptake of tuberose cut flower spike when compared to control and other treatments in both seasons. Regardless control, the lowest mean values of water uptake by tuberose cut flower spikes was registered by using the treatment of BA at 25ppm during all tested shelf life periods in the two seasons. The rest treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study. Concerning the effect of storage periods on Water uptake (g) spike ,data presented in Table (12) that the absorbed solution by tuberose cut flower spikes increased as cut flower spike advanced in age after 3 days from the treatment till the end of longevity in the two seasons under storage periods treatments at 4±1°C under study. It is clear that, water uptake by tuberose cut flower spikes was greatly influenced by storage periods at 4±1°C in both seasons. The lowest water uptake value was recorded when storage periods were increased. The highest water uptake was with those stored at 4±1°C for 0-time storage period compared with those stored for 7, 14 and 21 days respectively in both seasons. The reduction of water uptake value recorded with the increase of storage periods at low temperature may be due the lowest efficiency of absorption by stem cells. Similar results by using storage

Table (11): Effect of some growth regulators treatments, on Water uptake, Water loss and Water balance (g)/spike of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

1			Shelf li	Hife periods (day	(g)/spike			Wa)/spike			Wate		er balance (g	Water balance (g)/spike
Trea	Treatments		Silen III	Silen life periods (days)	IS (days)			Shelf life		periods (days)				Shelf life	Shelf life periods	Shelf life periods (days)
		3	6	9	12	15	3	6	9	12	15	ω	_	6	6 9	6 9 12
									1 st season	on					-	
	Control	54.26	87.81	116.73	135.73	97.43	47.41	82.69	116.76	142.03	103.03	6.84		5.12	5.12 -0.03	\dashv
	GA ₃ 200ppm	61.08	105.43	127.47	150.43	106.78	53.49	100.82	126.73	155.13	108.90	7.59		4.62	-	0.73
Crowth	00ppm	67.52	111.49	137.18	164.23	115.83	58.55	104.2	134.78	167.13	118.83	8.96		7.25	+	2.39
Regulators	BA 25 ppm	60.87	96.72	126.48	148.90	105.03	54.15	92.11	127.75	155.53	109.61	6.72		4.61	-	-1.27
	BA 50 ppm	63.51	101.07	133.70	155.40	109.55	56.45	95.84	133.52	160.22	113.28	7.06	_	5.23		0 18
	Kin 50 ppm	64.27	105.73	133.41	157.49	110.86	56.21	99.56	131.88	159.82	114.32	8 06	_	618	+	1 53
	Kin 100 ppm	68.21	110.20	137.99	165.33	115.90	59.86	10358	136.08	169.28	118.93	835	_	6.63		
L.S.D at	5 %	0.652	0.879	0.857	0.780	0.507	1.689	0.959	0.898	2.375	0.541	1.671		0.226	+	0 308
	1%	0.869	1.160	1.142	1.039	0.676	2.249	1.278	1.196	3.162	0.721	2.225		0.301	-	0.411
									2 nd season	on						
	Control	57.22	89.98	118.46	138.68	98.68	50.93	85.53	119.13	145.54	104.88	6.29		4.44	4.44 -0.67	-
	GA ₃ 200ppm	62.64	99.85	128.34	152.83	107.93	59.50	94.93	127.47	158.33	112.23	3.14		4.93		0.88
Growth	300ppm	69.87	111.27	136.74	166.73	117.10	61.14	103.66	135.05	169.31	120.15	8.73		7.61	7.61 1.69	1.69
Regulatos	BA 25 ppm	62.64	99.20	126.76	149.04	106.68	55.70	93.68	126.66	146.52	111.37	6.95		5.52	5.52 0.10	0.10
	BA 50 ppm	64.50	102.89	132.87	157.56	110.99	59.47	97.25	132.11	162.29	115.26	5.03		5.64	5.64 0.76	.64 0.76
	Kin 50 ppm	65.93	104.34	133.68	159.24	111.79	56.61	98.23	13238	163.95	115.62	9.33		6.11	6.11 1.30	1.30
	Kin 100 ppm	70.31	111.48	138.14	167.79	117.38	61.72	105.00	137.17	171.53	119.38	8.40		6.48	6.48 0.98	
L.S.D at	5 %	1.261	1.416	1.083	1.350	1.116	3.139	1.448	1,493	9.950	1.217	3.408		0.209	0.209 0.994	0.994
	1%	1.679	1.885	1.443	1.798	1.486	4.180	1.928	1.989	13.25	1.621	4.538		0.278		0.278 1.324 11.05

Table (12): Effect of Storage periods (Days) treatments on Water uptake, Water loss and Water balance (g)/spike of Polianthes tuberosa L.. cut flower spike during the two seasons of 2007-2008/2008-2009.

			Wafe	ater untake (9)/spike	e (g)/spik	e		Water	Water loss (g)/spike	'spike			Water b	Water balance (g)/spike	;)/spike	
E		S	Shelf life periods (days)	periods	(days)		S	Shelf life periods (days)	periods	(days)		S	nelf life	Shelf life periods (days)	(days)	
Treatments	ints	3	9	6	12	15	3	9	6	12	15	3	9	6	12	15
							1 st S	season								
	0	17.77	138.54	181.08	212.84	234.80	64.51	123.65	173.68	210.58	238.74	13.20	14.89	7.41	2.26	-3.94
Storage	7	71.91	121.38	154.88	177.36	200.28	63.64	115.46	154.44	181.90	210.20	8.26	5.92	0.43	-4.54	10.64
periods (Days)	14	54.91	81.28	103.95	124.11		49.31	78.88	104.66	130.56	•	5.59	2.40	-0.71	-6.44	(1)
	21	46.73	69.34	81.79	101.41		43.18	16.69	85.80	110.76		3.56	-0.57	-4.01	-9.34	1
	2 %	0.493	0.658	0.648	0.589	0.383	1.277	0.725	629.0	1.795	0.409	1.263	0.171	0.233	1.647	0.164
L.S.D at	1%	0.657	0.877	0.863	0.785	0.511	1.700	996.0	0.904	2.391	0.548	1.682	0.227	0.311	2.193	0.218
							2 nd s	season								
	0	79.31	139.52	182.33	215.55	237.84	66.53	124.96	175.17	209.89	242.45	12.78	14.56	7.16	99.5	-4.61
Storage	7	73.43	119.71	153.08	178.72	202.46	66.38	112.81	152.16	183.81	214.03	7.05	06.9	0.92	-5.10	-11.57
periods (Days)	14	57.00	81.16	104.59	126.05		52.64	79.43	106.22	132.01	74	4.36	1.73	-1.63	-5.95	6
	21	49.07	70.47	82.84	103.60		45.91	70.39	86.42	112.85	31	3.16	80.0	-3.58	-9.25	t.
	2 %	0.953	1.070	0.819	1.021	0.843	2.373	1.094	1.129	7.522	0.920	2.576	0.518	0.751	6.785	0.154
L.S.D at	1%	1.270	1.425	1.001	1.359	1.123	3.160	1.458	1.503	10.02	1.225	3.430	0.210	1.00	9:036	0.205

periods were reported by **Diab** (2007) on tuberose spikes. **Gendy** (2007) on gladiolus cut flower spikes storage tuberose spikes for two weeks highly significantly decreased preservative solution uptake.

Concerning the interaction effect between growth regulators and storage periods, data in Table (13) reveal that all the interaction between growth regulators and storage periods of tuberose cut flower spikes resulted increases of water uptake as compared to control in the two seasons. However, the interaction treatments between kinetin at 100ppm or GA₃ at 300ppm and storage periods at 4±1°C for 0,7,14 and 21days recorded the highest significant increase of this parameter, especially the interaction between kinetin at 100ppm and storage period at 4±1°C for 0-time after 3,6,9,12 and 15days from the treatment when compared to the other ones and study in the two seasons.

Furthermore, water uptake of tuberose cut flower spikes by using all the interaction treatments between growth regulators and storage periods at $4\pm1^{\circ}$ C for (0,7,14 and 21days) was increased as flower cut spikes advanced in age after 3days from the treatment till the end of age of longevity in the two seasons.

2.2.b.-Water loss g/spike:

Data in Table (11) clear that water loss by tuberose cut flower spikes increased as cut flower spikes prolonged in longevity after 3, 6, 9 and 12 days then decreased after this day to the end of longevity. The treatments of kinetin at 100ppm and GA₃ 300ppm approved to be the most effective treatments for inducing the greatest increases in water loss of tuberose cut

Table (14) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water loss (g)/spike of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

-		-	,		-						
Treatments	ants		Wa	Water loss (g)/spike	ike			Wa	Water loss (g)/spike	nike	
				1st season					2 nd season		
Growth	Storage		Shelf	Shelf life periods (days)	lays)			Shelf	Shelf life periods (days)	days)	
regulators	periods	3	9	6	12	15	3	9	6	12	15
	0	60.57	114.23	161.37	191.20	220.87	63.90	118.53	164.70	196.30	225.03
Control	7	57.43	29.66	139.27	164.57	191.27	58.73	96.37	140.90	166.47	194.50
	14	36.67	62.40	93.00	114.37	a t	42.57	67.93	95.97	118.60	3
	21	35.00	54.47	73.40	97.97	1 0	38.53	59.30	74.93	100.80	t
	0	62.97	124.87	170.23	207.23	225.00	65.63	122.53	171.73	209.33	236.50
GA ₃ 200ppm	7	59.57	121.20	151.97	177.63	210.60	66.20	111.63	150.93	181.37	212.43
i i	14	48.53	84.13	102.50	128.20		50.90	76.57	104.93	131.73	
	21	42.88	73.07	82.23	107.47	n•mi	45.33	68.97	82.27	110.90	
	0	66.50	130.43	179.30	223.03	253.80	09.89	132.27	180.63	227.30	256.43
C 4 300mm	7	67.17	123.20	159.47	191.97	221.53	70.00	119.63	156.47	194.53	224.17
GA3 Souppill	14	54.25	87.93	108.70	138.87	ī	56.93	86.80	110.83	137.13	×
	21	46.30	75.40	91.67	114.67		49.03	75.93	92.27	118.27	,
	0	63.70	120.17	168.73	205.43	232.97	65.63	121.47	171.30	204.80	236.77
BA 25 ppm	7	63.03	112.47	157.00	180.33	205.47	63.65	111.33	150.20	177.00	208.70
	14	48.23	71.10	101.50	126.67	ī	49.23	75.03	101.67	127.40	
	21	41.63	64.70	83.77	109.70	•	44.27	06.99	83.47	107.73	Ċ
	0	63.17	120.87	177.17	215.67	240.83	65.60	124.03	178.37	216.50	244.73
B A 50 mm	7	67.13	115.90	161.77	183.13	212.27	69.23	115.17	153.87	185.90	216.17
mdd ac wa	14	51.50	77.30	108.07	132.13	i	53.93	78.67	107.73	132.97	ž
	21	44.00	69.30	87.07	109.93		49.10	71.13	88.47	113.80	•
	0	65.43	124.93	177.83	207.57	243.07	66.30	124.83	177.10	217.70	245.73
Kin 50 nnm	7	63.17	115.77	153.57	183.70	214.20	66.03	114.10	154.00	186.10	216.73
mdd oc mw	14	51.13	82.67	107.77	133.10	0	47.70	81.70	109.03	134.43	ř
	21	45.10	. 74.87	88.33	114.90	٠	46.40	72.30	89.37	117.57	,
	0	69.23	130.07	181.10	223.90	254.63	70.03	131.03	182.37	228.17	251.97
Kin 100 nnm	7	00.89	120.03	158.07	191.97	221.10	70.83	121.47	158.73	195.33	225.53
mdd oor mar	14	54.87	86.63	111.07	140.57	(ii	57.27	89.33	113.40	141.77	(()
	21	47.33	77.60	94.10	120.67	(4)	48.73	78.17	94.17	120.87	٠
1 S D at	5%	3.377	1.919	1.795	4.749	1.082	6.277	2.896	2.987	19.90	2.435
L.3.D 41	1%	4.498	2.555	2.391	6.325	1.441	8.360	3.856	3.978	26.50	3.242

Results and Discussion

period at 4±1°C for 0-time after 3,6,9,12 and 15days from the treatment as compared to control in the two seasons.

Anyhow, water loss of tuberose cut flower spikes by using all interaction treatments between growth regulators and different storage period at $4\pm1^{\circ}$ C was increased as flower cut spikes prolonged in age after 3days from the treatment to the end of age of longevity in both seasons.

22.2.c.-Water balance (g)/spike:

According to data presented in Table (11) it could be concluded that all studied pre-harvest treatments significantly increased water balance of tuberose cut flower spikes as compared to control in both seasons, with the exception of GA₃ at 200ppm after 3 days of shelf life periods in second season. However, the treatments of GA₃ at 300ppm and kinetin at 100ppm recorded the highest records of water balance of tuberose cut flower spikes compared to the other ones of treatments under study in the two seasons (water balance by tuberose cut flower spikes decreased after 3 day from the treatment in the two seasons).

As for the effect of storage periods on Water balance Data presented in Table (12) showed that tuberose cut flower spikes stored at 4±1°C for different periods (0, 7, 14 and 21 days) recorded an decreases in water balance after 3, 6, 9, 12 and 15 day from the treatment under study in both seasons. However, the highest value of water balance was recorded by using 0-time storage period, whereas the lowest value of water balance was

gained by using 21 days storage periods after 3, 6, 9, 12 and 15 days from the treatment in both seasons under study.

Moreover, tuberose cut flower spikes stored at 4±1°C for 0-time storage period recorded an enhancement in water balance until 6 days then gradually decreased after that day. While storage periods at 4±1°C for 7, 14 and 21 days by tuberose cut flower spike resulted an decreases in water balance after 3 day from the treatment till the end of longevity in the two seasons under study. Similar results by using storage periods were reported by Abd El-Sadek (2005) on gypsophila cut flowers, Palanikumar et al., (2000) on cut roses and Hettiarachchi and Balas (2005) on Gloriosa superba (Glory lily) cut flowers. Gendy (2007) on gladiolus cut flower spikes.

Referring to the interaction effect between growth regulators and storage periods on water balance, data in Table (15) reveal that all the interaction treatments between growth regulators and storage periods at 4±1°C for (0,7,14 and 21days) succeeded in increasing water balance of tuberose cut flower spikes as compared with control in the two seasons. However, the combinations between (GA₃ at 300ppm or kinetin at 100ppm) and storage periods at 4±1°C for (0,7,14 and 12days) recorded the highest increases of water balance values of tuberose cut flower spikes, especially the combined treatment between GA₃ at 300ppm and storage period at 4±1°c for 0-time after 3,6,g,12 and 15days from the treatment as compared to control in both seasons under this study. Irrespective control, the lowest mean values of water balance of tuberose cut flower spikes was registered by the interaction between BA at 25ppm

Table (15) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water balance (g)/spike of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Kin 100 ppm 7 14 21 L.S.D at 5%						0	2.1		Kin 50 ppm	1 0	117		BA 50 ppm	7		71		BA 25 ppm 7		21	GA ₃ 300ppm			21	14	GA ₃ 200ppm 7	0	21	14	Control 7	0	regulators periods			Treatments	
	3,341			6.60	8.23	13.97	3.73	0.20	9.50	12.80	+	-		14.3/	1	1	-	6.50	1			1	1						6.70	7.57	9.90	ods 3	age			
0.601	0.451	0.50	0.30	3.07	7.30	15.80	-0.27	2.73	7.27	14.97	-1.07	1.93	4.5/	15.4/	-1.07	1.70	4./3	13.67	0.07	0.00	7.90	7 00.70	16.00	1 60	1 30	273	16.03	-0.57	2.70	6.93	11.40	6	Sh		W	
0.822	0.617	-3./3	2 72	-0.03	2.40	9.00	-3.87	-0.57	1.67	8.90	-3.94	-0.93	-0.87	6.46	-4.01	-1.50	-1.6	5.06	-1.90	0.20	2.00	9.27	-0.00	7 77	103	150	9.70	-430	-0.20	0.97	3.43	9	Shelf life periods (days)	1st season	Water balance (g)/spike	
5.882	4.356	-9.20	000.00	660	-4.07	3.10	-9.40	-6.10	-4.60	10.80	-9.50	-6.97	-4.30	1.50	-12.00	-7.20	-5.43	-1.90	-5.10	-5.90	-4.07	3.47	-9.70	-7.07	7.07	12.2	2 27	-10 50	-627	-5.00	-3.40	12	(days))/spike	
0.577	0.433			21.14	-9 70	-2.73	T	¥.	-9.77	-4.07	c.		-10.47	-4.43	1	9.	-11.23	-7.07	,		-9.70	-2.33		1	-11.93	3.43	3 43	i		-12 00	-10.40	15				
9 076	6.815	5.37	6.07	100	7 03	14.23	3.80	11.50	8.70	13.30	0.30	3.53	4.80	11.50	3.50	5.50	6.75	12.03	3.87	5.90	9.60	15.53	2.20	2.80	4.50	13.00	3.07	0.10	21.07	7.07	9.87	٠.				-
955 0	0.417	1.50	1.70	0.03	6.03	16 70	-0.23	1.90	7.90	14.87	-0.20	1.83	5.20	15.73	-0.40	1.50	6.87	14.10	1.73	3.23	9.70	15.77	-1.23	0.87	5.80	14.27	-0.60	1.07	0.00	6 00.00	10 50	6	She		Wa	
2648	1.988	-3.47	-1.97	0.80	0.00	8 53	-3.87	-1.07	0.93	9.20	-3.87	-1.23	0.50	7.63	-4.57	-1.20	0.90	5.27	-2.90	-1.30	1.90	9.07	-1.60	-2.87	0.73	7.23	-4.77	-1.80	0.70	3.20	330	0	helf life periods (days)	2nd season	Water balance (o)/snike	
72.01	17.95	-7.50	-5.70	-4.30	2.20	7 62	-9.87	-6.03	-5.07	2.13	-9.87	-5.90	-5.07	1.90	-10.30	-6.80	-4.90	1.23	-6.20	-1.87	-4.47	2.20	-10.07	-8.23	-5.87	2.13	-10.93	-7.13	-6.00	-3.37	2.12		(days)	Transfer of)/snike	
0 5430	0.407		39	-10.77	2.77	777	F 125		-11 23	-4 07	4		-11 97	-4.97			-11.47	-7.30			-9.97	-2.23	1		-12.40	-4.83	71		-13.20	-11.60	61	;				

and storage period at 4±1°C for 21days after 3,6,g and 12days from the treatment when compared with control in the two seasons.

2.3.Effect of some growth regulators as pre-treatments and storage periods on:

2.3. Chemical constituent determinations:

2.3.1-Chlorophyll "a", chlorophyll "b" and Carotenoids in leaves /spike (mg/gf.w.):

Data presented in Table (16) reveal that all growth regulators treatments succeeded in increasing chlorophyll a and chlorophyll b in leaves/spike (mg/g f.w.) of tuberose cut flower spikes as compared to control in the two seasons. However the highest significant increase of these parameter were recorded by using GA₃ at 300ppm as compared to control in the two seasons, followed descendingly by kinetin at 100ppm and BA at 50ppm in the two seasons. On contrary, the lowest values of these parameter of tuberose cut flower spikes was registered by using control in the two seasons under this study.

Furthermore, Data in Table (16) indicate that, all growth regulators treatments increased carotenoids in leaves/spike (mg/g f.w.) of tuberose cut flower spikes as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm of tuberose cut flower spikes exhibited to be the most effective one for inducing the highest significant increase in this parameter as compared to control in the two seasons, followed descendingly by GA₃ at 300ppm and BA at 50ppm in the two seasons. On the reserve the lowest values of this parameter of

Table (16): Effect of some growth regulators treatments on Total phenols percentage, Total nitrogen percentage, Total protein percentage, Total phosphorus percentage and Total potassium percentage in petals and flower stalk of *Polianthes tuberosa* L.cut flower spike during the two seasons of 2007-2008/2008-2009.

Trea				Growth	Regulat				L.S.D at	
Treatments		Control	GA ₃ 200ppm	GA ₃ 300ppm	BA 25 ppm	BA 50	Kin 50 ppm	Kin 100 ppm	5 %	%1
Total percer pe	l _n	0.248	0.185	0.173	0.198	0.190	0.214	0.185	0.012	0.015
Total phenols percentage in petals	2 nd season	0.220	0.176	0.152	0.176	0.167	0.212	0.161	0.012	0.165
Total percer flowe	Season	0.242	0.162	0.154	0.192	0.178	0.171	0.166	0.010	0.013
Total phenols percentage in flower stalk	2 nd season	0.228	0.145	0.165	0.170	0.181	0.161	0.164	0.012	0.015
Total r perce in p	l"	3.539	3.320	3.879	3.670	3.793	3.706	3.888	0.097	0.129
Total nitrogen percentage in petals	2 nd Season	3.566	3.750	3.852	3.621	3.823	3.698	3.840	0.052	0.069
Total perce in p	l" season	22.12	20.75	24.25	22.94	23.71	23.16	24.30	0.615	0.819
Total protein percentage in petals	2 nd Season	22.29	23.44	24.08	22.63	23.90	23.11	24.00	0.319	0.425
Total percer	1" season	3.305	3.679	3,801	3.523	3.687	3.588	3.797	0.052	0.069
Total nitrogen percentage in flower stalk	2 ^{ml} Season	3.313	3.653	3.816	3.543	3.677	3.607	3.774	0.073	0.097
Total percer flowe	l ^u season	20.66	23.00	23.76	22.02	23.04	22.43	23.73	0.324	0.432
Total protein percentage in flower stalk	2 nd season	20.71	22.83	23.85	22.15	22.98	23.55	23.59	0.449	0.598
Phosi percer pe	I ^N season	0.825	0.900	0.928	0.887	0.913	0.899	0.948	0.045	0.059
Phosphorus percentage in petals	2 nd season	0.825	0.907	0.920	0.893	0.918	0.906	0.954	0.324	0.432
Phosp percen flowe	l"	0.739	0.767	0.815	0.782	0.804	0.786	0.835	0.056	0.075
Phosphorus percentage in flower stalk	2 nd season	0.737	0.768	0.820	0.772	0.807	0.777	0.836	0.016	0.022
Pota: percen pet	l" l	2.909	3.077	3.243	2.979	3.129	3.086	3.233	0.037	0.049
Potassium percentage in petals	2 nd season	2.918	3.113	3.273	3.010	3.148	3.153	3.275	0.026	0.034
Potassium percentage in flower stalk	l _n	2.279	2.357	2.409	2.327	2.393	2.380	2.420	0.014	0.018
sium tage in stalk	2 nd seaso	2.305	2.367	2.421	2.345	2.399	2.397	2.427	0.009	0.012

tuberose cut flower spikes was registered by control in both seasons under study.

As for the effect of storage periods on Chlorophyll a, chlorophyll b and carotenoids (mg/g f.w.). It is quite clear from the data in Table (17) that there were gradual decrease in chlorophyll a, chlorophyll b and carotenoids in leaves/spike (mg/g f.w) of tuberose cut flower spikes with extending storage periods at 4±1°C for different days (0-time, 7, 14 and 21 days). However, storage periods at 4±1°C for 0-time treatment showed the highest significant increase in these parameters of tuberose cut flowers spikes when compared to the other ones under study in the two seasons. On the reverse the lowest values of these parameters of tuberose cut flower spikes was registered by storage periods at 4±1°C for 21days as compared to different storage periods in both seasons.

Regarding to the effect of interaction between growth regulators and storage periods on Chlorophyll "a" and caroteniods content (mg/g f.w.), Data in Table (18) reveal that all the combinations treatments between growth regulators and storage periods (0-time, 7, 14 and 21days) at 4±1°C increased chlorophyll and carotenoids in leaves/spikes (mg/g f.w.) of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between kinetin at 100ppm and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) 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, especially the combined treatment between kinetin at 100ppm

Table (17): Effect of storage periods (Days) treatments on Chlorophyll ,a,b, Carotenoids in leaves /spike (mg /g f.w.) ,Total sugars percentage , Reducing sugars percentage and Non-Reducing sugars percentage in petals and flower stalk of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

in k soon s soon											D.d.	al-m	Non-Re	ducino	100 mm		Reducing	ing.	Non -Reducing	duc
Nements I			Chlorop in leaves (mg/g	hyll ,a, / spike f. w.)	Chlorop leaves/ (mg/g	hyll ,b, spike f. w.)	Caroten leaves/ (mg/g	oids in spike f. w.)	Total s percent pet	ugars rage in als	sug percent pet	ars age in als	sug: percent	ars rage in	Total s percent flower	age in stalk	suga percent flower	age in	sugars percentage in flower stalk	SE
0 0.798 0.890 0.432 0.431 0.406 0.408 5.874 5.892 2.726 2.753 3.139 3.139 6.559 6.562 3.276 3.250 7 0.787 0.790 0.422 0.422 0.429 0.392 0.392 3.811 1.729 1.717 1.820 2.096 3.973 4.011 1.983 1.978 14 0.580 0.594 0.327 0.329 0.319 0.320 2.418 2.951 1.211 1.225 1.207 1.366 2.797 2.847 1.326 1.368 21 0.490 0.495 0.250 0.246 0.234 0.235 1.467 1.468 0.875 0.862 0.502 0.506 1.836 1.978 5 % 0.012 0.098 0.020 0.025 0.025 0.039 0.039 0.039 0.039 0.039 0.039 0.039 0.035 0.039 0.071 0.345 1 % 0.016	Treatmen	ıts	1 st	2 nd season	I st season	2 nd season	l st season	2 nd season	1 st season	2 nd season	1 st season	2 nd season	1 st season	2 nd season	I st season	2 nd season	1 st season	2 nd season	1 st season	2 nd season
7 0.787 0.790 0.422 0.429 0.392 0.392 0.392 3.811 1.729 1.717 1.820 2.096 3.973 4.011 1.983 1.978 14 0.580 0.594 0.327 0.329 0.319 0.320 2.418 2.951 1.211 1.225 1.207 1.366 2.797 2.847 1.326 1.368 21 0.490 0.495 0.250 0.246 0.234 0.235 1.467 1.468 0.875 0.862 0.502 0.606 1.836 1.978 1.050 5 % 0.012 0.009 0.008 0.007 0.007 0.039 0.020 0.039 0.039 0.035 0.205 0.205 0.092 0.098 0.071 0.345 1 % 0.012 0.012 0.010 0.008 0.010 0.009 0.022 0.271 0.052 0.052 0.074 0.273 0.122 0.130 0.094 0.459		0	0.798	0.800	0.432	0.431	0.406	0.408	5.874	5.892	2.726	2.753	3.139	3.139	6.559	6.562	3.276	3.250	3.283	3.313
14 0.580 0.594 0.327 0.329 0.319 0.320 2.418 2.951 1.211 1.225 1.207 1.366 2.797 2.847 1.326 1.368 21 0.490 0.495 0.250 0.246 0.234 0.235 1.467 1.468 0.875 0.862 0.502 0.506 1.836 1.890 1.043 1.050 5% 0.012 0.009 0.008 0.006 0.007 0.007 0.039 0.020 0.039 0.039 0.055 0.205 0.205 0.092 0.098 0.071 0.345 1% 0.016 0.012 0.010 0.008 0.010 0.009 0.052 0.271 0.052 0.052 0.074 0.273 0.122 0.130 0.094 0.459	Storage	7	0.787	0.790	0.422	0.429	0.392	0.392	3.649	3.811	1.729	1.717	1.820	2.096	3.973	4.011	1.983	1.978	1.990	2.033
21 0.490 0.495 0.250 0.246 0.234 0.235 1.467 1.468 0.875 0.862 0.502 0.606 1.836 1.890 1.043 1.050 5% 0.012 0.009 0.008 0.006 0.007 0.007 0.039 0.020 0.039 0.039 0.055 0.205 0.205 0.092 0.098 0.071 0.345 1% 0.016 0.012 0.010 0.008 0.010 0.009 0.052 0.271 0.052 0.052 0.074 0.273 0.122 0.130 0.094 0.459	periods (days)	14	0.580	0.594	0.327	0.329	0.319	0.320	2.418	2.951	1.211	1.225	1.207	1.366	2.797	2.847	1.326	1.368	1.471	
5 % 0.012 0.009 0.008 0.006 0.007 0.039 0.020 0.039 0		21	0.490	0.495	0.250	0.246	0.234	0.235	1.467	1.468	0.875	0.862	0.502	0.606	1.836	1.890	1.043	1.050	0.793	0.841
1% 0.016 0.012 0.010 0.008 0.010 0.009 0.052 0.271 0.052 0.052 0.074 0.273 0.122 0.130 0.094 0.459		5 %	0.012	0.009	0.008	0.006	0.007	0.007	0.039	0.020	0.039	0.039	0.055	0.205	0.092	0.098	0.071	0.345	0.104	0.145
	L.S.D at	1%	0.016	0.012	0.010	0.008	0.010	0.009	0.052	0.271	0.052	0.052	0.074	0.273	0.122	0.130	0.094	0.459	0.138	0.193

Table (18): Effect of interaction between some growth regulators and Storage periods (Days) treatments on Chlorophyll, a, Chlorophyll ,b, and Carotenoids in leaves/spike(mg/g f. w.) of Polianthes tuberosa L during the two seasons of 2007-2008/2008-2009.

		Chlore	Chlorophyll ,a, in leaves/ spike	in leaves/	spike	Chlor	Chlorophyll ,b, leaves/ spike	, leaves/ s	pike	Caro	Carotenoids in leaves/ spike	n leaves/	spike
Treatments	ıts		(mg/g f. w.)	f. w.)			(mg/g f. w.)	f. w.)			g/gm)	mg/g f. w.)	
(Sto	Storage periods (days)	iods (day	(s.	St	Storage periods (days)	iods (day	/s)	St	Storage periods (days)	iods (da	(S/
Growth	_	0	7	14	21	0	7	14	21	0	7	14	21
regulators	2						1st season	ason					
Control		0.733	0.697	0.520	0.430	0.400	0.390	0.323	0.243	0.373	0.367	0.297	0.233
GA, 200ppm		0.797	0.763	0.587	0.490	0.430	0.410	0.313	0.247	0.417	0.400	0.310	0.227
GA, 300ppm		0.823	0.837	0.650	0.523	0.457	0.453	0.337	0.267	0.437	0.417	0.337	0.237
BA 25 ppm		0.763	0.767	0.550	0.470	0.423	0.433	0.323	0.243	0.383	0.360	0.310	0.233
BA 50 ppm		0.820	0.820	0.600	0.497	0.450	0.440	0.333	0.250	0.400	0.300	0.330	0.240
Kin 50 ppm		0.800	0.763	0.580	0.490	0.413	0.403	0.320	0.240	0.397	0.390	0.310	0.230
Kin 100 ppm		0.840	0.820	0.637	0.530	0.450	0.427	0.337	0.260	0.437	0.423	0.340	0.237
	2%		0.0	0.033			0.0	0.020			0.0	0.019	
L.S.D at	1%		0.0	0.044			0.027	127			0.0	0.026	
							2 nd s	2nd season					
Control		0.730	0.703	0.523	0.440	0.393	0.397	0.323	0.240	0.377	0.357	0.293	0.227
GA, 200ppm		0.790	0.793	0.600	0.497	0.430	0.420	0.320	0.243	0.413	0.403	0.313	0.233
GA, 300ppm		0.830	0.837	0.640	0.520	0.457	0.453	0.340	0.257	0.427	0.417	0.337	0.237
BA 25 ppm		0.777	0.763	0.550	0.470	0.420	0.440	0.330	0.243	0.387	0.363	0.310	0.233
BA 50 ppm		0.823	0.820	0.613	0.510	0.447	0.447	0.337	0.247	0.400	0.390	0.330	0.243
Kin 50 ppm		0.810	0.800	0.590	0.490	0.417	0.407	0.317	0.230	0.407	0.393	0.313	0.233
Kin 100 ppm		0.837	0.817	0.640	0.540	0.453	0.437	0.337	0.263	0.443	0.420	0.340	0.240
	2%		0.0	0.023			0.0	0.016			0.0	610.0	
L.S.D at	1%		0.0	0.031			0.0	0.022			0.0	0.025	

and storage periods at $4\pm1^{\circ}$ C for 0-time in the two seasons of this study. Moreover, the combination treatments between GA₃ at 300ppm or BA at 50ppm and storage periods at $4\pm1^{\circ}$ C for 0-time and 7days resulted highly significant increase in chlorophyll a and carotenoids in leaves/spike of tuberose cut flower spikes as compared to control in both seasons. Irrespective control, the lowest values of these parameters of tuberose cut flower spikes was recorded by using the combined treatments between BA at 25ppm and different storage periods at $4\pm1^{\circ}$ C for 0-time, 7, 14 and 21days in most cases in the two seasons under this study.

Furthermore, Data in Table (18) indicate that all the combinations treatments between growth regulators and storage periods at 4±1°C for (0-time, 7, 14 and 21days) increased chlorophyll "b" in leaves/spikes (mg/g f.w) of tuberose cut flower spikes as compared to control in the two seasons. However the highest values of this parameter of tuberose cut flower spikes was registered by using the combinations treatments between GA₃ at 300ppm and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) as compared to control in the two seasons, especially the combined treatment between GA₃ at 300ppm and storage periods at 4±1°C for 0-time in the two seasons of this study. Moreover, using the combinations treatments between kinetin at 100ppm or BA at 50ppm and storage periods at 4±1°C for (0-time and 7days) recorded highly increases in this parameter of tuberose cut flower spikes as compared to control in both seasons. On the other side, the lowest values of this parameter of tuberose cut flower spikes

was recorded by using the combined treatment between kinetin at 50ppm and storage periods at $4\pm1^{\circ}$ C for 21days as compared to the other ones under study in the two seasons.

2.2.2.-Total sugars percentages:

Data in Table (16) reveal that all growth regulators treatments increased total sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the highest values of these parameter of tuberose cut flower spikes was registered by using kinetin at 100ppm as compared to control in the two seasons in most cases, followed descendingly by GA₃ at 300ppm in both seasons under this study. On the reverse, the lowest values of these parameter was recorded by using control in the two seasons. The rest treatment between the abovementioned treatments occupied an intermediate position in this concern in the two seasons.

Concerning the effect of storage periods on Total sugars percentages, Data listed in Table (17) demonstrate that there were gradual decrease in total sugars percentage in petals and flower stalks of tuberose cut flower spikes with extending storage periods at 4±1°C for different days (O-time, 7, 14 and 21days) in the two seasons. However, tuberose cut flower spikes were stored at 4±1°C for O-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 4±1°C for 7 days. Moreover storage periods at 4±1°C for 21 days treatment recorded highly significant decrease in total sugars percentage in petals and flower stalks of tuberose

cut flower spikes when compared to the other ones under study in the two seasons. Similar results by using storage periods were reported by **Diab** (2007) reported that Storing tuberose spikes for two weeks significantly decreased soluble, non soluble and total carbohydrates in the petals. Also decreasing storage period to 5 or 10 days showed similar significant reduction in carbohydrates percentage.

As for the effect of interaction between growth regulators and storage periods on total sugars percentages, Data in Tables (19&20) demonstrate that all the combinations treatments between growth regulators and storage periods at 4±1°C for 0time, 7, 14 and 21days increased total sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the highest significant increments of these parameters was registered by using the combinations treatments between kinetin at 100ppm and different storage periods at 4±1°C for 0-time, 7, 14 and 21days as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 4±1°C for 0-time as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between GA3 at 300ppm and storage periods at 4±1°C for 0-time resulted highly increases in total sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons.

Table (19): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total sugars percentage, Reducing sugars percentage and non reducing sugars percentage in petals of Polianthes tuberosa L cut flower spike during the two seasons of 2007-2008/2008-2009.

Treatments	ents	Total su	ugars pe	gars percentage in petals	n petals	Reduc	Reducing sugars percentage in	igars percen	tage in	Non-Re	educing s	Non-Reducing sugars percentage	centage
Growth	ŧ	S	torage pe	Storage periods (days)	(SA	S	Storage periods (days)	inde (day	(or	3	d ui	ın petals	
	•	c	7	7	1	1	34	and char		ñ	orage per	Storage periods (days)	(s)
regulators	ors			<u>+</u>	17	0	7	14	21	0	7	14	21
Control							1 st se	season	-				
Courto		5.73	3.51	2.33	1.37	2.63	1.59	0.99	090	3 10	1 00	1 24	1
GA3 200ppm		5.84	3.65	2.42	1.40	2.76	1.73	1 26	0.01	2.00	1.02	+C.1	0.77
GA ₃ 300ppm		5.99	3.78	2.49	1.62	2.77	1.79	1 34	10.0	2.73	1.92	1.16	0.49
BA 25 ppm		5.84	3.57	2.37	1.41	2.76	1.74	1.16	07.0	3.00	1.93	1.16	0.57
BA 50 ppm		5.87	3.63	2.42	1.45	2.82	1 76	1 10	0.07	2000	1.83	1.22	0.62
Kin 50 ppm		5.78	3.60	2.40	1 38	99 6	1.70	1.17	10.0	3.00	1.87	1.23	0.61
Kin 100 ppm		6.07	3.80	2.40	1.64	2.00	1.70	CZ.1	0.91	3.12	1.90	1.15	0.47
	20%		00:0	7.7	1.04	2.73	1.79	1.30	1.03	3.32	2.00	1.19	0.61
L.S.D at	200		0	104		J	0.104	04		÷	0.1	0.146	
	170		0.1	0.138			0.138	38			0.195	95	
							put	Jud cooca					
Control		185	2 51	23.4		0,0	7	cason					
GA. 200nnm		20.5	10.0	40.7	1.3/	7.68	1.57	1.03	0.64	3.15	1.94	1.31	0.73
CA. 300ppm		0.00	5.71	74.7	1.39	2.82	1.73	1.25	0.85	3.03	1.98	1.17	0.54
RA 75 ppm		0.00	3.77	7.59	1.62	2.78	1.78	1.36	1.06	3.23	1.99	1 23	95 0
mdd cz va		7.87	3.58	2.44	1.42	2.76	1.71	1.15	0.75	3.11	1.87	1 26	0.00
ba 30 ppm		5.86	3.70	3.45	1.46	2.86	1.74	1.22	0.84	3.00	1 0.6	07.1	0.07
Kin 50 ppm		5.78	4.62	2.41	1.38	265	1.70	1 26	000	0.00	0.50	2.23	0.62
Kin 100 ppm		80.9	3.79	2.52	1 63	27.7	1 70	07.1	0.09	3.12	7.97	1.15	0.49
. 40	2%		0.5	0.538	00.1	47	1./8	1.31	1.00	3.33	2.01	1.22	0.63
L.S.D at	10/		0.0	000			0.104	74			0.543	43	
	1 /0		0./16	16			0.138	38			0 723	23	
											****	7	•

Table (20): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total sugars percentage, Reducing sugars percentage, Non reducing sugars percentage in flower stalk and Total phenols percentage in petals and flower stalk of *Polianthes tuberosa* L cut flower spike during the two seasons of 2007-2008/2008-009.

at	L.S.D	Kin 100 ppm	Kin 50 ppm	dd oc va	RA SO ppm	BA 25 ppm	GA: 300ppm	GA ₃ 700ppm	Control		at	L.S.D	Kin 100 ppm	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA ₃ 300ppm	GA ₃ 200ppm	Control	regulators	Growth		Treatments
1%	5%	pm	m		3	3 -	mq	pm			1%	5%	pm	В	ם	3	om	m		ors	8		ents
1		6.95	6.52	0.40	6.48	6 42	6 82	6.63	6.13				6.89	6.51	6.52	6.41	6.81	6.62	6.14		0	Stora	perc
0.	0.	4.20	4.06		4 10	3 83	4.12	4.02	3.74		0	0.2	3.99	4.06	4.06	3.84	4.10	4.04	3.73		7	ge per	Total sugars centage in flo stalk
0.345	0.259	2.85	2.83	1.00	285	2.75	2.83	2.87	2.95		0.323	0.243	2.88	2.83	2.83	2.73	2.83	2.85	2.63		14	Storage periods (days)	Total sugars percentage in flower stalk
		1.98	1.82	+	-	_	2.00	1.95	1.72				1.84	1.74	1.91	1.82	1.95	1.94	1.65		21	lays)	wer
		3.44	3.34	2000	7 77	3.21	3.34	3.22	2.88				3.49	3.33	3.32	3.20	3.38	3.27	2.95		0	Stora	Re
1.	0.1	2.08	1.99	1 00	1 95	1.98	2.08	1.96	1.82		0.249	0.187	2.07	2.02	1.95	1.97	2.08	1.95	1.84		7	Storage periods (days)	Reducing sugars percentage in flower stalk
1.214	0.911	1.31	+	_	1.35	1.34	1.38	1.26	1.16		249	87	1.28	1.40	1.40	1.32	1.41	1.32	1.15		14	iods (d	sugar in flov lk
		1.10	1.00	1 00	1 14	1.1	1.09	1.08	0.73				1.05	1.06	1.15	1.10	1.11	1.07	0.76		21	ays)	ver
		3.51	3.13	3 10	3.15	3.21	3.48	3.41	3.25				3.40	3.19	3.20	3.21	3.44	3.35	3.19		0	Stora	Non -
0.	0	2.12	1.00	20.6	2.16	1.86	2.04	2.06	1.92		0.365	0.274	1.91	2.03	2.12	1.87	2.02	2.09	1.89		7	Storage periods (days)	Non -Reducing sugars percentage in flower stalk
0.511	0.384	1.54		1 05	1.50	1.41	1.46	1.61	1.79	2"	4.	74	1.60	1.43	1.43	1.41	1.42	1.53	1.48	1st season	14	ods (d	in flov
		0.87	001	0.74	0.80	0.72	0.90	0.87	0.98	2ºº season			0.79	0.69	0.77	0.72	0.83	0.87	0.89	son	21	ays)	gars ver
		0.270	0.000	0 303	0.243	0.270	0.237	0.270	0.310	ā			0.287	0.287	0.270	0.300	0.250	0.273	0.347		0	2101	Total
		1.5	-	0.260	0.197	0.207	0.180	0.197	-				0.207	0.250	0.203	0.220	0.200	0.207	0.260		7	Storage perious	pheno in p
0.033	0.025	0 0.12/	-	0.177	7 0.13	7 0.130	0.120	0.130	0.190		0.030	0.023	0.143		+	-	0.143	-	+		14	rious (Total phenols percentage in petals
		-	-	7 0.107	7 0.100	0 0.097	0 0.073	1	_				0.103		-	-	+	-	-		21	days)	entage
H		-	-	0.283	0.283	0.270	3 0.257	_	STATE OF THE PERSON.	_	-	t	3 0.260	_	_	-	_	_	_		0		Tot
		-	_	_		70 0.190	57 0.1	0.15/					0.1	_		0 0.220	_	0 0.180			7	Storage periods (days)	Total phenols percentage in flower stalk
0.001	0.020	5	_	0.153	0.190	-	+				0.027	0.00	0.170 0.133	00	-		+			1	14	perior	nenols percei flower stalk
1	- 0	2	0 137	0.110	0.150	0.120	0.120	0.097	0.150		,	7 0).133	0.127	0.130	0.140	0.117	0.120	0.160			un len	ercenta talk
			0.093	0.097	0.100	0.100	0.08/	0.0//	0.130	2			0.100	0.100	0.110	0.120	0.077	0.08/	0.137		17	19)	ige in

2.3.3.-Reducing sugars percentages:

Data in Table (16) demonstrate that all growth regulators treatments increased Reducing sugars percentage in petals and flower stalks of the tuberose cut flower spikes as compared to control in the two seasons. However, using the treatment of GA₃ at 300ppm resulted the highest significant increment of this parameter of tuberose cut flower spikes as compared to control in the two seasons in most cases, followed descendingly by kinetin at 100ppm in the two seasons. Moreover using the treatment of kinetin at 50ppm and BA at 50ppm recorded highly increases in these parameter as compared to control in the two seasons under this study. Diab (2007) reported that Storing tuberose spikes for two weeks significantly decreased soluble, non soluble and total carbohydrates in the petals. Also decreasing storage period to 5 or 10 days showed similar significant reduction in carbohydrates percentage. Abd El-Sadek (2005) on gypsophila stored at 5°C for (0 - 5) day showed increase in total and reducing sugars percentage compared to storage at 5°C for 15 days treatment.

With respect to the effect of storage periods on Reducing sugars percentages.

Data presented in Table (17) indicate that there were gradual decrease in reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes with extending storage periods at $4\pm1^{\circ}$ C for different days (0-time, 7, 14 and 21days) in the two seasons. However, tuberose cut flower spikes were stored at $4\pm1^{\circ}$ C for 0-time recorded the highest significant

increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 4±1°C for 7 days. Moreover storage periods at 4±1°C for 21 days treatment recorded highly significant decrease in reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes when compared to the other ones under study in the two seasons. Similar results by using storage periods were reported by **Abd El-Sadek (2005)** on gypsophila stored at 5°C for (0 - 5) day showed increase in total and reducing sugars percentage compared to storage at 5 °C for 15 days treatment. **Diab (2007)** reported that Storing tuberose spikes for two weeks significantly decreased soluble, non soluble and total carbohydrates in the petals. Also decreasing storage period to 5 or 10 days showed similar significant reduction in carbohydrates percentage.

With regard to the effect of interaction between growth regulators and storage periods on Reducing sugars percentages, Data in Table (19) demonstrate that most the combinations treatments between growth regulators and storage periods (at $4\pm1^{\circ}$ C) succeeded in increasing reducing sugars percentage in petals of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between GA₃ at 300ppm and different storage periods at $4\pm1^{\circ}$ C for 0-time, 7, 14 and 21days showed to be the most effective one for inducing the highest values of this parameter of tuberose cut flower spikes as compared to control in both season, especially the combined treatment between GA₃ at 300ppm and storage periods at $4\pm1^{\circ}$ C for 0-time in the two seasons. Moreover, the

combinations treatments between kinetin at 100ppm storage periods at 4±1°C for (0-time, 7, 14 and 21days) recorded highly increases in reducing sugars in petals of tuberose cut flower spikes as compared to control in both seasons. Regardless control, the lowest values of this parameters of tuberose cut flower spikes was recorded by using the combined treatment between BA at 25ppm and storage periods at 4±1°C for 21days in the two seasons.

Furthermore, Data in Table (19) reveal that, most the combinations treatments between growth regulators and storage periods (at 4±1°C) succeeded in increasing reducing sugars percentage in flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between kinetin at 100ppm and storage periods at 4±1°C for 0-time showed to be the most effective one for inducing the highest values of this parameter of tuberose cut flower spikes as compared to control in both seasons. Moreover, the combinations treatments between GA₃ at 300ppm storage periods at 4±1°C for (0-time, 7, 14 and 21days) recorded highly increases in reducing sugars in flower stalks of tuberose cut flower spikes as compared to control in both seasons. Regardless control, the lowest values of this parameters of tuberose cut flower spikes was recorded by using the combined treatment between BA at 25ppm and storage periods at 4±1°C for 21days in the two seasons.

2.3.4.-Non- Reducing sugars percentages:

Data in Table (16) reveal that, all growth regulators treatments increased Non-Reducing sugars percentage in petals and flower stalks of tuberose cut flower spike as compared to control in the two seasons. However, the highest values of this parameter was recorded by using kinetin at 100ppm as compared to control in the two seasons in most cases, followed descendingly by GA₃ at 300ppm in the two seasons.

Moreover using the treatments of BA at 50ppm and GA₃ at 200ppm of Non-Reducing sugars percentage in petals and flower stalks respectively recorded highly increases in these parameter of tuberose cut flower spikes as compared to control in the two seasons. **Diab** (2007) reported that Storing tuberose spikes for two weeks significantly decreased soluble, non soluble and total carbohydrates in the petals. Also, decreasing storage period to 5 or 10 days showed similar significant reduction in carbohydrates percentage.

Referring to the effect of storage periods on Non-Reducing sugars percentags, Data in Table (17) reveal that there were gradual decrease in Non-Reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes with extending storage periods at 4±1°C for different days (O-time, 7, 14 and 21days) in the two seasons. However, tuberose cut flower spikes were stored at 4±1°C for 0-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 4±1°C for 7 days. Moreover storage

periods at 4 ± 1 °C for 21 days treatment recorded highly significant decrease in Non-Reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes when compared to the other ones under study in the two seasons.

Concerning the effect of interaction between growth regulators and storage periods on Non-reducing sugars percentages, Data in Tables (19&20) demonstrate that all the combinations treatments between growth regulators and storage periods at 4±1°C for 0-time, 7, 14 and 21days increased nonreducing sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However the highest significant increments of these parameters was registered by using the combinations treatments between kinetin at 100ppm and different storage periods at 4±1°C for 0-time, 7, 14 and 21days as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 4±1°C for 0-time as compared to the other ones of this study in the two seasons. Moreover, the combinations treatments between GA₃ at 300ppm or BA at 50ppm and different storage periods at 4±1°C for 0-time, 7, 14 and 21days resulted highly increases in non-reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons.

2.3.5.-Total phenols percentages:

Data in Table (21) reveal that all growth regulators treatments decreased total phenols percentage in petals and

Table (21): Effect of some growth regulators treatments on Chlorophyll ,a,b, Carotenoids in leaves /spike (mg/g f.w.) ,Total sugars percentage , Reducing sugars percentage and Non-Reducing sugars percentage in petals and flower stalk of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Treatments Com Com G/ 200p	nents Control GA ₃ 200ppm	Chlorophyll, a, in leaves/ spike spike ts (mg/g f. w.) (mg/g f. w.) 1" 2" 1" 1" 1" 1" 1" 1"	phyll, saves/ ke (f. w.) 2 nd season 0.599	Chlor ,b, le sp (mg/ 1" season 0.339	Chlorophyll ,b, leaves/ spike (mg/g f. w.) 1" 2" eason season 0.339 0.338	Carotenoids in leaves/ spike (mg/g f. w.) l" 2" season season 0.318 0.313	moids twes/ ke f. w.) 2 nd season 0.313	Total sugars percentage in petals I' 2 nd season season 3.235 3.260 3.328 3.342	ugars lage in als 2 nd season 3.260	Reducing sugars percentage in petals Transport 2m season season season season l.478 1.453 l.478	cing ars age in 2nd season 1.478	Non-Reducing sugars percentage in petals 1" 2 nd season season 1.782 1.782	ducing ars tage in als 2nd season 1.782	ng in son son son son son son son son son so			Total sugars percentage in flower stalk l" 2" season season 3.538 3.364 3.861 3.867	Total sugars percentage in flower stalk l" 2" season season 3.538 3.364 3.861 3.867	Total sugars sugar percentage in percentage
	Control	0.595	0.599	0.339	0.338	0.318	0.313	3.235	3.260	_	.453		1.478	1.478 1.782	1.478 1.782 1.782	1.478 1.782 1.782 3.538	1.478 1.782 1.782 3.538 3.364	1.478 1.782 1.782 3.538 3.364 1.674	1.478 1.782 1.782 3.538 3.364 1.674 1.647
	GA ₃ 200ppm	0.662	0.670	0.350	0.353	0.338	0.341	3.328	3.342	1.6	65	-	1.662	1.662	1.662 1.663 1.680	1.662 1.663 1.680 3.861	1.662 1.663 1.680 3.861 3.867	1.662 1.663 1.680 3.861 3.867 1.902	1.662 1.663 1.680 3.861 3.867 1.902 1.879
	GA ₃ 300ppm	0.708	0.707	0.379	0.377	0.357	0.354	3.472	3,494	-	1.738	738 1.742		1.742	1.742 1.733	1.742 1.733 1.752	1.742 1.733 1.752 3.923	1.742 1.733 1.752 3.923 3.941	1.742 1.733 1.752 3.923 3.941 1.996
Growth Regulators	BA 25 ppm	0.643	0.640	0.356	0.358	0.322	0.323	3.298	3.320	-	1.611	611 1.593	-	1.593	1.593 1.687	1.593 1.687 1.727	1.593 1.687 1.727 3.700	1.593 1.687 1.727 3.700 3.708	1.593 1.687 1.727 3.700 3.708 1.897
	BA 50 ppm	0.684	0.692	0.368	0.369	0.340	0.341	3.343	3.617	=	1.649	1.665		1.665	1.665 1.694	1.665 1.694 1.952	1.665 1.694 1.952 3.832	1.665 1.694 1.952 3.832 3.843	1.665 1.694 1.952 3.832 3.843 1.953 1.941
	Kin 50 ppm	0.663	0.673	0.344	0.342	0.332	0.337	3.289	3.546		1.630	.630 1.626	-	1.626	1.626 1.659	1.626 1.659 1.920	1.626 1.659 1.920 3.787	1.626 1.659 1.920 3.787 3.809	1.626 1.659 1.920 3.787 3.809 1.953
	Kin 100 ppm	0.707	0.708	0.368	0.372	0.359	0.361	3,499	3.505	_	1.718	.718 1.709	+	1.709	1.709 1.781	1.709 1.781 1.796	1.709 1.781 1.796 3.898	1.709 1.781 1.796 3.898 3.993	1.709 1.781 1.796 3.898 3.993 1.973 1.983
1 8 0	5 %	0.016	0.012	0.010	0.008	0.010	0.009	0.052	0.269	0	0.052	052 0.052		0.052	0.052 0.073	0.052 0.073 0.272	0.052 0.073 0.272 0.121	0.052 0.073 0.272 0.121 0.129	0.052 0.073 0.272 0.121 0.129 0.093
at	1%	0.022	0.015	0.013	0.011	0.013	0.012	0.069	0.358	-	0.069	.069 0.069		0.069	0.069 0.097	0.069 0.097 0.362	0.069 0.097 0.362 0.162	0.069 0.097 0.362 0.162 0.172	0.069 0.097 0.362 0.162 0.172 0.124

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 GA₃ at 300ppm as compared to control in the two seasons in most cases, followed descendingly by kinetin at 100ppm in the two seasons. Moreover, using the treatment of GA₃ at 200ppm of tuberose cut flower spikes recorded highly decreases of total phenols percentage in petals and flower stalks as compared to control in the two seasons. On the reverse, the highest values of these parameter was registered by using control in the two seasons under this study.

The aforementioned results of kinetin are in agreement with those obtained by Maximoos (1993) on *Gerbera jamesonii* who mentioned that treated the plants with kinetin at 25, 50 and 100 ppm significantly decreased leaf total phenols content. Similar results were obtained by Auda (1992) on *Hippeastrum vittatum* and Shahin (1998) on Crinum and Hemerocallis

With regard to the effect of storage periods on Total phenols percentages, Data in Table (22) reveal that there were gradual decrease in total phenols in petals and flower stalks of tuberose cut flower spikes with extending storage periods at $4\pm1^{\circ}$ C for different days (0-time, 7, 14 and 21 days) in the two seasons. However, tuberose cut flower spikes were stored at $4\pm1^{\circ}$ C for 21days resulted the highest significant decrease of these parameters as compared to different storage periods in both seasons. Moreover, storage periods at $4\pm1^{\circ}$ C for O-time treatment gave the highest values total phenols in petals and

Table (22): Effect of storage periods (Days) treatments on Total phenols percentages, Total nitrogen percentage, Total protein percentage, phosphorus percentage and potassium percentage in petals and flower stalk of Polianthes tuberosa L.cut flower spike during the two seasons of 2007-2008/2008-2009.

31	L.S.D		(days)	Storage			Treatments
%1	5 %	21	14	7	0		ents
0.012	0.009	0.121	0.167	0.221	0.288	l _n	Total phenols percentage in petals
0.013	0.009	0.099	0.144	0.207	0.272	2 ^{ml} season	Total phenols percentage in petals
0.010	0.008	0.105	0.132	0.199	0.287	l" season	Total phenols percentage in flower stalk
0.012	0.009	0.098	0.126	0.193	0.276	2 nd season	henols tage in stalk
0.097	0.073	3.720	3.620	3.643	3.757	Season I"	Total nitrogen percentage in petals
0.052	0.039	3.703	3.741	otal nitrogen percentage in petals I' 2 nd ason season 757 3.749 620 3.741			
0.619	0.465	23.25	22.63	22.77	23,48	Season 1"	Total protein percentage in petals
0.321	0.241	23.15	23.38	23.44	23.43	2 nd season	orotein ntage etals
0.052	0.039	3.590	3.634	3.639	3.640	l" season	Total nitrogen percentage in flower stalk
0.074	0.055	3.599	3.636	3.626	3.645	2 nd	tal)gen tage in stalk
0.327	0.245	22.44	22.71	22.74	22.75	season	Total proteir percentage ir flower stalk
0,452	0.340	22.49	22.73	22.66	22.78	2 nd season	Total protein percentage in flower stalk
0.045	0.034	0.894	0.926	0.905	0.895	l ^u	Phosphorus percentage in petals
0.327	0.245	0.898	0.908	0.909	0.899	2 nd season	horus tage in als
0.056	0.042	0.781	0.789	0.790	0.799	season 1"	Phosphorus percentage in flower stalk
0.016	0.012	0.780	0.784	0.790	0.799	2 nd season	horus tage in
0.037	0.028	3.085	3.099	3.119	3.073	Season	Potassium percentage in petals
0.026	0.020	3.112	3.135	3.158	3.108	2 ^{ml} season	sium tage in als
0.014	0.010	2.361	2.371	2.373	2.360	season 1"	Potassium percentage in flower stalk
0.009	0.007	2.373	2.387	2.383	2.377	2 nd season	sium tage in

flower stalks of tuberose cut flower spikes when compared to the other ones under study in the two seasons.

Referring to the effect of interaction between growth regulators and storage periods on Total phenols percentages, Data in Table (20) reveal that, all the combinations treatments between growth regulators and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) decreased total phenols percentage in petals of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between GA₃ at 300ppm and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) recorded the lowest values of this parameter of tuberose cut flower spikes as compared to control in the two seasons, especially the combined treatment between GA3 at 300ppm and storage periods at 4±1°C for 21days in the two seasons. Moreover, using the combinations treatments between kinetin at 100ppm and storage periods at 4±1°C for (0-time, 7, 14 and 21days) recorded highly decreases in total phenols percentage in petals of tuberose cut flower spikes as compared to control in both seasons, especially the combined treatment between kinetin at 100ppm and storage periods at 4±1°C for 21days. On the reverse, the highest values of this parameter of tuberose cut flower spikes was recorded by the combinations between control (distilled water) storage periods at 4±1°C for 0-time in both seasons of this study.

Furthermore, Data presented in Table (20) indicate that 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 flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, using the combinations between GA₃ at 300ppm or GA₃ 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 GA₃ at 300ppm or GA₃ 200ppm and storage periods at 4±1°C for 21day as compared to control in the first and second seasons, respectively. Moreover, using the combined treatment between kinetin at 100ppm and storage periods at 4±1°C for 21days resulted highly decreases in this parameter of tuberose cut flower spikes as compared to control in both seasons. On the reverse, the highest values of total phenols percentage in flower stalks of tuberose cut flower spikes was registered by using the combinations treatments between control and storage periods at 4±1°C for 0-time as compared to the other ones of this study in the two seasons.

2.3.6.-Total nitrogen and total protein percentages:

Data in Table (21) reveal that most growth regulators treatments increased total nitrogen and total protein percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, using the treatment of GA₃ at 300ppm of tuberose cut flower spikes showed to be the most effective one for producing the highest values of these parameter as compared to control in the two seasons in most cases, followed descendingly by kinetin at 100ppm in the two seasons. Moreover, using the treatment of

BA at 50ppm recorded highly significant increments of theses parameters as compared to control in the two seasons. On the opposite, the lowest values of total nitrogen and total protein percentage in petals and flower stalks of tuberose cut flower spikes was recorded by control in the two seasons.

With regard to the effect of storage periods on Total nitrogen and total protein percentages, Data listed in Table (22) demonstrate that there were gradual decrease in total nitrogen and total protein percentage in petals and flower stalks of tuberose cut flower spikes with extending storage periods at $4\pm1^{\circ}$ C for different days (0-time, 7, 14 and 21days) in the two seasons. However, tuberose cut flower spikes were stored at $4\pm1^{\circ}$ C for 0-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed in descending order by storage periods at $4\pm1^{\circ}$ C for 7 days. Moreover, storage periods at $4\pm1^{\circ}$ C for 21 days treatment recorded highly significant decrease in total nitrogen and total protein percentage in petals and flower stalks of tuberose cut flower spikes when compared to the other ones under study in the two seasons.

Referring to the interaction effect between growth regulators treatments and storage periods treatments on Total nitrogen and total protein percentages, data in Table (23) indicate that all the combinations treatments between growth regulators and storage periods succeeded in increasing total nitrogen and total protein in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments of GA₃ at 300ppm

Table (23): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total nitrogen percentage and Total protein percentage in petals and flower stalk of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

1% 0.138	1 S D at 5% 0.104	Kin 100 ppm 3.86 3.85 3.82 3.83 24.14	Kin 50 ppm 3.68 3.70 3.72 3.69 22.98	BA 50 ppm 3.85 3.85 3.81 3.78 24.08	BA 25 ppm 3.63 3.64 3.65 3.56 22.71	GA ₃ 300ppm 3.87 3.88 3.85 3.81 24.17	GA ₃ 200ppm 3.76 3.75 3.77 3.72 23.50	Control 3.59 3.58 3.56 3.53 22.27		1% 0.258	L.S.D at 5% 0.194	Kin 100 ppm 3.91 3.86 3.90 3.88 24.46	Kin 50 ppm 3.69 3.70 3.71 3.72 23.06	BA 50 ppm 3.84 3.80 3.81 3.73 23.98	BA 25 ppm 3.57 3.67 3.69 3.68 22.29	GA ₃ 300ppm 3.91 3.87 3.89 3.84 24.46	GA ₃ 200ppm 3.73 3.07 2.77 3.70 23.33	Control 3.55 3.53 3.57 3.50 22.21		regulators 0 7 14 21 0	Growth Storage periods (days)	
0.850	0.638	4 24.04	8 23.14	8 24.04	1 22.73	7 24.27	0 23.46	7 22.38		1.637	1.2	6 24.14	6 23.11	8 23.73	9 22.96	6 24.17	3 19.21	1 22.08		7	Storage periods (days)	
50	38	23.88	23.25	23.81	22.81	24.08	23.56	22.27		37	.229	24.36	23.21	23.81	23.04	24.33	17.33	22.29		14	iods (day	in perais
		23.94	23.06	23.64	22.27	23.79	23.23	22.08	2 nd			24.23	23.27	23.31	23.02	24.02	23.13	21.89	1 st	21	s)	
		3.80	3.62	3.69	3.57	3.83	3.66	3.34	d season			3.83	3.61	3.71	3.53	3.82	3.66	3.32	season	0	Sto	
0.195	0.146	3.78	3.59	3.68	3.54	3.82	3.65	3.31		0.138	0.104	3.82	3.60	3.72	3.52	3.83	3.69	3.30		7	rage per	HOWEL
95	46	3.78	3.62	3.69	3.53	3.81	3.66	3.37		38	04	3.80	3.57	3.67	3.54	3.81	3.71	3.34		14	Storage periods (days)	HEIS JAMOH
		3.74	3.60	3.65	3.53	3.80	3.64	3.23				3.74	3.57	3.66	3.50	3.75	3.65	3.26		21	ys)	
		23.73	22.64	23.06	22.31	23.94	22.88	20.89				23.92	22.56	23.17	22.08	23.86	22.89	20.75		0	S	
-	0.8	23.63	22.46	22.98	22.14	23.89	22.83	20.69		0	0.	23.89	22.50	23.23	22.00	23.92	23.04	20.63		7	Storage periods (days)	s
1.196	0.898	23.61	22.61	23.06	22.08	23.83	22.86	21.04		0.864	0.649	23.73	22.33	22.92	22.14	23.79	23.21	20.88		14	riods (da	stalk
		23.39	22.48	22.83	22.04	23.73	22.77	20.21				23.39	22.31	22.86	21.86	23.46	22.83	20.38		21	ys)	

showed to be the most effective one for producing the highest significant increase of these parameters, especially the combined treatment between GA₃ at 300ppm and storage periods at 4±1°C for 0-time and 7days as compared to control in the two seasons of this study. Moreover, the combined treatment between kinetin at 100pm and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) particularly storage periods for 0-time of tuberose cut flower spikes recorded highly significant increase of these parameters in the two seasons. Regardless control, the lowest values of these parameters was recorded by using the combinations treatments between BA 25ppm and different storage periods at 4±1°C (0-time, 7, 14 and 21days) as compared to the other ones under study in the two seasons.

2.3.7.-Phosphorus percentages:

Data in Table (21) reveal that all growth regulators treatments succeeded in increasing phosphorus 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 was registered by using kinetin at 100ppm as compared to control in the two seasons, followed in descending order by GA₃ at 300ppm and BA at 50ppm in the two seasons. On the reverse, the lowest values of these parameters of tuberose cut flower spikes was recorded by using control in the two seasons. Furthermore, the remained treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study.

Concerning the effect of storage periods on Phosphorus percentages, Data in Table (22) reveal that tuberose cut flower spikes were stored at 4±1°C for 14days treatment showed to be most effective one for inducing the highest values of phosphorus percentage in petals as compared to different storage periods (0-time, 7 and 21days) in the two seasons, followed in descending order by stored periods at 4±1°C for 7days and 0-time. On the reverse, the lowest values of this parameter of tuberose cut flower spikes was registered by stored periods at 4±1°C for 21days as compared to different storage periods in both seasons of this study.

Furthermore ,Data presented in Table (22) reveal that there were gradual decrease in phosphorus percentage in flower stalks of tuberose cut flower spikes with extending storage periods at 4±1°C for different days (0-time, 7, 14 and 21days) in the two seasons. However, tuberose cut flower spikes were stored at 4±1°C for 0-time recorded the highest significant increase of this parameters as compared to different storage periods in both seasons, followed in descending order by storage periods at 4±1°C for 7 days. Moreover storage periods at 4±1°C for 21 days treatment recorded highly significant decrease in phosphorus percentage in flower stalks of tuberose cut flower spikes when compared to the other ones under study in the two seasons.

As for the interaction effect between growth regulators and storage periods treatments on Phosphorus percentages, data in Table (24) reveal that all the combinations treatments between growth regulators and storage periods at $4\pm1^{\circ}$ C for

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Treatments Phosphorus percentage in petals Growth regulators Storage periods (days) Control 7 14 21 Control 0.830 0.823 0.813 0.813 GA, 200ppm 0.897 0.900 0.903 0.904 GA, 300ppm 0.923 0.937 0.923 0.924 BA 25 ppm 0.800 0.893 0.887 0.887 Kin 50 ppm 0.900 0.920 0.903 0.916 Kin 50 ppm 0.897 0.910 0.903 0.887	ds (days) 14 0.833 0.903 0.933 (0.887 0.923				natural naturalism nat		Detacin	n norce	Detacium nercentage in Detals	etals	LOTASSIA	r Ottassium percenses		
regulators hpm hpm opm opm	0.833 0 0.903 0 0.933 (0.933 0		hosphor	is percent	Phosphorus percentage in Hower stalk	er stalk	Lotassiu	3 3 3	0		0.00	Ctorogo poriode (davs)	sde (days	9
0 0.830 0ppm 0.897 0ppm 0.902 0ppm 0.902 0ppm 0.909			3	orage peri	Storage periods (days)		Stor	rage peri	Storage periods (days)		ore	rage per n	(mn) en	
0	833 (903 .933 .887923			7	14	21	0	7	14	21	0	7	4	7
Oppm 0.830 0.823 Oppm 0.897 0.900 Oppm 0.923 0.937 opm 0.880 0.893 oppm 0.900 0.920 oppm 0.897 0.910	833 903 .933 .887	17				1st season	=							
Oppm 0.830 0.823 Oppm 0.897 0.900 Oppm 0.923 0.937 opm 0.880 0.893 oppm 0.900 0.920 oppm 0.897 0.910	903			000	0.743	0.730	2 900	2.913	2.910	2.913	2.257	2.290	2.287	2.283
0.897 0.900 0.923 0.937 0.880 0.893 0.900 0.920		0.813	092.0	0.723	0.743	0.7.70	3 043	3.057	3.137	3.073	2.340	2.363	2.370	2.357
0.923 0.937 0.880 0.893 0.900 0.920 0.897 0.910		0.900	0.787	0.780	0.733	0.747	Cto.C	000	036.0	3 250	2 413	2417	2.400	2.407
0.880		0.920	0.823	0.827	0.807	0.803	3.203	3.270	3.230	0.4.0	000	7000	2 223	2 320
0.900	+	0.887	0.783	0.770	0.797	0.780	2.947	3.010	2.983	2.977	2.530	175.7	2,333	2 3 9 7
0.897	_	010	0.603	0 797	0.807	0.790	3.103	3.160	3.143	3.110	2.387	2.393	7.40/	7.307
768.0	+	0.910	0.043	1010	0000	0 703	3 100	3.133	3.037	3.073	2.380	2.393	2.377	2.370
	0.903	0.887	0.773	0.787	0.770	0.1.0		1360	3 230	3 200	2.417	2.430	2.427	2.407
0.953	0.957	0.943	0.843	0.843	0.827	0.827	2.217	3.207	2000		8	0.0	0.027	
21.00	00			0.1	0.111			0.0	0.073			0	9200	
1 S D at 5%	10			0.	0.148			0.0	0.097			0.0	200	
%1			-			7 season	00							
			0,00	0 740	10777	0 720	2.913	2.923	2.920	2.917	2.297	2.300	2.317	2.307
Control 0.830 0.830	0.823	0.817	00/.00	0.740	1	1	2 073	2 137	3 120	3.123	2.367	2.367	2.373	2.360
GA, 200ppm 0.900 0.910	0.910	0.907	0.783	0.770	0.763	0.757	2.0.0	2000	777	1367	7 477	2.430	2.417	2.410
0013 0023	0.930	0.913	0.837	0.827	0.810	0.807	3.247	3.303	7.77		+	+	7357	2 340
+		0000	577.0	1910	0 780	0.770	2.977	3.050	3.037	2.977	2.337	7.347	1007	22
BA 25 ppm 0.803 0.897	0.900	0.883	0.11.0	5000	803 000	0.793	3.107	3.190	3.160	3.133	2.393	2.400	2.407	2.397
BA 50 ppm 0.910 0.927	0.923	0.913	0.825	0.007	000.000	0.783	3.150	3,200	3.150	3.113	2.387	2.400	2.410	2.390
Kin 50 ppm 0.903 0.917	0.907	0.897	0.777	0.780	0.770	0.7.0	3 257	3 303	3.283	3.257	2.430	2.440	2.430	2.497
Kin 100 ppm 0.940 0.960	0.963	0.953	0.837	0.843	0.833	0.030	164.0		0.52	-		0	0.019	
5%	0.693			5	0.033				690.0			0	0.025	

Results and Discussion

different storage periods (0-time - 7, 14 and 21days) increased phosphorus percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments between kinetin at 100ppm and different storage periods at 4±1°C (0-time- 7, 14 and 21days) recorded the highest increases in these parameters of tuberose cut flower spikes as compared to control in the two seasons, especially the combined treatment between kinetin at 100ppm and storage periods at 4±1°C for 14 and 7days in petals and flower stalks respectively, in the two seasons of this study. Moreover, the combinations treatments between GA3 at 300ppm or BA at 50ppm and different periods at 4±1°C (0-time- 7, 14 and 21days) resulted highly increases in phosphorus in petals and flowers stalks of tuberose cut flower spikes as compared to control in the two seasons. Irrespective control, the lowest values of these parameters was registered by using the combinations treatments between BA at 25ppm and different storage periods at 4±1°C for different storage periods (0-time, 7, 14 and 21days) in the two seasons.

2.3.8.-Potassium percentages:

Data in Table (21) demonstrate that all growth regulators treatments increased potassium percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm recorded the highest significant increase in these parameters as compared to control in the two seasons in most cases, followed in descending order by GA₃ at 300ppm in the two seasons.

Moreover, using the treatments of BA at 50ppm and kinetin at 50ppm of tuberose cut flower spikes resulted highly increases in these parameters as compared to control in the two seasons. On the reverse, the lowest values of these parameters of tuberose cut flower spikes was registered by using control in both seasons of this study.

Regarding to the effect of storage periods on Potassium percentages, Data presented in Table (22) indicate that tuberose cut flower spikes were stored at $4\pm1^{\circ}$ C for 7days resulted the highest significant increase in potassium percentage in petals as compared to different storage periods (0-time, 14 and 21days) in the two seasons, followed in descending order by stored periods at $4\pm1^{\circ}$ C for 14days and 21days. On the reverse, the lowest values of this parameter of tuberose cut flower spikes was recorded by stored periods at $4\pm1^{\circ}$ C for 0-time as compared to the other ones under study in the two seasons.

Additionally, data in Table (22) indicate that storage periods at $4\pm1^{\circ}$ C for 14days of tuberose cut flower spikes is being the most effective one for inducing the highest values of potassium percentage in flower stalks as compared to different storage periods in the two seasons. However, storage periods at $4\pm1^{\circ}$ C for 7days of tuberose cut flower spikes recorded highly increases of this parameter as compared to different storage periods (0-time and 21days) in the two seasons.

Concerning the effect of interaction between growth regulators and storage periods on Potassium percentages, Data presented in Table (24) indicate that all the combinations

treatments between growth regulators and different storage periods increased 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 in these parameters of tuberose cut flower spikes was recorded by using the combinations treatments between kinetin at 100ppm different storage periods at 4±1°C (0-time, 7, 14 and 21days) as compared to control in the two seasons in most cases, followed in descending order by the combinations treatments between GA₃ at 300ppm and different storage periods at 4±1°C (0-time, 7, 14 and 21days) in the two seasons of this study. Moreover, the combinations treatments between BA at 50ppm and different storage periods at 4±1°C for (0-time, 7, 14 and 21days) recorded highly increases in potassium percentage in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. Regardless control, the lowest values of these parameters of tuberose cut flower spikes was registered by using the combinations treatments between BA at 25ppm and storage periods (0-time, 7, 14 and 21days) at 4±1°C in both seasons under this study.

Part I: The second experiment: (pulsing solutions and holding solutions treatments of Polianthes tuberosa)

- 3.1. Effect of pulsing solutions and holding solutions treatments on:
- 3.1. Flower post harvest characters:

3.1.a.-Vase life (days):

Data presented in Table (25) indicate that the treatment of STS at 1:4mM for 15 minutes recorded the highest number of days of vase life of tuberose cut flower spikes when compared to control or the other ones under study in the two seasons. Furthermore, the treatments could be arranged descendingly as follows: STS at 1:4mM > benzyladenine at 10ppm > kinetin at 20ppm > sucrose at 10% > control (distilled water) in the first season only, while in the second season, arranged as follows: STS at 1:4 mM for 15 minutes > kinetin at 200ppm > benzyladenine at 10ppm > control (distilled water) > sucrose at 10%. These results were recorded in the two seasons, as shown in Table (25). However, the increase in vase life due to (STS, BA and S) treatment was also found by Anju et al., (1999) on chrysanthemum and kwon (2000) on freesia. Such increase in tuberose cut flower spikes longevity caused by (STS and benzyladenine) treatment might be attributed to that STS inhibited the action of ethylene and leading to a decrease in lip oxygenease (Lox) activity as well as served as an antibacterial component Kwon et al., (2000) on fressia, Nowak and RudnicKin, (1990) on many cut flowers. In addition, benzyladenine (BA) delayed senescence by its effect on ethylene

Table (25): Effect of pulsing solutions, Holding solutions treatments and their interaction of vase life (days) of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		L.S.D at		mean	5151:4 ml	Carc	Sucrose 10 %	DA 10 ppm	8	Kin.20 ppm		D.W	Pulsing solutions				Treat
		at		<u> </u>	4 ml		10 %	ppm		ppm		8	solutions				Treatments
0.1.70	0.175	5%	Pulsing	13.560	14.40	į	13.20	13.90		13.50	12.00	12 80	D.W	1	T	T	T
0.234	0 237	1 0/	Pulsing solutions	15.100	18.60		13 90	14.80		14.50	13.70	13 70	4 %	0			
0.170	5%	solutions	Holding	20.300	22.40	10.90	10 00	20.90		20.80	18.50		4% +CA 200 ppm	Sucrose	Holding solutions		Vas
0.234	1%			20.933	22.90	19.//	2	21.70		21.40	18.90		% + 8HQS 200	Sucrose 4	olutions	1" season	Vase life (days)
0.392	5%	interaction		22.020	23.80	21.30		22.40		22.10	20.50	mod oom	+CA 200 ppm + 8HQS	Sucrose 4%			
0.523	1 %				20.420	17.413		18.740	10.400	18 460	16.880	1	mean				
0.360	5 %	Pulsing	13.000	13 600	14.80	12.70		13.90	15.00	13.60	13.00	1	D.W		1		
0.479	1%	solutions	Sucrose 4 % 14.20 14.30 14.40 14.40 18.60 15.100														
0.360	5%	Holding solutions	20.180		22.30	18.30		20.50	21.50		18.30	medel	Sucrose 4% +CA 200	riolding solutions	H-III.	141	Vac
0.479	1 %	olutions	17.820		21.00	14.40		19.70	19.10		14.80	200 ppm	Sucrose 4 % + 8HQS	lutions	2 season	nd (days)	Vaca life (day)
0.804	5 %	interaction	21.320		24.10	20.00	10.70	20 70	21.90		19.90	200 ppm	Sucrose 4% +CA 200 ppm + 8HOS				
1.073	1 %	ion			20.180	15.880	17.540	17040	18.080		16.040		mean				

synthesis processes in the tissue of carnation flowers Cook et al., (1985), Sacalis and Lee, (1985) and Van Staden et al., (1987), the decrease of ethylene production within the flowers carnation flowers Bosse and Van Staden, (1989). Sucrose inhibited ethylene synthesis as well as promoting bud opening and inhibiting flower senescence, Ichimura and Hisamatsu, (1999).

The aforementioned results of sucrose are in parallel with those obtained by Reid and Nell (2000) and Pruthi et. al., (2001) on gladiolus. Reid et. al., (2001) on tuberose found that the vase life was improved by pulsing with 5 and 8% sucrose.

The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on bird of paradise, Gendy (2000) on gladiolus, Chikkasubbanna and Suma (2002) on alstroemeria, Alka et. al., (2006) and Alka et. al., (2008) on gladiolus indicate that the vase life increased by pulsing with cytokinins. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992), Hutchinson et. al., (2003) on tuberose, Kushal et. al., (2007) on Dianthes caryophyllus and Kuroshima et. al., (2008) on Delphinium Cultivars demonstrate that Silver thiosulfate gave the greatest improvement of vase life.

Concerning the effect holding solution treatments on vase life (days), Data in Table (25) reveal that, all holding solution treatments prolonged the vase life of tuberose cut flower spikes when compared to control in the two seasons. However, the treatment of holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant increase in vase life of tuberose cut flower spikes

when compared to control and the other ones in both seasons. Moreover, holding tuberose cut flower spikes bases contained (sucrose at 4% + citric acid at 200ppm) and (sucrose at 4% + 8-HQS at 200ppm) resulted highly significant increase in flower vase life longevity as compared to control (D.W. treatment) in both seasons. Regardless control, the lowest value of vase life (days) of tuberose cut flower spikes was recorded by using the holding solution contained (sucrose at 10%) in the two seasons. Anyhow, 8-hydroxy quinoline salts (8-HQ) delayed senescence and eliminated bacterial growth which was the principal reason for reduced water uptake and transport of gerbera flower, Abdel Kader, (1987). 8-HQS prevented the growth of microorganism in the xylem and thus maintained water uptake by flower stems Kwon et al., (2000) on fressia. The aforementioned results of (sucrose) are in parallel with those obtained by Naidu and Reid (1989) on tuberose, El-Saka (1992) on tuberose, Gendy (2000) on gladiolus and Jitendra- kumar and Daljcct-Singh (2004) on tuberose stated that sucrose treatment increased longevity. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) on tuberose, Gendy (2000) on gladiolus, Dias-Tagliacozzo et. al., (2005) on lillium longiflorum and Padaganur et. al., (2005) on tuberose stated that (sucrose + citric acid) treatment increased longevity. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Song et al., (1992) on cut gladiolus, Reddy et. al., (1995) on tuberose, Gendy (2000) on gladiolus, Gargi and Devi (2005) on tuberose and Alka et. al., (2007) on gladiolus reported that (sucrose + 8-HQS) treatment as holding solution increased the longevity. The

aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Gendy (2000) on gladiolus, El Bouhy (2002) on tuberose, Gendy (2007) on gladiolus and Bayogan et. al., (2008) on bird of paradise flower stated that the treatment of cut flower spikes bases in holding solution contained (sucrose + 8-HQS + citric acid) record highly significant increase in flower longevity.

Referring to the effect of interaction between pulsing solution and holding solution treatments on vase life (days), Data in Table (25) reveal that all interaction treatments between pulsing solution and holding solution succeeded in increasing of flower longevity of tuberose cut flower spikes as compared to control (distilled water) in the two seasons. However, the interaction treatments between pulsing solution of STS at 1:4mM for 15 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted the highest significant increase in vase life of tuberose cut flower spikes when compared to control (distilled water) in the two seasons. Furthermore, the interaction treatments between pulsing solution of (STS at 1:4 mM for 15 minutes, benzyladenine at 10ppm for 24 hours and kinetin at 20ppm for 24 hours) and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm, sucrose at 4% + citric acid at 200ppm and sucrose 4% + 8-HQS at 200ppm) succeeded in extending vase life of tuberose cut flower spikes compared to control (distilled water) in both seasons. Irrespective control, the lowest value of vase life of tuberose cut flower spike was registered by using interaction treatment between pulsing solution of sucrose at 10% for 24 hours and holding solution contained (sucrose at 4%) as compared to the other ones under study in the two seasons. These results agreed with those found by El-Saka (1992) on bird of paradise, Hwang and Kinm (1995) on gladiolus and Gendy (2000) on gladiolus showed that (STS) or (Kin) treatments as pulsing solutions then holding solutions contained (S+8 HQS+CA) increased longevity.

3.1.b.-Change percentage in spike fresh weight:

Data in Table (26) show that the change percentage in spike fresh weight of tuberose cut flower spike was increased as flower cut spikes advanced in age until 6 days from the treatment to the end of longevity in both seasons under study. It could be indicate that, all pulsing solutions treatments i.e., (kinetin at 200ppm, Benzyl adenine at 10ppm, sucrose at 10ppm for 24 hours) and silver thiosulphate at 1:4MM for 15 minutes succeeded in increasing change percentage in fresh weigh of tuberose cut flower spikes compared with control (distilled water) in both seasons under this study. However, pulsing tuberose cut flower spikes bases in silver thiosulphate (STS) (1:4MM) for 30 minutes recorded the highest significant increase in change percentage in fresh weight of cut flower spikes compared to other treatments under study. Regardless control the lowest mean values of change percentage in fresh weight of tuberose cut flower spikes was registered by using sucrose at 10% for 24 hours after 3, 6, g, 12 and 15 days from the treatment to the end of longevity in both seasons. The remained pulsing solutions treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study.

Table (26): Effect of pulsing solutions treatments, on Change percentage in fresh weight, Floret opening percentage and Floret wilting percentage of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

				en frach weight of cut	h weioh	t of cut	6	Eleret opening percentage	ing nerce	ntage		Floret	wilting p	Floret wilting percentage	
		Change	percenta	flage in nega	0		•					Sholl	life peri	Shelf life periods (days)	
E		0	Polf life	Chalflife periods (davs)	davs)			Shelf life periods (days)	periods (days)	31	9	6	12	15
I rearments	ments		2111 1110	0	12	15	3	9	6	71	6				
		5	0					_	season						
						0.01	12.78	70 77	34.56	48.40	53.73	17.11	35.27	49.32	76.15
	D.W	17.49	17.83	7.02	-1.12	18.6-	0/.70		.,	30.03	57.04	19 61	28.64	44.56	70.00
1	Kin.20	19.48	19.79	10.22	3.75	-4.40	14.79	22.13	39.41	52.25	10.70	i	1	1000	11 89
n. I. iing	Ppm BA 10	10.00	31.36	12 04	7.00	-1.77	15.15	22.49	40.53	53.25	57.87	8.77	27.09	47.87	00.77
Fulsing	mdd	20.81	21.30	0.71		91.9	13 90	21.66	37.87	49.82	54.79	14.11	31.78	47.65	74.03
	Sucrose 10 %	17.27	18.87	7.44	77.1	-0.70			1, 43	54.85	60.18	8.36	25.33	40.99	65.20
	STS 1:4	22.05	22.59	14.62	9.51	1.45	16.81	23.41	74.14	6.1		7011	0.664	0.643	0.837
	TEI			t	0000	0.848	0.258	0.225	0.304	0.393	0.492	1.100	00.00	0.857	1116
	2 %	0.468	0.408	0.5/4	0.092	1	0.345	0 300	0.405	0.525	0.565	1.476	0.000	0.007	
L.S.D at	1%	0.624	0.544	0.766	0.923	1.1.1	0.0		noseas put						
									7		64.30	16.88	36.83	48.64	76.87
		1637	18 91	6.03	-3.15	-10.59	11.89	20.66	34.31	49.51	24.37	10.00			
	D.W	/6.61	10.01	01.0	1 69	+	15.60	22.03	39.57	52.44	57.70	13.28	30.01	46.32	71.57
	mdd ppm	17.38	18.40	8.10	1.00	-		+	+	20 24	57.17	7.99	31.57	47.78	71.75
Pulsing	BA 10	17.89	18.64	10.25	4.58	4.62	14.43	21.25	19.61	72:20				3	F
solutions	Sucrose 10	_	21.71	6 94	81 0-	8 -7.94	14.04	22.22	39.18	50.29	54.97	13.19	33.37	48.94	V.
	%	16.38	CI./I	+	-	-	+	23.00	368	54.78	60.23	96.6	28.50	41.39	66.24
	STS 1:4	16.61	21.27	12.42	7.34	4 -0.46	0.10	- 1	+	1	369 6	2 458	5 325	4.861	5.728
	Ē	2000	1 205	0.574	0.580	0.824	1.840	2.633	-	+	0.000	+	7 103	+	7.641
I S D at		0.900	+	+	+	1.099	9 2.455	3.512	5.730	5.236	4.917	-	2011/	1	
200	1%	1.208	1.000	-			-								

Results and Discussion

The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on bird of paradise. Gendy (2000) on gladiolus, Alka et. al., (2006) and Alka et. al., (2008) on gladiolus indicate that the changes percentage of fresh weights of cut flower spikes increased by pulsing with cytokinins.

The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) on gladiolus, Qadri et. al., (2000) on I. hollandica, Hutchinson et. al., (2003) on tuberose and Kushal et. al., (2007) on Dianthes caryophyllus indicated that (STS) treatment increased the changes percentage in spikes fresh weight of cut flower spikes.

With respect to the effect holding solution treatments on change percentage in fresh weight, Data presented in Table (27) reveal that, all holding solution treatments highly significant increased the change percentage of fresh weight of tuberose cut flower spikes after 3, 6, g, 12 and 15 days from the treatment compared to the control (D.W.) in both seasons, with the exception of holding solution of sucrose at 4% which scored the lowest value in this concern compared to control in the two season. However, the holding solution of (sucrose at 4% + 8-HQS200ppm + citric acid 200ppm) after 3, 6, g, 12 and 15 days from the treatment was more effective in this regard compared with the other ones and control in both seasons. Moreover, using holding solution contained (sucrose at 4% + 8-HQS at 200ppm) and (sucrose 4% + citric acid at 200ppm), respectively succeeded to increased the change percentage in fresh weight of tuberose cut flower spikes compared to control in the two

Table (27): Effect of Holding solutions treatments, on Change percentage in fresh weight of cut flower spike, Floret opening percentage and Floret wilting percentage of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	and Floret wilting percentage of Fondances moores.	ercentag	e 01 <i>F</i> 0	nannes	coraomi								1141	100000	0000
		Change	percent	age in fre	Change percentage in fresh weight of cut	of cut	Flo	ret open	Floret opening percentage	ntage		Floret	WIIIIII	Floret witting percentage	age
			=	flower spike	e		0		noriode dave)	(syeb		Shelf life	life per	periods(days)	ys)
	Treatments		Shelf lif	Shelf life periods (days)	s days)		1	2	lenou iad	13	4	9	6	12	15
		,	9	6	12	15	3	9	6	71	CI				
		,					1st se	1st season							
				,,,,	2 400	12.22	10.53	18.11	28.88	44.85	49.35	21.02	46.79	60.93	83.21
	D.W	15.78	14.87	3.00	-2.400	77.71-					20 03	-	35.05	52.80	77.86
	Sucrose 4 %	12.40	11.24	-0.92	-8.59	-19.24	13.31	19.70	34.14	47.40	27.07	10.01	-	20.40	
Holding	Sucrose 4% +CA 200	22.36	24.25	14.81	8.73	1.20	16.04	23.73	42.43	54.38	59.11	9.40	24.68	39.27	66.83
solutions	Sucrose 4 % + 8HOS	01.00	24.06	15.30	9.83	3.00	16.39	24.08	43.20	54.97	60.24	7.84	22.45	38.27	64.76
	200 ppm	61.27	7.00				71.21	24.83	45.15	56.92	62.85	7.01	18.24	34.11	61.49
	Sucrose 4% +CA 200	24.37	26.03	18.48	12.86	16.6	17.10	70.47		2000	207	V	0.664	0.643	0.837
	bpm + one comp + mdd	074.0	0.408	0.574	0.692	0.848	0.258	0.225	0.304	0.393	0.492	_	0.00	2. 0.0	
1 S D at	5 %	0.400	0.400	9920	0.003	1131	0.345	0.300	0.405	0.525	0.565	1.476	988.0	0.857	1.116
Troop at	1%	0.624	0.244	0.700	0.750		bu C								
									0000	46.43	60.05	20.30	48 88	62.29	83.37
	W C	13.23	13.71	2.70	-3.69	-14.57	10.53	18.32	28.85	45.47	20.23	00.02	10.00		
		10.55	9.70	-1 94	-10.52	-20.81	13.45	20.27	33.92	48.54	53.22	14.90	39.13	54.45	78.06
	Sucrose 4 %	0.51			81.9	0.10	16.57	23.59	43.28	54.97	59.45	7.82	25.68	40.50	67.52
Holding		19.88	21.90	17.90	00					;	30.03	99 1.1	7637	41 02	71 59
	Sucro	21.36	22.85	13.77	7.44	1.63	15.01	22.42	40.55	15.60	-	00.11	1		
	200 ppm		30.40		10.86	4 23	16.57	24.56	44.83	56.92	62.18	6.63	20.31	34.83	63.79
	ppm + 8HQS 200 ppm	77.11	74.03	_	+		1 640	2633	4 295	3.925	3.686	2.458	5.325	4.861	5.728
	-	906.0	1.205		+	-	0.01	+	+	5 236	+	3.279	7.103	6.785	7.641
L.S.D at	-	1.208	1.608	99.766	0.774	1.099	2.455	3.312	-	-	-	_	-		

seasons. The aforementioned results of sucrose are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) on gladiolus and Jitendra-kumar and Daljcct-Singh (2004) on tuberose stated that sucrose treatment increased the changes percentage of fresh weight of cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) on tuberose and Gendy (2000) on gladiolus stated that (sucrose + citric acid) treatment increased the changes percentage of fresh weight of cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Song et. al., (1992) on cut gladiolus, and Gendy (2000) on gladiolus reported that (sucrose + 8-HQS) treatment as holding solution increased the changes percentage of fresh weight of cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Gendy (2000) on gladiolus, El Bouhy (2002) on tuberose and Gendy (2007) on gladiolus stated that the treatment of cut flower spikes bases in holding solution contained (sucrose + 8-HQS + citric acid) record highly significant increase the changes percentage of fresh weight of cut flowers.

Referring to the interaction effect between pulsing solution and holding solutions treatments on change percentage in fresh weight, data in Table (28) reveal that most the interactions between pulsing solutions and holding solutions resulted increases in change percentage in fresh weight of tuberose cut flower spikes as compared to control during the two

Table (28) Effect of interaction between pulsing solutions and holding solutions treatments of change percentage of fresh weight of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	Treatments			Chan	ge nercentae	Change nercentage in fresh weight of ant flower	inht of our	100000			
				181	a bereauth	20 111 211 111 25	ight of cut	lower spik			
Pulsing				Season		. 31131		2	season		
Solution	Holding Solution	,	13		m)	Shelf life periods (days)	ls (days)				
		6	٥	6	12	15	3	9	6	17	15
	D.W	14.28	12.52	1.04	-8.33	-17.73	10.56	13.38	-0.31	-9.99	-21.18
	Sucrose 4 %	11.49	91.6	-4.54	-13.55	-25.41	8.77	7.31	-4.47	-15.31	-27.51
D.W	Sucrose 4% +CA 200 ppm	20.23	22.95	12.52	4.35	-4.13	18.56	21.11	10.49	2.24	-3.85
	Sucrose 4 % + 8HQS 200 ppm	18.95	20.23	11.20	4.61	-2.60	18.83	20.27	11.92	2.70	-1.59
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	22.48	24.29	14.86	7.33	0.50	20.11	21.98	12.53	4.62	1.17
	D.W	15.71	14.82	3.67	-4.54	-12.31	13.20	12.87	1.98	5.34-	-13.81
Kin.20	Sucrose 4 %	12.35	11.12	-1.78	-9.70	-20.29	10.42	10.20	-3.28	-11.78	-20.58
mdd	Sucrose 4% +CA 200 ppm	22.56	23.08	15.32	8.73	1.08	20.31	22.57	12.73	4.98	-0.50
		22.34	23.94	15.88	10.39	3.25	21.11	22.94	13.47	8.13	0.92
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	24.42	25.97	18.03	13.88	6.30	21.87	23.40	15.62	12.43	3.90
	D.W	16.30	15.65	5.85	0.64	-9.45	14.93	13.89	4.42	-0.67	-11 63
BA 10	Sucrose 4 %	13.50	12.12	0.55	-5.19	-16.84	11.85	10.25	-0.63	-6.99	-19.25
mdd	Sucrose 4% +CA 200 ppm	23.52	25.72	16.04	11.12	3.63	17.56	20.21	14.21	8.61	0.70
		24.79	26.22	17.16	12.63	5.44	22.30	23.61	14.89	8.80	2.20
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	25.92	27.09	20.61	15.78	8.35	22.80	25.26	18.35	13.14	4.89
	D.W	14.85	13.81	-0.86	5.12-	-15.29	11.54	11.34	0.47	4.47-	-17.40
Sucrose	Sucrose 4 %	10.39	9.72	-3.15	-12.14	-22.65	9.35	8.4	-3.29	-14.04	-24.15
% 01	Sucrose 4% +CA 200 ppm	19.88	22.70	12.52	5.93	-0.11	19.77	20.84	10.92	3.57	-0.76
		18.71	23.06	12.91	7.30	1.08	20.70	22.03	12.40	4.82	99.0
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	22.53	25.05	15.78	10.13	3.15	21.52	23.01	14.19	9.24	1.95
	D.W	17.75	17.54	8.62	4.95	-6.32	15.93	17.10	6.93	2 02	-8.84
VI STS	Sucrose 4 %	14.28	14.05	4.31	-2.36	-11.00	12.36	12.19	66	-4 47	-12.57
E	Sucrose 4% +CA 200 ppm	25.59	26.79	17.66	13.53	2.25	23.22	25.09	15.66	11.51	3.89
	Sucrose 4 % + 8HQS 200 ppm	26.17	26.82	19.35	14.25	7.84	23.84	25.38	16.18	12.77	5.97
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	26.47	27.77	23.14	17.19	11.23	24.22	26.60	21.33	14.89	9.24
L.S.D at	5%	1.046	0.911	1.283	1.547	1.895	2.025	2.696	1.283	1.298	1.841
	1%	1.395	1.215	1.712	2.064	2.528	2.701	3.596	1.712	1.731	2.456

seasons. However, the combinations of holding solution contained (sucrose at 4% + citric acid 200ppm + 8-HQS at 200ppm) showed to be the most effective one for inducing the highest values of this parameter, especially the interaction treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) showed the highest significant increase in change percentage in fresh weight after 3 days from the treatment till the end of longevity when compared with control (distilled water) in two seasons under this study. Moreover, using the interaction between pulsing solution of Benzyl adenine at 10ppm for 24hours and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) or the interaction between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + 8-HQS at 200ppm) recorded highly significant increase in this parameter after 3,6,g,12 and 15 days from the treatment as compared to control in the two seasons. On the reverse, the combined treatments of D.W and sucrose at 4% and BA at 10ppm and sucrose at 4% recorded the lowest values of this parameter during all longevity periods in both seasons of this study.

These results agreed with those found by El-Saka (1992) on bird of paradise, Gendy (2000) on gladiolus and El Bouhy (2002) on tuberose showed that (STS) or (Kin) treatments as pulsing solutions then holding solutions contained (S +8 HQS +CA) increased longevity.

3.1.c.-Floret opening percentage:

Data presented in Table (26) indicate that all pulsing solutions treatments succeeded in increasing floret opening percentage of tuberose cut flower spikes when compared to control (distilled water (D.W.)) after 3, 6, g, 12 and 15 days from the treatment in both seasons. However, pulsing tuberose cut flower spikes bases in silver thiosulphate (STS) (1:4 mM) for 30 minutes showed the greatest significant increase in floret opening percentage of cut flower spikes after 3, 6, g, 12 and 15 days from the treatment as compared to the other ones in the two seasons. Moreover, pulsing tuberose cut flower spike in benzyladenine at 10ppm and kinetin at 20ppm recorded significant increases in floret opening percentage of cut flower spikes compared to control (distilled water) in both seasons. The differences between the aforementioned two treatments were not significant in the two seasons. Irrespective control, the lowest floret opening percentage value was registered by using pulsing solution of sucrose at 10% for 24 hours after 3, 6, g, 12 and 15 days from the treatment to the end of longevity in both seasons.

The aforementioned results of sucrose are in parallel with those obtained Seemann and Huber (1995) on gladiolus, Finger et. al., (1999) on bird of paradise, Parmar et. al., (2002) on gladiolus, Hutchinson et. al., (2003) on tuberose, Whitehead et. al., (2003) on freesia and Yamane et. al., (2005) on gladiolus recorded that pulsing with sucrose 20% for 24 hrs. at room temperature, markedly increased the number of open florets in the inflorescence.

The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise. Gendy (2000) on gladiolus, Hutchinson et. al., (2003) on tuberose, Alka et. al., (2006) and Alka et. al., (2008) on gladiolus indicate that the floret opening percentage increased by pulsing with cytokinins. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) on gladiolus, Han and Miller (2003) on lily flowers, Hutchinson et. al., (2003) on tuberose indicated that (STS) treatment increased floret opening percentage.

Regarding to the effect holding solution treatments on Floret opening percentage, data presented in Table (27) reveal that, all holding solution treatment of tuberose cut flower spikes were resulted increased in floret opening percentage compared to control in both seasons. However, the treatment of tuberose cut flower spikes bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant increase in floret opening percentage as compared to control. Moreover, the holding solution treatments contained (sucrose at 4% + citric acid at 200ppm and (Sucrose at 4% + 8-HQS at 200ppm) were resulted the highly significant increase in floret opening percentages of tuberose cut flower spikes compared to control in the two seasons.

These results are in agreement with that recorded by **Reid** et al., (2001) on tuberose cut flowers, regarding (S + 8-HQS). The aforementioned results of (sucrose) are in parallel with those obtained by **El-Saka** (1992) on tuberose and bird of

paradise, Gendy (2000) on gladiolus, Jitendra- kumar and Daljcct-Singh (2004) on tuberose stated that sucrose treatment increased floret opening percentage. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) on tuberose, Gendy (2000) on gladiolus, Satendra et. al., (2006) on tuberose stated that (sucrose + citric acid) treatment increased floret opening percentage. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Song et al., (1992) on cut gladiolus, Gendy (2000) on gladiolus, Gargi and Devi (2005) on tuberose and Alka et. al., (2007) on gladiolus reported that (sucrose + 8-HQS) treatment as holding solution increased the floret opening percentage. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) on tuberose, Gendy (2000) on gladiolus, El Bouhy (2002) on tuberose, Gendy (2007) on gladiolus and Bayogan et. al., (2008) on bird of paradise stated that the treatment of cut flower spikes bases in holding solution contained (sucrose + 8-HQS + citric acid) recorded highly significant increase of floret opening percentage.

As for the interaction effect between pulsing solution and holding solution treatments on floret opening percentage, data in Table (29) indicate that of tuberose cut flower spikes was greatly increased by using all the combinations between pulsing solutions and holding solutions treatments when compared with control (distilled water) during the two seasons. However, the combination of pulsing solution of STS at 1:4mM for 30minutes recorded the highest values of this parameter, especially the

Table (29) Effect of interaction between pulsing solutions and holding solutions treatments of Floret opening percentage of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Treatments	Pulsing solution	+	D.W	Sucrose 4 %	D.W Sucrose 4% +CA 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	D.W		Sucrose 4 %		Kin.20 ppm Sucrose 4% +CA 200 ppm		100 100															8 2 3	8 8
		Holl				pm	8HQS 200 ppm					pm	8HQS 200 ppm				522	-	8HQS 200 ppm	8HQS 200 ppm	8HQS 200 ppm	8HQS 200 ppm	8HQS 200 ppm	8HQS 200 ppm 100 100 100 100 100 100 100 10	8HQS 200 ppm 8HQS 200 ppm	8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm	8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm	8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm	8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm	8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm 8HQS 200 ppm
		3	10.06	11.24	13.61	14 20	14.79	10.36	10.50	14.20	15.98	16.27	17.16	10.65	14.50	16.27		16.57	16.57	16.57 17.75	16.57 17.75 10.36	16.57 17.75 10.36 11.83	16.57 17.75 10.36 11.83 15.39	16.57 17.75 10.36 11.83 15.39 15.68	16.57 17.75 10.36 11.83 15.39 15.68 16.27	16.57 17.75 10.36 11.83 15.39 15.68 16.27 11.24	16.57 17.75 10.36 11.83 15.39 15.68 16.27 11.24 14.79	16.57 17.75 10.36 11.83 15.39 15.68 16.27 11.24 14.79 18.94	16.57 17.75 10.36 11.83 15.39 15.68 16.27 11.24 14.79 18.94 19.23	16.57 17.75 10.36 11.83 15.39 15.68 16.27 11.24 14.79 14.79 18.94 19.23
		6	17.16	18.94	22.19	22 40	23.08	23.00	18.05	19.53	23.67	24.26	25.15	18.64	19.82	20.00	24.20	24.26	24.26	24.26 25.44	24.26 24.26 25.44 17.75	24.26 24.26 25.44 17.75 19.53 23.08	24.26 24.26 25.44 17.75 19.53 23.08	24.26 24.26 25.44 17.75 19.53 23.08 23.67	24.26 24.26 25.44 17.75 19.53 23.08 23.67 24.26	24.26 24.26 25.44 17.75 19.53 23.08 23.67 24.26 18.94	24.26 24.26 25.44 17.75 19.53 23.08 23.67 24.26 18.94 20.71	24.26 24.26 25.44 17.75 19.53 23.08 23.67 24.26 18.94 20.71 25.44	24.26 24.26 25.44 17.75 19.53 23.08 23.67 24.26 18.94 20.71 25.44 25.74	24.26 24.26 25.44 117.75 119.53 23.08 23.67 24.26 18.94 20.71 25.44 25.74 26.23
181	1 season	9	28.11	32 54	34 01	26.20	40.03	40.03	28.99	34.02	43.79	44.38	45.86	29.29	34.91	45.56		46 15	46.15	46.15	46.15 46.75 28.40	46.15 46.75 28.40 33.73	46.15 46.75 28.40 33.73 41.12	46.15 46.75 28.40 33.73 41.12 41.72	46.15 46.75 28.40 33.73 41.12 41.72 44.38	46.15 46.75 28.40 33.73 41.12 41.72 41.72 44.38 29.59	46.15 46.75 28.40 33.73 41.12 41.72 41.72 44.38 29.59 35.50	46.15 46.75 28.40 33.73 41.12 41.72 41.72 44.38 29.59 35.50 46.75	46.15 46.75 28.40 33.73 41.12 41.72 44.38 29.59 35.50 46.75 47.34	46.15 46.75 28.40 33.73 41.12 41.72 41.72 44.38 29.59 35.50 46.75 47.34 47.93
	ä	12	43 20	40.20	40 70	50.70	20.30	33.85	44.38	46.75	55.62	56.21	58.28	45 56	47 34	1	5/10	57.10	57.40	57.40 58.88	57.40 58.88 43.79	57.40 57.40 58.88 43.79 46.15	57.40 57.40 58.88 43.79 46.15 51.78	57.10 57.40 58.88 43.79 46.15 51.78 52.66	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73 47.34	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73 47.34	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73 47.34 52.07	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73 47.34 52.07 57.69 58.28	57.10 57.40 58.88 43.79 46.15 51.78 52.66 54.73 47.34 52.07 57.69 58.28 58.88
Floret oper		Shell life	4734	47.34	49.70	33.03	36.21	60.36	49.11	52.37	60.06	60 95	62 72	50.00	52.06	11.70	60.65	60.65	61.83	60.65	60.65 61.83 63.91 48.52	60.65 61.83 63.91 48.52 50.30	60.65 61.83 63.91 48.52 50.30 55.92	60.65 61.83 63.91 48.52 50.30 55.92 57.6	60.65 61.83 63.91 48.52 50.30 55.92 57.6 61.54	60.65 61.83 63.91 48.52 50.30 55.92 57.6 61.54	60.65 61.83 63.91 48.52 50.30 55.92 57.6 61.54 51.78	60.65 61.83 63.91 48.52 50.30 55.92 57.6 61.54 51.78 55.03	60.65 61.83 63.91 48.52 50.30 55.92 57.6 61.54 51.78 55.03 63.91	60.63 61.83 63.91 48.52 50.30 55.92 57.6 61.54 51.78 55.03 63.91 64.50
Floret opening percentage		periods (days)	25.0	9.75	11./0	14.62	10.72	12.67	10.72	15.60	16 57	16.57	10 53	10.77	17.72	10.00	15 60	15.60	15.60 14.62	15.60 14.62 17.54	15.60 14.62 17.54 9.75	15.60 14.62 17.54 9.75 12.67	15.60 14.62 17.54 9.75 12.67	15.60 14.62 17.54 9.75 12.67 16.57	15.60 14.62 17.54 9.75 12.67 15.60	15.60 114.62 17.54 9.75 12.67 16.57 15.60 11.60	15.60 14.62 17.54 9.75 12.67 16.57 15.60 15.60 13.65	15.60 14.62 17.54 9.75 12.67 16.57 15.60 15.60 11.60 13.65	15.60 14.62 17.54 9.75 12.67 16.57 15.60 15.60 11.60 13.65 19.49	15.60 14.62 17.54 9.75 12.67 16.57 15.60 15.60 11.60 13.65 19.49 17.54
tage			0	17.54	19.49	22.42	20.47	23.39	18.52	19 49	24.27	22 42	25.22	10.04	70.01	19.49	22.20	22.42	22.42	22.42 20.47 25.34	22.42 20.47 25.34 18.52	22.42 20.47 25.34 18.52 21.44	22.42 20.47 25.34 18.52 21.44 22.42	22.42 20.47 25.34 18.52 21.44 22.42 24.37	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36 18.52	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36 18.52 21.44	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36 18.52 24.36 21.44 26.32	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36 18.52 24.37	22.42 20.47 25.34 18.52 21.44 22.42 24.37 24.36 18.52 21.44 26.32 24.37
	2 nd season	>	9	28.27	33.14	35.09	34.11	40.94	29.24	34 11	44.00	11.00	+5.00	45.81	28.27	34.11		45.81	45.81	45.81 41.91 45.81	45.81 41.91 45.81 29.24	45.81 41.91 45.81 29.24 35.09	45.81 41.91 45.81 29.24 35.09 45.81	45.81 41.91 45.81 29.24 35.09 45.81 41.91	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86 29.24	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86 29.24 33.14	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86 29.24 33.14	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86 29.24 33.14 44.83 40.94	45.81 41.91 45.81 29.24 35.09 45.81 41.91 43.86 29.24 33.14 44.83 40.94
	á		12	43.86	45.81	51.66	50.68	55.56	44 83	72 27	4/./0	30.33	33.61	39.45	44.83	47.76		57.51	57.51 55.56	57.51 55.56 55.56	57.51 55.56 55.56 43.86	57.51 55.56 55.56 43.86 47.76	57.51 55.56 55.56 43.86 47.76 51.66	57.51 55.56 55.56 43.86 47.76 51.66 51.66	57.51 55.56 55.56 43.86 47.76 51.66 51.66 51.66	57.51 55.56 55.56 55.56 43.86 47.76 51.66 51.66 51.66 51.66 51.63	57.51 55.56 55.56 55.56 43.86 47.76 51.66 51.66 51.66 51.66 51.63 50.53	57.51 55.56 55.56 55.56 43.86 47.76 51.66 51.66 51.66 51.66 51.65 51.65 51.65 51.66 51.66	57.51 55.56 55.56 55.56 43.86 47.76 51.66 51.66 51.66 51.66 51.63 49.71 53.61 53.51	57.51 55.56 55.56 55.56 43.86 47.76 51.66 51.66 51.66 51.66 51.56 56.53 49.71 53.61 57.51
			15	48.73	50.68	55.56	56.53	60.43	40 71	13.71	33.01	62.38	59.45	63.35	50.68	52.63		59.45	61.40	61.40	59.45 61.40 61.40 49.71	59.45 61.40 61.40 49.71 53.61	59.45 61.40 61.40 49.71 53.61 55.56	59.45 61.40 61.40 49.71 53.61 55.56	59.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45	59.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45	59.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45 52.63 55.56	\$9.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45 52.63 55.56 64.33	59.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45 52.63 55.56 64.33	59.45 61.40 61.40 49.71 53.61 55.56 56.53 59.45 52.63 59.45 62.38

interaction treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) after 3, 6, 9, 12 and 15 days from the treatment in the two seasons. Moreover, the interaction of pulsing solution of STS at 1:4mM for 30minutes and holding solution contained (sucrose at 4% + 8-HQS at 200ppm) at the first season and interaction between pulsing solution of STS at 1:4mM for minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm) at the second season of tuberose cut flower spikes resulted highly increases of floret opening percentage as compared to control in the two seasons. On the opposite, the lowest values of floret opening percentage of tuberose cut flower spike was gained by using the combinations of distilled water as a holding solution, especially the combined treatment between D.W as pulsing solution and D.W as holding solution as it gave the lowest floret opening percentage in both seasons during all longevity periods of this study.

These results agreed with those found by El-Saka (1992) on bird of paradise, Gendy (2000) on gladiolus and El Bouhy (2002) on tuberose showed that (STS) or (Kin) treatments as pulsing solutions then holding solutions contained (S +8 HQS +CA) increased floret opening percentage of tuberose.

3.1.d.-Floret wilting percentage:

Data in Table (26) reveal that, pulsing tuberose cut flower spikes bases in silver thiosulphate (STS) (1:4mM) for 15 minutes gave the highest significant decrease of floret witling

percentage compared to the other treatments under study in both seasons. Moreover, pulsing solutions of BA at 10ppm for 24 hours and kinetin at 20ppm for 24 hours succeeded in decreasing the floret wilting percentage of tuberose cut flower spikes compared to control "distilled water" in the two seasons.

Concerning the effect holding solution treatments on Floret wilting percentage, Data in Table (27) concluded that, floret wilting percentage of tuberose cut flower spikes was decreased by using all holding solution treatments. However, the treatment of tuberose cut flower spikes bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant decrease in floret wilting percentage as compared to control (D.W. treatment) in both seasons. Regardless control, using the treatment of tuberose cut flower spikes bases in holding solution contained (sucrose at 4%) registered highly significant increase in floret wilting percentage as compared to the other treatments under study in the two seasons. The remained treatment occupied an intermediate position between the aforementioned treatments in the two seasons under this study.

With regard to the interaction effect between pulsing solution and holding solution treatments on Floret wilting percentage, Data in Table (30) indicate that, all the interaction between pulsing solution and holding solution succeeded in decreasing the floret wilting percentage of tuberose cut flower spikes as compared to control during the two seasons. However, the combinations of pulsing solution of STS at 1:4mM for 30 minutes recorded the highest significant decrease of this

Table (30) Effect of interaction between pulsing solutions and holding solutions treatments of Floret wilting percentage of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

D.W Holding Solution 6 25.92 52					-	Floret wilting percentage	percentage			
D.W. Colored 4%		Treatments		181 883	son			2" se	ison	
D.W Sucrose 4%						Shelf life per	iods (days)			
D.W Sucrose 4% S.5	A. Leina colution	Holding Solution		0		15	9	6	12	15
D.W D.W C.5.74 S.G.PH S.G.SP R.1.5 20.36 38.74 55.32 7.9 Sucrose 4% Color 3.00 S.G.SP 73.12 13.43 33.97 44.02 74.02 Sucrose 4% 4.8 HQS 200 ppm 13.16 29.27 42.94 73.12 14.48 31.37 44.02 74 Sucrose 4% 4.CA 200 ppm + 8HQS 200 ppm 10.22 4.29 73.13 77.42 19.84 38.23 35.91 76 Sucrose 4% 4.CA 200 ppm 10.22 4.23 37.24 65.03 8.84 24.50 37.01 65.03 Sucrose 4% 4.CA 200 ppm 8.54 2.33 37.24 65.03 8.88 38.23 35.91 77.02 Sucrose 4% 4.CA 200 ppm 8.44 2.33 37.24 65.03 8.84 38.13 38.11 76.04 Sucrose 4% 4.CA 200 ppm 8.24 1.33 33.70 61.31 88.28 33.17 62.27 88.28	ulsing solution	0	0000	53.64	65.07	88.75	27.30	55.56	64.64	86.15
Sucross 4% Sucross		D.W	76.67	32.04	05.50	\$1.68	98 06	38.74	55.32	79.22
Sucrose 4% +CA 200 ppm 16.01 32.20 44.05 7.51.2 1.51.2 7.51.2		Sucrose 4 %	20.26	39.09	20.25	27.12	13.43	13.97	44 02	74.59
Sucrose 4 % + 8HQS 200 ppm 13.16 29.27 42.94 1.03 2.4.90 37.01 6.6 Sucrose 4 % + CA 200 ppm 10.22 45.90 45.30 65.69 8.44 24.50 37.01 6.6 D.W Sucrose 4 % + CA 200 ppm 19.62 45.90 61.33 83.13 20.64 48.54 62.27 8.8 Sucrose 4 % + CA 200 ppm 8.54 21.33 37.24 65.03 8.58 2.8 38.11 66.27 8.8 Sucrose 4 % + CA 200 ppm 8.54 21.33 37.24 65.03 8.58 2.8 38.11 66.27 8.8 Sucrose 4 % + CA 200 ppm 8.140 8.54 21.33 37.20 63.11 9.26 22.20 42.17 7 Sucrose 4 % + CA 200 ppm 8.144 58.45 21.33 33.00 51.88 75.98 10.56 37.01 77.1 64.19 88.11 66.19 88.44 44.44 88.45 81.06 11.11 48.79 64.19 88.11 66.19 <th>D.W</th> <th>Sucrose 4% +CA 200 ppm</th> <td>10.91</td> <td>32.20</td> <td>44.05</td> <td>71.05</td> <td>04.61</td> <td>31.37</td> <td>42 22</td> <td>76.41</td>	D.W	Sucrose 4% +CA 200 ppm	10.91	32.20	44.05	71.05	04.61	31.37	42 22	76.41
Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 10.22 2.3.18 37.36 65.69 8.84 4.4.50 37.01 D.W Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 19.62 45.90 61.33 83.13 20.64 48.54 6.22.7 8.8 Sucrose 4% + CA 200 ppm 8.54 23.53 37.24 65.03 8.58 23.87 38.11 6.6 Sucrose 4% + SHQS 200 ppm 8.54 21.33 37.90 63.11 9.26 22.20 42.17 77 Sucrose 4% + SHQS 200 ppm 8.24 16.77 33.17 61.32 8.10 17.19 33.17 61.32 8.10 17.19 33.17 61.32 8.10 17.19 33.17 61.32 8.10 17.19 33.17 61.32 8.10 17.19 33.17 61.32 8.10 17.19 33.17 66.13 8.28 23.57 8.11 48.79 64.19 8.79 8.71 48.79 64.19 8.71 42.19 8.71 42.19 6.71 42.19 8.71 <th></th> <th>Sucrose 4 % + 8HOS 200 ppm</th> <td>13.16</td> <td>29.27</td> <td>42.94</td> <td>(1.05</td> <td>01.1</td> <td>03.50</td> <td>10.00</td> <td>00 29</td>		Sucrose 4 % + 8HOS 200 ppm	13.16	29.27	42.94	(1.05	01.1	03.50	10.00	00 29
D.W Sucrose 4% + CA 200 ppm 19.62 45.90 61.33 83.13 20.64 48.54 62.27 8.8 D.W Sucrose 4% + CA 200 ppm 18.19 35.64 53.17 77.42 19.84 38.23 35.91 73 Sucrose 4% + CA 200 ppm 8.54 21.33 37.24 65.03 8.58 23.87 38.11 76 Sucrose 4% + CA 200 ppm 8.54 21.33 37.90 63.11 9.26 22.20 42.17 77 Sucrose 4% + CA 200 ppm 8.44 2.84 16.77 33.17 61.32 8.10 17.19 33.17 6.41 Sucrose 4% + CA 200 ppm 8.44 28.45 8.65 6.221 10.14 48.79 64.19 8.79 Sucrose 4% + CA 200 ppm 4.65 15.23 35.50 52.93 15.23 35.60 35.79 42.19 65.79 77.20 Sucrose 4% + CA 200 ppm 81.05 1.52 32.16 66.23 32.14 42.19 65.41 82.30 82.		Sucrosc + C + 200 npm + 8HOS 200 npm	10.22	23.18	37.36	69.59	8.84	24.50	37.01	00.70
D.W Sucrose 4% + CA 200 ppm 18.19 35.64 53.17 77.42 19.84 38.23 55.91 77 Sucrose 4% + CA 200 ppm 9.98 23.53 37.24 65.03 8.58 23.87 38.11 65 Sucrose 4% + CA 200 ppm 8.54 21.33 37.20 63.11 9.26 22.20 42.17 6 Sucrose 4% + CA 200 ppm 8.54 10.33 33.70 6.09 6.09 7.07 38.85 6.31 8.10 17.19 33.17 6 Sucrose 4% + CA 200 ppm 11.93 33.90 2.207 36.28 64.39 4.31 23.74 39.63 6 Sucrose 4% + CA 200 ppm 4.05 15.23 35.56 62.21 10.14 28.33 42.19 6 Sucrose 4% + CA 200 ppm 4.65 15.82 32.16 60.23 38.37 36.31 36.34 37.12 6 Sucrose 4% + CA 200 ppm 4.65 15.82 32.16 60.23 38.37 10.24 39.63		Sucrose 4 % + CA 200 ppm of 200 ppm	19 62	45.90	61.33	83.13	20.64	48.54	62.27	83.82
Sucrose 4% of Sucrose		D.W	18 10	35.64	53.17	77.42	19.84	38.23	55.91	78.82
Sucrose 4% + CA 200 ppm 8.54 2.1.5 3.1.7 61.32 8.11 9.26 22.20 42.17 77 Sucrose 4% + Su0 ppm + 8HQS 200 ppm 8.54 1.13 33.17 61.32 8.10 17.19 33.17 6 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 15.88 44.44 58.45 81.06 11.11 48.79 64.19 8 Sucrose 4% + CA 200 ppm 6.09 22.07 36.28 64.39 4.31 23.74 39.63 65.79 7 Sucrose 4% + CA 200 ppm 5.29 19.23 35.56 60.23 38.21 10.14 28.33 42.19 66.19 Sucrose 4% + CA 200 ppm 465 15.82 32.16 62.31 38.21 46.33 65.44 85.40 85.49 85.49 85.40 85.49 85.44 85.40 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.44 85.45 85.44 85.44 85.45 85		Sucrose 4 %	000	23.53	37.24	65.03	8.58	23.87	38.11	62.86
Sucrose 4% + 8HOS 200 ppm 8.34 21.53 3.17 61.32 8.10 17.19 33.17 6 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 8.24 16.77 33.17 61.32 8.10 17.19 33.17 6 D.W D.W 1.58 4.44 58.45 81.06 11.11 48.79 64.19 8 Sucrose 4% + CA 200 ppm 1.193 33.90 51.88 75.98 10.56 37.69 55.79 7 Sucrose 4% + SHQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + SHQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + SHQS 200 ppm 4.65 15.82 35.7 81.18 14.02 39.68 59.49 Sucrose 4% + SHQS 200 ppm 8.75 25.55 40.45 68.73 12.67 45.31 45.72 Sucrose 4% + SHQS 200 ppm 8.54 20.00 36.24 45.20	Kin.20 ppm	Sucrose 4% +CA 200 ppm	9.90	21.33	37.90	63.11	9.26	22.20	42.17	70.62
Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 8.24 10.77 53.17 8.24 10.17 48.49 8.49 64.19 8 D.W Sucrose 4% +CA 200 ppm 15.88 44.44 58.45 81.06 11.11 48.79 64.19 8 Sucrose 4% +CA 200 ppm 11.93 33.90 51.88 75.98 10.56 37.69 55.79 7 Sucrose 4% +CA 200 ppm 6.09 22.07 36.28 64.21 10.14 28.33 42.19 6 Sucrose 4% +CA 200 ppm 4.65 15.82 32.16 60.23 38.2 19.28 37.12 6 Sucrose 4% +CA 200 ppm 4.65 15.82 32.16 60.23 38.2 19.28 37.12 6 Sucrose 4% +CA 200 ppm 4.65 13.33 42.09 55.77 81.18 14.02 39.68 59.49 89.40 Sucrose 4% +CA 200 ppm 8.75 25.55 42.29 77.73 20.78 45.21 36.40 36.50 Sucrose 4% +CA 200 ppm		Sucrose 4 % + 8HQS 200 ppm	8.54	25.13	33.17	21.19	8.10	17.19	33.17	61.72
D.W 15.88 44.44 58.45 0.150 17.10 55.79 7 Sucrose 4% CA 200 ppm 11.93 33.90 51.88 75.98 10.15 37.69 55.79 7 Sucrose 4% CA 200 ppm 6.09 22.07 36.28 64.39 4.31 23.74 39.63 65.49 65.91 10.14 28.33 42.19 6 Sucrose 4% + CA 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 D.W Sucrose 4% + CA 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + CA 200 ppm 4.65 15.82 32.16 60.23 38.24 46.03 65.44 8 Sucrose 4% + CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.40 55.71 8.18 45.00 45.00 56.25 77.73 20.78 45.20 20.30		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	8.24	10.77	20.16	90.19	=======================================	48 79	64.19	81.18
Sucrose 4% 11.93 33.90 51.88 75.98 10.50 27.74 39.63 6 Sucrose 4% +CA 200 ppm 6.09 22.07 36.28 64.39 4.31 27.74 39.63 6 Sucrose 4% +CA 200 ppm 4.65 15.82 35.56 62.21 10.14 28.33 42.19 6 Sucrose 4% +CA 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% +CA 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% +CA 200 ppm 8.75 26.62 42.29 71.43 9.40 26.00 45.21 7 Sucrose 4% +CA 200 ppm 8.75 26.55 40.45 68.73 12.26 30.50 39.49 39.40 Sucrose 4% +CA 200 ppm 8.54 20.00 36.25 77.73 20.78 45.20 34.50 Sucrose 4% +C		D.W	15.88	44.44	58.45	00.10	95 01	27.69	55 79	77.94
Sucrose 4% +CA 200 ppm 6.09 22.07 36.28 64.39 4.31 25.74 37.05 Sucrose 4% + CA 200 ppm 5.29 19.23 35.56 62.21 10.14 28.33 42.19 6.0 Sucrose 4% + SHQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + CA 200 ppm + SHQS 200 ppm 23.33 48.95 63.53 85.37 21.67 46.33 65.44 8 Sucrose 4% + CA 200 ppm 10.25 26.62 42.29 71.43 9.40 26.00 45.21 39.49 Sucrose 4% + CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% + CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% + CA 200 ppm 8.54 20.00 36.21 63.47 8.58 24.37 34.60 66.19 3.36 20.78 45.21 77.73 20.78 45.		Sucrose 4 %	11.93	33.90	51.88	86.67	10.30	10.10	30.63	69 59
Sucrose 4% + 8HQS 200 ppm 5.29 19.23 35.56 62.21 10.14 28.33 42.19 0.0 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 6 Sucrose 4% + CA 200 ppm 19.67 37.79 55.77 81.18 14.02 39.68 59.49 8 Sucrose 4% + CA 200 ppm 8.75 26.62 42.29 71.43 9.40 26.00 45.21 6 Sucrose 4% + CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 7 Sucrose 4% + CA 200 ppm 8.54 20.00 36.21 63.47 8.58 24.37 34.60 6 Sucrose 4% + CA 200 ppm 8.54 20.00 36.25 77.73 20.78 45.72 8.58 Sucrose 4% + CA 200 ppm 3.45 16.89 34.52	0.10	C 40. +CA 200 nnm	60.9	22.07	36.28	64.39	16.4	47.07	01.01	99 69
Sucrose 4% + 8HQS 200 ppm 4.65 15.82 32.16 60.23 3.82 19.28 37.12 0 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 4.65 15.82 32.16 60.23 38.27 19.28 37.12 0 D.W Sucrose 4% + CA 200 ppm 19.67 37.79 55.77 81.18 14.02 39.68 59.49 8 Sucrose 4% + CA 200 ppm 8.75 26.62 42.29 71.43 9.40 26.00 45.21 5 Sucrose 4% + CA 200 ppm 8.75 26.55 40.45 68.73 12.26 30.50 39.94 5 Sucrose 4% + CA 200 ppm 8.74 20.00 36.21 63.47 8.58 24.37 34.60 6 Sucrose 4% + CA 200 ppm 8.54 20.00 36.25 77.73 20.78 45.20 54.92 Sucrose 4% + CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4% + CA 200 ppm 3.45 1.68 34.52 58.73<	BA to ppin	Sucrose 4 /a . Ca. Co. Douglass	5 29	19.23	35.56	62.21	10.14	28.33	47.19	00.00
Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 23.33 48.95 65.57 81.18 14.02 39.68 59.49 8 D.W Sucrose 4% CA 200 ppm 19.67 37.79 55.77 81.18 14.02 39.68 59.49 8 Sucrose 4% CA 200 ppm 10.25 26.62 42.29 71.43 9.40 26.00 45.21 7 Sucrose 4% CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% CA 200 ppm 8.75 26.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% CA 200 ppm 8.54 20.00 36.25 77.73 20.78 45.20 54.92 Sucrose 4% CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4% CA 200 ppm 4.65 18.99 35.90 60.19 3.36 10.20 32.43 Sucrose 4%		Sucrose 4 % + 8HQS 200 ppui	4 65	15.82	32.16	60.23	3.82	19.28	37.12	67.29
D.W D.W 23.33 40.75 55.77 81.18 14.02 39.68 59.49 8 Sucrose 4% Sucrose 4% CA 200 ppm 19.67 37.79 55.77 81.18 14.02 39.68 59.49 8 Sucrose 4% CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% CA 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 39.94 Sucrose 4% CA 200 ppm 8.54 20.00 36.25 77.73 20.78 45.20 54.92 Sucrose 4% CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4% CA 200 ppm 4.65 18.99 35.90 60.19 3.36 10.21 18.94 38.58 Sucrose 4% CA 200 ppm 4.65 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4%		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	20.00	30.00	63 53	85.37	21.67	46.33	65.44	89.53
Sucrose 4% Sucrose 4% Sucrose 4% 9,0 57.79 37.79 37.77 37.79 37.77 37.71 37.71 37.71 37.71 37.71 37.70 37.71 37.70 37.71 37.70 37.71 37.70 37.71 37.70 <th></th> <th>D.W</th> <td>25.55</td> <td>00.01</td> <td>55.7.</td> <td>81 18</td> <td>14.02</td> <td>39.68</td> <td>59.49</td> <td>80.34</td>		D.W	25.55	00.01	55.7.	81 18	14.02	39.68	59.49	80.34
Sucrose 4% + CA 200 ppm 10.25 26.62 42.29 71.45 7.40 20.50 39.94 Sucrose 4% + 8HQS 200 ppm 8.75 25.55 40.45 68.73 12.26 30.50 39.94 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 8.54 20.00 36.21 63.47 8.58 24.37 34.60 6 D.W D.W 20.33 42.00 56.25 77.73 20.78 45.20 54.92 Sucrose 4% + CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4% + CA 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4% + CA 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.24 Sucrose 4% + CA 200 ppm 3.45 56.76 3.78 16.20 32.24 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.36 1.485 1.437 1.871 5.497 11.91 10.87 S% 3.300		Sucrose 4 %	19.61	31.19	11.00	71.43	0.40	26.00	45.21	73.72
Sucrose 4 % + 8HQS 200 ppm 8.75 25.55 40.45 68.73 12.26 30.30 37.77 Sucrose 4 % + 8HQS 200 ppm + 8HQS 200 ppm 8.54 20.00 36.21 63.47 8.58 24.37 34.60 6 D.W D.W 20.33 42.00 56.25 77.73 20.78 45.20 54.92 Sucrose 4 % CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4 % + CA 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4 % + RHQS 200 ppm 3.36 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sw 3.30 1.981 1.917 2.496 7.332 15.88 14.50	Sucrose 10 %	Sucrose 4% +CA 200 ppm	10.25	26.62	42.29	71.43	04.6	05.00	30.04	78.07
Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 8.54 20.00 36.21 63.47 8.58 24.31 34.00 Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 20.33 42.00 56.25 77.73 20.78 45.20 54.92 Sucrose 4% +CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4% +CA 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4% + RHQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 1.437 1.871 5.497 11.91 10.87 5% 2.473 1.485 1.437 2.496 7.332 15.88 14.50	200 1200 1200	S. C.	8.75	25.55	40.45	68.73	17.70	30.30	24.60	67.85
D.W Sucrose 4% + CA 200 ppm 20.33 42.00 56.25 77.73 20.78 45.20 54.92 D.W Sucrose 4 % CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4 % + CA 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4 % + CA 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 1.437 1.871 5.497 11.91 10.87 Sweep 3.30 1.981 1.917 2.496 7.332 15.88 14.50		Sucrose 4 /8 / 200 com + 8HOS 200 nom	8.54	20.00	36.21	63.47	8.58	24.37	34.00	00.70
D.W Sucrose 4 % 46.62 72.58 9.72 41.31 45.72 Sucrose 4 % CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4 % + 8HQS 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4 % + 8HQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 1.437 1.871 5.497 11.91 10.87 5% 3.30 1.981 1.917 2.496 7.332 15.88 14.50		Sucrose 4% +CA 200 ppm out 2 200 ppm	20.33	42 00	56.25	77.73	20.78	45.20	54.92	/6.18
Sucrose 4 % Sucrose 4 % 3.36 20.83 35.52 Sucrose 4 % +CA 200 ppm 4.65 18.99 35.90 60.19 3.36 20.83 35.52 Sucrose 4 % + 8HQS 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4 % + 8HQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 1.437 1.871 5.497 11.91 10.87 5% 5% 1981 1.917 2.496 7.332 15.88 14.50		D.W	0001	33 34	46.62	72.58	9.72	41.31	45.72	74.01
Sucrose 4% +CA 200 ppm 4.03 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4% + 8HQS 200 ppm 3.45 16.88 34.52 58.73 12.17 18.94 38.58 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 2.473 1.485 1.437 1.871 5.497 11.91 10.87 5% 3.300 1.981 1.917 2.496 7.332 15.88 14.50		Sucrose 4 %	4 65	18 00	35.90	60.19	3.36	20.83	35.52	92.09
Sucrose 4 % + 8HQS 200 ppm 3.45 10.00 3.15 10.00 3.166 3.78 16.20 32.24 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.38 15.43 31.66 56.76 3.78 16.20 32.24 5% 1.871 2.497 11.91 10.87 10.87 5% 1.91 1.91 2.496 7.332 15.88 14.50	STS 1:4 ml	Sucrose 4% +CA 200 ppm	4.00	56.91	34.57	58.73	12.17	18.94	38.58	64.18
Sucrose 4% +CA 200 ppm + 8HQS 200 pp			2.38	15.43	31.66	56.76	3.78	16.20	32.24	56.08
5% 5.45 1.332 15.88 14.50			2 473	1 485	1.437	1.871	5.497	11.91	10.87	12.81
	L.S.D at	5%	3.300	1.981	1.917	2.496	7.332	15.88	14.50	17.09

Results and Discussion

parameter, especially the combined treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) after 6, 9, 12 and 15 days from the treatment in the two seasons under this study. Furthermore, the floret wilting percentage of tuberose cut flower spikes under all the combinations between pulsing solution and holding solution was increased as flower cut spikes advanced in age after 6 days from the treatment till the end of age of longevity in the two seasons.

3.2.a.-Water uptake (g)/spike:

It is clear from Table (31) that the absorbed solution by tuberose cut flower spikes increased as cut flower spike advanced in age after 3, 6, g, 12 and 15 days from the treatment in both seasons. However, pulsing tuberose cut flower spikes bases in silver thiosulphate (STS) (1:4 mM) for 15 minutes recorded the highest increase in water uptake as compared to the ones and control (D.W.) in the two seasons. Regardless control, the lowest water uptake value of tuberose cut flower spikes was registered by using pulsing treatment of sucrose at 10% for 24 hours in the first season, while in the second season sucrose at 10% for 24 hours the lowest water uptake value compared to control and other treatments under study. The aforementioned results of (sucrose) are in parallel with those obtained by Naidu and Reid (1989) on tuberose, El- Bouhy (2002) Nagaraja et. al, (2002) on tuberose stated that using sucrose at 20% as pulsing solution treatment increased water uptake and water balance compared to control. The aforementioned results of

Table (31): Effect of pulsing solutions treatments, on Water uptake, Water loss and Water balance (g)/spike of of Polianthes tuberosa L.cut flower spike during the two seasons of 2007-2008/2008-2009.

0	2007-9007/9007-/007 10								100/100	ilea			Water ba	Water balance (g)/spike	ike	
			Water	uptake (g)/spike	/spike			water	Water loss (B)/spine	IINC			Shelf life periods (days)	periods (da	vs)	
				periods (days)	davs)			Shelf life	be	ays)	1	-	9	0	12	15
Trea	Treatments	·	9		12	15	3	9	6	12	2	2		,		
		c							1st season							
						00.000	20,00	10 00	147 17	179.95	219.26	14.91	11.91	5.71	-0.73	-6.28
	D.W	67.83	114.93	152.88	179.23	212.98	26.75	10.06	/1.//		1, 000	9	1017	8.43	131	-3.99
	Kin.20 ppm	73.85	124.35	168.45	193.68	219.42	56.16	106.19	10.091	190.37	223.41	60./1	10.17	1.0		000
Pulsing	RA 10 ppm	75.74	126.25	172.51	201.63	223.05	59.95	106.43	162.30	195.93	223.98	60.61	19.82	10.21	5.69	-0.93
solutions	and or vo	77.89	117.35	155.79	180.69	207.33	53.93	100.45	149.32	179.35	211.32	14.81	16.90	6.47	1.33	-3.99
	Sucrose 1070	100.00	130.00	175 97	206.45	231.21	59.01	18.601	163.55	198.45	230.26	20.63	21.09	12.43	8.00	1.05
	STS 1:4 ml	19.04	00000			0.00	040	1 337	1.139	1.392	0.886	0.815	0.249	0.147	0.141	0.320
	2 %	0.686	1.297	1.133	1.387	0.873	1.049	1000						201.0	0010	7000
L.S.D at	1%	916.0	1.730	1.512	1.850	1.165	1.400	1.783	1.519	1.857	1.187	1.087	0.332	0.190	0.100	0.427
							2 nd	2 nd season								
						-	3	00.00	14101	178 30	204 74	13.81	14.32	4.71	-1.93	-7.27
	D.W	66.79	11.15	145.73	176.37	197.47	52.98	96.83	10.141	00.071				-	0 33	77 V
	Kin 20 nnm	72.01	118.37	158.32	191.69	203.64	55.70	101.43	151.21	183.37	208.41	16.31	16.94	11./	0.33	11.1
Pulsing	10 of 10	+	116.92	159.70	188.07	206.19	54.78	98.86	150.65	174.04	209.07	17.60	90.81	9.05	14.03	-2.87
solutions	ndd or wa	+	o to		+	187 65	50.24	92.01	133.80	169.17	192.63	16.51	15.18	6.01	-0.77	-4.97
	Sucrose 10%	66.75	107.19	-	+	+	-	67 601	15.4.31	193.52	219 19	18.47	20.92	11.13	5.41	-0.30
	STS 1:4 ml	75.77	124.55	165.44	198.93	218.89	57.29	103.63	15.451	20.061	217717			107.0	0300	1.001
	2 %	2.194	2.324	2.347	2.456	2.676	1.483	2.259	2.242	2.420	2.719	1.726	0.944	0.491	0.250	1.00.1
L.S.D at	10%	2 927	-	3.131	3.276	3.569	1.978	3.014	2.991	3.229	3.627	2.302	1.259	0.655	0.334	1.456
	0/1		-													

on tuberose and bird of paradise, Gendy (2000) on gladiolus, El- Bouhy (2002) on tuberose cleared that (kin) treatment increased water uptake, water loss and water balance of cut flower spikes. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, El-Hindi (1999) on dahlia, Gendy (2000) on gladiolus, El- Bouhy (2002) on tuberose showed that dipping of cut flower spike bases in the treatment of STS at 1-4 mM for 10 minutes increased absorbed solution, water loss and water balance compared to control.

As for the effect holding solution treatments on water uptake (g)/spike, it is clear from Table (32) that the absorbed solution by tuberose cut flower spike increased as cut flower spike advanced in age after 3 days from the treatment till the end of longevity in the two seasons under the solution treatments of this study. However, holding tuberose cut flower spikes bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) induced the highest significant increase in water uptake as compared to control (D.W) and other treatment in the first season only, but in the second season using holding solution contained (sucrose at 4% + citric acid at 200ppm) by tuberose cut flower spikes recorded the highest significant increase in water uptake compared to control and other holding solution treatments in this concern. The lowest values of water uptake by tuberose cut flower spikes was registered by using holding solution contained (sucrose at 4%) after 3 days as cut flower spikes and till the end of age of

Table (32); Effect of Holding solutions treatments, on Water uptake, Water loss and Water balance (g)/spike of of Poliunthes tuberosa L.cut flower spike during the two seasons of 2007-2008/2008-2009.

				(a) and an	Jan H.o.			Water	Water less (a)/snike	snike			Water	Water balance (a)/snike	/snike	
			water	water uptake (g)/spike	Spike			OL ALCHA	ioss (E)	June (Shalflif	Shalf life norinde/ days	of done)	
	Lreatments		Shelf lin	Shelf life periods days)	S(days)			Shell III	Shell life periods(days	(days)			Silcii III	no her none	of days)	1
		6	9	6	12	15	3	9	6	12	15	3	9	6	12	15
								lst	1st season							
	D.W	72.48	102.75	135.78	99.691	191.82	86.89	16:06	132.77	171.75	12.661	13.50	11.85	3.01	-2.09	-7.89
	Sucrose 4 %	60.57	92.73	128.04	165.14	184.38	51.39	83.48	129.01	170.93	196.21	9.18	9.25	-0.97	-5.79	-11.83
Holding solutions	Sucrose 4% +CA 200 ppm	75.98	137.51	185.49	207.74	235.53	55.37	114.62	173.25	201.01	235.06	20.61	22.89	12.25	6.74	0.47
	Sucrose 4 % + 8HQS 200 ppm	77.47	137.63	186.44	207.97	238.68	56.84	114.66	173.61	200.13	237.51	20.63	22.97	12.83	7.83	1.17
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	79.29	143.16	189.84	211.16	243.68	56.09	118.03	173.72	200.23	239.73	23.21	25.13	16.12	10.93	3.95
	2 %	989.0	1.297	1.133	1.387	0.873	1.049	1.337	1.139	1.392	988.0	0.815	0.249	0.147	0.141	0.320
L.S.D at	1%	0.916	1.730	1.512	1.850	1.165	1.400	1.783	1.519	1.857	1.187	1.087	0.332	0.196	0.188	0.427
								2 nd	d season			-				
	D.W	72.79	102.87	136.17	169.69	190.85	61.47	71.16	134.00	172.41	201.11	11.33	11.09	2.17	-2.73	-10.27
	Sucrose 4 %	53.83	92.43	125.99	157.83	179.41	43.89	85.00	127.80	166.13	192.35	9.95	7.43	-1.81	-8.30	-12.94
Holding solutions	Sucrose 4% +CA 200 ppm	77.35	139.11	184.35	212.19	233.49	57.69	117.31	173.48	200.89	233.88	19.61	21.80	10.87	11.31	-0.39
	Sucrose 4 % + 8HQS 200 ppm	73.81	106.70	144.84	183.85	196.33	53.39	84.90	132.99	171.37	196.07	20.41	21.80	11.85	12.49	0.26
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	75.91	137.07	177.63	199.93	213.77	54.56	113.78	162.71	187.61	210.63	21.35	23.29	14.93	12.32	3.15
	5 %	2.194	2.324	2.347	2.456	2.676	1.483	2.259	2.242	2.420	2.719	1.726	0.944	0.491	0.250	1.091
L.S.D at	1%	2.927	3.100	3.131	3.276	3.569	1.978	3.014	2.991	3.229	3.627	2.302	1.259	0.655	0.334	1.456

longevity from the treatment in both seasons. Moreover, the treatments of tuberose cut flower spikes bases in holding solution contained (sucrose at 4% citric acid at 200ppm) and (sucrose at 4% + 8-HQS at 200ppm) recorded increases in water uptake as compared to control (distilled water) in the two seasons. Furthermore, 8-hydroxy quinoline salts (8-HQ) delayed senescence and eliminated bacterial growth which was the principal reason for reduced water uptake and transport of gerbera flower, Abdel Kader, (1987). 8-HQS prevented the growth of microorganism in the xylem and thus maintained water uptake by flower stems Kwon et al., (2000) on fressia. The aforementioned results of (sucrose) are in parallel with those obtained by El-Saka (1992) suggested that sucrose at 10% treatment decreased absorbed solution of tuberose and bird of paradise cut flowers, El-Zohairy (1999) mentioned that sucrose at 3 and 5% treatments increased water balance and water loss but decreased water uptake, by rose flowers and Gendy (2000) indicated that sucrose treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers.

The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) found that (sucrose +citric acid) treatment increased absorbed solution by tuberose and bird of paradise cut flowers, El-Hindi (1999) reported that (sucrose +citric acid) treatment increased absorbed solution and water balance in dahlia cut flowers. Gendy (2000) indicated that (sucrose +citric acid) treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in

parallel with those obtained by El-Saka (1992) found that sucrose + 8 HQS treatment increased absorbed solution percentage of tuberose and bird of paradise cut flowers, El-Hindi (1999) stated that 8-HQS treatment increased absorbed solution and water balance of dahlia cut flowers. El-Zohairy (1999) mentioned that (8-HQS) improved water uptake and water balance but, this treatment decreased water loss of rose cut flowers. Gendy (2000) showed that sucrose +8- HQS treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) found that (S + 8-HQS + CA) treatment increased abscrbed solution percentage of tuberose and bird of paradise cut flowers. Gendy (2000) showed that (S + 8-HQS + CA) treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers, El Bouhy (2002) on tuberose, Gendy (2007) stated that the treatment of gladiolus cut flower spikes bases in holding solution contained (sucrose + 8-HQS +citric acid) record highly significant increase in water uptake, water loss and water balance as compared to control (D.W. treatment)

Concerning the effect of interaction between pulsing solution and holding solution treatments on Water uptake (g) spike, Data presented in Table (33) reveal that most the interaction treatments between pulsing solutions and holding solutions succeeded in increasing the water uptake of tuberose cut flower spikes as compared to control (distilled water) in the

Table (33) Effect of interaction between pulsing solutions and holding solutions treatments of Water uptake (g)/spike of *Polianthes tuberosa* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	Treatments					Water uptake (g)/spike	ike (g)/spil	(e			
				1st season					2nd season		
Pulsing solution	Holding Solution					Shelf life p	periods (days)	's)			
		3	6	9	12	15	3	6	9	12	15
	D.W	67.10	97.67	132.73	167.10	186.50	69.63	101.30	135.20	169 53	190 67
	Sucrose 4 %	56.33	88.87	120.73	155.37	178.47	49.80	88.80	117 70	151 03	1740
D.W	Sucrose 4% +CA 200 ppm	70.43	127.57	168.43	191.50	230.63	72.60	133 13	170 50	196.63	227 72
	Sucrose 4 % + 8HQS 200 ppm	72.47	129.30	169.77	192.03	231.53	69.70	103.10	141.97	177 17	193.00
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	72.80	131.23	172.50	190.13	237.77	72.23	129.40	163.27	186 60	196.70
	D.W	74.00	102.73	136.33	170.70	191.17	75 97	104 13	138 57	171 43	1061
	Sucrose 4 %	58.67	91.87	129.10	166.33	183 40	51.07	94 77	120.53	161.40	170 70
Kin.20 ppm	Sucrose 4% +CA 200 ppm	77.33	136.50	193.27	207.80	138 43	79 23	142 40	105.57	210.02	770 00
	Sucrose 4 % + 8HQS 200 ppm	78.90	142.33	190.03	209.83	241.33	76.10	107.93	146 57	177.03	106.90
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	80.33	148.33	193.50	213.73	242.77	77.67	142.63	181 37	196.27	207 70
	D.W	75.40	106.07	140.37	174.57	195.63	72.60	103.40	138 20	176 17	100 00
	Sucrose 4 %	62.80	94.23	132.73	171.40	187.43	53.13	93.33	129.07	160.57	180 17
BA 10 ppm	Sucrose 4% +CA 200 ppm	78.47	143.13	196.10	217.83	24303	80.50	139.53	194.23	222 20	239 43
	Sucrose 4 % + 8HQS 200 ppm	80.37	141.60	195.33	220.80	242.80	77.80	109.40	148.30	180.23	199.03
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	81.67	146.23	198.00	223.53	246.33	77.87	138.93	188.70	201.20	213.33
	D.W	69.20	99,43	128.03	160.70	190.10	68.23	96.10	122.33	152.97	175 34
	Sucrose 4 %	57.30	90.97	121.27	157.70	181.03	55.33	87.97	118.17	145.80	176.30
Sucrose 10 %	Sucrose 4% +CA 200 ppm	70.47	131.67	171.67	193.47	212.80	71.13	128.87	162.77	188.17	198.87
	Sucrose 4 % + 8HQS 200 ppm	71.80	129.67	179.17	193.80	223.17	67.83	98.13	137.07	169.97	190.50
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	74.93	135.00	181.80	197.77	229.53	71.23	124.90	158.70	185.17	197.23
	D.W	76.70	107.87	141.43	175.23	195.70	77.53	109.40	146.57	178.33	194.10
OTO 1.4 a.l	Sucrose 4 %	67.77	97.73	136.13	174.90	191.57	59.83	97.30	135.50	169.43	186.67
010134111	Sucrose 4% +CA 200 ppm	83.20	148.67	198.00	228.13	252.73	83.30	151.60	198.70	234.93	257.50
	Sucrose 4 % + 8HQS 200 ppm	83.80	145.23	200.90	223.37	254.57	77.60	114.93	150.30	181.57	202.30
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	86.73	155.00	203.40	230.63	262.00	80.57	149.50	196.13	230.40	253.90
L.S.D at	5%	1.353	2.900	2.534	3.101	1.952	4.907	5.196	5.249	5.491	5.983
	1%	2.047	3.860	3.380	4.136	2.604	6.546	6.932	7.002	7.326	7.981

two seasons. However, the combinations of STS at 1:4mM for 30 minutes induced the highest values of this parameter, especially the combined treatment between pulsing solution of STS at 1:4mM for 15 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HOS at 200ppm) at the first season, moreover the interaction treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm) at the second season after 3, 6, 9, 12 and 15 days from the treatment. Furthermore, the absorbed solution of tuberose cut flower spikes by using all interaction treatments between pulsing solution and holding solution was increased as flower cut spikes prolonged in age after 3 days from the treatment till the end of longevity in the two seasons. On the reverse, the lowest values of water uptake / spike of tuberose cut flower spike was registered by using the combinations of sucrose at 4% as holding solution, with the exception of the combined treatment between STS 1:4ml and sucrose at 4% In general, the lowest values of this parameter was recorded by using the combined treatment between D.W and sucrose at 4% during all longevity periods in both seasons. These results agreed with those found by El- Saka (1992) stated that (STS) or (Kin) treatments then holding solution of (S +8 HQS +CA) increased absorbed solution of tuberose and bird of paradise cut flower spikes, Gendy (2000) cleared that the treatments of interaction between (STS) or (Kin) as pulsing solutions and holding solution of (S+8HOS +CA) increased absorbed solution, water loss and water balance of gladiolus cut flower spikes. and El Bouhy (2002) on tuberose

the interaction treatment between STS as pulsing solution and holding solution of S + 8 HQS + CA recorded highly significant increase in both absorbed solution and water balance and decrease in water loss of tuberose cut flower spikes compared to control, Also, he observed that the combination treatment of BA as pulsing solution and holding solution of (S + 8HQS + CA) recorded highly significant increase in absorbed solution and water balance as well as decrease in water loss of tuberose cut flower compared to control or the other ones under study.

3.2.b.-Water loss (g)/spike:

Data in Table (31) reveal that pulsing tuberose cut flower spikes bases in silver thiosulphate (STS) (1:4mM) for 15 minutes recorded highly significant increase in water loss as compared the other ones and control (D.W.) in both seasons. However, pulsing solutions of BA at 10ppm for 24 hours and kinetin at 20ppm for 24 hours succeeded in increased water loss of tuberose cut flower spikes compared to distilled water (control) in both seasons.

The aforementioned results of sucrose are in parallel with those obtained by El- Bouhy (2002) Nagaraja et. al., (2002) on tuberose stated that using sucrose at 20% as pulsing solution treatment increased water uptake and water balance compared to control. The aforementioned results of (cytokinins) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) on gladiolus, El- Bouhy (2002) on tuberose cleared that (kin) treatment increased water uptake, water loss and water balance of cut flower spikes.

The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, El-Hindi (1999) on dahlia, Gendy (2000) on gladiolus, El-Bouhy (2002) on tuberose showed that dipping cut flower spike bases in the treatment of STS at 1-4 mM for 10 minutes increased absorbed solution, water loss and water balance compared to control.

With respect to the effect holding solution treatments on Water loss (g)/spike, data in Table (32) reveal that, the treatment of tuberose cut flower spikes bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) and (sucrose at 4% + citric acid at 200ppm) resulted highly significant increase in water loss as compared to control (distilled water) in both seasons. However, the treatment of holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) gave the highest significant increase of water loss in the first seasons, while in the second season, holding solution contained (sucrose at 4% + citric acid at 200ppm) resulted the highest significant increase in water loss as compared to control (D.W.) in the second season. Moreover, using the treatment of holding solution contained (sucrose at 4% + 8-HQS at 200ppm) by tuberose cut flower spikes bases recorded increases in water loss compared to control in both seasons. The lowest mean values of water loss by tuberose cut flower spikes was registered by using the treatment of holding solution contained (sucrose at 4%) after 3, 6, g, 12 and 15 day from the treatment till the end of age of longevity in the two seasons.

The aforementioned results of (sucrose) are in parallel with those obtained by El-Zohairy (1999) mentioned that sucrose at 3 and 5% treatments increased water balance and water loss but decreased water uptake, by rose flowers and Gendy (2000) indicated that sucrose treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) found that (sucrose +citric acid) treatment increased absorbed solution by tuberose and bird of paradise cut flowers, El-Hindi (1999) on that (sucrose +citric acid) treatment increased reported absorbed solution and water balance in dahlia cut flowers. Gendy (2000) indicated that (sucrose +citric acid) treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers.

The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8 HQS treatment increased absorbed solution percentage of tuberose and bird of paradise cut flowers, El-Hindi (1999) stated that 8-HQS treatment increased absorbed solution and water balance of dahlia cut flowers. El-Zohairy (1999) mentioned that (8-HQS) improved water uptake and water balance but, this treatment decreased water loss of rose cut flowers. Gendy (2000) showed that sucrose +8- HQS treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) found that (S +

8-HQS + CA) treatment increased absorbed solution percentage of tuberose and bird of paradise cut flowers. Gendy (2000) showed that (S + 8-HQS + CA) treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers, El Bouhy (2002) on tuberose, Gendy (2007) stated that the treatment of gladiolus cut flower spikes bases in holding solution contained (sucrose + 8-HQS +citric acid) record highly significant increase in water uptake, water loss and water balance as compared to control.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Water loss (g) / spike, Data Table (34) indicate that, most the interaction treatments between pulsing solution and holding solution recorded increased of water loss of tuberose cut flower spikes after 3, 6, 9, 12 and 15 day from the treatment when compared with control in the two seasons. However, most the combinations of pulsing solution of STS at 1:4mm for 15 minutes recorded highly significant increase of water loss as compared to control in the two seasons. Moreover, the interaction between pulsing of (STS at 1:4mM for 30 minutes) and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) in the first season, while the interaction between pulsing solution of STS and holding solution contained (sucrose at 4% + citric acid at 200ppm) in the second season respectively, after 3,6,g,12 and 15 days from the treatment recorded the highest significant increase of water loss of tuberose cut flower spikes as compared to control. Anyhow, water loss of tuberose cut flower spikes by using all the

Table (34) Effect of interaction between pulsing solutions and holding solutions treatments of Water loss (g)/spike of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2009.

	Treatments					Water los	Water loss (a)/snike			l	
				1st season			- A - A		2nd season		
Pulsing solution	Holding Salution				S	Shelf life pe	periods (davs)		3543011		
9		3	9	6	12	15	3	9	0	1.3	15
	D.W	55.73	88.17	131.53	173.30	196.67	61.13	92.93	134.70	176.97	204.03
9	Sucrose 4 %	47.60	81.07	123.87	164.93	193.73	42.30	85.97	122.93	161.63	190.57
D.W	Sucrose 4% +CA 200 ppm	53.27	106.27	158.67	188.77	233.93	55.53	113.50	162.10	195.23	236.13
		56.03	110.03	160.97	188.33	233.97	52.30	83.80	132.57	174.53	197.80
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	51.97	108.53	160.80	184.43	238.00	53.36	107.93	152.77	183.13	195.17
	D.W	09.09	90.93	133.60	173.77	199.40	64.57	93.77	136.93	174.57	207.83
	Sucrose 4 %	48.87	82.47	130.50	172.53	195.90	42.23	86.33	132.03	169.47	192.93
MIN.20 ppm	Sucrose 4% +CA 200 ppm	56.23	114.17	180.97	201.23	238.97	59.83	120.93	185.03	215.43	239.40
	Sucrose 4 % + 8HQS 200 ppm	58.07	119.80	176.77	202.07	243.27	55.50	85.60	135.07	171.07	196.57
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	57.03	123.57	178.23	202.23	239.50	56.37	120.53	166.97	186.30	205.33
	D.W	61.00	93.13	135.83	174.80	201.97	58.97	91.73	134.77	176.67	206.20
	Sucrose 4 %	52.00	84.43	133.03	175.53	197.90	43.57	84.70	129.63	165.27	192.33
BA 10 ppm	Sucrose 4% +CA 200 ppm	55.87	118.70	182.37	208.90	240.33	59.30	117.00	181.80	215.70	239.13
		26.97	116.47	180.83	210.20	239.10	56.63	87.50	134.80	172.83	197.73
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	57.43	119.43	179.43	210.23	240.60	55.43	113.37	172.23	189.5	209.93
	D.W	56.43	88.87	128.23	165.13	200.10	58.53	86.67	122.63	156.70	186.67
	Sucrose 4 %	52.43	83.10	123.77	165.70	194.33	41.07	81.33	120.40	158.43	190.67
Sucrose 10 %	Sucrose 4% +CA 200 ppm	52.63	110.67	161.00	188.77	213.07	52.63	109.07	153.27	185.87	199.67
	Sucrose 4 % + 8HQS 200 ppm	54.40	108.00	165.37	188.10	222.37	48.23	78.00	126.43	167.00	190.17
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	53.77	111.60	168.23	189.07	226.73	50.73	105.00	146.27	177.87	195.97
	D.W	61.13	93.43	134.63	171.77	200.40	64.13	93.77	140.97	177.17	200.83
4	Sucrose 4 %	26.07	86.33	133.87	175.97	199.20	50.27	86.67	134.00	175.83	195.27
STS 1:4 ml	Sucrose 4% +CA 200 ppm	58.87	123.30	183.23	217.37	249.00	61.13	126.03	185.20	225.53	255.07
	Sucrose 4 % + 8HQS 200 ppm	58.73	119.00	184.10	211.97	248.87	54.30	89.60	136.07	171.40	198.07
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	60.23	127.00	181.90	215.20	253.83	56.63	122.07	175.30	217.67	246.73
L.S.D at	5%	2.347	2.989	2.546	3.113	1.989	3.316	5.052	5.014	5.412	080.9
	1%	3.130	3.987	3.396	4.153	2.653	4.424	6.739	889.9	7.220	8.111

Results and Discussion

combinations between pulsing solutions and holding solutions was increased as flower cut spikes advanced in age after 3 days from the treatment till the end of age of longevity in the two seasons. On the other side, the lower values of water loss / spike of tuberose cut flower spike was recorded by using the combination of sucrose at 4% as solution, particularly the combined treatment between D.W and sucrose at 4% during all longevity periods in both seasons. These results agreed with those found by El- Saka (1992) stated that (STS) or (Kin) treatments then holding solution of (S +8 HQS +CA) increased absorbed solution of tuberose and bird of paradise cut flower spikes, Gendy (2000) cleared that the treatments of interaction between (STS) or (Kin) as pulsing solutions and holding solution of (S+8HQS +CA) increased absorbed solution, water loss and water balance of gladiolus cut flower spikes. and El-Bouhy (2002) on tuberose the interaction treatment between STS as pulsing solution and holding solution of S + 8 HQS + CA recorded highly significant increase in both absorbed solution and water balance and decrease in water loss of tuberose cut flower spikes compared to control, Also, he observed that the combination treatment of BA as pulsing solution and holding solution of (S + 8HQS + CA) recorded highly significant increase in absorbed solution and water balance as well as decrease in water loss of tuberose cut flower compared to control or the other ones under study.

3.2.c.-Water balance (g) spike:

Data in Table (31) demonstrated that water balance of tuberose cut flower spikes was increased after 3 days and 6 days then decreased after that day in both seasons, with the exception of pulsing of sucrose at 10% for 24 hours in the second season which decreased water balance value after 3 days from the treatment in this concern. Generally, all pulsing solutions treatments highly significant increased the water balance of tuberose cut flower spikes after 3, 6, g, 12 and 15 days from the treatment compared to control in the two season. Furthermore, the treatment of (STS) at 1:4mM for 15 minutes after 3, 6, g, 12 and 15days from the treatment was more effective in this regard compared with the others in the two seasons.

The aforementioned results of sucrose are in parallel with those obtained by El-Bouhy (2002) Nagaraja et. al., (2002) on tuberose stated that using sucrose at 20% as pulsing solution treatment increased water uptake and water balance compared to control. The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) on gladiolus, El-Bouhy (2002) on tuberose cleared that (kin) treatment increased water uptake, water loss and water balance of cut flower spikes.

The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, El-Hindi (1999) on dahlia, Gendy (2000) on gladiolus, El-Bouhy (2002) on tuberose showed that dipping of cut flower spike bases in the treatment of STS at 1-4

mM for 10 minutes increased absorbed solution, water loss and water balance compared to control.

As for the effect holding solution treatments on Water balance (g)/spike, According to data in Table (32) it is obvious that, the treatment of tuberose cut flower spikes bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted the highest significant increase of water balance as compared to control (distilled water) in the two seasons. However, holding solution contained (sucrose at 4% + citric acid at 200ppm) and (sucrose at 4% + 8-HQS at 200ppm) by tuberose cut flower spikes bases recorded highly significant increase in water balance as compared to control in both seasons. On contrary, the lowest mean of value of water balance by tuberose cut flower spikes was registered by using holding solution contained (sucrose at 4%) compared to control (D.W.) and other treatments in the two seasons.

The aforementioned results of (sucrose) are in parallel with those obtained by El-Zohairy (1999) mentioned that sucrose at 3 and 5% treatments increased water balance and water loss but decreased water uptake, by rose flowers and Gendy (2000) indicated that sucrose treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) found that (sucrose +citric acid) treatment increased absorbed solution by tuberose and bird of paradise cut flowers, El-Hindi (1999) on reported that (sucrose +citric acid) treatment increased absorbed solution and water balance in dahlia cut flowers. Gendy (2000)

indicated that (sucrose +citric acid) treatment decreased absorbed solution, water loss and water balance on gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8 HQS treatment increased absorbed solution percentage of tuberose and bird of paradise cut flowers, El-Hindi (1999) stated that 8-HQS treatment increased absorbed solution and water balance of dahlia cut flowers. El-Zohairy (1999) mentioned that (8-HQS) improved water uptake and water balance but, this treatment decreased water loss of rose cut flowers. Gendy (2000) showed that sucrose +8- HQS treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers.

The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by El-Saka (1992) found that (S + 8-HQS + CA) treatment increased absorbed solution percentage of tuberose and bird of paradise cut flowers, Gendy (2000) showed that (S + 8-HQS + CA) treatments as holding solutions increased water uptake and water loss, but decreased water balance of gladiolus cut flowers, El-Bouhy (2002) on tuberose, Gendy (2007) stated that the treatment of gladiolus cut flower spikes bases in holding solution contained (sucrose + 8-HQS +citric acid) record highly significant increase in water uptake, water loss and water balance as compared to control (D.W. treatment)

Concerning the effect of interaction between pulsing solution and holding solution treatments on Water balance (g) / spike, data presented Table (35) reveal that all the combinations

Table (35) Effect of interaction between pulsing solutions and holding solutions treatments of Water balance (g)/spike of Polianthes tuberosa L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	- L				2	Water balance (g)/spike	ce (g)/spik	e			
	Leatments			1st season					2nd season		
					S	Shelf life periods (days)	riods (days	(9			
Pulsing solution	Holding Solution	3	9	6	12	15	3	9	6	12	15
	D.W	11.37	9.50	1.20	-6.20	-10.17	8.50	8.37	0.50	-7.43	-13.37
	Sucrose 4 %	8.73	7.80	-2.90	-9.57	-15.27	7.50	2.83	-5.23	-9.70	-16.33
D.W	Sucrose 4% +CA 200 ppm	17.17	21.30	77.6	2.73	-3.30	17.07	19.63	8.40	1.40	-3.40
	Sucrose 4 % + 8HQS 200 ppm	16.43	19.27	8.80	3.70	-2.43	17.40	19.30	9.40	2.63	-4.80
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	20.83	22.70	11.70	5.70	-0.23	18.60	21.47	10.50	3.47	1.53
	D.W	13.40	11.80	2.73	-3.07	-8.23	11.40	10.37	10.50	-3.13	-12.73
	Sucrose 4 %	08.6	9.40	-1.40	-6.20	-12.50	8.83	8.43	1.63	-8.07	-13.23
Kin.20 ppm	Sucrose 4% +CA 200 ppm	21.10	22.33	12.30	6.57	-0.53	19.40	21.47	-2.50	3.60	-0.50
	Sucrose 4 % + 8HQS 200 ppm	20.83	22.53	13.27	7.77	-1.93	20.60	22.33	10.53	5.93	0.23
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	23.30	24.77	15.27	11.50	3.27	21.30	22.10	14.40	6.97	2.37
	D.W	14.40	12.93	4.53	-0.23	-6.33	13.63	11.67	3.43	0.50-	7.20-
	Sucrose 4 %	10.80	08.6	-0.30	-4.13	-10.47	9.57	8.63	-0.57	-4.70	-12.17
BA 10 ppm	Sucrose 4% +CA 200 ppm	22.60	24.43	13.73	8.93	2.70	21.20	22.53	12.43	6.50	0.30
	Sucrose 4 % + 8HQS 200 ppm	23.40	25.13	14.50	10.60	3.70	21.17	21.90	13.50	7,40	1.30
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	24.23	26.80	18.57	13.30	5.73	22.43	25.57	16.47	11.67	3.40
	D.W	12.77	10.57	-0.20	-4.43	10.00-	9.70	9.43	-0.30	-3.73	-11.30
	Sucrose 4 %	4.87	7.87	-2.50	-8.00	-13.30	14.27	6.63	-2.23	-12.63	-14.37
Sucrose 10 %	Sucrose 4% +CA 200 ppm	17.83	21.00	10.67	4.70	-0.27	18.50	19.80	9.50	2.30	-0.80
	Sucrose 4 % + 8HQS 200 ppm	17.40	21.67	10.80	5.70	0.80	19.60	20.13	10.63	2.97	0.33
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	21.17	23.40	13.57	8.70	2.80	20.50	19.90	12.43	7.30	1.27
	D.W	15.57	14.43	6496-	3.47	-4.70	13.40	15.63	5.60	1.17	-6.73
	Sucrose 4 %	11.70	11.40	2.27	-1.07	-7.63	9.57	10.63	1.50	-6.40	-8.60
STS 1:4 ml	Sucrose 4% +CA 200 ppm	24.33	25.37	14.77	10.77	3.73	22.17	25.57	13.50	9.40	2.43
	Sucrose 4 % + 8HQS 200 ppm	25.07	26.23	16.80	11.40	5.70	23.30	25.33	14.23	10.17	4.23
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	26.50	28.00	21.50	15.43	8.17	23.93	27.43	20.83	12.73	7.17
	5%	1.821	0.557	0.329	0.316	0.716	3.358	2.111	1.098	0.559	2.441
L.S.D at	1%	2.430	0.743	0.438	0.421	0.955	5.147	2.816	1.464	0.746	3.256

Results and Discussion

between pulsing solution and holding solution treatments succeeded in increasing water balance of tuberose cut flower spikes during the two seasons as compared with control (distilled water). However, the combinations of pulsing solution of STS at 1:4mM for 30 minutes recorded the highest significant increase of this parameter, especially the combined treatment of pulsing solution of (STS at 1:4mM for 30 minutes) and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) after 3,6,g, 12 and 15 days from the treatment in the two seasons. These results agreed with those found by El-Saka (1992) stated that (STS) or (Kin) treatments then holding solution of (S +8 HQS +CA) increased absorbed solution of tuberose and bird of paradise cut flower spikes, Gendy (2000) cleared that the treatments of interaction between (STS) or (Kin) as pulsing solutions and holding solution of (S+8HQS +CA) increased absorbed solution, water loss and water balance of gladiolus cut flower spikes. and El Bouhy (2002) on tuberose the interaction treatment between STS as pulsing solution and holding solution of S + 8 HQS + CA recorded highly significant increase in both absorbed solution and water balance and decrease in water loss of tuberose cut flower spikes compared to control, Also, he observed that the combination treatment of BA as pulsing solution and holding solution of (S + 8HQS + CA) recorded highly significant increase in absorbed solution and water balance as well as decrease in water loss of tuberose cut flower compared to control or the other ones under study.

- 3.3.Effect of pulsing solutions and holding solutions treatments on :
- 3.3. Chemical constituent determinations:
- 3.3.1.-Chlorophyll "a", chlorophyll "b" and caroteniods in leaves / spike (mg/g f. w)

Data in Table (36) reveal that pulsing tuberose cut flower spikes bases in STS at 1:4mM for 15minutes recorded the highest significant increase of chlorophyll "a" chlorophyll "b" and caroteniods in leaves / spike (mg/g.f.w) after (initial, 8 and end days) from the treatment as compared to control (D.W) in the two seasons, followed descendingly by kinetin at 20ppm for 24hours and Benzyl adenine at 10ppm for 24hours in the two seasons. Regardless control, the lowest values of this parameter was registered by using pulsing solution of sucrose at 10% for 24hours after (8 and the end the longevity) in most cases of tuberose cut flower spikes in the two seasons. Furthermore, chlorophyll "a" chlorophyll "b" and carotenoids in leaves / spike (mg/g.f.w) of tuberose cut flower spikes under all pulsing solution treatments were decreased as flower cut spikes prolonged in age after initial from the treatment till the end of age of longevity in both seasons under this study.

The aforementioned results of cytokinins are in parallel with those obtained by **Gendy (2000)** stated that kinetin treatment increased chlorophyll "B", but decreased chlorophyll "A", carotenoids and non reducing sugars percentage of gladiolus cut flowers. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by **Gendy**

Table (36): Effect of pulsing solutions treatments on Chlorophyll a, b, Carotenoids in leaves/spike (mg/g f. w.) and Total, Reducing, Non-Reducing sugars percentage in petals of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

D.W 0.793 0.545 0.328 0.410 0.279 0.233 0.377	Т	Treatments	Ch Shu	Chlorophyll ,a, in leaves/ spike (mg/g f. w.) Shelf life periods (days)	II ,a, in pike w.) eriods	II.S	hlord leave (mg) elf lif (d	yll ,b, spike . w.) periods s	She	Carotenoids in leaves/ spike (mg/g f. w.) Shelf life periods (days)	ds in sike w.)	T perce She	Total sugars percentage in petals Shelf life periods (days)		s etals			Redu percen Shelf	Reducing sugars percentage in petals Shelf life periods (days)	
National Part National Par			Initial		End	Initial	- 8	End	Initial	00	End		Initial		Initial	Initial 8	Initial 8 End Initial	Initial 8 End Initial	Initial 8 End Initial 8	Initial 8 End Initial 8 End Initial
D.W 0.793 0.545 0.328 0.410 0.279 0.233 0.377 Kin.20 ppm 0.793 0.595 0.342 0.410 0.293 0.243 0.377 BA 10 ppm 0.793 0.595 0.342 0.410 0.293 0.243 0.377 Sucrose 10 0.793 0.565 0.329 0.410 0.234 0.235 0.377 STS 1:4 ml 0.793 0.607 0.355 0.410 0.297 0.251 0.377 5 % - 0.013 0.006 - 0.008 0.005 - 1 % - 0.017 0.007 - 0.011 0.006 - 5 % - 0.017 0.007 - 0.011 0.006 - D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.588 0.331 0.427 0.287 0.235 0.373 Sucrose 10										1st season	-			-	_	-				
Kin.20 ppm 0.793 0.595 0.342 0.410 0.293 0.243 0.377 BA 10 ppm 0.793 0.591 0.331 0.410 0.284 0.236 0.377 Sucrose 10 % 0.793 0.565 0.329 0.410 0.284 0.235 0.377 5 % - 0.013 0.006 - 0.008 0.005 - 1 % - 0.013 0.006 - 0.014 0.297 0.251 0.377 5 % - 0.017 0.007 - 0.011 0.006 - D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.569 0.331 0.427 0.287 0.245 0.373 BA 10 ppm 0.817 0.569 0.328 0.427 0.283 0.233 0.373		D.W	0.793	0.545	-			_	0.377	0.304	_	0.229	229 6 153		6 153 4 108	6 153 4 108 2 141	6 153 4 108 2 141 2 100	6 153 4 108 3 141 3 100 1715	6 153 4 108 2 141 2 100 1715 2 2 2	6 153 4 108 3 141 3 100 1715 5 5 5
BA 10 ppm 0.793 0.591 0.331 0.410 0.284 0.236 0.377 Sucrose 10 % 0.793 0.565 0.329 0.410 0.284 0.236 0.377 STS 1:4 ml 0.793 0.565 0.329 0.410 0.297 0.251 0.377 5 % - 0.013 0.006 - 0.008 0.005 - D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.280 0.235 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.235 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 5 % - 0.011 0.006 - 0.007 0.006 -			0.793	0.595		-	-	-	-	0 313	5	220	-	6163	6153 4770	6 153 4 670 2 220	6 153 4 670 2 220	6153 4670 2330	6 163 4 670 2.141 5.100 1./15	6183 4670 2.141 3.100 1./15 0.868
Sucrose 10 0.793 0.565 0.329 0.410 0.275 0.233 0.377 STS 1:4 ml 0.793 0.607 0.355 0.410 0.297 0.251 0.377 5 % - 0.013 0.006 - 0.008 0.005 - 1% - 0.017 0.007 - 0.011 0.006 - kin.20 ppm 0.817 0.545 0.327 0.427 0.280 0.235 0.373 kin.20 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.569 0.328 0.331 0.427 0.295 0.245 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 -	Pulsing		0.793	0.591	0.331	-	-	-	-	0.10.0	1	677.0	-	0.153	6.153 4.679	6.153 4.679	0.153 4.679 2.328	6.153 4.679 2.328 3.100	6.153 4.679 2.328 3.100 1.963	0.153 4.679 2.328 3.100 1.963 1.141
% 0.757 0.367 0.328 0.377 0.215 0.233 0.377 STS 1:4 ml 0.793 0.607 0.355 0.410 0.297 0.251 0.377 5 % - 0.013 0.006 - 0.008 0.005 - 1% - 0.017 0.007 - 0.011 0.006 - D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1 % - 0.014 0.007 - 0.007 0.006 -	Sugninge	Sucrose 10	0.703	0 565	0 220	-	-	-	-	0.500		0.224	0.224 6.153	-	6.153	6.153 4.715	6.153 4.715 2.269	6.153 4.715 2.269 3.100	6.153 4.715 2.269 3.100 1.916	6.153 4.715 2.269 3.100 1.916 1.269
5 % - 0.013 0.006 - 0.008 0.005 - 1% - 0.013 0.006 - 0.008 0.005 - D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.280 0.235 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.237 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1 % - 0.014 0.007 - 0.017 0.006 -		% STS 1:4 ml	0.703	0.505	0.355	-	-	-	0.377	0.304	0	0.227	0.227 6.153		6.153	6.153 4.943	6.153 4.943 2.427	6.153 4.943 2.427 3.100	6.153 4.943 2.427 3.100 2.271	6.153 4.943 2.427 3.100 2.271 1.133
D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373		5 %	0.175	0.007	0.333	0.410	+	-	0.377	0.320	0	0.235	.235 6.153	-	6.153	6.153 4.933	6.153 4.933 2.545	6.153 4.933 2.545 3.100	6.153 4.933 2.545 3.100 2.297	6.153 4.933 2.545 3.100 2.297 1.337
D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.295 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.237 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007	L.S.D at	10%		0.013	0.000		0.008	-		0.007	0	0.006	.006		1	- 0.090	- 0.090 0.066	- 0.090 0.066 -	- 0.090 0.066 - 0.123 0.066	- 0.090 0.066 - 0.123 0.066 -
D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.297 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.237 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007			-	0.017	0.007	ā	0.011	-		0.010	0.	0.007	007 -		0	- 0.120	- 0.120 0.088 - 0.164	0.120 0.088	- 0.120 0.088 - 0.164	0.120 0.088 - 0.164 0.088
D.W 0.817 0.545 0.327 0.427 0.280 0.235 0.373 Kin.20 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007 -										2 nd season	ň						-	-	-	-
Kin.26 ppm 0.817 0.595 0.341 0.427 0.295 0.245 0.373 BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 STS 1:4 mt 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007		D.W	0.817	0.545	0.327	0.427	-	-	0.373	0.307	0.231	231	231 6 103	-	6 103	6 103 4 118 2 150	6 103 4 118 2 150 2 022 1 700	6 103 4 118 2 150 3 073 1 600 5 000	6 103 4 118 2 150 3 073 1 600 5 000	6 103 4 118 2 150 2 072 1 000 000
BA 10 ppm 0.817 0.588 0.331 0.427 0.287 0.237 0.373 Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007 -	Della	Kin.20 ppm	0.817	0.595	0.341	0.427	0.295	0.245	0.373	0.313	0.230	ő	_	6.103	6.103 4.845	6.103 4.845	6.103 4.845 2.362 3.073 1.007	6.103 4.845 2.362 3.073 1.007 1.007	6.103 4.845 2.362 3.073 1.007 1.007	6.103 4.845 2.362 3.073 1.007 1.102 3.030
Sucrose 10 0.817 0.569 0.328 0.427 0.283 0.233 0.373 STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007 -	solutions	BA 10 ppm	0.817	0.588	0.331	0.427	0.287	0.237	0.373	0.307	0 227	27	-	6 103	6 103 4 569	6 103 4 569 7 777	6 103 4 568 2 277 2 277	6 103 4 569 2 277 2 277 1.002	6 103 4 568 2 277 2 272 1.007	6 103 4 569 2 277 2 277 1.002
STS 1:4 ml 0.817 0.609 0.351 0.427 0.299 0.250 0.373 5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.010 0.007		Sucrose 10	0.817	0.569	0.328	0.427	0.283	0.233	0.373	0.305	0.225	25			6.103	6.103 4.961 7.403	6.103 4.961 7.403 3.073	6.103 4.961 7.403 3.073 1.995	6.103 4.961 2.403 2.073 2.220 1.220	6.103 4.961 2.403 2.073 2.220 1.220
5 % - 0.011 0.006 - 0.007 0.006 - 1% - 0.014 0.007 - 0.016 0.007		STS 1:4 ml	0.817	0.609	0.351	0.427	0.299	0.250	0 373	0000	2500	36			4010	£.100	6 107	5.073	2.103 4.010 2.103 3.073 2.239 1.280 3.030	2 100 2
1% - 0.014 0.007 : 0.010 0.007	L.S.D at	5 %	1	0.011	0.006	x	0.007	0.006		0.007	0.006	90	0.100	0.103	0.103 4.918	0.103 4.918	0.103 4.918 2.5/3 3.073 2.314	0.103 4.918 2.5/3 3.073 2.314 1.419	0.103 4:918 2.5/3 3.073 2.314 1.419 3.030	0.103 4.918 2.5/3 3.073 2.314 1.419
0.010		1%	1	0.014	0.007	э	0.010	0.007	ij	0010	0.007	07				0.000	0.001 - 0.084	0.000	0.001 - 0.084 0.061	0.061

(2000) indicated that (STS) treatment decreased chlorophyll 'A', 'B' and carotenoids contents of gladiolus cut flower spike petals, Khenizy (2000) found that (STS) treatment increased chlorophyll A,B, carotene contents of Dianthus caryophyllus and El-Bouhy (2002) showed that dipping of cut flower spike bases of tuberose in the treatment of STS at 1-4 mM for 10 minutes increased the contents of chlorophyll "a" and "b" after 5 days from the treatment as the end of longevity compared to control or those the other under study.

Regarding to the effect holding solution treatments on chlorophyll "a" chlorophyll "b" and caroteniods (mg/g.f.w),Data in Table (37) demonstrate that holding tuberose cut flower spikes bases in holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) exhibited to be the most effective one for inducing the highest significant increase of chlorophyll "a", chlorophyll "b" and carotenoids in leaves / spike (mg/g.f.w) after (initial, 8 and end days) from the treatment as compared to control (D.W) in the two seasons, followed descendingly by holding solution contained (sucrose 4% + CA 200ppm) and (sucrose 4% + 8-HQS 200ppm) in both seasons under this study. Furthermore, chlorophyll "a", chlorophyll "b" and carotenoids in leaves / spike (mg/gf.w) of tuberose cut flower spikes were decreased as flower cut spike advanced in age after initial till the end of age of longevity in the two seasons.

The aforementioned results of (sucrose) are in parallel with those obtained by Gendy (2000) found that sucrose

Table (37): Effect of Holding solutions treatments on Chlorophyll a, b, Carotenoids in leaves/spike (mg/g f. w.) and Total, Reducing, Non-Reducing sugars percentage in petals of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	I.S.D at		solutions	Holding					L.S.D.at		solutions	Holding						- i
1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W		1%	5 %	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W				Treatments
,		0.817	0.817	0.817	0.817	0.817			,	0.793	0.793	0.793	0.793	0.793		Initia	She	Chi
0.014	0.011	0.618	0.589	0.602	0.547	0.550		0.017	0.013	0.619	0.587	0.601	0.547	0.547		00	(days)	Chlorophyll ,a, in leaves/ spike (mg/g f. w.)
0.007	0.006	0.355	0.340	0.351	0.318	0.314		0.007	0.006	0.359	0.341	0.352	0.319	0.313		End	eriods	ike w.)
	1	0.427	0.427	0.427	0.427	0.427			1	0.410	0.410	0.410	0.410	0.410		Initia	Shel	Ch le
0.010	0.007	0.310	0.291	0.298	0.269	0.276		0.011	0.008	0.307	0.287	0.297	0.265	0.273		œ	Shelf life periods (days)	Chlorophyll ,b, leaves/ spike (mg/g f. w.)
0.007	0.006	0.256	0.243	0.245	0.229	0.227		0.006	0.005	0.256	0.241	0.246	0.229	0.225		End	riods	II ,b, ike
2.		0.373	0.373	0.373	0.373	0.373 0.303	2 nd s	(II)	е:	0.377	0.377	0.377	0.377	0.377	1st season	Initia	Shel	Car le
0.010	0.007	0.322	0.310	0.318	0.298	0.303	season	0.010	0.007	0.321	0.309	0.317	0.297	0.303	ason	*	Shelf life periods (days)	Carotenoids in leaves/ spike (mg/g f. w.)
0.007	0.006	0.239	0.230	0.237	0.218	0.225		0.007	0.006	0.236	0.228	0.234	0.221	0.226		End	riods	s in lke v.)
1		6.103	6.103	6.103	6.103	6.103		ű	1	6.153	6.153	6.153	6.153	6.153		Initia I	Shel	Toperce
0.112	0.084	4.975	4.748	4.922	4.740	4.025		0.120	0.090	4.997	4.799	4.974	4.819	3.789		œ	Shelf life periods (days)	Total sugars percentage in petals
0.082	0.061	2.581	2.362	2.511	2.396	1.923		0.088	0.066	2.567	2.341	2.519	2.389	1.894		End	riods	ers petals
(4))	e	3.073	3.073	3.073	3.073	3.073		1	1	3.100	3.100	3.100	3.100	3.100		Initia I	Shelf	Redu
0.112	0.084	2.313	2.096	2.205	1.969	1.661		0.164	0.123	2.256	2.075	2.135	2.010	1.685	ie i	∞ .	Shelf life periods (days)	Reducing sugars percentage in petals
0.082	0.061	1.353	1.109	1.287	1.157	0.903		0.088	0.066	1.337	1.133	1.269	1.141	0.868		End	riods	gars petals
9		3.030	3.030	3.030	3.030	3.030		×	,	3.053	3.053	_	-	3.053		Initia I	Shelf	Nor sugars
0.152	0.113	2.663	2.652	2.717	2.771	2,363		0.212	0.159	2.741	2.723	2.839	2.809	2.105		8	Shelf life periods (days)	Non-Reducing sugars percentage in petals
0.116	0.087	1.228	1.253	1.223	1.239	1.020		0.131	0.099	1.230	1.207	1.251	1.249	1.026		End	iods	ing age in

treatment (at 10%) decreased chlorophyll "A, B" carotenoids of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by Gendy (2000) suggested that (sucrose+ citric acid) treatment increased decreased chlorophyll "A, B" and carotenoids of gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions decreased chlorophyll "A, B" and carotenoids contents of gladiolus cut flowers and Alka et. al., (2007) on gladiolus found that the treatment of 300ppm 8.HQ.with 5% sucrose recorded higher recorded carotene in the petals of the cut spikes on the fourth day after treatment (DAT). The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions decreased chlorophyll "A, B" and carotenoids contents of gladiolus cut flowers.

As for the in interaction effective between pulsing and holding solution treatments on chlorophyll a, chlorophyll b and carotenoids (mg/g f.w.), data in Tables (38 & 39) reveal that, most the combinations treatments between pulsing and holding solutions increased chlorophyll a, chlorophyll b and carotenoids in leaves / spikes (mg/g f.w.) of tuberose cut flower spikes as compared to control (D.W) in the two seasons. However, the combinations treatments of STS at 1:4mM for 30 minutes recorded the highest significant increase in this parameter, especially the combined treatment between STS and (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4% + CA

Table (38): Effect of interaction between pulsing solutions and holding solutions treatments on Chlorophyll a, b, in leaves/ spike (mg/g f. w.) of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	L.S.D at	Out	Siici		STS 1:4 ml			Suc		201 350 10 70	Sucress 10 0/		Suc	0	and do see	BA 10 nnm		Suc	2112		Kin.20 ppm			Suc		D.W					Solutions	guising	
1%	5%	Sucrose 4 /0 1/CV 700 bbm + 911/O2 700 bbm	1000 40% +C v 300 ppm + 8HOS 300 ppm	Sucrose 4 % + 8HOS 700 mm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Successed 4% +CA 200 ppm	Sucre 187 174 200	D.W	Sucrose 4 % +CA 200 ppm + 8HQS 200 ppm	200 A07 +CA 200 1 8110 200	Sucrose 4 % + 8HOS 200 nnm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W			Solutions	Holding	
ř	ı	0./93	0./93	0707	0 793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0./93	0./93	0.793	0.793	0./93	0.100	0 703	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	Initial	Shelf life			
0.037	0.028	0.650	0.620	0.007	0 637	0.540	0.587	0.593	0.583	0.593	0.513	0.537	0.630	0.600	0.610	0.567	0.547	0.640	0.550	0.500	0.613	0.583	0.550	0.583	0.540	0.553	0.533	0.513	∞	e periods (days)	I" season	4	Chlor
0.017	0.013	0.377	0.363	0.300	0380	0.327	0.330	0.353	0.343	0.340	0.300	0.307	0.350	0.330	0.337	0.32/	0.310	0.370	0.040	0.242	0.363	0 323	0.310	0.343	0.327	0.340	0.320	0.310	End	(days)		(mg/	ophyll ,a,
	t	0.817	0.817	0.017	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.017	0.017	0.817	0.817	0.817	0.817	0.817	0.817	0.817	0.817	Initial	Shelf li		mg/g i. w.)	Chlorophyll ,a, in leaves/ spike
0.032	0.024	0.647	0.620	0.043	0.643	0 543	0.593	0.597	0.593	0.593	0.513	0.547	0.620	0.600	0.607	0.567	0.547	0.643	0.390	0.010	0.500	0.82.0	0 547	0.583	0.540	0.553	0.530	0.517	00	Shelf life periods (days)	2" season		/spike
0.017	0.013	0.367	0.357	0.370	0700	0327	0.333	0.350	0.337	0.343	0.300	0.310	0.350	0.333	0.343	0.320	0.310	0.363	0.34/	0.500	0.360	2020	0313	0.347	0.327	0.337	0.320	0.303	End	ls (days)	2		
	4	0.410	0.410	0.410	0.410	0.410	0 410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.110	0.410	0410	0.410	0.410	0.410	0.410	Initial	Shelf lif			
0.025	0.018	0.330	0.300	0.317	0.2.2	0.207	0.287	0.290	0.290	0.280	0.243	0.273	0.313	0.283	0.297	0.267	0.260	0.317	0.290	0.500	1,67.0	0.12.0	0.207	0.287	0.270	0.290	0 277	0 273	∞	ife period	1st season		Chlo
0.014	0.011	0.273	0.260	0.267	0.227	0.230	0.50	0.253	0.230	0.233	0.223	0.227	0.250	0.237	0.237	0.233	0.223	0.257	0.243	0.253	0.233	177.0	747.0	0.247	0777	0.240	0227	0000	End	e periods (days)		(mg	Chlorophyll ,b, in leaves/ spike
	6	0.427	0.427	0.427	0.427	724,0	0.127	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.42/	0.42/	0.427	0.427	124.0	0.427	0.427	0 437	Initial	Shelf li		mg/g f. w.)	, in leaves
0.000	0.017	0.330	0.300	0.320	0.237	107.0	0.007	0.300	0.297	0.280	0.257	0.280	0.317	0.287	0.297	0.273	0.263	0.317	0.293	0.300	0.283	0.220	182.0	1/2.0	0.273	0.273	0.270	0770		Shelf life periods (days)	2nd season		spike
0.017	0.013	0.267	0.260	0.263	0.22/	0.233	0.220	0.253	0 233	0 237	0 223	0 220	0.250	0.240	0.237	0.233	0.227	0.263	0.247	0.250	0.237	0.227	0.24/	0.2.33	0.240	177.0	177.0	2000	End	s (davs)			

Table (39): Effect of interaction between pulsing solutions and holding solutions treatments on Carotenoids percentage in petals in petals of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2009.

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			Caro	ptenoids in leave	Carotenoids in leaves/ spike(mg/g f. w.)	w.)	
65 65 65 66	Holding		1st season			2nd season	
Pulsing solutions	Solutions	Shel	Shelf life periods (davs)	ivs)	Shel	Shelf life periods (days	ys)
		Initial	8	End	Initial	8	End
	P 47	0.377	0.300	0.227	0.373	0.300	0.220
	D.W	0.377	0.300	0.223	0.373	0.307	0.227
		0.377	0.313	0.233	0.373	0.317	0.237
n.w	Sucrose 4% +CA 200 ppin	0.377	0.300	0.227	0.373	0.300	0.230
	Sucrose 4 % + 6HQS 200 ppm	0.377	0.307	0.237	0.373	0.310	0.240
	Se 470 +CA 200	0.377	0.313	0.227	0.373	0.310	0.230
	D.W	0.377	0.297	0.217	0.373	0.297	0.213
	Sucrose 4 %	0.377	0.320	0.233	0.373	0.320	0.237
Kin.20 ppm	Sucrose 4% +CA 200 ppm	0.377	0.307	0.227	0.373	0.307	0.227
	Sucrose 4 % + 8HQS 200 ppm	0.377	0.330	0.241	0.373	0.330	0.243
	e 4% +CA 200	0.377	0.297	0.220	0.373	0.300	0.220
	D.W	0.377	0.297	0.217	0.373	0.297	0.217
DA 10 com	Sucrose 4 70	0.377	0.317	0.230	0.373	0.317	0.233
mdd or wa	Sucrose 4 % + 800 S 200 mm	0.377	0.303	0.227	0.373	0.307	0.230
	Sucrose 4 % + 8HQS 200 ppm	0.377	0.317	0.227	0.373	0.317	0.233
	Sucrose 476 404 CA 200 ppm - Succession ppm	0.377	0.300	0.227	0.373	0.300	0.223
	D.W	0.377	0.287	0.223	0.373	0.287	0.213
/0 01 2000000	Sucross 40/ ±CA 200 mm	0.377	0.303	0.230	0.373	0.303	0.230
Sucrose 10 %	Sucrose 4 % + CA 200 Phili	0.377	0.317	0.227	0.373	0.317	0.227
	Sucrose 4 70 + 01123 200 ppm	0.377	0.313	0.230	0.373	0.317	0.230
	Daw	0.377	0.307	0.230	0.373	0.307	0.230
	Successed 9%	0.377	0.303	0.223	0.373	.303	0.220
CTC 1.4 ml	Suciose 4 /6	0.377	0.333	0.243	0.373	0.333	0.247
3131:4	Sucrose 4 % + OHOC 200 ppm	0.377	0.320	0.233	0.373	0.320	0.237
	Sucrose 4 % + 611Q3 200 ppm	0.377	0.337	0.247	0.373	0.337	0.247
	Sucrose 470 CA 200 ppin 1 off 5 200 ppin	1	0.167	0.013	1	0.167	0.013
L.S.D at	3 / 0	ı	0.022	0.017		0.022	0.017

200ppm) after (8 and end days) from the treatment as compared to control (D.W) in both seasons. Moreover, the combined treatment between kinetin at 20ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HOS200ppm) or (sucrose 4% + CA 200ppm) resulted highly significant increase in chlorophyll a, chlorophyll b and carotenoids in leaves / spike (mg/g f.w.) of tuberose cut flower spikes as compared to control (D.W) in the two seasons under this study. Furthermore, chlorophyll a, chlorophyll b and coroteniods in leaves / spike (mg/g f.w.) under all the combinations treatments between pulsing solution and holding solution of tuberose cut flower spikes was decreased after (initial) from the treatment till the end of age of longevity as flower cut spike prolonged in age in the two seasons. The aforementioned results are in parallel with those obtained by Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) decreased chlorophyll a, b and carotenoids content of gladiolus cut flower spike florets and El Bouhy (2002) noticed that the combination treatment of sucrose (25%) as pusling solution and that o holding solution of (S + 8-HQS + CA) increased chlorophyll "a" content, total chlorophylls content of tuberose cut flower spike compared to control.

3.3.2.-Total sugars content (%):

Data in Table (36&43) reveal that, all pulsing solution treatments of tuberose cut flower spikes succeeded in increasing total sugars content (%) in petals and flower stalks after (initial,

Table (43): Effect of pulsing solutions treatments on Total, Reducing, Non-Reducing sugars percentage in flower stalk of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2008-2009.

7	mperose L.	cut mower s	JINC GUILLE	moerose L. cut nower spine during the con-			a in Comon	Non - Reducir	Non - Reducing sugars percentage in	centage in
		Total sugars	gars percentage in flower stalk	flower stalk	Reducing su	Reducing sugars percentage in nover stalk	2 111 110 11 25	_	flower stalk)
Treatments	lents	Chalf	Cholf life nariods (davs)	(ave)	Shelf	Shelf life periods (days)	ays)	Shelf	Shelf life periods (days)	ıys)
		Silicit	o o	Fnd	Initial		End	Initial	8	End
		Initial	0		1st season					
							000.	2 553	2 142	1 161
	D.W	6.687	4.257	2.189	3.133	2.115	1.029	CCCC	2 1 1 1 1	
•	Kin.20	6.687	4.825	2.453	3.133	2.552	1.193	3.553	2.273	1.261
Pulsing	BA 10	6.687	4.819	2.381	3.133	2.410	1.153	3.553	2.409	1.227
solutions	ppm Sucrose 10	6 687	5.326	2.578	3.133	2.487	1.283	3.553	2.839	1.295
	% STS 1:4	2007	0.430	2.550	3 133	2.593	1.289	3.553	2.827	1.261
	m	0.087	0.44.0			0	0000		0.511	0.127
	5 %	1	0.158	0.052	j	0.158	0.050	P)		0110
L.S.D at	1%		0.210	690.0	W.	0.210	0.120	1	0.201	0.170
					2 nd season	u				
	W	6 743	4.291	2.251	3.237	2.126	1.045	3.507	2.165	1.205
	Kin.20	6.743	4.849	2.493	3.237	2.592	1.239	3.507	2.257	1.254
Pulsing	ppm BA 10	6.743	4.807	2.397	3.237	2.429	1.218	3.507	2.378	1.179
solutions	ppm Sucrose 10		5.360	2.677	3.237	2.479	1.299	3.507	2.881	1.378
	% STS 1.4		5.453	7 507	3 237	2.628	1.357	3.507	2.835	1.240
	T	6.743	5.405	7.5.7		or - o	0.073		0.181	0.152
	2 %	Ç	0.171	0.133	1	0.110	0.0.0		0.343	0.203
L.S.D at	1%	17	0.228	0.178		0.158	0.098		0.242	603:0

Results and Discussion

8, end days) from the treatment as compared to control (distilled water) in the two seasons. However, pulsing tuberose cut flower spikes bases in STS at 1:4mM for 30 minutes showed to be the most effective one for inducing the highest values of this parameter in the two seasons, followed descendingly by sucrose at 10% for 24hours and kinetin at 20 ppm for 24 hours in both seasons. Moreover the lowest values of total sugars content (%) in petals was registered by using control (distilled water) for 24hours in the two seasons.

The remained treatments occupied an intermediate position between the abovementioned treatments and control in the two seasons under this study.

The aforementioned results of (sucrose) are in parallel with those obtained by Mayak et. al., (1973) on gladiolus, El-Bouhy (2002) indicated that the treatment of sucrose at 25% as pulsing solution increased total and non reducing sugars percentage and contents in the florets of tuberose cut flower spikes compare to control. and Yamane et. al., (2005) noticed that pretreatment with sucrose increased sugar contents on cut gladiolus spikes.

The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) found that (kin) at 5ppm treatment increased total soluble sugars percentages in the florets, but decreased non - reducing sugars percentage tuberose and bird-of -paradise, Gendy (2000) stated that kinetin treatment increased total sugars percentage and reducing sugars percentage but, decreased chlorophyll "A", and carotenoids

petals and flower stalks of tuberose cut flower spikes was decreased as flower cut spikes prolonged in age after (initial) till the end of age of longevity in the two seasons.

The aforementioned results of (sucrose) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise indicated that sucrose at 10% treatment increased total sugars percentage of tuberose cut flower spikes and Gendy (2000) found that sucrose treatment (at 10%) increased total sugars percentage of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) stated that (sucrose +citric acid) treatment increased total sugars percentages of tuberose and bird of paradise cut flowers and Gendy (2000) suggested that (sucrose+ citric acid) treatment increased total percentages of gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8-HQS treatment increased total sugars percentages of tuberose and bird of paradise petals and Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions increased total sugars percentages of gladiolus cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions increased total sugars percentages of gladiolus cut flowers, El Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased total sugars contents of tuberose cut flowers spikes comparing to control or that of the other one under study. **Gendy (2007)** stated that the treatment of gladiolus cut flower spikes bases in holding solution contained (sucrose + 8-HQS +citric acid) record highly significant increase the percentage of total sugars in the flowers as compared to control.

As for the interaction effect between pulsing solution and holding solution treatments on Total sugars percentage, data in Table (40) reveal that, all the combination treatments between pulsing solution and holding solution increased total sugars percentage in petals and flower stalks of tuberose cut flower spikes as compared to control (D.W) in the two seasons. However, the combinations treatments of STS at 1:4mM for 15 minutes is being the most effective one for inducing the highest significant increase of this parameter, especially the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) followed descendingly by the combined treatment between STS and (sucrose 4% + CA 200ppm) and STS and (sucrose 4%) after (initial, 8 and end days) from the treatment as compared to control in the two seasons. Moreover, using the combined treatment of sucrose at 10% for 24hours and holding solution contained (sucrose 4% + CA 200ppm) 8-HQS 200ppm) or (sucrose 4% + CA 200ppm) in the petals of this parameter and the combined treatment between sucrose 4% and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4%) in the flower stalks recorded highly increases of this parameter as compared to control in the two seasons. Furthermore, the percentage of total sugars in petals and flower stalks of tuberose cut flower spikes was decreased as flower cut spikes prolonged in age (after

Table (40): Effect of interaction between pulsing solutions and holding solutions treatments on Total sugars percentage in petals and flower stalk of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2008-2009.

			Totale	Mare por	entage in	aptale		£	tol engo		J mi ocote		1111
Pulsing	Holding			ugars per	Total sugars per centage in perais	Signs		10	Total sugars		percentage in nower		STAIKS
gillering.	ginnon				2	2" season			1st seasor	_		2nd season	u
Solutions	Solutions	Shelf life	ă	(days)	Shelf li	Shelf life periods (days)	(days)	Shelf life		periods (days)	Shelf li	Shelf life periods (days)	s (days)
		Initial	8	End	Initial	∞	End	Initial	8	End	Initial	8	End
	D.W	6.153	3.477	1.750	6.103	3.467	1.740	6.687	3.590	1.923	6.743	3.743	1.950
	Sucrose 4 %	6.153	4.217	2.167	6.103	4.183	2.187	289.9	4.633	2.357	6.743	4.640	2.367
D.W	Sucrose 4% +CA 200 ppm	6.153	4.440	2.283	6.103	4.450	2.327	6.687	4.430	2.303	6.743	4.453	2.557
	Sucrose 4 % + 8HQS 200 ppm	6.153	4.103	2.160	6.103	4.117	2.177	6.687	4.220	2.117	6.743	3.930	2.147
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	6.153	4.303	2.347	6.103	4.373	2.363	6.687	4.413	2.247	6.743	4.690	2.233
	D.W	6.153	3.750	1.860	6.103	4.797	1.900	6.687	3.967	1.950	6.743	4.007	1.937
	Sucrose 4 %	6.153	4.817	2.420	6.103	4.727	2.413	289.9	5.033	2.690	6.743	5.053	2.600
Kin.20 ppm	Sucrose 4% +CA 200 ppm	6.153	4.947	2.497	6.103	4.867	2.533	6.687	5.000	2.683	6.743	5.013	2.643
	Sucrose 4 % + 8HQS 200 ppm	6.153	4.820	2.330	6.103	4.750	2.370	6.687	4.907	2.487	6.743	4.933	2.510
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	6.153	5.063	2.533	6.103	5.087	2.593	6.687	5.220	2.457	6.743	5.237	2.777
	D.W	6.153	3.580	1.867	6.103	3.687	1.877	289.9	3.767	1.747	6.743	3.757	1.663
17 17 17 17 17 17 17 17 17 17 17 17 17 1	Sucrose 4 %	6.153	4.850	2.380	6.103	4.557	2.340	6.687	5.037	2.350	6.743	4.997	2.313
BA 10 ppm	Sucrose 4% +CA 200 ppm	6.153	5.073	2.433	6.103	4.903	2.463	6.687	5.150	2.550	6.743	5.060	2.497
	Sucrose 4 % + 8HQS 200 ppm	6.153	4.950	2.237	6.103	4.743	2.260	6.687	5.110	2.720	6.743	5.123	2.693
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	6.153	5.120	2.430	6.103	4.950	2.447	6.687	5.033	2.537	6.743	5.097	2.820
	D.W	6.153	4.217	1.997	6.103	4.243	2.017	6.687	4.350	2.130	6.743	4.390	2.230
	Sucrose 4 %	6.153	5.073	2.530	6.103	5.097	2.507	6.687	5.717	2.720	6.743	5.720	2.857
Sucrose 10 %	Sucrose 4% +CA 200 ppm	6.153	5.160	2.570	6.103	5.170	2.417	6.687	5.383	2.693	6.743	5.403	2.737
	Sucrose 4 % + 8HQS 200 ppm	6.153	5.083	2.423	6.103	5.097	2.400	6.687	5.177	2.530	6.743	5.267	2.547
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	6.153	5.180	2.613	6.103	5.197	2.673	6.687	6.003	2.817	6.743	6.020	3.017
	D.W	6.153	3.923	1.997	6.103	3.930	2.083	289.9	4.097	1.950	6.743	4.087	1.990
	Sucrose 4 %	6.153	5.137	2.450	6.103	5.137	2.533	6.687	5.403	2.253	6.743	5.423	1.990
STS 1:4 ml	Sucrose 4% +CA 200 ppm	6.153	5.250	2.813	6.103	5.220	2.813	6.687	6.057	2.867	6.743	6.100	3.040
	Sucrose 4 % + 8HQS 200 ppm	6.153	5.037	2.553	6.103	5.033	2.603	6.687	5.310	2.597	6.743	3.350	2.803
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	6.153	5.317	2.910	6.103	5.270	2.830	6.687	6.233	3.083	6.743	6.353	3.160
I S D at	2%	100	0.201	0.147		0.187	0137	i	0.352	0.116	1	0.380	0.298
	1%	3	0.268	0.196	4	0.250	0.183	Ü	0.470	0.155	ī	0.509	0.398

initial) till the end of age of longevity in the two seasons. The aforementioned results are in parallel with those obtained by El-Saka (1992) found that (Kin) treatment as pulsing solution followed by holding solution of (S +8 HQS +CA) increased the percentage of total, sugars percentages of tuberose and bird of paradise cut flower spike florets, Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) increased total sugars percentage of gladiolus cut flower spike florets and El Bouhy (2002) noticed that the treatment of interaction between BA as pulsing solution and holding solution of (S + 8HQS + CA) increased the percentage and content of total sugars in the florets of tuberose cut flower spike compared to control or the other ones.

3.3.3.-Reducing sugars content (%):

Data in Tables (36&43) indicate that, pulsing tuberose cut flower spikes bases in STS at 1:4 mM for 30 minutes gained the highest significant increase in reducing sugars content (%) in petals and flower stalks after (8 and end days) from the treatment as compared to control (distilled water) in the two seasons. However, pulsing solution of sucrose at 10% for 24 hours recorded highly significant increase in this parameter as compared to control in the two seasons. Anyhow, Reducing sugars content (%)in petals and flower stalks under all tested treatments was decreased as flower cut spikes advanced in age after (initial) from the treatment till the end of longevity in the two seasons. The aforementioned results of (sucrose) are in

parallel with those obtained by Mayak et. al., (1973) on gladiolus, El-Bouhy (2002) indicated that the treatment of sucrose at 25% as pulsing solution increased total and non reducing sugars percentage and contents in the florets of tuberose cut flower spikes compare to control, and Yamane et. al., (2005) noticed that pretreatment with sucrose increased sugar contents on cut gladiolus spikes. The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on found that (kin) at 5ppm treatment increased total soluble sugars percentages in the florets, but decreased non - reducing sugars percentage tuberose and bird-of -paradise, Gendy (2000) stated that kinetin treatment increased total sugars percentage and reducing sugars percentage but, decreased chlorophyll "A", and carotenoids gladiolus cut flowers. El-Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of total sugars and reducing sugars of tuberose cut flowers compared to control and the other ones under study.

Alka et. al., (2008) on gladiolus found that effect of benzyladenine significantly enhanced the concentration of reducing and non reducing sugars in gladioli petals 4 days after treatment. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) indicated that (STS) treatment increase reducing sugars percentage of gladiolus cut flower spike petals.

Referring to the effect holding solution treatments on Reducing sugars content (%), data in Tables (37 & 44) reveal that all holding solution treatments increased the percentage of reducing sugars in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, using holding solution contained (sucrose at 4% + citric acid 200ppm + 8- HQS at 200ppm) exhibited to be the most effective treatment for producing the highest values of this parameter as compared to the other treatments of this study in the two seasons, followed in descending order by holding solution contained (sucrose at 4% + citric acid at 200ppm) after (8 and end days) in both seasons. On the reverse, the lowest value of the percentage of reducing sugars in petals and flower stalks of tuberose cut flower spikes was recorded by using control in the two season. Anyhow, the percentage of reducing sugars in petals and flower stalks of tuberose cut flower spikes was decreased as flower cut spikes advanced age after (initial) from the treatment till the end of age of longevity in the two seasons. The aforementioned results of (sucrose) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise indicated that sucrose at 10% treatment increased reducing sugars percentage of tuberose cut flower spikes and Gendy (2000) found that sucrose treatment (at 10%) increased reducing sugars percentage of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) stated that (sucrose +citric acid) treatment increased reducing sugars percentages of tuberose and bird of paradise cut flowers and Gendy (2000) suggested that (sucrose+ citric acid) treatment increased sugars percentages of gladiolus cut flowers. The reducing

aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8-HQS treatment increased reducing sugars percentages of tuberose and bird of paradise petals. Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions increased reducing sugars percentages of gladiolus cut flowers and Alka et. al., (2007) on gladiolus found that the treatment of 300ppm 8.HQ.with 5% sucrose recorded higher recorded higher reducing sugar content in the petals of the cut spikes on the fourth day after treatment (DAT). The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions increased reducing sugars percentages of gladiolus cut flowers and El Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased reducing sugars contents of the other one under study.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Reducing sugars percentage, data presented in Table (41) reveal that, all the combinations treatments between pulsing solution and holding solution increased reducing sugars percentage in petals and flower stalks of tuberose cut flower spikes after (initial, 8 and end days) from the treatment as compared to control (D.W) in the two seasons. However, the combinations treatments of STS at 1:4mM for 15minutes obtained the highest values of this parameter, particularly the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm) or (sucrose 4% + CA 200ppm) after (8 and end

Table (41): Effect of interaction between pulsing solutions and holding solutions treatments on Reducing sugars percentage in petals and flower stalk of *Poliunthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		L.S.D at				STS 1:4 ml					Sucrose 10 %					BA 10 ppm						天in 20 nnm				5.17	DW				Pulsing solutions	
	1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Company of the same	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	Sucrose 4 % + 8HOS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W		Solutions	Holding	
			3.100	3.100	3.100	3.100	3.100	3 100	3 100	2 100	3 100	3 100	3 100	3.100	3.100	3.100	3.100	3.100	3.100	3.100	3,100	3.100	3.100	3.100	3.100	3.100	3.100	3.100	Initial	Shelf li		
100.0	0.27.0	0 275	2.640	2.303	2.467	2.130	1.943	0.4.2	057.7	7747	2 212	2 273	2 070	2 097	1.970	2.003	2.000	1.510	2.147	2.027	2.073	2.060	1.507	1.947	1.830	1.817	1.587	1.393	8	Shelf life periods (days)	Reducing	
0.196	0.14/	0 147	1.587	1.337	1.627	1.340	1.050	1.42/	1.220	1,000	1.203	0.907	1.77.1	1 277	1 047	1.057	1.060	0.850	1.317	1.080	-1.250	1.090	0.830	1.077	0.923	1.013	0.930	0.643	End	s (days)	sugars	
,	,	1 10 1 1	3.073	3.073	3.073	3.073	3.073	3.0/3	3.073	3.0/3	2.073	3.073	2073	2 072	3 073	3 073	3.073	3.073	3.073	3.073	3.073	3.073	3.073	3.073	3.073	3.073	3.073	3 073	Initial	Shelf	Reducing sugars percentage in petals	
0.113	0.084	0.004	2 620	2 260	2.557	2.160	1.973	2.400	2.220	2.35/	2.2/3	1.943	2.203	2000	2 000	2160	1 920	1 553	2.233	2.090	2.150	1.970	1.540	2.047	1.830	1.800	1.523	1 207	œ	Shelf life periods (days)	ge in pet	
0.183	0137	1.017	1617	1 227	1.647	1.403	1.103	1.460	1.273	1.367	1.290	1.010	1.237	1.01/	1.020	1,000	1 000	0100	1 280	1.067	1.253	1.090	0.823	1 173	0.863	1.080	0.000	0620	End	ds (dave)	als	
e	4	3.133				3.133	3.133	3.133	3.133	3.133	3.133		3.133											3 133			3 133		Initial	Char	Rec	
0.470	0.352	3.037	2.030	2 200	7 092	2.197	2.070	2.873	2.313	2.663	2.520	2.063	2.440	2.300	2./6/	1/0.2	1.80/	1 067	2762	3 717	2 572	2 700	1 067	780.2	2007	2 272	3 150		sitial o grids (days)	I" season	lucing su	
0.268	0.201	1.537	1.240	1.323	1 533	1 193	0.950	1.387	1.257	1.337	1.447	0.987	1.280	1.197	1.217	1.223	0.850	0.40	1.2/2	1.233	1 222	1 2/2	1.130	1.033	1	+	+	+	ds (days)	on	Reducing sugars percentage in flower stalks	
r	ĸ	3.237	3.237	3.23/	102.0	3 727	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.23/	3.23/	3.23/	7.227	3.23/	3.237	3.237	3.237	3.23/	3.237	Initial	Shelf		entage in	
0.353	0.265	3.040	2.743	3.027	2.22	2210	2 120	2.927	2.423	2.680	2.273	2.090	2.440	2.423	2.770	2.527	1.983	2.823	2.820	2.513	2.193	2.010	2.253	+	+	+	+	8	Shelf life periods (days)	2 nd season	flower	
0219	0.164	1.623	1.320	1.613	1.270	1000	0 957	1.417	1.293	1.347	1.437	1.003	1.483	1.260	1.263	1.243	0.840	1.433	1.240	1.287	1.337	0.900	1.137	1.047	1.103	1.077	0.863	End	ds (days)	n	stalks	

days) from the treatment as compared to control in the two seasons. Moreover, using the combined treatment between sucrose 10% for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4% + CA 200ppm) resulted highly significant increase of the percentage of reducing sugars in petals and flower stalks of tuberose cut flower spikes as compared control in both seasons. On the other hand, the lowest values of this parameter was registered by using the combined treatment of control and holding solution contained (distilled water) as control in the two seasons in this study. The aforementioned results are in parallel with those obtained by El-Saka (1992) found that (Kin) treatment as pulsing solution followed by holding solution of (S +8 HQS +CA) increased the percentage of reducing sugars percentages of tuberose and bird of paradise cut flower spike florets. Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) increased reducing sugars percentage, of gladiolus cut flower spike florets.and El Bouhy (2002) noticed the treatment of interaction between BA as pulsing solution and holding solution of (S + 8HQS + CA) increased the percentage and content of reducing sugars of tuberose cut flower spike compared to control or the other ones.

3.3.4.-Non reducing sugars content (%):

Data in Table (36&43) reveal that all pulsing solution treatment tuberose cut flower spikes bases scored increases of non reducing sugars content (%) in petals after (8days and end

days) from the treatment as compared to control in the two seasons. However, pulsing solution of kinetin at 20 ppm for 24 hours gave the highest significant increase in this parameter after (8 and end days) from the treatment as compared to control in the two seasons in most cases. The aforementioned results of (sucrose) are in parallel with those obtained by Mayak et. al., (1973) on gladiolus, El- Bouhy (2002) indicated that The treatment of sucrose at 25% as pulsing solution increased total and non reducing sugars percentage and contents in the florets of tuberose cut flower spikes compare to control and Yamane et. al., (2005) noticed that pretreatment with sucrose increased sugar contents on cut gladiolus spikes. The aforementioned results of cytokinins are in parallel with those obtained by El-Saka (1992) on found that (kin) at 5 ppm treatment increased total soluble sugars percentages in the florets, but decreased non - reducing sugars percentage tuberose and bird-of -paradise, Gendy (2000) stated that kinetin treatment increased total sugars percentage and reducing sugars percentage but, decreased chlorophyll "A", and carotenoids gladiolus cut flowers. El-Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of total sugars and reducing sugars of tuberose cut flowers compared to control and the other ones under study. Alka et. al., (2008) on gladiolus found that effect of benzyladenine significantly enhanced the concentration of reducing and non reducing sugars in gladioli petals 4 days after treatment. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird- of paradise, Gendy (2000) indicated that

(STS) treatment decreased non reducing sugars of gladiolus cut flower spike petals.

Additionally, Data in Table (43) reveal that, pulsing tuberose cut flower spikes bases in sucrose at 10% for 24 hours appeared to be the most effective treatment for inducing the highest values of the percentage of non-reducing sugars in flower stalks after (initial, 8 and end days) from the treatment as compared to control in the two seasons. However, using the treatment of pulsing solution of STS at 1:4mM for 30 minutes resulted highly increases after (8 and end days) when compared to control in both seasons. Moreover using the treatment of control (D.W) resulted the lowest of values of this parameter in the two seasons in most cases. The aforementioned results of (sucrose) are in parallel with those obtained by Mayak et. al., (1973) on gladiolus, El- Bouhy (2002) indicated that The treatment of sucrose at 25% as pulsing solution increased total and non reducing sugars percentage and contents in the florets of tuberose cut flower spikes compare to control. and Yamane et. al., (2005) noticed that pretreatment with sucrose increased sugar contents on cut gladiolus spikes. The aforementioned results of (cytokinins) are in parallel with those obtained by El-Saka (1992) on found that (kin) at 5 ppm treatment increased total soluble sugars percentages in the florets, but decreased non - reducing sugars percentage tuberose and bird of paradise, Gendy (2000) stated that kinetin treatment increased total sugars percentage and reducing sugars percentage but, decreased chlorophyll "A", and carotenoids gladiolus cut flowers. El-Bouhy (2002) stated that pulsing tuberose cut flower spikes in

BA increased the contents of total sugars and reducing sugars of tuberose cut flowers compared to control and the other ones under study. Alka et. al., (2008) on gladiolus found that effect of benzyladenine significantly enhanced the concentration of reducing and non reducing sugars in gladioli petals 4 days after treatment. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird- of paradise, Gendy (2000) indicated that (STS) treatment decreased non reducing sugars of gladiolus cut flower spike petals.

Referring to the effect holding solution treatments on Non-Reducing sugars content (%), data in Table (37&44) reveal that all holding solution treatments increased the percentage of non-reducing sugars in petals of tuberose cut flower spikes as compared to control in the two seasons. However, the greatest values of this parameter was registered by using holding solution contained (sucrose at 4% + citric acid at 200ppm) and (sucrose 4%) as compared to control in the first and second seasons respectively. Moreover, the lowest values of this parameter was registered by using holding solution contained (D.W) as control after (initial, 8 and end days) from the treatment in both seasons under this study.

Furthermore, Data in Table (44) reveal that, all holding solution treatments increased the percentage of non-reducing sugars in flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the highest values of this parameter was registered by using holding solution contained (sucrose at 4% + citric acid at 200ppm + 8- HQS at

200ppm) as compared to control in the two seasons. Moreover, the lowest values of this parameter was registered by using holding solution contained (D.W) as control after (initial, 8 and end days) from the treatment in both seasons under this study. The aforementioned results of (sucrose) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise indicated that sucrose at 10% treatment decreased non reducing sugars percentage of tuberose cut flower spikes and Gendy (2000) found that sucrose treatment (at 10%) increased non reducing percentage of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) stated that (sucrose increased non reducing sugars +citric acid) treatment percentages of tuberose and bird of paradise cut flowers and Gendy (2000) suggested that (sucrose +citric acid) treatment increased non reducing sugars percentages of gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8-HQS treatment increased decreased non, reducing sugars of tuberose and bird of paradise petals. Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions increased non reducing sugars percentages of gladiolus cut flowers and Alka et. al., (2007) on gladiolus found that the treatment of 300ppm 8.HQ.with 5% sucrose recorded higher recorded higher non. reducing sugar content in the petals of the cut spikes on the fourth day after treatment (DAT). The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions increased non reducing sugars percentages of gladiolus cut flowers and El-Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased non reducing sugars contents of tuberose cut flowers spikes comparing to control or that of the other one under study.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Non-Reducing sugars percentage, Data in Table (42) indicate that most the combinations treatments between pulsing solution and holding solution increased the percentage of non-Reducing sugars in petals and flowers stalks of tuberose cut flower spikes as compared to control (D.W) in the two seasons. However, the combinations treatment between STS at 1:4mM for 15minutes or sucrose at 10% for 24hours and holding solution contained (sucrose 4% + CA 200pm + 8-HQS 200ppm) or (sucrose 4%) recoded the highest values of this parameter after (8 and end days) from the treatment as compared to control (D.W) in the two seasons in most cases. The aforementioned results are in parallel with those obtained by El-Saka (1992) stated that (Kin) treatment as pulsing solution followed by holding solution of (S +8 HQS +CA) increased the percentage of non reducing sugars percentages of tuberose and bird of paradise cut flower spike florets, Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) increased non reducing sugars percentage of gladiolus cut flower spike florets and EI Bouhy (2002) noticed that the combination treatment of sucrose

Table (42): Effect of interaction between pulsing solutions and holding solutions treatments on Non-Reducing sugars percentage in petals and flower stalk of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

				l	COD# 000#1000#	- AAA 00							
Pulsing	Holding	Z	on-Reduci	ing sugar	Non-Keducing sugars percentage in petals	ge in pet	ıls	Non -R	educing s	ugars nei	Non -Reducing sugars percentage in flower stalls	flower	etalle
solutions	Solutions		1st season			2"d season	-		1st concon		, ,	nd	Staiks
	SUMMONS	Shelf	Shelf life periods (days)	(days)	Shelf	Shelf life periods (days)	(dave)	Chaff He			7	z season	
		Initial	∞	End	Initial	0	Fod End	Sucil 1	리	(days)	Shelf lif	Shelf life periods (days)	(days)
	D.W	3.053	2 083	1 107	3 030	0110	CHO.		×	End	Initial	œ	End
	Sucrose 4 %	3.053	2,630	1 237	0.00.0	2.600	0/0.1	5.553	1.767	1.083	3.507	1.943	1.087
D.W	Sucrose 4% +CA 200 nnm	2.000	000.7	107.1	3.030	7.000	1.273	3.553	2.483	1.297	3.507	2.523	1.290
	Sucreed 4 of 1010 con	5.033	7.073	1.270	3.030	2.650	1.247	3.553	2.157	1.243	3.507	2.157	1453
	Successful As + Shows 200 ppm	3.053	2.273	1.237	3.030	2.287	1.313	3.553	2.133	1.083	3.507	1 767	1 100
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.053	2.357	1.270	3.030	2.327	1.190	3.553	2.170	1 097	3 507	7 437	1,007
	D.W	3.053	2.243	1.030	3.030	2.257	1.077	3.553	2 000	1.077	3 507	1 007	/60.1
Kin.20	Sucrose 4 %	3.053	2.757	1.330	3.030	2.757	1.323	3 553	2 243	1 247	70000	1,66.1	1.037
mdd	Sucrose 4% +CA 200 ppm	3.053	2.873	1.247	3 030	7117	1 280	2 663	C+4.4	7+0.1	2.507	7.200	1.263
	Sucrose 4 % + 8HQS 200 ppm	3.053	2.793	1.250	3.030	7660	1.200	3,333	2.477	1.450	3.507	2.500	1.357
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	3.053	2017	1017	00000	2.000	1.505	3.553	2.190	1.213	3.507	2.113	1.270
	M O	2 0.62	0000	/17.1	3.030	2.853	1.313	3.553	2.457	1.217	3.507	2.413	1.343
	Superior 4 p./	5.000	7.070	1.017	3.030	2.133	0.967	3.553	1.900	0.897	3.507	1.773	0.823
BA 10 nnm	Suci 036 4 70	5.053	2.850	1.320	3.030	2.637	1.250	3.553	2.360	1.127	3.507	2 470	1 070
mdd or re	Sucrose 4% +CA 200	3.053	3.070	1.377	3.030	2.743	1.373	3.553	2.383	1.333	3 507	2 200	1 233
	Sucrose 4 % + 8HQS 200 ppm	3.053	2.980	1.190	3.030	2.663	1.243	3.553	2 810	1 573	2 507	0000	1.433
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.053	3.023	1.153	3.030	2.687	1.2.10	3 553	2 503	1 357	700.0	2.700	1.433
	D.W	3.053	2.147	1.030	3.030	2 300	1 007	3 563	2000	107.	2.507	7:03/	1.337
C. Consula	Sucrose 4 %	3.053	2 800	1 247	3 020	2000	100.1	5.553	187.7	1.143	3.507	2.300	1.227
oncrose 10	Sucrose 4% +CA 200 ppm	3.053	2 847	1 173	3.030	2.023	/17:1	5.553	3.197	1.273	3.507	3.447	1.420
	Sucrose 4 % + 8HOS 200 ppm	3.053	2.837	1.43	00000	/10.7	000.1	5.553	2.720	1.357	3.507	2.723	1.390
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	2.053	2.007	7	000.0	1/8.7	1.127	3.553	2.863	1.273	3.507	2.843	1.253
	D W	5.025	2.730	1.18/	3.030	2.797	1.213	3.553	3.130	1.430	3.507	3.093	009.1
	Success 4 97	3.033	086.1	0.947	3.030	1.957	0.980	3.553	2.027	1.000	3.507	1.967	1 033
STS 1.4 ml	30c103c 4 %	3.053	3.007	1.110	3.030	2.977	1.130	3.553	3.207	1 060	3 507	3 313	0020
111 11 212	Sucrose 4% +CA 200 ppm	3.053	2.783	1.187	3.030	2.663	1.167	3.553	3 073	1 343	3 507	014.0	027.0
	Sucrose 4 % + 8HQS 200 ppm	3.053	2.733	1217	3.030	2.773	1 277	3 553	0.000	1 367	10000	5.075	/75.1
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.053	2.677	1.323	3.030	2,650	1 213	3.553	2 107	1.537	5.507	-	1.483
L.S.D at	5%	3	0.356	0220		0.254	7010	CCC.C	161.6	/+0.1	3.50/	+	1.537
	1%	9	0.475	1000		167.0	0.194		0.336	0.284	21	0.406	0.340
			0.473	167.0	ı	0.339	0.259	٠	0.449	0.379	11	0.541	0.454

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(25%) as pulsing solution and that holding solution of (S + 8-HQS + CA) increased and non reducing sugars percentage of tuberose cut flower spike compared to control. And added that the treatment of interaction between BA as pulsing solution and holding solution of (S + 8HQS + CA) increased the percentage and content of non reducing sugars of tuberose cut flower spike compared to control or the other ones.

3.3.5.-Total nitrogen and total protein percentage:

Data presented in Table (45) indicate that most pulsing solution treatments recorded increases of the percentage of total nitrogen and total protein in petals of tuberose cut flower spikes as compared to control in the two seasons. However, pulsing tuberose cut flower spikes bases in STS at 1:4mM for 30 minutes approved to be the most effective treatment for inducing the greatest values of this parameter, followed descending by kinetin at 20ppm for 24hours after (initial, 8 and end days) from the treatment in the two seasons. On the reverse, the lowest values of the percentage of total nitrogen and total protein in petals of tuberose cut flower spikes was registered by using the treatment of control in two seasons of this study. aforementioned results of cytokinins are in parallel with those obtained by El- Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of total nitrogen, total protein, in the florets of tuberose cut flowers compared to control and the other ones under study. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird- of paradise,

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Table (45): Effect of pulsing solutions treatments on Total nitrogen percentage and Total protein percentage in petals and flower stalk of Polianthes tuberose L. 19.90 0.741 19.40 19.60 19.01 19.25 Total protein percentage in 1.114 1.486 20.36 18.14 19.76 19.44 18.70 End Shelf life periods (days) flower stalk 0.911 0.683 20.33 19.73 18.87 19.47 0.795 19.61 19.25 19.12 18.45 19.03 1.061 19.34 œ 20.15 20.15 20.15 20.15 20.15 Initial 20.33 20.33 20.33 20.33 ť. 20.33 0.120 3.136 3.042 3.184 0.090 3.104 3.081 0.238 Total nitrogen percentage 3.257 0.178 2.903 2.993 3.161 3.111 Shelf life periods (days) End in flower stalk 0.109 0.145 3.019 3.111 3.138 3.156 3.253 3.045 0.170 0.127 3.094 3.079 3.059 2.951 œ 3.223 3.223 3.223 3.223 3.223 Initial 3.253 3.253 9 3.253 3.253 3.253 1 0.513 0.384 23.12 23.78 22.94 23.46 0.798 22.71 0.598 22.50 22.15 21.64 24.14 Total protein percentage Shelf life periods (days) 21.61 End 2nd season 0.551 1st season 23.45 24.03 0.413 in petals 22.83 23.20 23.52 0.807 24.08 0.605 22.02 21.50 21.70 22.40 œ cut flower spike during the two seasons of 2007-2008/2008-200924.15 24.15 24.15 24.15 24.15 Initial 23.29 23.29 ţ: 23.29 23.29 23.29 Ä 0.082 3.753 3.699 3.805 3.634 0.061 0.128 3.671 960.0 3.458 3.599 3.545 3.463 3.862 Fotal nitrogen percentage End Shelf life periods (days) 3.844 990.0 0.088 3.753 3.712 3.763 0.128 3.653 0.096 3.473 3.585 3.523 3.440 3.853 00 3.863 3.863 3.863 3.863 3.863 Initial 3.727 3.727 3.727 3.727 3.727 100 Sucrose 10 % Sucrose 10 % Kin.20 ppm BA 10 ppm STS 1:4 ml STS 1:4 ml BA 10 ppm Kin.20 ppm D.W D.W 2 % 2 % Treatments 1% L.S.D at Pulsing solutions L.S.D at Pulsing solutions

Results and Discussion

1%

Gendy (2000) indicated that (STS) treatment increase total nitrogen percentage, total protein percentage of gladiolus cut flower spike petals.

Additionally, Data in Table (45) reveal that the greatest values of total nitrogen and total protein percentage in flower stalks of tuberose cut flower spikes was recoded by using pulsing solution of STS at 1:4mM for 30 minutes after (initial, 8 and end days) as compared to control in the two seasons. Furthermore, the lowest values of these parameters was registered by using sucrose at 10% for 24 hours in the two seasons in most cases. The aforementioned results of cytokinins are in parallel with those obtained by El- Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of total nitrogen, total protein, in the florets of tuberose cut flowers compared to control and the other ones under study. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird- of paradise, Gendy (2000) indicated that (STS) treatment increase total nitrogen percentage, total protein percentage of gladiolus cut flower spike petals.

As for the effect holding solution treatments on Total nitrogen and total protein content (%),Data in Table (46) reveal that holding tuberose cut flower spikes bases in holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) appeared to be the most effective for producing the highest values of the percentage of total nitrogen and total protein in petals after (initial, 8 and end days) from the treatment as

Table (46): Effect of Holding solutions treatments on Total nitrogen percentage and Total protein percentage in petals and flower stalk of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2008-2009 .

Cur	cut ilower spine authors		-						1		Tota	Total protein	_
		Tot	Total nitrogen	-			ontone	1012	10tal mirogen		thouse	agreentage in flower	Wer
		be	percentage		Total pro	Total protein percentage in petals	Ciliage	percen	percentage in flower stalk	wer	bercent	stalk	
			in petals					31131 10	apointe	(daye)	Shelf life periods (days)	periods	(days)
	Treatments	Shelf life	Shelf life periods (days)	(days)	Shelf life	Shelf life periods (days)	(days)	Shell life	Shell life perious (uays)	-			End
	*	Initial	œ	End	Initial	œ	End	Initial	œ	End	Initial	6	Pila
					1st season								
						- 10	03 10	2 2 5 2 3	2 917	2 904	20.33	18.23	18.15
	Wa	3.727	3.447	3.452	23.29	21.54	00.12	5.533	1 20 0	3.060	20.33	18 48	19.13
	70 7	1777	3.519	3.549	23.29	21.99	22.18	3.253	7.66.7	3.000	50.07	0000	10.30
	Sucrose 4 %	2 727	3 678	3.679	23.29	22.99	22.99	3.253	3.085	3.088	20.33	19.78	19.30
Holding solutions	Sucrose 4% +CA 200 ppm Sucrose 4 % + 8HQS 200	3,727	3.513	3.517	23.29	21.96	21.98	3.253	3.069	3.092	20.33	19.18	19.33
	ppm + Man 100 + CA 200 npm +		3175	3 730	23.29	23.23	23.31	3.253	3.200	3.281	20.33	20.00	20.50
	Sucrose 4 /8 1CA 200 prim	3.727	3.710	5.1.50	1		0020		0.127	0.178		0.795	1.114
	1	п	960.0	960.0	à.	0.605	0.298		1	000		1 061	1 486
I S D at	2 %		0.128	0.128	i	0.807	0.798	1	0.170	0.238		1.00.1	001.1
	1%		071.0		2 nd sea	season							
							1	,,,,	2 001	3 001	20.15	18.88	18.76
	300	3.863	3.703	3.643	24.15	23.15	11.77	3.223	1000	1000	21.00	19 20	18.86
	70 1	3 863	3.708	3.681	24.15	23.18	23.01	3.223	5.072	2.017	20.02	10.06	19.80
	Sucrose + 0	3.863	3.800	3.774	24.15	23.75	23.59	3.223	3.193	3.183	50.07	17.70	200
Holding	Sucrose 4% +CA 200 ppm Sucrose 4 % + 8HQS 200	3.863	3 633	3.636	24.15	22.71	22.73	3.223	3.097	3.094	20.15	19.36	19.34
		+			+	+	23.02	2 223	1 293	3.251	20.15	20.58	20.32
	Sucrose 4% +CA 200 ppm +	3.863	3.881	3.827	24.15	74.25	76.67	7.12		0000		0.693	0.555
	8HQS 200 ppm		0.066	0.061	1	0.413	0.384	3	0.109	0.090	,	0.000	0.00
	5 %	•	0000	+	-	0.551	0.513		0.145	0.120		0.911	0./41
L.S.D at	1%	1	0.088	0.082									

Results and Discussion

compared to control in the two seasons, followed descendingly by (sucrose 4% + CA 200ppm) in both seasons. In addition, the lowest values of the percentage of total nitrogen and total protein in petals of tuberose cut flower spikes was registered by using holding solution contained (distilled water) as control in the two seasons after (8 and end days) from the treatment in this study in most cases.

Furthermore, Data presented in Table (46) indicate that all holding solution treatments succeeded in increasing the percentage of total nitrogen and total protein in flower stalks of tuberose cut flower spikes as compared to control (D.W) in the two seasons. However, the highest values of these parameters was recorded by using holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) when compared to control (D.W) in the two seasons. Moreover, using the treatment of holding solution contained (sucrose 4% + CA at 200ppm) resulted highly increments of this parameter of tuberose cut flower spikes as compared to control (D.W) in the two seasons. On the reverse, the lowest values of the percentage of total nitrogen and total protein in flower stalk of tuberose cut flower spikes was recorded by holding solution contained (distilled water) as control respectively after (14 and end days) from the treatment in both seasons in this study.

The aforementioned results of (sucrose) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise indicated that sucrose at 10% treatment increased N-protein percentages of tuberose cut flower spikes and Gendy

(2000) found that sucrose treatment (at 10%) decreased total nitrogen percentage and protein percentage of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by El-Saka (1992) stated that (sucrose +citric acid) treatment increased decreased N- protein of tuberose and bird of paradise cut flowers and Gendy (2000) suggested that (sucrose + citric acid) treatment increased total gladiolus flowers. protein cut nitrogen, Nof aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by El-Saka (1992) found that sucrose + 8-HQS treatment increased N- protein percentages of tuberose and bird of paradise petals and Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions increased total nitrogen, Ngladiolus cut flowers. The of percentages protein aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions increased total nitrogen, N-protein percentages of gladiolus cut flowers and El-Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased total nitrogen, total protein in the florets of tuberose cut flowers spikes.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Total nitrogen and total protein percentage, Data in Table (47) indicate that most the combinations treatments between pulsing and holding solution increased total nitrogen and total protein percentage in petals of tuberose cut flower spikes as compared to control in the two seasons. However, the combinations treatments of STS at

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Table (47): Effect of interaction between pulsing solutions and holding solutions treatments on Total nitrogen percentage and Total protein percentage in petals of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Total protein percentage in petals In season 2nd season Shelf life periods (days) Shelf life periods (linitial) Initial 8 End Initial 8 23.29 22.79 21.83 24.15 22.48 23.29 22.19 22.33 24.15 22.29 23.29 22.19 22.33 24.15 23.29 23.29 22.19 22.33 24.15 23.29 23.29 22.11 22.38 24.15 23.44 23.29 22.18 22.19 24.15 23.44 23.29 23.13 22.81 24.15 23.44 23.29 23.13 22.81 24.15 23.54 23.29 23.13 22.81 24.15 23.54 23.29 23.13 22.28 24.15 23.24 23.29 23.73 23.65 24.15 23.25				ŀ										
Note Price Price	Dulcing			Total	nitrogen p	ercentage	in petals			Total p	rotein per	centage in	petals	
D.W Shef life periods (days) Shef life	colutions	Holding		1st season			2nd season			1st season	=		2 nd season	
D.W Initial 8 End Initial 22,58 Sucrose 4% ACA 200 ppm 3.727 3.487 3.483 3.863 3.577 3.697 23.29 22.19 21.83 24.15 22.48 Sucrose 4% + CA 200 ppm 3.727 3.253 3.273 3.863 3.577 3.690 23.29 20.15 20.18 24.15 22.49 Sucrose 4% + CA 200 ppm 3.727 3.250 3.550 3.863 3.767 3.60 23.29 20.15 20.38 24.15 22.44 Sucrose 4% + CA 200 ppm 3.727 3.700 3.650 3.863 3.540 3.577 23.49 23.13 22.15 24.15 23.24 Sucrose 4% + CA 200 ppm	0000000000	Solutions	Shelf li	fe period	ls (days)	Shelf li	fe period	s (days)	Shelf	life period	is (days)	Shelf li	fe periods	(davs)
D.W. 3.727 3.567 3.513 3.863 3.613 3.560 23.29 21.96 24.15 22.58 Sucrose 4% +CA 200 ppm 3.727 3.587 3.497 3.863 3.577 3.580 32.29 21.96 24.15 22.48 Sucrose 4% + SHQS 200 ppm 3.727 3.587 3.497 3.863 3.727 3.697 23.29 22.10 21.83 24.15 22.28 Sucrose 4% + CA 200 ppm 3.727 3.523 3.213 3.863 3.520 3.533 23.29 22.15 20.18 24.15 23.20 Sucrose 4% + CA 200 ppm 3.727 3.263 3.530 3.863 3.500 3.533 23.29 22.15 24.15 23.24 Sucrose 4% + CA 200 ppm 3.727 3.700 3.560 3.863 3.570 3.563 3.577 23.29 23.15 24.15 23.24 Sucrose 4% + CA 200 ppm 3.727 3.600 3.520 3.863 3.670 3.737 23.29 23.13 24.15 </th <th></th> <th></th> <th>Initial</th> <th>8</th> <th>End</th> <th>Initial</th> <th>8</th> <th>End</th> <th>Initial</th> <th>~</th> <th>End</th> <th>Initial</th> <th>∞</th> <th>Find</th>			Initial	8	End	Initial	8	End	Initial	~	End	Initial	∞	Find
Sucrose 4% - CA 200 ppm 3727 3.487 3.493 3.803 3.597 3.580 23.29 21.79 21.83 24.15 22.48 Sucrose 4% - CA 200 ppm 3.727 3.257 3.497 3.863 3.727 3.697 23.29 22.19 21.85 24.15 23.248 Sucrose 4% - CA 200 ppm 3.727 3.250 3.533 3.291 3.863 3.870 23.29 22.15 20.08 24.15 23.29 Sucrose 4% - CA 200 ppm 3.727 3.250 3.863 3.870 3.800 23.29 20.15 20.38 24.15 23.20 Sucrose 4% - CA 200 ppm 3.727 3.800 3.863 3.570 3.620 23.29 20.15 20.38 24.15 23.24 D.W 3.727 3.800 3.520 3.863 3.570 3.503 3.863 3.727 23.70 22.29 20.15 20.38 24.15 23.24 Sucrose 4% - CA 200 ppm 3.727 3.500 3.863 3.863 3.640 <th></th> <th>D.W</th> <th>3.727</th> <th>3.567</th> <th>3.513</th> <th>3.863</th> <th>3.613</th> <th>3.560</th> <th>23.29</th> <th>22.29</th> <th>21.96</th> <th>24 15</th> <th>22 58</th> <th>20.05</th>		D.W	3.727	3.567	3.513	3.863	3.613	3.560	23.29	22.29	21.96	24 15	22 58	20.05
Sucrose 4% -CA 200 ppm 3.727 3.537 3.497 3.633 3.727 3.697 23.29 22.10 21.85 24.15 23.29 Sucrose 4% - CA 200 ppm + 8HQS 200 ppm 3.727 3.523 3.213 3.863 3.727 3.533 23.29 20.15 20.88 24.15 22.09 Sucrose 4% - CA 200 ppm 3.727 3.223 3.260 3.863 3.750 3.630 23.29 20.15 20.88 24.15 22.09 Sucrose 4% - CA 200 ppm 3.727 3.490 3.550 3.863 3.760 3.620 23.29 20.15 20.38 24.15 22.39 Sucrose 4% - CA 200 ppm 3.727 3.490 3.550 3.863 3.760 3.740 3.229 20.15 20.38 24.15 22.39 Sucrose 4% - CA 200 ppm 41QS 200 ppm 3.727 3.700 3.620 3.863 3.540 3.577 23.29 20.33 20.29 22.15 22.15 24.15 22.29 Sucrose 4% - CA 200 ppm 41QS 200 ppm </th <th>700000000000000000000000000000000000000</th> <th>Sucrose 4 %</th> <th>3.727</th> <th>3.487</th> <th>3.493</th> <th>3.863</th> <th>3.597</th> <th>3.580</th> <th>23.29</th> <th>21.79</th> <th>21 83</th> <th>24 15</th> <th>22 48</th> <th>32.20</th>	700000000000000000000000000000000000000	Sucrose 4 %	3.727	3.487	3.493	3.863	3.597	3.580	23.29	21.79	21 83	24 15	22 48	32.20
Sucrose 4% + 8HQS 200 ppm 3.727 3.223 3.213 3.863 3.520 3.33 23.29 20.15 20.08 24.15 22.00 DLW 4% + CA 200 ppm + 8HQS 200 ppm 3.727 3.253 3.257 3.863 3.810 3.800 23.29 20.15 20.08 24.15 23.81 Sucrose 4% + CA 200 ppm 3.727 3.203 3.250 3.863 3.750 3.623 23.29 20.15 20.38 24.15 23.41 Sucrose 4% + CA 200 ppm 3.727 3.800 3.863 3.577 3.633 3.239 21.15 22.38 24.15 23.44 Sucrose 4% + CA 200 ppm 3.727 3.700 3.560 3.863 3.767 3.740 23.29 23.15 22.81 24.15 23.54 Sucrose 4% + CA 200 ppm 3.727 3.700 3.560 3.863 3.767 3.740 23.29 22.35 24.15 22.54 D.W D.W 3.727 3.500 3.560 3.863 3.690 3.777	D.W	Sucrose 4% +CA 200 ppm	3.727	3.537	3.497	3.863	3.727	3.697	23.29	22 10	21.85	24 15	23 20	22 10
Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 3.727 3.550 3.573 3.863 3.810 3.800 23.29 22.19 22.33 24.15 23.80 D.W 3.727 3.520 3.523 3.560 3.863 3.750 3.620 23.29 22.19 22.33 24.15 23.84 Sucrose 4% + CA 200 ppm 3.727 3.400 3.863 3.657 3.633 23.29 20.15 20.38 24.15 23.44 Sucrose 4% + CA 200 ppm 3.727 3.700 3.650 3.863 3.547 3.732 23.19 24.15 22.18 Sucrose 4% + CA 200 ppm 3.727 3.700 3.650 3.863 3.720 3.707 23.29 23.13 22.81 24.15 22.35 Sucrose 4% + CA 200 ppm 3.727 3.500 3.327 3.863 3.640 3.637 23.29 20.63 20.79 24.15 22.35 Sucrose 4% + CA 200 ppm 3.727 3.507 3.863 3.847 3.80 3.877 23.29		Sucrose 4 % + 8HQS 200 ppm	3.727	3.223	3.213	3.863	3.520	3.533	23 29	20.15	20.08	24.15	22.00	22.10
D.W Sucrose 4 % 3.223 3.260 3.863 3.750 3.620 23.29 20.15 20.38 24.15 23.44 Sucrose 4 % + CA 200 ppm 3.727 3.490 3.520 3.863 3.677 3.620 23.29 21.81 22.19 24.15 23.44 Sucrose 4 % + CA 200 ppm 3.727 3.490 3.863 3.677 3.623 23.29 21.81 22.19 24.15 22.54 Sucrose 4 % + CA 200 ppm 3.727 3.700 3.650 3.863 3.540 3.577 23.29 23.19 23.29 24.15 22.54 Sucrose 4 % + CA 200 ppm 3.727 3.300 3.327 3.863 3.540 3.537 23.29 20.63 20.79 24.15 24.1		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.727	3.550	3.573	3.863	3.810	3.800	23.29	22.19	22.33	24 15	23.81	22.75
Sucrose 4 % 3.727 3.490 3.550 3.863 3.627 3.623 3.2.9 2.11 2.2.3 Sucrose 4% +CA 200 ppm 3.727 3.800 3.80 3.863 3.767 3.740 23.29 23.18 22.18 22.18 Sucrose 4% +CA 200 ppm +8HQS 200 ppm 3.727 3.700 3.863 3.630 3.863 3.740 23.29 23.13 22.81 24.15 23.54 Sucrose 4% +CA 200 ppm 3.727 3.700 3.277 3.863 3.847 3.793 23.29 23.19 22.29 24.15 22.35 Sucrose 4% +CA 200 ppm 3.727 3.500 3.863 3.847 3.810 23.29 22.15 24.15 22.25 Sucrose 4% +CA 200 ppm 3.727 3.507 3.633 3.863 3.690 3.737 23.29 22.54 22.71 24.15 22.75 Sucrose 4% +CA 200 ppm 3.727 3.737 3.803 3.863 3.640 3.637 23.29 22.41 22.71 24.15		D.W	3.727	3.223	3.260	3.863	3.750	3.620	23 79	20.15	85.00	21 1/2	23.44	27.77
Sucrose 4% +CA 200 ppm 3.727 3.800 3.810 3.633 3.767 3.740 23.29 23.75 22.13 22.13 Sucrose 4% + 8HQS 200 ppm 3.727 3.700 3.650 3.863 3.767 3.740 23.29 23.17 23.13 22.13 22.13 23.25 Sucrose 4% + CA 200 ppm 3.727 3.700 3.650 3.863 3.847 3.793 23.29 23.13 22.81 24.15 23.25 Sucrose 4% + CA 200 ppm 3.727 3.300 3.327 3.863 3.847 3.793 23.29 22.05 29.15 24.15 23.25 Sucrose 4% + CA 200 ppm 3.727 3.307 3.863 3.840 3.847 3.80 23.29 22.04 22.25 24.15 23.25 Sucrose 4% + CA 200 ppm 8.727 3.727 3.307 3.863 3.640 3.637 23.29 22.13 24.15 24.15 24.50 D.W Sucrose 4% + CA 200 ppm 8.727 3.473 3.863 3.863		Sucrose 4 %	3.727	3.490	3.550	3.863	3 657	3 623	23.20	21.01	22.00	21.12	20 00	22.03
Sucrose 4 % + 8HQS 200 ppm 3.727 3.700 3.650 3.863 3.540 3.77 23.29 23.13 22.81 24.15 22.13 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.727 3.700 3.727 3.863 3.847 3.793 23.29 23.13 22.81 24.15 22.13 Sucrose 4% + CA 200 ppm 3.727 3.300 3.327 3.863 3.707 23.29 20.63 20.79 24.15 23.25 Sucrose 4% + CA 200 ppm 3.727 3.507 3.863 3.847 3.810 3.737 23.29 20.63 20.79 24.15 23.25 Sucrose 4% + CA 200 ppm 3.727 3.507 3.783 3.863 3.920 3.877 23.29 22.54 22.71 24.15 23.25 Sucrose 4% + CA 200 ppm 3.727 3.277 3.307 3.863 3.640 3.877 23.29 23.73 23.65 24.15 22.75 Sucrose 4% + CA 200 ppm 3.727 3.463 3.863 3.630 3.877	Kin.20 ppm	Sucrose 4% +CA 200 ppm	3.727	3.800	3.810	3.863	3.767	3.740	23 29	23.75	23.81	24.15	23.54	22.00
Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 3,727 3,10 3,727 3,863 3,847 3,793 23,29 23,19 23,29 24,15 24,04 D.W 3,727 3,500 3,327 3,863 3,720 3,707 23,29 20,63 20,79 24,15 23,25 Sucrose 4% +CA 200 ppm 3,727 3,500 3,863 3,690 3,737 23,29 20,63 20,79 24,15 23,06 Sucrose 4% +CA 200 ppm 3,727 3,500 3,630 3,847 3,800 23,29 22,54 22,71 24,15 24,04 D.W 3,727 3,797 3,783 3,863 3,900 3,877 23,29 22,13 24,15 24,04 Sucrose 4% +CA 200 ppm 3,727 3,207 3,863 3,900 3,887 23,29 21,13 24,15 22,59 Sucrose 4% +CA 200 ppm 3,727 3,637 3,863 3,707 3,683 3,803 3,813 3,777 23,29 22,15 24,15 <		Sucrose 4 % + 8HQS 200 ppm	3.727	3.700	3.650	3.863	3.540	3.577	23.29	23.13	22.81	24.15	22.13	22.33
D.W 3.727 3.300 3.327 3.863 3.720 3.707 23.29 20.63 20.79 24.15 23.25 Sucrose 4% 4CA 200 ppm 3.727 3.500 3.560 3.863 3.690 3.737 23.29 22.06 22.25 24.15 23.06 Sucrose 4% + CA 200 ppm 8HQS 200 ppm 3.727 3.607 3.633 3.863 3.640 3.637 23.29 22.46 22.75 24.15 24.04 D.W 3.727 3.797 3.797 3.783 3.863 3.640 3.637 23.29 21.13 21.38 24.15 22.75 D.W 3.727 3.797 3.797 3.863 3.630 3.587 23.29 21.13 21.38 24.15 22.75 D.W 3.727 3.277 3.307 3.863 3.507 23.29 20.35 24.15 22.59 Sucrose 4% + CA 200 ppm 3.727 3.463 3.480 3.863 3.707 3.687 23.29 20.15		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.727	3.710	3.727	3.863	3.847	3.793	23.29	23.19	23.29	24.15	24 04	23.71
Sucrose 4% 3.727 3.530 3.560 3.863 3.690 3.737 23.29 22.06 22.25 24.15 23.06 Sucrose 4% + CA 200 ppm 3.727 3.607 3.633 3.863 3.847 3.810 23.29 22.06 22.25 24.15 24.04 Sucrose 4% + CA 200 ppm 3.727 3.80 3.420 3.863 3.640 3.637 23.29 22.13 21.38 24.15 22.75 Sucrose 4% + CA 200 ppm 3.727 3.797 3.783 3.863 3.920 3.877 23.29 23.73 23.65 24.15 22.75 Sucrose 4% + CA 200 ppm 3.727 3.247 3.307 3.863 3.717 3.647 23.29 20.35 20.67 24.15 22.69 Sucrose 4% + CA 200 ppm 3.727 3.463 3.480 3.863 3.707 3.687 23.29 20.35 20.67 24.15 23.23 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.727 3.867 3.833 3.863 3.803		D.W	3.727	3.300	3.327	3.863	3.720	3.707	23.29	20.63	20.79	24.15	23 25	23 17
Sucrose 4%+CA 200 ppm 3.727 3.607 3.633 3.863 3.847 3.810 23.29 22.54 22.71 24.15 24.04 Sucrose 4%+ RHQS 200 ppm 3.727 3.380 3.420 3.863 3.640 3.637 23.29 21.13 21.38 24.15 22.75 Sucrose 4%+ CA 200 ppm 3.727 3.797 3.783 3.863 3.920 3.877 23.29 21.13 21.38 24.15 22.75 Sucrose 4%+ CA 200 ppm 3.727 3.277 3.307 3.863 3.647 23.29 20.48 20.67 24.15 22.69 Sucrose 4%+ CA 200 ppm 3.727 3.547 3.533 3.863 3.717 3.647 23.29 20.48 20.67 24.15 22.69 Sucrose 4%+ CA 200 ppm 3.727 3.647 3.533 3.863 3.717 3.647 23.29 22.17 22.08 24.15 23.23 Sucrose 4%+ CA 200 ppm 3.727 3.657 3.657 3.863 3.897 3.800		Sucrose 4 %	3.727	3.530	3.560	3.863	3.690	3.737	23.29	22.06	22.25	24.15	23.06	23 35
Sucrose 4 % + 8HQS 200 ppm 3.727 3.380 3.420 3.863 3.640 3.637 23.29 21.13 21.38 24.15 22.75 Sucrose 4% + CA 200 ppm + 8HQS 200 ppm 3.727 3.797 3.783 3.863 3.920 3.877 23.29 21.13 21.38 24.15 22.75 D.W 3.727 3.727 3.277 3.307 3.863 3.920 3.877 23.29 23.73 23.65 24.15 24.50 Sucrose 4% + CA 200 ppm 3.727 3.257 3.307 3.863 3.717 3.647 23.29 20.48 20.67 24.15 23.23 Sucrose 4% + CA 200 ppm 3.727 3.463 3.480 3.863 3.707 3.687 23.29 22.17 22.08 24.15 23.23 Sucrose 4% + CA 200 ppm 4 HQS 200 ppm 3.727 3.657 3.853 3.863 3.897 3.800 23.29 21.65 21.15 24.15 23.17 Sucrose 4% + CA 200 ppm 3.727 3.800 3.823<	BA 10 ppm	Sucrose 4% +CA 200 ppm	3.727	3.607	3.633	3.863	3.847	3.810	23.29	22.54	22.71	24.15	24.04	23.81
Sucrose 4%+CA 200 ppm + 8HQS 200 ppm 3.727 3.797 3.783 3.863 3.920 3.877 23.29 23.73 23.65 24.15 24.50 D.W 3.727 3.277 3.207 3.863 3.920 3.877 23.29 23.73 23.65 24.15 22.69 Sucrose 4%+CA 200 ppm 3.727 3.257 3.307 3.863 3.717 3.647 23.29 20.48 20.67 24.15 23.23 Sucrose 4%+CA 200 ppm 3.727 3.547 3.533 3.863 3.717 23.29 22.17 22.08 24.15 23.23 Sucrose 4%+CA 200 ppm 3.727 3.657 3.687 3.863 3.707 3.687 23.29 22.17 22.08 24.15 23.23 D.W 3.727 3.657 3.853 3.863 3.897 3.800 23.29 22.185 23.04 24.15 23.37 Sucrose 4%+CA 200 ppm 3.727 3.800 3.833 3.863 3.847 3.847 23.29		Sucrose 4 % + 8HQS 200 ppm	3.727	3.380	3.420	3.863	3.640	3.637	23.29	21.13	21.38	24.15	22.75	22.73
D.W 3.727 3.277 3.307 3.863 3.630 3.587 23.29 20.48 20.67 24.15 22.69 Sucrose 4 % + CA 200 ppm 3.727 3.257 3.307 3.863 3.717 3.647 23.29 20.48 20.67 24.15 23.23 Sucrose 4 % + CA 200 ppm 3.727 3.547 3.533 3.863 3.717 23.29 20.35 20.67 24.15 23.23 Sucrose 4 % + CA 200 ppm 8HQS 200 ppm 3.727 3.637 3.863 3.707 3.863 3.707 23.29 21.65 21.75 24.15 23.83 D.W 3.727 3.657 3.867 3.863 3.803 3.743 23.29 21.65 21.75 24.15 23.17 Sucrose 4 % + CA 200 ppm 3.727 3.800 3.833 3.863 3.803 3.847 23.29 24.17 24.08 24.15 24.15 23.77 Sucrose 4 % + CA 200 ppm 3.727 3.800 3.823 3.863 3.847		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.727	3.797	3.783	3.863	3.920	3.877	23.29	23.73	23.65	24.15	24.50	24.23
Sucrose 4 % 3.727 3.257 3.307 3.863 3.717 3.647 23.29 20.35 20.67 24.15 23.23 Sucrose 4 % + CA 200 ppm 3.727 3.547 3.533 3.863 3.813 3.777 23.29 22.17 22.08 24.15 23.83 Sucrose 4 % + CA 200 ppm 8HQS 200 ppm 3.727 3.657 3.687 3.863 3.707 3.687 23.29 22.15 24.15 23.17 D.W 3.727 3.657 3.867 3.863 3.897 3.800 23.29 22.85 23.04 24.15 24.25		D.W	3.727	3.277	3.307	3.863	3.630	3.587	23.29	20.48	20.67	24.15	22.69	22.42
Sucrose 4%+CA 200 ppm 3.727 3.547 3.533 3.863 3.813 3.777 23.29 22.17 22.08 24.15 23.83 Sucrose 4%+ 8HQS 200 ppm 3.727 3.463 3.480 3.863 3.707 3.687 23.29 22.17 22.08 24.15 23.17 Sucrose 4%+ CA 200 ppm + 8HQS 200 ppm 3.727 3.657 3.687 3.863 3.897 3.800 23.29 22.85 23.04 24.15 24.15 24.35 D.W 3.727 3.867 3.853 3.863 3.893 3.743 23.29 24.17 24.08 24.15 24.35 Sucrose 4%+ CA 200 ppm 3.727 3.800 3.833 3.863 3.880 3.820 23.29 24.17 24.08 24.15 24.25 Sucrose 4%+ CA 200 ppm 3.727 3.800 3.823 3.847 3.847 23.29 24.18 24.15 24.25 Sucrose 4%+ CA 200 ppm 3.727 3.800 3.823 3.863 3.847 3.349 <th< th=""><th>Sucrose 10</th><th>Sucrose 4 %</th><th>3.727</th><th>3.257</th><th>3.307</th><th>3.863</th><th>3.717</th><th>3.647</th><th>23.29</th><th>20.35</th><th>20.67</th><th>24.15</th><th>23.23</th><th>22.79</th></th<>	Sucrose 10	Sucrose 4 %	3.727	3.257	3.307	3.863	3.717	3.647	23.29	20.35	20.67	24.15	23.23	22.79
Sucrose 4 % + 8HQS 200 ppm 3.727 3.463 3.480 3.863 3.707 3.687 23.29 21.65 21.75 24.15 23.17 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.727 3.657 3.687 3.863 3.897 3.800 23.29 22.85 23.04 24.15 24.35 D.W 3.727 3.867 3.853 3.863 3.893 3.743 23.29 24.17 24.08 24.15 24.35 Sucrose 4 % CA 200 ppm 3.727 3.800 3.833 3.863 3.880 3.820 23.94 23.96 24.15 24.25 Sucrose 4 % + CA 200 ppm 3.727 3.800 3.920 3.863 3.847 3.847 23.29 24.15 24.15 24.25 Sucrose 4 % + CA 200 ppm 3.727 3.800 3.823 3.863 3.847 23.29 24.38 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 24.15 <th>%</th> <th>Sucrose 4% +CA 200 ppm</th> <th>3.727</th> <th>3.547</th> <th>3.533</th> <th>3.863</th> <th>3.813</th> <th>3.777</th> <th>23.29</th> <th>22.17</th> <th>22.08</th> <th>24.15</th> <th>23.83</th> <th>23.60</th>	%	Sucrose 4% +CA 200 ppm	3.727	3.547	3.533	3.863	3.813	3.777	23.29	22.17	22.08	24.15	23.83	23.60
D.W 200 ppm 8HQS 200 ppm 3.727 3.657 3.687 3.863 3.897 3.800 23.29 22.85 23.04 24.15 24.35 D.W 3.727 3.867 3.867 3.863 3.893 3.743 23.29 24.17 24.08 24.15 23.77 Sucrose 4 % 2.00 3.727 3.830 3.833 3.863 3.880 3.820 23.92 24.17 24.08 24.15 24.25 Sucrose 4 % + CA 200 ppm 3.727 3.900 3.920 3.863 3.847 23.29 24.38 24.15 24.25 Sucrose 4 % + 8HQS 200 ppm 3.727 3.800 3.823 3.863 3.847 23.29 24.38 24.15 24.04 Sucrose 4 % + BHQS 200 ppm 3.727 3.800 3.823 3.863 3.747 23.29 24.15 24.15 24.04 Sucrose 4 % + CA 200 ppm 3.727 3.807 3.880 3.863 3.747 23.29 24.		Sucrose 4 % + 8HQS 200 ppm	3.727	3.463	3.480	3.863	3.707	3.687	23.29	21.65	21.75	24.15	23.17	23.04
D.W 3.727 3.867 3.853 3.863 3.743 23.29 24.17 24.08 24.15 23.77 Sucrose 4 % 4 % 3.727 3.830 3.833 3.863 3.880 3.820 23.29 24.17 24.08 24.15 24.25 Sucrose 4 % + CA 200 ppm 3.727 3.900 3.920 3.863 3.847 23.29 24.38 24.50 24.15 24.04 Sucrose 4 % + RHQS 200 ppm 3.727 3.800 3.823 3.863 3.760 3.747 23.29 24.38 24.50 24.15 24.04 Sucrose 4 % + CA 200 ppm 3.727 3.800 3.823 3.863 3.760 3.747 23.29 24.38 24.50 24.15 24.04 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.727 3.807 3.880 3.863 3.930 3.867 23.29 24.15 24.15 24.56 24.56 5% - 0.214 0.214 - 0.147 0.137 - 1.533		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.727	3.657	3.687	3.863	3.897	3.800	23.29	22.85	23.04	24.15	24.35	23.75
Sucrose 4 % 3.727 3.830 3.833 3.863 3.820 23.29 23.94 23.96 24.15 24.25 Sucrose 4 % + CA 200 ppm 3.727 3.900 3.920 3.863 3.847 23.29 24.38 24.50 24.15 24.04 23.00 23.29 24.38 24.50 24.15 24.04 23.20 23.29 24.38 24.50 24.15 24.04 23.20 23.75 23.90 24.15 24.04 23.20 23.75 23.90 24.15 24.15 24.04 23.20 23.75 23.90 24.15 2		D.W	3.727	3.867	3.853	3.863	3.803	3.743	23.29	24.17	24.08	24.15	23.77	23,40
Sucrose 4%+CA 200 ppm 3.727 3.900 3.920 3.863 3.847 23.29 24.38 24.50 24.15 24.04 3.863 3.760 3.747 23.29 24.38 24.50 24.15 24.04 3.863 3.760 3.747 23.29 23.75 23.90 24.15 23.50 3.863 3.760 3.747 23.29 24.17 24.25 24.15 23.50 3.863 3.863 3.930 3.867 23.29 24.17 24.25 24.15 24.56 24.56 24.56 24.17 24.25 24.15 24.56 24.56 24.56 24.56 24.17 24.25 24.15 24.56 24.56 24.56 24.56 24.17 24.25 24.15 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.25 24.15 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56 24.56<		Sucrose 4 %	3.727	3.830	3.833	3.863	3.880	3.820	23.29	23.94	23.96	24.15	24.25	23.88
Sucrose 4 % + 8HQS 200 ppm 3.727 3.800 3.823 3.863 3.760 3.747 23.29 23.75 23.90 24.15 23.50 3.800 Sucrose 4 % + CA 200 ppm + 8HQS 200 ppm 3.727 3.867 3.880 3.863 3.930 3.867 23.29 24.17 24.25 24.15 24.56 24.56 5% - 0.214 0.214 - 0.147 0.137 - 1.353 1.337 - 0.923 1% - 0.286 - 0.196 0.183 - 1.805 1.783 - 1.231	S1S1:4 ml	Sucrose 4% +CA 200 ppm	3.727	3.900	3.920	3.863	3.847	3.847	23.29	24.38	24.50	24.15	24.04	24.04
Sucrose 4% +CA 200 ppm +8HQS 200 ppm 3.727 3.867 3.880 3.863 3.930 3.867 23.29 24.17 24.25 24.15 24.56 24.56 5% - 0.214 0.214 - 0.147 0137 - 1.353 1.337 - 0.923 1% - 0.286 - 0.196 0.183 - 1.805 1.783 - 1.231		Sucrose 4 % + 8HQS 200 ppm	3.727	3.800	3,823	3.863	3.760	3.747	23.29	23.75	23.90	24.15	23.50	23.42
5% - 0.214 0.214 - 0.147 0137 - 1.353 1.337 - 0.923 0.923 1% - 0.286 - 0.196 0.183 - 1.805 1.783 - 1.231		Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.727	3.867	3.880	3.863	3.930	3.867	23.29	24.17	24.25	24.15	24.56	24.17
- 0.286 0.286 - 0.196 0.183 - 1.805 1.783 - 1.231	L.S.D at	5%	r	0.214	0.214	3	0.147	0137	r	1.353	1.337	10	0.923	0.859
		1%	x	0.286	0.286	10	0.196	0.183	Y	1.805	1.783	,	1.231	1.146

1:4mM for 15 minutes resulted the highest values of this parameter, especially the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm) or (sucrose 4% + CA 200ppm + 8-HQS 200ppm) after (8 and end days) from the treatment at the first and second season respectively, with the exception of the combined treatment of BA at 10ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) at the end of longevity of the percentage of total nitrogen protein in petals in the second season only. Moreover, using the combined treatment between kinetin at 20ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm) at the first season, and the combined treatment between Benzyl adenine at 10ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) at the second season recorded highly increases of this parameter in petals as compared to control under this study.

Furthermore, Data presented in Table (48) reveal that the combined treatment between STS at 1:4mM for 30minutes and holding solution contained (sucrose 4%) in the first season and the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm) in the second season gave the highest values of the percentage of total nitrogen and total protein in flower stalks of tuberose cut flower spikes as compared to control in the two seasons under study. The aforementioned results are in parallel with those obtained by El-Saka (1992) found that (STS) treatment then (S +8 HQS + CA)

Table (48): Effect of interaction between pulsing solutions and holding solutions treatments on Total nitrogen percentage and Total protein percentage in flower stalk of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

		T	otal nitr	ogen perc	entage in	Total nitrogen percentage in flower stalk	IK.	To	tal prote	in percen	Total protein percentage in flower stalks	wer stall	5.7
solution	Holding	31	1st season	2004		2nd season			1st season		2	2nd season	
s	Solutions	Shelf li	fe period	Shelf life periods (days)	Shelf	Shelf life periods (days)	s (days)	Shelf life		periods (days)	Shelf life	Shelf life periods (days)	s (days)
		Initial	∞	End	Initial	00	End	Initial	00	End	Initial	00	End
	D.W	3.253	2.920	2.897	3.223	2.963	2.920	20.33	18 25	8 10	21.00	18 53	25.01
	Sucrose 4 %	3.253	2.990	3.167	3.223	3.000	2.990	20.33	18.69	19.79	20.15	18.75	18 69
D.W	Sucrose 4% +CA 200 ppm	3.253	2.957	2.950	3.223	3.023	3.010	20.33	18.48	18.44	20.15	18.90	18.81
	Sucrose 4 % + 8HQS 200 ppm	3.253	3.147	3.327	3.223	3.167	3.140	20.33	19.67	20.79	20.15	19.79	19.63
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.253	3.457	3.467	3.223	3.403	3.343	20.33	21.60	21.67	20.15	21.27	20.90
	D.W	3.253	2.957	2.817	3.223	3.093	3.000	20.33	18.48	17.60	20.15	19.33	18 75
Kin 20	Sucrose 4 %	3.253	2.890	3.057	3.223	2.973	2.933	20.33	18.06	19.10	20.15	18.58	18 33
ppm	Sucrose 4% +CA 200 ppm	3.253	3.217	3.347	3.223	3.200	3.187	20.33	20.10	20.92	20.15	20.00	19.92
:	Sucrose 4 % + 8HQS 200 ppm	3.253	3.253	3.147	3.223	3.113	3.107	20.33	20.33	19.67	20.15	1.46	19.42
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.253	3.080	3.187	3.223	3.310	3.293	20.33	19.25	19.92	20.15	20.69	20.58
	D.W	3.253	2.780	2.713	3.223	3.007	2.977	20.33	17.38	16.96	20.15	18.79	18.60
BA 10	Sucrose 4 %	3.253	2.910	2.953	3.223	3.100	3.003	20.33	18.19	18.46	20.15	19.38	18.77
mag	Sucrose 4% +CA 200 ppm	3.253	3.333	3.087	3.223	3.337	3.383	20.33	20.83	19.29	20.15	20.85	21.15
	Sucrose 4 % + 8HQS 200 ppm	3.253	3.010	2.997	3.223	3.060	3.083	20.33	18.81	18.73	20.15	19.13	19.27
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.253	3.263	3.213	3.223	3.277	3.233	20.33	20.40	20.08	20.15	20.48	20.21
	D.W	3.253	2.917	2.923	3.223	2.867	2.993	20.33	18.23	18.27	20.15	17.90	18.71
Sucrose	Sucrose 4 %	3.253	2.777	2.553	3.223	3.107	3.033	20.33	17.35	15.96	20.15	19.42	18.96
% 01	Sucrose 4% +CA 200 ppm	3.253	2.960	3.037	3.223	2.877	2.900	20.33	18.50	18.98	20.15	17.98	18.13
	Sucrose 4 % + 8HQS 200 ppm	3.253	2.927	2.940	3.223	3.007	3.067	20.33	18.29	18.38	20.15	18.79	19.17
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.253	3.177	3.060	3.223	3.243	3.217	20.33	19.85	19.13	20.15	20.27	20.10
	D.W	3.253	3.013	3.170	3.223	3.180	3.117	20.33	18.83	19.81	20.15	19.88	19.48
STS 1:4	Sucrose 4 %	3.253	3.220	3.570	3.223	3.180	3.127	20.33	20.13	22.31	20.15	19.88	19.54
<u>n</u>	Sucrose 4% +CA 200 ppm	3.253	2.960	3.020	3.223	3.530	3,433	20.33	18.50	18.88	20.15	22.06	21.46
	Sucrose 4 % + 8HQS 200 ppm	3.253	3.007	3.050	3.223	3.140	3.073	20.33	18.79	19.06	20.15	19.63	19.21
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	3.253	3.023	3.477	3.223	3.233	3.170	20.33	18.90	21.73	20.15	20.21	19.81
L.S.D at	5%		0.284	0.399		0.244	0.201	,	1.778	2.490	r	1.528	1.242
	1%		0.379	0.532		0.325	0.268	20	2.372	3.332		2.038	1.656

treatment increased N- protein percentage after 8 days from the treatment in the florets of tuberose cut flower spike, **Gendy** (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S+8 HQS+CA) decreased total nitrogen, total protein, percentage of gladiolus cut flower spike florets and El Bouhy (2002) noticed that the treatment of interaction between BA as pulsing solution and holding solution of (S+8HQS+CA) increased the percentage and content of total nitrogen and total protein in the florets of tuberose cut flower spike compared to control or the other ones.

3.3.6.-Total phenols content (%):

It is obvious from data presented in Table (49) that all pulsing treatments of tuberose cut flower spikes bases decreased total phenols content (%) in petals and flower stalks when compared to control with the exception of pulsing solution of sucrose at 10% for 24hours after (8days and the end) from the treatment in the two seasons in most cases. However, the highest significant decrease of total phenols content (%) in petals and flower stakes of tuberose cut flower spikes was registered by using pulsing treatment of STS at 1:4mM for 15minutes after (8days and end days) from the treatment as compared to control in the two seasons, followed descendingly by kinetin at 20ppm for 24hours and benzyl adenine at 10 ppm for 24hours in both seasons. Anyhow, total phenols contents (%) in petals and flower stalks of tuberose cut flower spikes under all pulsing treatments was decreased after (initial days) from the treatment

Table (49): Effect of pulsing solutions treatments on Total phenols percentage, phosphorus percentage and potassium percentage in petals and flower stalk of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

	Irea						Pulsing	Solutions				L.S.D at					Pulsing				L.S.D at	
	reatments			D.W	Kin.20	ppm	BA 10	ppm	10 %	STS 1:4	5 %	1%			D.W	Kin.20 ppm	BA 10	Sucrose 10 %	STS 1:4	s % ml	10/	
perc	She	Initial		0.320	000	0.320	0.320		0.320	0.320					0.320	0.320	0.320	0.320	000	0.320		
Total phenols percentage in petals	Shelf life periods (days)	∞		0.262	200	0.239	0 241		0.265	0.220	0.009	0.012	0.012		0.263	0.238	0.250	0.262	0 227	0.22/	0.013	0.017
nols 1 petals	eriods	End		0.154		0.131	0 137		0.149	0.119	0 008	0011	0.011		0.137	0.127	0.131	0.129	0 100	0.102	0.011	0.014
perc	Sh	Initial		0.377		0.377	0 277		0.377	0.377					0.360	0.360	0.360	0.360	0.360	0.360	·	ı
Total phenols percentage in flower stalk	Shelf life periods (days)	∞		0.263		0.238	0752	0.00	0.276	0.232	0.011	000	0.014		0.245	0.242	0.262	0.267	000	0.220	0.014	0.018
nols 1 flower	eriods)	End		0.147		0.136	0 127	0.10	0.152	0.119	0000		0.012		0.141	0.129	0.123	0.132	0.01	0.107	110.0	0.014
perc	She	Initial		0.867		0.867		0.007	0.867	0.867			ā		0.840	0.840	0.840	0.840		0.840		ř
Phosphorus percentage in petals	Shelf life periods (days)	∞	1st season	0.853		0.853		0.007	0.849	0.873		0.000	0.044	2 nd season	0.837	0.843	0.835	0.832		0.863	0.023	0.030
rus n petals	eriods)	End		0.844		0.864		0.049	0.854	0.88.0		0.000	0.044	on	0.831	0.834	0.839	0.840		0.857	0.023	0.031
perc	Sh	Initial		0.810	0.010	0.810		0.810	0.810	0.810			t		0.823	0.823	0.823	0.823		0.823		
Phosphorus percentage in flower	Shelf life periods	∞	l	0.765	0.700	0.841		0.783	0.758	0 022		0.03	0.044		0.730	0.765	0 753	_	-	0.785	0.023	0.030
rus 1 flower	eriods	End		0 782	0.702	0.855		0.783	0.777	0.040		0.023	0.031		0.725	0.753	0 741	0.727		0.778	0.023	0.031
perc	Sh	Initial		2 007	1,66.7	2.997		2.997	2.997		1.00	í	1		3.157	3.157	3 157	3 157		3.157	14	Ε
Potassium percentage in petals	Shelf life periods			2 040	2.949	3.018		2.992	2.982	2	0.01	0.052	0.069		3.033	3.087	-	-	-	3.170	0.093	0.124
ım n petals	eriods	End	1	2 607	2.69/	2.703		2.676	2.696		4.144	0.023	0.031		2.689		-	2 724	+-	2.743	0.023	0.031
perce	She	Initial	ľ	2	2.327	7 777	4:041	2.327	2 327		2.321	į	į		2350	-	-		2.330	2.350	ř.	
Potassium percentage in flower	Shelf life periods	8 J			2.308	2 343	0.040	2.314	2314	1	2.332	0.015	0.019		2317	2.317	2.303	140.3	2.333	2392	0.016	0.000
ım	eriods	End			2.119	7 107	2.197	2.145	2 122		2.223	0.033	0.044		2 108	2.108	2.199	2.100	2.133	2.216	0.040	0.054

as flower cut spikes prolonged in age till the end of longevity in the two seasons.

As for the effect holding solution treatments on Total phenols content (%), data in Table (50) reveal that, all holding solution treatments succeeded in decreasing the percentage of total phenols in petals and flower stalks of tuberose cut flower spikes as compared to control in two seasons, especially, holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm), followed descendingly by (sucrose at 4% + citric acid at 200ppm) in two seasons. On the reverse, the highest values of the percentage of total phenols in petals and flower stalks was recorded by using the treatment of holding solution contained (sucrose at 4%), followed descendingly by control (D.W) in the two seasons in most cases. Furthermore, the percentage of total phenols in petals and flower stalks of tuberose cut of flower spikes was decreased as flower cut spikes advanced in age after (initial) from the treatment till the end of age of longevity in the two seasons.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Total phenols percentage, Data in Table (51) reveal that, most the combinations treatments between pulsing solution and holding solution decreased of the percentage of total phenols in petals and flower stalks of tuberose cut flower spikes as compared to control (D.W) in the two seasons. However, the lowest values of this parameter was registered by using the combinations treatments of STS at 1:4mM for 30 minutes, especially the

Table (50): Effect of Holding solutions treatments on Total phenols percentage, phosphorus percentage and potassium percentage in petals and flower stalk of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

Carone an	I S D at		solutions	Holding					SDat		solutions	Holding						1
1%	5 %	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	+CA 200 ppm	Sucrose 4 %	D.W		1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W			r i catillents	
	1	0.320	0.320	0.320	0.320	0.320			E	0.320	0.320	0.320	0.320	0.320		Initial	Shel	To perce
0.017	0.013	0.221	0.241	0.230	0.280	0.267		0.012	0.009	0.215	0.239	0.232	0.275	0.265		00	Shelf life periods (days)	Total phenols percentage in petals
0.014	0.011	0.097	0.120	0.116	0.150	0.143		0.011	0.008	0.111	0.129	0.121	0.169	0.160		End	riods	ols petals
	à	0.360	0.360	0.360	0.360	0.360				0.377	0.377	0.377	0.377	0.377		Initial	Shelf	Tot
0.018	0.014	0.206	0.229	0.225	0.288	0.289		0.014	0.011	0.202	0.235	0.231	0.294	0.299		∞	Shelf life periods (days)	Total phenols percentage in flower stalk
0.014	0.011	0.103	0.121	0.116	0.155	0.137		0.012	0.009	0.108	0.127	0.125	0.167	0.163		End	riods	ols Nower
	¥	0.840	0.840	0.840	0.840	0.840	2	r	ISWE IN	0.867	0.867	0.867	0.867	0.867	1 1 1	Initial	Shelf lif	Phosph
0.030	0.023	0.870	0.828	0.857	0.829	0.826	2 nd season	0.044	0.033	0.874	0.835	0.874	0.849	0.833	1 st season	∞	Shelf life periods (days)	Phosphorus percentage in petals
0.031	0.023	0.859	0.838	0.850	0.829	0.825	_	0.044	0.033	0.880	0.843	0.881	0.848	0.839		End	is (days)	rcentage
7	r	0.823	0.823	0.823	0.823	0.823		ř.	EO C	0.810	0.810	0.810	0.810	0.810		Initial	Sh	
0.030	0.023	0.797	0.738	0.775	0.735	0.727		0.044	0.03	0.865	0.789	0.815	0.766	0.744		∞	Shelf life periods (days)	Phosphorus percentage in flower stalk
0.031	0.023	0.782	0.727	0.763	0.727	0.726		0.031	0.023	0.884	0.800	0.833	0.773	0.756		End	eriods)	n flower
x	ř	3.157	3.157	3.157	3.157	3.157		ı	э	2.997	2.997	2.997	2.997	2.997		Initial	She	perc
0.124	0.093	3.176	3.137	3.159	2.959	3.097		0.069	0.052	3.093	3.008	3.053	2.913	2.951		- - -	Shelf life periods (days)	potassium percentage in petals
0.031	0.023	2.757	2.739	2.753	2.659	2.677		0.031	0.023	2.746	2.715	2.734	2.639	2.661		End	eriods	ım n petals
4.	м	2.350	2.350	2.350	2.350	2.350		j.		2.327	2.327	2.327	2.327	2.327		Initia 	Shel	percer
0.020	0.016	2.386	2.341	2.377	2.313	2.332		0.019	0.015	2.360	2.325	2.343	2.289	2.314		œ	Shelf life periods (days)	Potassium percentage in flower stalk
0.054	0.040	2.239	2.192	2.216	2.023	2.141		0.044	0.033	2.221	2.145	2.197	2.096	2.149		End	riods	n flower

Results and Discussion

Pulsing solutions D.W Sucrose 4% + Sucrose	Holding Solutions D.W Sucrose 4 % + CA 200 ppm Sucrose 4 % + 8HQS 200 ppm Sucrose 4 % + CA 200 ppm	1 otal pirenos 1 st season Shelf life periods (days)		Total phonois percentag	True Brim	petals		Tota	Total phenols percentage in Hower stalks	percent	ige in more	STAIRS	
	Holding Solutions Solutions +CA 200 ppm +CA 200 ppm +CA 200 ppm + 8HQS 200 ppm	Shelf life		1 Otal phenois percentage in perms	2	noseas put		1,1	season		2 nd	season	
	Solutions % +CA 200 ppm %+ 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	SHEH HIS	noriode	(sveb)	Shelf life	e periods (days)	(days)	Shelf life	Shelf life periods (days)	(days)	Shelf life periods (days)	eriods (days)
	% +CA 200 ppm % + 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	Initial	8	End	Initial	æ	End	Initial	8	End	Initial	œ	End
	% +CA 200 ppm % + 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	0000		2210	0.300	0360	0.160	0.377	0.303	0.170	0.360	0.303	0.157
	% +CA 200 ppm % + 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	0.320	0.273	0.100	0.25.0	0.200	0.143	0.377	0.307	0.173	0.360	0.300	0.157
	+CA 200 ppm % + 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	0.320	0.250	0.130	0.500	0.260	0.123	0.377	0.247	0.140		0.223	0.133
	% + 8HQS 200 ppm +CA 200 ppm + 8HQS 200 ppm	0.320	0.260	0.133	0.320	0.263	0.140	0.377	0.247	0.130		0.220	0.137
	+CA 200 ppm + 8HQS 200 ppm	0.520	0.220	0.130	0350	0.240	0.120	0.377	0.210	0.120	0.360	0.180	0.120
		0.500	0.000	0 150	0 320	0.257	0.140	0.377	0.287	091.0	0.360	0.290	0.130
		0.520	022.0	0.150	0.320	0.267	0.150	0.377	0.287	0.170	0.360	0.283	0.160
	%	0.320	0.270	00110	0.320	0.233	0.120	0.377	0.203	0.120	0.360	0.200	0.117
	Sucrose 4% +CA 200 ppm	0.320	0.240	0.127	0.320	0.233	0.123	0.377	0.223	0.130	0.360	0.220	0.130
	Sucrose 4 % + 8HQS 200 ppm	0.520	0.240	0.103	0.320	0.210	0.100	0.377	0.190	0.100	0.360	0.217	0.107
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.500	014.0	01.0	0.320	0.260	0.137	0.377	0.290	0.157	0.360	0.307	0.137
		0.320	0300	0.157	0.320	0.280	091.0	0.377	0.290	0.153	0.360	0.303	0.153
	%	0250	7000	0.130	0 320	0.227	0.130	0.377	0.240	0.130	0.360	0.253	0.107
201	Sucrose 4% +CA 200 ppm	0.000	0.242	0.133	0.320	0.243	0.127	0.377	0.240	0.137	0.360	0.233	0.127
	Sucrose 4 % + 8HQS 200 ppm	0.320	0.207	0.113	0.320	0.240	0.100	0.377	0.207	0.110	0.360	0.213	0.093
Sucrose 4%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	025.0	002.0	0.170	0320	0.293	0.163	0.377	0.330	0.180	0.360	0.297	0.140
D.W		0.520	0.207	0.183	0.320	0.290	0.167	0.377	0.307	0.193	0.360	0.293	0.163
Sucrose Sucrose 4 %	%	0.320	0.250	0.133	0.320	0.250	0.123	0.377	0.263	0.133	0.360	0.253	0.130
S	Sucrose 4% +CA 200 ppm	0250	0.230	0.137	0.320	0.250	0.107	0.377	0.250	0.130	0.360	0.250	0.120
	Sucrose 4 % + 8HQS 200 ppm	0.320	0.230	0.120	0.320	0.227	0.087	0.377	0.230	0.123	0.360	0.243	0.107
Sucrose 4%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	022.0	0.237	0.153	0.320	0.263	0.117	0.377	0.287	0.150	0.360	0.250	0.120
D.W		0.250	0.250	0.157	0.320	0.273	0.130	0.377	0.280	0.143	0.360	0.260	0.140
STS 1-4 Sucrose 4 %	%	0.500	0000	0 000	0.320	0.190	0.083	0.377	0.203	0.103	0.360	0.193	0.093
901	Sucrose 4% +CA 200 ppm	0.320	0.217	0.107	0.320	0.217	0.103	0.377	0.217	0.110	0.360	0.220	0.93
	Sucrose 4 % + 8HQS 200 ppm	0.220	0.197	0.000	0.320	0.190	0.077	0.377	0.173	0.087	0.360	0.177	0.87
Sucrose 4%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.040.0	0000	8100		0.028	0.024	8	0.024	0.020	ť	0.031	0.024
S D at 5%			0.000	5000		0.037	0.032		0.032	0.026	Si.	0.041	0.032

combines treatment of STS and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4% + CA 200ppm) as compared to control (D.W) after (initial, 8, end days) from the treatment in the two seasons under this study. In addition, the combined treatment between kinetin at 20ppm for 24hours or Benzyl adenine at 10ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4% + CA 200ppm) recorded highly decreases in this parameter as compared to control (D.W) in the two seasons. On the reverse, the highest values ofthe percentage of total phenols in petals and flower stalk of tuberose cut flower spikes was recorded at 10% for 24hours, especially the combined treatment between sucrose 10% and holding solution contained (sucrose 4%) or (distilled water) as compared to control in the two seasons. Generally, the percentage of total phenols in petals and flower stalks of tuberose cut flower spikes was decreased as flower cut spikes advanced in age after initial till the end of age of longevity in both season in this study.

3.3.7.-Phosphorus content (%):

Data presented in Table (49) reveal that most pulsing solution treatments of tuberose cut flower spikes bases increased of potassium content (%) in petals and flower stalks after (8 and end days) from the treatment as compared to control in the seasons. However, pulsing tuberose cut flower spikes bases in STS at 1:4mM for 30 minutes caused the highest significant increase of this parameter as compared to control in the two seasons in most cases. Moreover, pulsing solution of kinetin at

20ppm for 24hours resulted highly increase in this concern in the two seasons when compared to control. The aforementioned results of cytokinins are in parallel with those obtained by Gendy (2000) stated that kinetin treatment increased phosphorus percentage of gladiolus cut flowers and El- Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of phosphorus in the florets of tuberose cut flowers compared to control and the other ones under study. The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird- of paradise, Gendy (2000) indicated that (STS) treatment increase phosphorus percentage of gladiolus cut flower spike petals. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions increased total, reducing and non reducing sugars percentages, but, decreased chlorophyll "A,B" and carotenoids contents as well as total nitrogen, N-protein, phosphorus and potassium percentages of gladiolus cut flowers. El-Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased total, reducing and non reducing sugars as well as the contents of total nitrogen, total protein, phosphorus and potassium in the florets of tuberose cut flowers spikes comparing to control or that of the other one under study. Gendy (2007) stated that the treatment of gladiolus cut flower spikes bases in holding solution contained (sucrose + 8-HQS +citric acid) record highly significant increase the percentage of total sugars in the flowers as compared to control (D.W. treatment)

Regarding to the effect holding solution treatments on Phosphorus content (%), data in Table (50) reveal that all holding solution treatments increased the percentage of phosphorus in petals and flower stalks of tuberose cut flower spikes as compared to control in the two seasons. However, the treatment of holding solution contained (sucrose 4% + CA at 200ppm + 8- HQS 200ppm) gave the greatest significant increase in the percentage of phosphorus in petals and flower stalk of tuberose cut flower spikes as compared to control (D.W) in the two seasons, followed in descending order by (sucrose 4% + CA at 200ppm) and (sucrose 4% + 8-HQS at 200ppm) after (8 and end days) from the treatment in the two seasons in most cases. On the reverse, the lowest values of this parameter was registered by using control in the two seasons.

The aforementioned results of sucrose are in parallel with those obtained by Gendy (2000) found that sucrose treatment (at 10%) decreased phosphorus percentage of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by Gendy (2000) suggested that (sucrose+ citric acid) treatment increased decreased phosphorus percentages of gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions decreased phosphorus percentages of gladiolus cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions decreased phosphorus percentages of gladiolus

cut flowers and El **Bouhy** (2002) indicated that holding solution treatment of S + 8HQS + CA increased the contents of phosphorus in the florets of tuberose cut flowers spikes comparing to control or that of the other one under study.

Concerning the effect of interaction between pulsing solution and holding solution treatments on Phosphorus percentage, Data in Table (52) reveal that the combinations treatments between STS at 1:4mM for 15 minutes and holding solution contained (sucrose 4% + CA 200ppm +8-HQS 200ppm) is being the most effective one for inducing the highest values of phosphorus percentage in petals and flower stalk of tuberose cut flower spikes after (initial, 8 and end days) from the treatment as compared to control (D.W) in the two seasons in most cases. Moreover, using the combined treatment between kinetin at 20ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or (sucrose 4% + CA 200ppm) recorded highly increases in this parameter after (8 and the end of longevity) as compared to control (D.W) in both season under this study. The aforementioned results are in parallel with those obtained by Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) decreased phosphorus percentage of gladiolus cut flower spike florets and El Bouhy (2002) noticed that the treatment of interaction between BA as pulsing solution and holding solution

Table (52): Effect of interaction between pulsing solutions and holding solutions treatments on phosphorus percentage in petals and flower stalk of Polianthes tuberose L. cut flower spike during the two seasons of 2007-2008/2008-2009.

D. I.da			Phosph	Phosphorus percentage in petals	entage in	petals		Phospho	orus ne	reentega in	flamor eta	H.	
solutions	Holding		1st season			2 nd season	-		1st season	st season 2nd	1101161 314	and const	1
20110110113	Solutions	Shelf li	Shelf life periods (days)	s (days)	Shelf lif	Shelf life periods (days)	s (days)	Shelf li	e.	periods (days)	Shelflif	season	
		Initial	∞	End	Initial	8	End	Initial		End	Initial	Initial & Fad	s (uay
	D.W	0.867	0.857	0.837	0.840	0.830	0.813	0.18.0	0 707	0.770	0000	0	End
	Sucrose 4 %	0.867	0.867	0.823	0 840	0280	0220	0.010	0.707	0.730	0.823	0.700	0.713
D.W	Sucrose 4% +CA 200 ppm	0.867	0.873	0.883	0.840	0.000	0.000	0.010	0./13	0./40	0.823	0.710	0.703
	Sucrose 4 % + 8HOS 200 ppm	0.867	0 873	0.000	0.040	0.000	140.0	0.010	0./90	0.810	0.823	0.737	0.727
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	0.867	0.027	0.027	0.040	0.823	0.823	0.810	0.770	0.787	0.823	0.720	0.713
	D.W	0.000	0.077	0.000	0.040	0.000	0.040	018.0	0.843	0.843	0.823	0.783	0.770
	Sucrose 4 %	0.007	0.027	0.640	0.840	0.827	0.823	0.810	0.803	0.813	0.823	0.740	0.740
NIII.20	Sucrose 4% +C x 200 mm	0.007	0.040	0.040	0.840	0.820	0.81/	0.810	0.830	0.837	0.823	0.757	0.733
ppm	Sucross 40/ ± 0000 200	0.80/	0.867	0.907	0.840	0.857	0.843	0.810	0.860	0.873	0.823	0.780	0.777
	Sucrose 40/ +C+ 100 - OHO - OHO	0.867	0.840	0.843	0.840	0.827	0.827	0.810	0.817	0.843	0.823	0.743	0.730
	Sucrose 4 /0 + CA 200 ppin + on QS 200 ppm	0.867	0.890	0.890	0.840	0.883	0.860	0.810	0.897	0.910	0.823	0807	0 787
	5.W	0.867	0.817	0.823	0.840	0.810	0.820	0.810	0.723	0.733	0.823	0 710	0 707
BA 10	Sucrose 4 %	0.867	0.830	0.840	0.840	0.817	0.823	0.810	0.787	0 767	0.803	0.727	0 0
ppm	Sucrose 4% +CA 200 ppm	0.867	0.833	0.850	0.840	0.850	0.840	0.810	0.790	0.780	220.0	0.707	0.730
	Sucrose 4 % + 8HQS 200 ppm	0.867	0.847	0.857	0.840	0.833	0.850	0.810	0.777	0.760	0.023	0.770	0.773
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.867	0.860	0.877	0.840	0.867	0.863	0180	0.837	0077	0.000	0.720	0.703
	D.W	0.867	0.837	0.857	0.840	0.830	0.830	0.010	0.037	0.0//	0.823	0.80/	0.793
Sucroso	Sucrose 4 %	0.867	0.850	0.870	0.840	0.000	0.000	0.010	0.720	0.743	0.823	0.730	0.720
10 %	Sucrose 4% +CA 200 ppm	0.867	0.890	0.863	0.640	0.027	0.007	0.010	0.09/	0./1/	0.823	0.727	0.727
i	Sucrose 4 % + 8HQS 200 ppm	0.867	0.833	0.837	0.840	0.007	0.000	0.010	0./5/	0.793	0.823	0.753	0.730
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.867	0833	0.843	0.010	0.017	0.000	0.010	0.750	0.760	0.823	0.723	0.707
	D.W	0.867	0880	0.000	0.040	0.000	0.000	0.010	0.80/	0.8/3	0.823	0.767	0.750
STS 1.4	Sucrose 4 %	0.867	0.860	0.867	0.640	0.000	0.007	0.810	0.767	0.760	0.823	0.757	0.750
E	Sucrose 4% +CA 200 ppm	0.867	0.907	0.000	0.040	0.007	0.000	0.010	0.803	0.807	0.823	0.747	0.743
	Sucrose 4 % + 8HQS 200 ppm	0.867	0.830	0.500	0.040	0.037	0.090	0.810	0.8//	0.910	0.823	0.813	0.807
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	0.867	0.020	0.000	0.040	0.000	0.84/	0.810	0.833	0.850	0.823	0.783	0.780
	5%		0.772	0.540	0.040	0.00/	0.8/3	0.810	-	0.917	0.823	0.823	0.810
L.S.D at	1%		0.000	0.073	1	0.052	0.052	r	0.073	0.052	а	0.052	0.052
		1	0.098	0.098	10	0.069	0.069	ï	0 098	0.060		0.000	0.000

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of (S + 8HQS + CA) increased the percentage and content total nitrogen, total protein and potassium in the florets of tuberose cut flower spike compared to control or the other ones.

3.3.8.-Potassium content (%):

Data in Table (49) demonstrate that most pulsing solution treatments of tuberose cut flower spikes bases increased potassium content (%) in petals and flower stalks after (8 and end days) from the treatment as compared to control in the seasons. However, pulsing tuberose cut flower spikes bases in STS at 1:4mM for 30 minutes caused the highest significant increase of this parameter as compared to control in the two seasons. Moreover, pulsing solution of kinetin at 20ppm for 24hours resulted highly increase in this concern in the two seasons when compared to control. The aforementioned results of cytokinins are in parallel with those obtained by El- Bouhy (2002) stated that pulsing tuberose cut flower spikes in BA increased the contents of potassium in the florets of tuberose cut flowers compared to control and the other ones under study.

The aforementioned results of silver thiosulphate (STS) are in parallel with those obtained by El-Saka (1992) on tuberose and bird of paradise, Gendy (2000) indicated that (STS) treatment decreased potassium percentage of gladiolus cut flower spike petals.

Referring to the effect holding solution treatments on Potassium content (%), Data in Table (50) reveal that most holding solution treatments increased the percentage of potassium in petals and flower stalks of tuberose cut flower spikes after (initial, 8 and end days) from the treatment as compared to control in the two seasons. However, the treatment of holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) approved to be the most effective treatment for inducing the highest values of the percentage of potassium in petals and flower stalks in the two seasons, followed in descending order by holding solution contained (sucrose at 4% + citric acid at 200ppm)and (sucrose at 4% + 8- HQS 200ppm). On the reserve, the lowest values of this parameter was registered by using holding solution contained (sucrose 4%) after (initial, 8 and end days) from the treatment in both seasons under this study.

The aforementioned results of (sucrose) are in parallel with those obtained by Gendy (2000) found that sucrose treatment (at 10%) decreased potassium of gladiolus cut flowers. The aforementioned results of (sucrose +citric acid) are in parallel with those obtained by Gendy (2000) suggested that (sucrose + citric acid) treatment decreased potassium percentages of gladiolus cut flowers. The aforementioned results of (sucrose +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that sucrose+8-HQS treatments as holding solutions decreased potassium percentages of gladiolus cut flowers. The aforementioned results of (sucrose + citric acid +8-HQS) are in parallel with those obtained by Gendy (2000) indicated that (S + 8-HQS + CA) treatments as holding solutions, decreased potassium percentages of gladiolus cut flowers and El Bouhy (2002) indicated that holding solution treatment of S + 8HQS + CA increased the contents of

potassium in the florets of tuberose cut flowers spikes comparing to control or that of the other one under study

As for the effect of interaction between pulsing solution and holding solution treatments on Potassium percentage in petals and flower stalks, Data in Table (53) demonstrate that the highest values of potassium percentage in petals and flower stalks of tuberose cut flower spikes were recorded by using the combinations treatments of STS at 1:4mM for 15 minutes, especially the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) followed descending by holding solution contained (sucrose 4% + CA 200ppm) after (initial, 8 and end days) from the treatment as compared to control (D.W) in the two seasons. Moreover, the combined treatment between kinetin at 20ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm) resulted highly increases of the percentage of potassium in petals and flower stalks of tuberose cut flower spikes as compared to control (D.W) in the two seasons. The aforementioned results are in parallel with those obtained by Gendy (2000) cleared that the interaction of treatments between (STS) or (Kin) as pulsing solutions and holding solution contained (S +8 HQS +CA) decreased potassium percentage of gladiolus cut flower spike florets and El Bouhy (2002) noticed that the treatment of interaction between BA as pulsing solution and holding solution of (S + 8HQS + CA) increased the percentage and content of potassium in the florets of tuberose cut flower spike compared to control or the other ones.

Table (53): Effect of interaction between pulsing solutions and holding solutions treatments on potassium percentage in petals and flower stalk of *Polianthes tuberose* L. cut flower spike during the two seasons of 2007-2008/2008-2009.

			Potas	sium pe	Potassium percentage in petals	in petals		1	Potas	oinm noro			
Pulsing	Holding		1st season	-		2nd season	On		181	st committee of the state of th	entage in I	lower stal	KS.
solutions	Solutions	Shel	Shelf life periods	riods					1 3643011	OH		2" season	no
	Solutions		(days)		Shelf	ife perio	Shelf life periods (days)	Shelf	ife perio	Shelf life periods (days)	Shelf	Shelf life periods (days)	sb
		Initial	00	End	Initial	œ	End	Initial	œ	End	Initial	0	
	D.W	2.997	2 8 50	059 C	3 157	2022	3			-	The state of the s	0	
	Sucrose 4 %	2 997	2 003	2 670	3.127	2.923	2.633	2.327	2.257	2.027	2.350	2.287	
D.W	Sucrose 4% +CA 200 nnm	2007	2.505	2.070	3.137	2.900	2.610	2.327	2.297	2.123	2.350	2.290	1
	Sucrose 4 % + 9HOS 200	2.99/	2.903	2./10	3.157	3.100	2.727	2.327	2,323	2.150	2 350	7757	1
	Sucrose 40/ +C 4 700 BILO 200	2.997	2.950	2.667	3.157	2.083	2.717	2.327	2.29	2.100	2 350	2 207	
The last designation of the la	Day of the Car 200 ppm + only 200 ppm	2.997	3.077	2.790	3.157	3.160	2.760	2.327	2.370	2.197	05E C	3360	
	D.W	2.997	2.990	2.653	3.157	3.067	2 657	227	22/2	2 102	2000	2.300	
Kin.20	Sucrose 4 %	2.997	2.927	2.640	3.157	2.950	2633	2 227	2 200	2.103	2.330	2.337	
ppm	Sucrose 4% +CA 200 ppm	2.997	3.117	2.743	3.157	3.177	2 783	227	2 270	141.7	2.330	2.317	2.083
	Sucrose 4 % + 8HQS 200 ppm	2.997	2.997	2.760	3.157	3.117	2.760	2 327	2 340	071.0	2250	2.39/	2.227
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.997	3.060	2.720	3.157	3.127	2757	7 377	2 272	0/1.2	2.330	2.363	2.233
	D.W	2.997	2.937	2.653	3 157	3 400	2 607	7 277	2010	2.22	2.330	2.400	2.280
BA 10	Sucrose 4 %	2.997	2.903	2.607	3 157	2 077	2 672	770.4	2.000	2.133	2.350	2.317	2.150
ppm	Sucrose 4% +CA 200 ppm	2.997	2.993	2 700	2 157	3 100	2717	2.327	2.280	2.060	2.350	2.307	2.017
	Sucrose 4 % + 8HQS 200 ppm	2.997	3.063	2710	2 157	2 120	2770	2.321	2.323	2.177	2.350	2.367	2.217
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	2 997	3 063	3710	21.67	0.100	2.720	2.327	2.327	2.166	2.350	2.330	2.157
	D.W	2007	2000	2.710	3.15/	3.137	2.743	2.327	2.327	2.193	2.350	2.383	2.237
111	Sucrose 4 %	2.997	2.900	2.650	3.157	3.023	2.700	2.327	2.327	2.177	2.350	2337	2 133
е	Sucross 40% +C A 700	1.99/	2.900	2.617	3.157	2.950	2.677	2.327	2.263	1.983	2 350	2 207	1 007
10 %	Sucrose 4 % + CA 200 ppm	2.997	3.043	2.763	3.157	3.133	2.753	2.327	2.327	2 153	2350	2357	7 202 1
	Sucross 40/ +C 4 700 BILOS 700	2.997	2.937	2.700	3.157	3.163	2.753	2.327	2.323	2.103	2350	2330	2 172
	mdd 007 con bbut a grifo 200 bbut	2.99/	3.070	2.750	3.157	3.177	2.737	2.327	2.330	2.193	2 350	0360	3 373
	Sucree 4 0/	2.997	3.017	2.697	3.157	3.073	2.700	2.327	2.330	2 223	055 C	7 382	1
STS 1:4	Sucrose + 70	2.997	2.933	2.663	3.157	3.020	2.703	2.327	2.317	2 167	2350	7 757	C02.2
ml	Sucrose 4% +CA 200 ppm	2.997	3.150	2.753	3.157	3.283	2.783	2 327	2 171	7 767	0.000	2.333	2.007
	oucrose 4 % + 8HQS 200 ppm	2.997	3.093	2.737	3.157	3.193	2.743	2 327	3 340	2 100	2.500	2.413	2.2/3
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.997	3.193	2.760	3.157	3.280	2 787	7777	3 400	2 777	2.330	2.383	2.233
L.S.D at	5%	•	0.116	0.052		8000	0 050	1:01	2.400	117.7	2.330	2.427	2.283
	1%		0 155	0.060	9 9	0.277	2000	t	0.033	0.073	ı	0.033	0.090
			0.1.00	0.009		0.2//	0.069	t	0 044	800 0		0000	0

PART (2)

Part II: The first experiment: (growth regulators and storage periods of Strelitzia reginae)

4.1. Effect of some growth regulators on:

4.1.a.- Vegetative growth measurements:

According to data presented in Table (54) on some vegetative growth measurements of bird of paradise plant as affected by some pre-harvest growth regulators treatments i.e., GA₃ at 200 and 300ppm, BA at 25 and 50ppm and kinetin at 50 and 100ppm, it could be concluded that 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 GA₃ treated plants. Regardless control, the lowest means values of all abovementioned parameters by bird of paradise cut flower stalks was registered by using the treatment of BA at 25ppm in the two seasons.

4.1.b.- Flowering growth measurements:

Data in Tables (55 & 56) reveal that 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

Table (54): Effect of some growth regulators on Number of leaves / plant & plant height /cm and fresh weight of one leaf/g of Strelitzia reginae Ait. during the two seasons of 2007-2008/2008-2009

Treatments | No. of leaves / plant | Plant height / cm | f. w. of one leaf / g

Control GA ₃ 200ppm GA ₃ 300ppm BA 25 ppm BA 50 ppm	irol Oppm Oppm ppm	plant	Plant height / cm 1st season 91.33 140.0 143.67 113.67
BA 50 ppm	ppm	132.0	113.67
Kin 50 ppm	ppm	156.33	131.33
Kin 100 ppm	ppm	169 33	137.67
L.S.D at	7	13.3	8.371
	1%	18.41	11.74
		2	2 nd season
Control	rol	60.67	96.33
GA ₃ 200ppm	ppm	155.0	146.33
GA ₃ 300ppm	ppm	160.67	151.67
BA 25 ppm	opm	122.67	128.33
БА 50 ppm	opm	143.0	136.0
W:= 100 ppm	ppm	169.0	145.33
Kin 100 ppm			154.33
L.S.D at	10%		8.91
	17/	15.75	12.49

Table (55): Effect of some growth regulators on some flowering parameters of Strelitzia reginae Ait. During the two seasons of 2007-2008/2008-2009

Treatments		fresh weight of flower stalk with spathe/g	fresh weight of flower stalk without spathe / g	fresh weight of spathe / g	fresh weight of One floret/g	Length of flower stalk / (cm)	Thickness of flower stalk / (cm)	Spathe length / (cm)	Spathe width / (cm)	Thickness / (cm)
					1 St season	=				
				25.00	2 53	77 67	0.700	18.33	1.97	1.23
Control		84.70	57.13	27.57	60.6	136.67	0.833	24.33	2.43	1.53
GA, 200ppm	Е	130.43	89.53	40.90	4.60	120.07	0.933	24.00	2.60	1.57
GA, 300npm	8	151.50	101.93	49.57	5.03	133.07	1 000	1961	2.70	1.53
DA 25 nnm	-	98.03	65.63	32.40	4.03	94.67	0007	00 00	2 90	1.90
dd c7 va		20 001	73.23	36.60	4.30	103.0	1.200	77.70	900	001
BA 50 ppm	E I	50.701	83.77	39.87	4.23	120.00	1.033	21.33	2.80	200
Kin 50 ppm	8	123.13	17.50	40.33	447	131.67	1.067	23.00	3.10	7.07
Kin 100 ppm	Щ	126.80	86.47	2000	0.406	160'9	0.159	2.072	0.264	0.308
	2 %	7.039	5.203	3.305	0.400	0 630	0.223	2.905	0.370	0.432
L.S.D at	1%	898.6	7.295	4.633	0.569	8.339	227.0			
					2 nd season	no			01.0	1 30
		1	(2.22	31 63	3.60	84.00	0.767	19.33	7.10	00.1
Control		93.97	05.20	50.17	7 03	137.67	0.867	24.33	2.60	1.70
GA ₃ 200ppm	md	135.90	93.97	41.93	4.25	149.00	0.933	24.67	2.70	1.73
GA ₃ 300ppm	md	156.60	103.97	57.03	2.15	104 33	1.267	20.00	2.93	1.80
BA 25 ppm	ш	105.00	68.40	36.60	4.20	79011	1 300	22.33	3.07	1.93
BA 50 ppm	mı	117.13	76.93	40.20	4.60	00000	1 067	22.00	3.13	1.93
Kin 50 ppm	md	125.67	85.03	40.63	4.53	00.051	1.133	23.33	3.27	2.20
Kin 100 ppm	mdı	134.83	90.40	44.43	4.83	8 519	0.232	2.628	0.270	0.323
	2 %	6.647	5.971	3.619	0.508	00011	0.325	3.685	0.378	0.453
L.S.D at	7.0.	0100	8 370	5.073	0.432	0+6.11	0.0			

Table (56): Effect of some growth regulators on some Dry weight /g 2008/2008-2009 of Strelitzia reginae Ait. during the two seasons of 2007-

5 %	00ppm 5 ppm 1 ppm 1 ppm 0 ppm 5 %								GA ₃ 200ppm	Control		-	1%	5 %	Kin 100 ppm				BA 25 ppm	GA ₃ 300ppm	GA ₃ 200ppm				Treatments Dry w	
14.70 11.97 12.20 12.17 12.17 13.27 14.94	4.70 1.97 2.20 2.17 3.27 3.494	4.70 1.97 1.220 2.17 2.17	4.70 1.97 2.20 2.17	4.70 1.97 2.20	4.70 1.97	4.70	4 70		13.40	9.87		.007	1607	1.146	12.90	11.67	1.07	11 87	11.37	14.17	13.20	8.00			Dry weight of one leaf/g	
21.33 25.47 16.27 17.63 18.80 19.03	21.33 25.47 16.27 17.63 18.80 19.03	21.33 25.47 16.27 17.63 18.80	21.33 25.47 16.27 17.63	21.33 25.47 16.27 17.63	21.33 25.47 16.27	21.33 25.47	21.33	21.33		15.07	2 nd season	2.084		1 486	17.23	17.03	16.03	17.70	14 70	23 23	19.27	13.70	1 st season		Dry weight of flower stalk with spathe / g	
9.87 11.20 11.67 11.83	9.87 11.20 11.67 11.83	9.87	9.87	9.87	9.87	16.27	1/22	14.00	5.57		in .	1.896	1.353	10:80	10.00	10.40	10.53	9.83	14.0/	14.63	13.00	9.20		without spathe / g	Dry weight of flower stalk	
7.20	7.20		7.13	0.45	6.40	6 40	9.20	7.33	5.70			NS	1.553	6.43	0.03	0.00	5 50	4.87	7.75	6.27	4.50	4.50		Qtc	Dry weight of spathe	
9500		0.553	0.500	0.517	0.4/0	0.000	0 683	0.543	0.417		0.010	0.045	0.032	0.517	0.480	0.477		0.437	0.613	0.500	0.373			One floret/g	Dry weight of	

length of flower stalk, 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 GA₃ at 300ppm in both seasons. Also, using the treatments of GA₃ 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 and spathe thickness were recorded by using the treatments of Kinetin at 100ppm and BA at 50ppm, respectively in both seasons.

The greatest values of spathe length was recorded by using the treatment of GA₃ at 300ppm and GA₃ at 200ppm as compared to control of both seasons. Irrespective control, The lowest means values of most the aforementioned parameters of bird of paradise cut flower stalks was registered by using the treatment of BA at 25ppm in the two seasons.

4.1.c.-Chemical composition determinations:

Data in Table (57) demonstrate that 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 GA₃ at 300ppm, followed descendingly by using 100ppm Kinetintreated plants in both seasons. Whereas, the highest values of

Table (57): Effect of some growth regulators on Chlorophyll ,a,&b and Carotenoids (mg/g f. w.) & total nitrogen, phosphorus and potassium percentage in leaves of Strelitzia reginae Ait. During the two seasons of 2007-2008/2008-2009

Treatments | Chlorophyll ,a, | Chlorophyll ,b, | Carotenoids | Total nitrogen | Phosphorus | potassium

ricaulients	(mg/g f. w.)	(mg/g f. w.)	(mg/g f. w.)	Total nitrogen	Phosphorus	potassium
			1st season	0,	percentage	percentage
Control	1.047	0.780	0.243	2.503	0 202	
GA ₃ 200ppm	1.160	0.843	0 322	2 220	0.323	2.760
GA ₃ 300ppm	1.307	0.918	0.772	2.3/0	0.384	3.370
BA 25 ppm	1.130	0.670	0.429	3.707	0.407	3.460
BA 50 ppm	1 112	0.010	0.290	2.863	0.340	3.220
Vin en	1.113	0.847	0.277	3.107	0371	2 1
mdd oc urv	1.090	0.823	787	3 153	0.571	3.280
Kin 100 ppm	1.207	0.875	7,02.0	3.133	0.340	3.200
5%	0.056	NIC	0.330	3.553	0.390	3.440
L.S.D at 1%	0.079	No.	0.097	0.178	0.056	SN
	0.013	N.S.	N.S.	0.249	0.079	014
			2 nd season			
Control	1.097	0.832	0.294	3 340	0000	
GA3 200ppm	1.173	0.855	0.331	2 573	0.329	2.790
GA ₃ 300ppm	1.330	0.913	0.390	3 640	0.451	3.400
BA 25 ppm	1.143	0.840	0.240	0.040	0.365	3.450
BA 50 ppm	1.183	0.814	0.040	3.103	0.298	3.220
Kin 50 ppm	0011	0.017	0.332	3.533	0.387	3.330
Kin 100 nnm	25.1	0.912	0.227	3.107	0.350	Ucc E
mdd oor man	1.25/	0.903	0.357	4.303	0 400	277.0
L.S.D at 5%	0.056	0.056	N.S.	0.406	0.702	3,460
4 7 0	0.0/9	N.S.	N.S.	0.569	0.079	0.261

to control in the two seasons. The lowest mean values of vase life (days) by bird of paradise cut flower stalks were registered by using the treatments of BA at 25ppm in the first season and BA at 50ppm in the second season.

As for the effect of storage periods on vase life (days) (longevity), it is quite clear from the data in Table (58) that there were gradual decrease in vase life (days) of bird of paradise cut flower stalks with extending storage periods at $7 \pm 1^{\circ}$ C for different days (0-time, 7, 14, 21, 28, 35 and 42 days). However, bird of paradise cut flower stalks were stored at $7 \pm 1^{\circ}$ C for 42 days recorded highly significant decrease in vase life as compared to other different storage periods in both seasons. Moreover, storage periods at $7 \pm 1^{\circ}$ C for 0-time treatment showed the greatest values in vase life of bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

Regarding to the effect of interaction between growth regulators and storage periods on Vase life (day), data in Table (58) reveal that the interaction treatment between growth regulators of GA_3 300ppm or kinetin at 100ppm and storage periods at $7 \pm 1^{\circ}C$ for 0 or 7 days record highly significant increase in longevity of bird of paradise cut flower stalks compared to other treatments under study in both seasons.

Data resulted that the highest values in vase life in the first season but in the second season the highest values in vase life of bird of paradise cut flower stalks by using the interaction between of kinetin at 100ppm and storage periods for 0, 7 days.

Moreover, regardless control the lowest values of vase life of bird of paradise cut flower stalks by using the interaction between BA at 25ppm and storage period for 42 days when compared to other treatments under study.

5.1.b.-Change percentage in fresh weight of cut flower stalks:

According to data presented in Table (59) on change percentage in fresh weight of bird of paradise cut flower stalks as affected by some pre harvest treatments as (growth regulators) i.e., gibberellic acid (GA3) at 200 and 300ppm, Benzyladenine (BA) at 25 and 50ppm and Kinetin (kin) at 50 and 100ppm, it could be concluded that all pre harvest treatments succeeded in increasing change percentage in fresh weight of cut flower stalks as compared with control in both seasons of this study. However, GA3 at 300ppm spraying plants showed to be the most effective treatment for producing the highest values of the parameter as compared with control and the other treatments in both seasons. Moreover, using the treatments of kinetin at 100ppm and Benzyladenine at 50ppm resulted in highly significant increases in this parameter. The differences between the aforesaid two treatments were not significant in both seasons. The remained treatments occupied an intermediate position between the abovementioned treatments in both seasons. Anyway, it is worthy to notice that the change percentage in fresh weight of cut flower stalks was increased as flower cut stalks advanced in age till 8 days of shelf life periods then decreased after that down to the end of shelf life periods in the two seasons.

Table (59): Effect of some growth regulators treatments, on Change percentage in fresh weight and Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Control 4.195 1	Shelf life periods (days)	16 16 17 18 19 19 19 19 19 19 19	20 21.62 -21.62 -2.05 1.58 -10.55 -5.59 -5.63		28 1" season	4	8	Shelf li	Shelf life periods (days)	days)	24	28
Control 4.195 1.626 GA3 200ppm 7.895 8.939 GA3 300ppm 8.707 10.87 BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 50 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68	4.950 - 4.950 - 8.440 10.670 0.612 6.240 8.841 1.324 1.753 1.753	16 12.99 3.16 6.73 4.32 0.83 0.22 4.47	50 005 538 539 63 63		28 season	4	8	13	91	20	24	30
Control 4.195 1.626 GA3 200ppm 7.895 8.939 GA3 300ppm 8.707 10.87 BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68					season			7				2
Control 4.195 1.626 GA3 200ppm 7.895 8.939 GA3 300ppm 8.707 10.87 BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 50 ppm 8.502 10.37 5 % 0.681 0.585 1 % 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68				16.02 -1.55 0.77								
GA3 200ppm 7.895 8.939 GA3 300ppm 8.707 10.87 BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1 % 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68			1.58 1.58 -10.55 -5.59 -5.63	-1.55	-16.42	3.381	1.605	-1.995	-7.505	-12.68	-10.63	-5.51
GA3 300ppm 8.707 10.87 BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 I % 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68			1.58 -10.55 -5.59 -5.63 -1.45	77.0	-2.77	6.214	7.767	6.962	3.105	-1.08	-1.16	-0.75
BA 25 ppm 6.046 5.119 BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68			-5.59 -5.63 -1.45		0.18	1.971	10.01	989.6	6.624	2.96	0.85	68.0
BA 50 ppm 8.062 8.475 Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68		0.83 0.22 4.47 0.685	-5.59 -5.63 -1.45	-8.01	-8.38	4.729	4.138	1.962	-3.067	-6.73	-5.14	-3.08
Kin 50 ppm 7.221 9.961 Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200 ppm 7.687 9.009 GA3 300 ppm 8.310 10.68		0.22 4.47 0.685	-5.63	-4.31	-5.38	6.067	7.267	4.06	1.167	-3.90	-3.07	-1.79
Kin 100 ppm 8.502 10.37 5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68		4.47	-1.45	-4.43	-4.93	6.067	7.886	6.495	1.538	-2.70	-2.51	-1.43
5 % 0.681 0.585 1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68	-	0.685		-1.07	-2.23	7.395	8.424	8.310	4.419	-0.05	-0.22	-0.03
1% 0.901 0.775 Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68	+		0.763	1.067	909.0	0.516	0.471	4.678	0.309	0.745	0.307	1.612
Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68		0.907	1.011	1.413	0.802	0.816	0.622	6.192	0.409	986.0	0.406	2.135
Control 3.613 1.105 GA3 200ppm 7.687 9.009 GA3 300ppm 8.310 10.68				7.	2 nd season							
GA3 200ррт 7.687 9.009 GA3 300ррт 8.310 10.68	-5.661	-13.96	-22.60	-17.90	-16.48	3.143	1.224	-3.462	-8.914	-13.04	-10.74	-7.30
GA3 300ppm 8.310 10.68	8.273	3.88	-0.733	-1.24	-2.75	6.129	8.124	7.995	3.595	-0.09	-0.14	-1.15
	11.071	7.27	1.86	0.45	-0.37	8.943	9.738	10.052	7.229	2.63	1.00	99.0
BA 25 ppm 5.761 5.566	2.294	-3.76	-8.24	86.9-	-7.99	4.700	4.552	2.329	-2.119	-6.22	-5.01	-2.71
7.017 8.245	5.816	2.14	-5.58	-3.93	-5.54	5.867	7.329	5.324	0.586	-3.64	-2.99	-2.07
7.040 8.565	6.230	1.99	-5.00	-4.10	-4.66	5.510	7.295	5.962	1.443	-3.02	-4.50	-1.49
8.072 9.946	8.692	4.34	-0.52	96.0-	-2.33	5.271	8.948	9.314	4.305	0.03	-0.29	-0,41
5 % 0.612 0.624	0.657	1.796	1.108	0.790	0.679	2.075	0.337	1.512	0.475	0.318	1.188	0.577
0.811 0.826	0.870	2.378	1.467	1.057	668.0	2.747	0.446	2.002	0.629	0.421	1.467	0.764

Referring to the effect of storage periods on the change percentage in fresh weight data in Table (60) reveal that the change percentage in stalks fresh weight of Bird of paradise cut flower stalks was increased as flower cut stalks advanced in age till 12 days of 0-time and 7-time but till 8 days of 14, 21 time on reverse 28, 35, 42-time till 4 day and then decreased after that down to the end of longevity in the two seasons. Moreover, storage periods at $7 \pm 1^{\circ}$ C for 0-time treatment showed highly significant increase in change percentage in stalks fresh weight of Bird of paradise cut flower stalks when compared to the other ones under study in the two season. Whereas, the lowest value of change percentage in fresh weight was gained by using 42 days storage periods. This trend was true during all tested shell life periods in both seasons of this study.

As for the interaction effect between growth regulators and storage life periods on the change percentage in fresh weight data in Tables (61 & 62) reseal that all the combinations between growth regulators and storage life periods succeeded in increasing the change percentage in fresh weight of bird paradise cut flower stalks during the two seasons as compared with control. However, the combinations of GA₃ at 300ppm showed to be the most effective one for inducing the highest values of this parameter, especially the combined treatment between GA₃ at 300ppm and storage life periods at 0-time during all the tented shelf life periods in two seasons of this study. Anyhow, in most cases the values of the combinations between growth regulators and storage life periods was increased as flower cut stalks prolonged in age till 12 days of shelf life periods then decreased

Table (60): Effect of Storage periods (Days) treatments on Change percentage in fresh weight and Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

						tof out flo	war etalk				Water b	Water balance (g)/stalk	alk		
		ت	Change percentage in Iresu weight of cut more:	entage in	Iresii weigi	11 OI Cut 110					Shelf lif	Shelf life periods(days)	days)		
T	opare.			Shelf li	Shelf life periods(days)	(days)		9		0	13	91	20	24	28
Leannents	liciits	4	∞	12	91	20	24	87	+	0			-		
								-	li seasoni						
	0	12.23	16.64	16.116	14.29	10.24	5.69	06.0	11.43	16.33	16.57	13.895	09.6	5.36	1.06
		20.41	07 61	12 049	8 64	3.30	-2.14	-7.96	8.857	11.31	11.00	7.186	3.48	-1.16	-5.23
	,	+7.01	64.71	200.00	4 57	850	6.03	17 71	7.714	8.829	8.41	4.271	-0.44	-4.83	-7.51
Storage	14	10.04	10.98	4.394	10.4	00.0	2000	21.00	6 5 10	6 538	7.65	9260	4.31	-8.84	(30)
periods	21	7.035	7.738	4.833	-0.09	-6.58	-12.80	-70.10	610.0	0.000	00.7	2		9	
(Days)	36	\$ 105	4.263	0.995	-6.01	-12.62	-19.34		3.814	3.486	11.24	-4.124	-8.12	-12.40	9
	01	3 636	1815	-2 703	-10.18	-18.39	0		2.786	1.376	4.67	-6.567	-11.49	,	
	S S	3.020	0.620	7 955	13.14	69 06-			1.705	-0.781	-3.97	-8.657	-12.88		0
	47	2.348	0.439	1 324	5890	0.763	1.067	909.0	0.516	0.471	4.678	0.309	0.745	0.307	1.612
I S D at	%5	0.081	0.383	1.52.1	10000	110	1413	0 800	0.816	0.622	6.192	0.409	986.0	0.406	2.135
	1%	0.901	0.775	1.753	0.907	1.011	C14:1	0.002	0.00						
								ř.	2nd season						
		1	20 51	150 31	12.71	10.15	5 34	0.48	9.567	16.10	17.70	13.838	9.74	3.92	0.85
	0	11.44	19.01	10.231	0000	75.4	2.10	7.80	8 614	10.99	11.47	7.767	3.11	-1.70	-5.80
	7	9.793	11.83	12.234	0.50	4.30	1 1 1		7 205	6 057	8 40	1 867	-0.53	-5.43	-9.51
	14	8.480	10.59	199.6	5.29	-0.65	-6.95	-13.47	067.1	0.00	0.10		00 4	00.0	
Storage	7.1	6.902	7.759	5.241	0.44	-5.59	-11.84	-19.30	5.490	6.457	4.23	0.114	-3.99	-8.28	ē
(Days)	3.6	\$ 000	4.478	096.0	-5.25	-11.79	-19.03	ı	3.719	3.367	0.56	-4.124	-7.80	-11.18	ï
	97	3 320	2 067	-2.591	-7.98	-17.21		м	3.671	1.238	-1.98	-6.176	-10.85	00.00	6
	3	236.0		1905	-12.61	-20.28	*	r	1.405	0.100	-2.95	-9.162	-13.05	0.00	
	7	101.7	120.0	0.657	1 796	1 108	0.790	0.679	2.075	0.337	1.512	0.475	0.318	1.188	0.577
L.S.D at	-	0.012	170.0	0.870	2 378	1.467	1.057	0.899	2.747	0.446	2.002	0.629	0.421	1.467	0.764
	1%	0.811	0.020	0.0.0											

Results and Discussion

Table (61) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Change percentage in fresh weight of *Strelitzia reginae Ait* cut flower stalk during the first season of 2007-2008.

Treat	ments				THE REAL PROPERTY IN	ight of cut flov		
					1st seasor			
Growth	Storage			She	If life period	s (days)		
regulators	periods	4	8	12	16	20	24	28
	0	10.098	12.852	10.570	6.68	-0.564	-7.667	-14.46
	7	7.184	4.588	-0.304	-7.10	-15.227	-24.689	-33.028
	14	5.848	3.159	-1.734	-8.13	-16.473	-23.130	-30.017
Control	21	4.454	2.176	-5.520	-11.62	-18.227	-26.865	-37.406
	28	3.251	-0.978	-8.605	-18.94	-26.795	-29.804	-
	35	0.512	-4.360	-14.000	-24.66	-35.754	-	-
	42	-1.980	-6.059	-15.055	-27.21	-38.188	-	
	0	11.382	15.505	17.667	14.95	11.200	7.434	2.455
	7	10.332	13.036	13.246	10.30	5.029	0.807	-3.806
GA_3	14	10.328	13.450	13.262	8.72	3.748	-0.976	-5.406
200ppm	21	8.356	9.689	8.421	3.94	-1.376	-6.554	-12.608
- CONTRACTOR	28	6.402	6.051	5.103	-0.35	-5.591	-11.587	-
	35	5.083	4.046	1.552	-3.93	-10.806	-	
	42	3.385	0.799	-0.168	-11.58	-16.546	-	
	0	14.757	20.629	21.335	20.15	17.671	14.196	9.784
	7	11.228	14.649	17.049	14.88	10.883	6.309	1.947
GA_3	14	10.935	14.342	14.370	10.44	6.346	2.064	-2.765
300ppm	21	8.981	11.202	10.741	7.72	2.355	-2.655	-7.730
	28	5.896	6.817	5.934	-0.51	-6.829	-14.501	
	35	5.430	5.428	4.657	-0.52	-7.667		-
	42	3.723	3.036	0.605	-5.03	-11.713	-	
	0	12.163	15.915	10.372	13.92	10.119	5.130	-0.122
	7	9.219	10.809	9.939	6.18	1.811	-3.430	-10.581
	14	7.409	7.552	5.555	0.42	-3.870	-9.657	-17.284
BA 25 ppm	21	5.105	3.318	-0.960	-6.46	-13.090	-21.739	-30,649
	28	4.653	1.427	-3.087	-9.50	-16.683	-26.373	
	35	1.838	-1.974	-8.166	-17.58	-26.543		
	42	1.938	-1.218	-9.367	-17.22	-25.622	50	
	0	12.696	17.247	17.787	14.61	11.460	7.274	3.072
	7	10.158	13.759	13.299	11.87	4.062	-1.004	-5.930
	14	15.825	12.169	11.057	6.79	1.564	-3.825	-15.365
BA 50 ppm	21	6.503	8.070	5.906	0.55	-5.745	-12.720	-19.461
-	28	5.098	7.943	1.897	-5.92	-13.072	-19.892	
	35	3.833	2.603	-1.971	-10.08	-19.102		-
	42	2.321	0.532	-4.745	-12.02	-18.308	5	*
	0	12.413	17.123	16.868	13.64	9.633	5.026	1.201
-	7	12.046	15.843	15.189	10.91	6.865	2.195	-4.303
Zi- 50	14	9.287	12.397	10.789	4.12	-0.046	-5.704	-12.368
Cin 50 ppm	21	6.947	8.686	5.712	-0.39	-6.454	-12.866	-19.025
-	28	4.210	4.878	1.817	-5.79	-12.358	-19.668	18
-	35	2.881	2.512	-3.531	-11.01	-17.807	181	
	42	2.761	1.290	-3.164	-9.96	-19.239	-	
-	0	12.121	17.175	18.211	16.10	12.154	8.422	4.395
	7	11.521	14.765	15.926	13.45	9.640	4.826	-0.001
in100com	14	10.638	13.768	13.862	9.36	4.705	-0.961	-5.746
in100ppm	21	8.897	11.025	9.529	5.59	-3.405	-6.206	-14.264
	28	6.223	6.703	3.909	-1.04	-7.008	-13.567	
-	35	5.821	4.453	2.539	-3.48	-11.034		
	42 50/	4.289	4.690	-2.088	-8.94	-15.182	2	
L.S.D at	5%	1.801	1.549	3.504	1.812	2.020	2.823	1.603
	1%	2.385	2.050	4.639	2.399	2.674	3.738	2.122

Table (62) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Change percentage in fresh weight of *Strelitzia reginae Ait* cut flower stalk during the second season of 2008-2009.

Treatme	nts		Change pe	rcentage in	tresh weigh 2 nd season	t of cut flowe		
				C1 -16 1:	fe periods (days)		
Growth	Storage		0 1		16	20	24	28
regulators	periods	4	8	10.190	5.48	-1.475	-8.211	-12.437
	0	9.645	12.182	-0.600	-7.90	-14.905	-26.422	-32.248
	7	5.915	2.883		-9.37	-14.012	-25.642	-31.558
	14	4.349	2.825	-1.143	-13.17	-20.403	-27 .816	-39.143
Control	21	3.863	1.051	-5.312	-19.13	-29.467	-37.234	•
	28	2.977	-1.199	-9.170	-25.74	-35.950	-	20
	35	0.227	-4.283	-15.120	-27.92	-41.825		-
	42	-1.684	-5.722	-18.472	16.57	10.958	8.372	2.064
	0	11.521	16.032	17.359	11.60	6.139	1.029	-2.313
	7	10.057	12.628	13.829	8.44	3.362	-2.344	-7.972
	14	9.346	12.626	13.031	3.89	-0.894	-4.958	-11.044
GA ₃ 200ppm	21	7.926	10.207	8.582		-3.018	-10.755	
5 505	28	6.127	6.889	4.838	0.08	-6.829		
	35	5.454	4.068	3.141	-2.8	-14.851	-	
	42	3.373	0.616	-2.867	-10.56		12.349	6.829
	0	12.901	18.818	20.689	18.57	16.096	6.351	1.710
t	7	10.352	12.599	17.302	14.45	10.323	-0.283	-3.756
t	14	10.090	13.530	13.978	10.32	5.543	-0.283	-7.353
GA ₃ 300ppm	21	9.345	11.858	11.634	8.30	2.808		-1.000
GA3 Sooppin	28	6.616	7.226	6.106	1.11	-5.460	-12.750	-
1	35	4.268	5.371	5.033	0.37	-6.692	*	
	42	4.596	5.335	2.757	-2.20	-9.573	÷ 210	-0.365
	0	11.769	15.419	16.922	13.33	13.714	5.210	
	7	8.862	11.395	10.570	6.50	9.790	-2.809	-10.853
	14	7.301	7.149	5.578	1.73	-4.099	-9.712	-16.506
D 4 25 nnm	21	4.900	3,215	0.426	-6.25	-11.493	-19.798	-28.222
BA 25 ppm	28	4.505	2.710	-3.114	-8.13	-16.093	-21.776	-
	35	1.737	-0.776	-7.205	-14.81	-24.754	21	-
	42	1.255	-0.147	-7.116	-18.66	-24.709	5	2 121
	0	12.007	16.719	15.897	13.40	11.243	6.353	2.431
	7	10.078	13.581	13.367	8.16	4.899	-0.575	-6.534
	14	9.674	11.480	10.437	6.27	0.076	-4.958	-16.059
D. 50	21	7.658	8.365	5.575	4.26	-4.924	-9.596	-18.603
BA 50 ppm	28	4.736	4.920	2.680	-5.90	-11.850	-18.706	-
	35	3.107	2.692	-2.580	0,71	-19.786	/5	*
	42	1.862	-0.045	-4.667	-11.91	-18.706		
	0	10.743	15.390	15.941	13.73	8.959	5.326	0.640
	7	11.786	15.257	14.993	11.78	5.814	1.642	-4.387
		8.699	12.628	11.824	10.48	0.565	-5.211	-11.254
	14	6.450	8.065	6.194	0.41	-5.051	-11.565	-17.637
Kin 50 ppm	21	4.836	4.455	2.069	-3.70	-10.662	-18.923	
	28	3.387	2.987	-4.585	-9.95	-16.253		-
I	35	3.380	1.181	-2.824	-8.82	-18.360	-	
	42	_	16.498	16.760	14.90	11.522	7.988	4.228
	0	11.513	14.468	16.319	-	9.849	5.432	-0.602
l	7	11.499	13.885	13.920	72/10/20	4.047	-0.488	-6.83
	14	9.902	11.550	9.588	5.65	0.859	-6.613	-13.08
Kin 100 ppm		8.170	6.343	3.311	-1.10	-5.796	-13.052	
	28	5.896	4.407	3.182	-3.58	-10.216	-	
II.	35	5.060	2.473	-2.235	0.10	10 E (12 a 4		- 2
	42	4.464	1.550	1.739			2.113	1.797
L.S.D at	5%	1.620	1.550	1.739	6.291		2.797	2.379

after that down to the end of shelf life periods in the two seasons.

5.1.c.-Water balance (g)/stalks:

Data of both seasons presented in Table (59) reveal that all studied pre-harvest treatments significantly increased water balance (g)/stalks of bird of paradise cut flower stalks as compared with control. Water balance by Bird of paradise cut flower stalks increased until 8 day then gradually decreased after that day in two seasons. Irrespective control, decreased after 4 day of shelf life periods of cut flower stalks in both season and kinetin 100ppm recorded an enhancement in water balance until 21 day then gradually decreased after that day. However, the treatment of GA₃ 300ppm showed to be the most effective treatment for producing the highest values of this parameter as compared with control and other treatments in both seasons. Moreover, using the treatments of kinetin at 100ppm and GA₃ 200ppm resulted in highly significant increases in this parameter. The differences between the aforesaid two treatments were not significant in both seasons. The rest treatments occupied an intermediate position between the above-mentioned treatments in both seasons. The lowest mean values of water balance by Bird of paradise cut flower stalks was registered by using the treatment of Benzyladenine at 25ppm during all tested shelf like periods in the two seasons.

Referring to the effect of storage periods on water balance, data presented in Table (60) show that Bird of paradise cut flower stalks stored at 7 ± 1 °C for different periods (0- days

,7,14,21,28,35 and 42 days) recorded an decreases in water balance during all shelf life periods in both seasons. On the other side, there was a negative relationship between the values of water balance of Bird of paradise cut flower stalks and storage periods, hence the water balance values of Bird of paradise cut flower stalks decreased as the storage periods advanced.

Thereupon, the highest value of water balance was recorded by using 0-time storage periods, whereas the lowest value of water balance was gained by using 42 days storage periods. This trend was true during all tested shelf life periods in both seasons of this study.

Regarding the interaction effect between growth regulators and storage periods on water balance, data in Tables (63 & 64) indicate that all the interaction treatments between growth regulators and storage periods recorded increases of water balance of bird of paradise cut flower stalks during the two seasons when compared to control. However, the interactions of GA₃ at 300ppm showed to be the most effective one for inducing the highest values of this parameter, especially the combined treatment between GA₃ at 300ppm and storage period for 0-time after 4,8,12,16,20,24 and 28 days from the treatment in the two seasons.

5.1.d.-Floret opening percentage.

Data in Table (65) reveal that all studied pre harvest treatments significantly increased floret opening percentage of Bird of paradise cut flower stalks when compared with control after 4, 8, 12, 16, 20, 24, 28 days of shelf life periods in the two

Table (63) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water balance (g)/stalk of Strelitzia reginae Ait cut flower stalk during the first season of 2007-2008.

Treatments Water balance (g)/stalk 1st season Growth Storage Shelf life periods (days) regulators periods 4 8 12 16 20 24 0 8.867 11.533 9.433 5.200 -0.43-4.967-9.900 7 5.533 3.733 0.767 -3.867-10.33 -15.267 -18.200 14 4.533 2.600 -0.767-5.067 -11.20 -16.400-10.433 Control 21 3.533 1.533 -2.500 -6.93 -12.73-18.067 28 1.867 -0.200 -2.867 -11.167 -15.37 -19.700 35 0.700 -3.067-8.200 -14.667 -20.04 + . 42 -1.367 -4.900-9.833 -16.033-18.63 0 11.200 15.567 16.367 14.133 10.33 6.267 2.400 7 9,433 11.533 12.533 8.800 4.10 0.467 -3.233 14 8.533 11.333 11.767 6.967 GA₃ 3.20 -1.467 -4.40021 200ppm 4.000 8.333 7.000 3.233 -1.43 -4.63328 4.467 4.867 3.300 -0.500 -4.47 -8.733 35 3.967 3.067 1.067 -2.933 -7.77 42 1.900 -0.333-3.300-7.967 -11.50 0 14.533 22.067 23.367 21.133 18.47 13.200 8.767 7 10.533 14.233 15.233 14.233 12.70 4.367 1.400 14 11.367 12.067 GA_3 13.067 9.267 4.53 0.567 -3.93321 7.900 10.067 300ppm 9.000 5.867 1.57 -3.333 28 4.767 5.800 4.400 -0.200-4.50 -8.867 4.300 35 4,400 3.200 -0.300 -4.67 42 2.400 1.433 -0.467 -3.633-7.37 0 10.500 14.367 16.033 12.300 8.33 4.567 -1.7677 7.600 9.833 8.600 2.933 1.47 -3.567 -8.333 14 5.533 5.133 4.200 0.600 -2.40-7.700BA 25 ppm -11.433 21 4.367 2.600 -0.300-5.467 -9.57 -13.93328 2.900 1.200 -2.000-8.100 -11.43 -15.333 35 1.133 -2.167 -6.200 -11.533 -16.53 42 1.067 -2.000-6.600 -12.200-17.000 11.633 17.133 16.133 14.733 10.03 5.633 2.333 7 9.333 12.333 11.667 6.733 2.73 -1.200-5.300 14 8.000 10.933 9.200 6.133 -0.40-3.267 -9.567 BA 50 ppm 21 5.700 6.100 4.10 0.733 -4.10 -9.367 28 3.767 3.200 1.60 -4.367 -8.20 -13.300 35 2.333 1.767 -2.38 -7.200 -13.0742 1.700 -0.600-4.267 -8.600 -14.27 0 11.900 16.600 16,400 13.567 9.13 4.067 1.200 7 9.533 13.733 13.933 9.933 5.93 3.267 -2.733 14 6.600 10.467 9.267 4.267 -0.20-4.367 Kin 50 ppm -8.467 21 5.767 7.933 5.100 0.333 -3.23-8.333 28 3.700 4.500 1.300 -3.767-8.37 -12.20035 2.767 2.333 2.100 -6.767 -10.4342 2.200 -0.367 -2.633 -6.800-11.700 11.367 17.067 18.233 16.200 11.30 8.733 4.367 10.033 13.800 14.233 11.533 7.73 3.800 -0.20014 9.433 9.267 12.100 7.733 3.73 -1.200-4.367 Kin100 ppm 21 7.367 9.200 8.167 4.167 -0.67 -4.23328 5.233 5.033 3.067 -0.767-4.53 -8.633 35 4.300 3.300 3.067 -2.567 -7.93 42 4.033 1.300 -0.700-5.367 -9.70 5% 1.630 1.244 L.S.D at 12.37 0.817 1.970 0.812 4.266 1% 2.159 1.647 16.38 1.081 2.608 1.075 5.647

Table (64) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water balance (g)/stalk of Strelitzia reginae Ait cut flower stalk during the second season of 2008-2009.

its			A STATE OF THE STA	balance (g)/sta			
				2 nd season			
			Shelf I	fe periods (day	(s)		20
Storage		8	12	16	20	24	28
periods	4			4.733	-0.13	-4.900	-8.600
0				-6.400	-9.70		-22.267
7				-7.267	-10.33	-16.867	-20.233
14					-12.43	-17.200	
21					-16.80	-20.467	
28					-20.47		
35					-21.43		
42				The second secon	10.63	7.267	1.400
0					4.73	0.567	-3.033
7					2.80	-2.433	-6.433
14	7.367	1122/25 1012			-1.00	-4.500	
21	6.200				-2.73	-1.900	
28	4.100				-4.40		
35	3.700				-10.63	-	-
42	1.667					12.333	6.333
0	13.267	21.133				5.033	1.133
7	10.200	12.100				-0.800	-2.867
	9.033	12.067				-2.367	•
-	8.200	10.700					-
	5.533	6.000					-
	13.367	3.467					
	3.000	2.700	1.200				0.367
		14.233	16.633				-7.833
	I British Marketon	9.700	9.200				-11.467
		5.433	4.400				
		2.600	-0.267	100			
		1.500	-3.167		and the same of th		-
		-0.700	-4.933			-	
		-0.900	-5.567	-12.700			1.600
		17,700	15.600	12.933			-5.100
			11.700	7.033			-10.967
			9.533	5.067			-10.507
			4.300	-0.467			-
	1		2.300	-5.533		-12.600	-
		1.567	-2.600	-6.300		-	+
10.0	-		-3.567	-8.633			0.767
-	-		16.100	14.133			-2.967
			13.600	10.200	5.20		-8.200
			9.867	3.567	0.47		-8.200
			4.200	0.433	-3.50		-
			1.433	-2.467	-7.90	-12.333	-
				-7.667		-	
			-0.367	-8.100	-12.73		1007
				14.900	12.00	8.067	4.067
0				12.600	8.47	4.467	-0.533
7				7.767	2.43	-1.300	-6.367
14				4.200	-0.43	-4.367	-
21				-1.700	-4.70	-8.867	1 2
28				-0.967	-7.60	-	
35				-6.667	-9.97	-	
42	_				0.842	2.931	1.527
5%	5.489				1.115	3881	2.022
	0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 14 21 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 28 35 42 0 7 7 14 28 35 42 0 7 7 14 28 28 35 42 0 7 7 14 28 28 28 28 28 28 28 28 28 28 28 28 28	0 8.667 7 4.867 14 4267 21 2.600 28 2.200 35 0.200 42 -0.800 0 11.433 7 8.433 14 7.367 21 6.200 28 4.100 35 3.700 42 1.667 7 10.200 14 9.033 21 8.200 28 5.533 35 13.367 42 3.000 0 10.567 7 7.500 14 6.200 21 3.800 28 3.167 35 1.033 42 0.633 0 11.433 7 9.100 14 8.100 21 6.100 28 3.600 35 1.933	0 8.667 10.967 7 4.867 2.967 14 4267 1.467 21 2.600 0.533 28 2.200 -0.600 35 0.200 -3.333 42 -0.800 -3.433 0 11.433 16.433 7 8.433 11.833 14 7.367 10.933 21 6.200 9.300 28 4.100 5.100 35 3.700 3.067 42 1.667 0.200 0 13.267 21.133 7 10.200 12.100 14 9.033 12.067 21 8.200 10.700 28 5.533 6.000 28 5.533 6.000 35 13.367 3.467 42 3.000 2.700 0 10.567 14.233 7 7.500 9.700 <	0 8.667 10.967 8.600 7 4.867 2.967 0.600 14 4267 1.467 -0.800 21 2.600 0.533 -3.933 28 2.200 -0.600 -6.733 35 0.200 -3.333 -10.200 42 -0.800 -3.433 -11.633 0 11.433 16.433 17.300 7 8.433 11.833 13.500 14 7.367 10.933 11.167 21 6.200 9.300 7.333 35 3.700 3.067 2.133 42 1.667 0.200 1.167 0 13.267 21.133 23.433 7 10.200 12.100 16.533 14 9.033 12.067 12.000 21 8.200 10.700 9.567 28 5.533 6.000 4.533 35 13.367 3.467	0 8.667 10.967 8.600 4.735 7 4.867 2.967 0.600 -6.400 14 4267 1.467 -0.800 -7.267 21 2.600 0.533 -3.933 -8.833 28 2.200 -0.600 -6.733 -12.700 35 0.200 -3.333 -10.200 -15.000 42 -0.800 -3.433 11.633 -16.933 0 11.433 16.433 17.300 16.567 7 8.433 11.833 13.500 10.733 14 7.367 10.933 11.167 7.033 21 6.200 9.300 7.333 3.267 21 6.200 9.300 7.333 3.267 22 4.100 5.100 3.367 -0.767 35 3.700 3.067 2.133 -2.2867 42 1.667 0.200 1.167 -8.800 4 1.9033	0 8.667 10.967 8.600 4./33 -6.400 -9.70 7 4.867 2.967 0.600 -6.400 -9.70 14 4267 1.467 -0.800 -7.267 -10.33 21 2.600 0.533 -3.933 -8.833 -12.43 28 2.200 -0.600 -6.733 -12.700 -16.80 35 0.200 -3.333 -11.633 -16.933 -21.43 40 11.433 16.433 17.300 16.567 10.63 7 8.433 11.833 13.500 10.733 4.73 14 7.367 10.933 11.167 7.033 2.80 21 6.200 9.300 7.333 3.267 -1.00 21 6.200 9.300 7.333 3.267 -1.00 28 4.100 5.100 3.367 -0.767 -2.73 42 1.667 0.200 1.167 8.800 -10.63	0 8.667 10.967 8.600 4.735 50.72 7 4.867 2.967 0.600 -6.400 -9.70 -15.733 14 4267 1.467 -0.800 -7.267 +10.33 -16.867 21 2.600 0.533 -3.933 -8.833 -12.43 -17.200 28 2.200 -0.600 -6.733 -12.700 -16.800 -20.47 - 35 0.200 -3.333 -10.200 -15.000 -20.47 - 42 -0.800 -3.333 -10.200 -16.933 -21.43 - 41 7.367 10.933 11.167 70.33 2.80 -2.433 14 7.367 10.933 11.167 70.33 2.80 -2.433 21 6.200 9.300 7.333 3.267 -1.00 -4.500 28 4.100 5.100 3.367 -0.767 -2.73 -1.900 42 1.667 0.200 </td

Table (65): Effect of some growth regulators treatments, on Floret opening percentage and Floret wilting percentage of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

entage ds (days) 20 24 28 1" season 38 10 42 48 52 24	s) 24 28 4 1 1 season 10 42 AS 52 24 20 20 20 20 20 20 20 20 20 20 20 20 20	Fit of the season Fit of the s	Fit of the season Fit of the s	Fit of the season Fit of the s	Floret wilting per	Floret wilting percentage
s) 0 24 28 1" season 19 42.48 53.24 29 60.86 64.57	s) 24 28 4 1 1 season 1 1 season 57 25.49 41	Fit of the season of the seaso	Fit of the season of the seaso	Fit of the season of the seaso	Floret wilting percentage Shelf life Periods (days)	Signature Floret wilting percentage Shelf life periods (days) 1
s) 1 28 1 19 2 28 1 19 2 28 1 19 2 28 2 28 2 3.24 2 4 58.86 3 29 4 2.48 5 3.24 5 64.57 6 8.57 7 1 50.19 5 6.67 2 4 58.86 6 2.19	28 4 28 4	S Fig. Fig	S Fig. Fig	S Fig. Fig	Section Sect	Shelf life Periods (days)
28 1" season 53.24 64.57 68.57 56.67 62.19	1" season 53.24 33.00 64.57 25.49 68.57 22.93 50.67 28.54 62.19 30.77 62.00 25.77	Fig. 28 4 8 12 1" season 57.08 67.20 64.57 25.49 41.08 59.60 68.57 22.93 37.95 53.74 562.19 30.77 44.02 60.69 62.20 25.77 41.83 62.07	Fig. 28 4 8 12 1" season 57.08 67.20 64.57 25.49 41.08 59.60 68.57 22.93 37.95 53.74 562.19 30.77 44.02 60.69 62.20 25.77 41.83 62.07	Fig. 28 4 8 12 1" season 57.08 67.20 64.57 25.49 41.08 59.60 68.57 22.93 37.95 53.74 562.19 30.77 44.02 60.69 62.20 25.77 41.83 62.07	Floret wilting percentage 28 4 8 12 11 16 20 11 18 20 11 16 20 11 20 11 20 12 16 20 17 20 18 20 18 20 20 20 20 20 20 20 20 20 2	Floret wilting percentage 28 4 8 12 16 20 24 11 season 53.24 33.00 57.08 64.57 25.49 41.08 59.60 68.57 22.93 37.95 53.74 60.05 62.19 30.77 41.83 62.07 69.20 81.73 80.70 80 shelf life periods (days) 24 24 25.66 20 24 25.66 27.08 88.56 97.36 88.59 97.36 85.26 85.26 85.26 85.26 85.26 85.26 85.26 85.26 85.26 85.26 85.26 86.27 41.83 62.07 69.20 81.73 80.70
son	4 33.00 25.49 22.93 28.54 30.77 25.77 25.77	## FIC ##	FIG. 12.00	## 12 ## 12 ## 33.00 \$7.08 67.20 ## 25.49 41.08 \$9.60 ## 22.93 37.95 53.74 ## 22.93 37.95 53.74 ## 24.04 66.47 30.77 44.02 60.69 25.77 41.83 62.07 24.83 38.46 54.83 ## 4.279 4128 \$674	Floret wilting percentage 4 8 12 16 20 1 33.00 57.08 67.20 80.56 88.56 25.49 41.08 59.60 66.12 81.62 22.93 37.95 53.74 60.05 76.16 28.54 50.49 66.47 79.80 83.83 30.77 44.02 60.69 70.88 81.99 25.77 41.83 62.07 69.20 81.73 24.83 38.46 54.83 62.05 76.96	Floret wilting percentage Shelf life periods (days) 4 8 12 16 20 24 1 33.00 57.08 67.20 80.56 88.56 97.36 2 25.49 41.08 59.60 66.12 81.62 89.74 2 22.93 37.95 53.74 60.05 76.16 85.26 2 28.54 50.49 66.47 79.80 83.83 93.60 3 0.77 44.02 60.69 70.88 81.99 90.66 2 5.77 41.83 62.07 69.20 81.73 89.79 2 4.279 4128 56.74 2713 250.
	33.00 25.49 22.93 22.93 28.54 30.77 25.77 24.83	4 8 12 33.00 57.08 67.20 25.49 41.08 59.60 22.93 37.95 53.74 28.54 50.49 66.47 30.77 44.02 60.69 25.77 41.83 62.07 24.83 38.46 54.83	4 8 12 33.00 57.08 67.20 25.49 41.08 59.60 22.93 37.95 53.74 28.54 50.49 66.47 30.77 44.02 60.69 25.77 41.83 62.07 24.83 62.07	33.00 57.08 67.20 25.49 41.08 59.60 22.93 37.95 53.74 28.54 50.49 66.47 30.77 44.02 60.69 25.77 41.83 62.07 24.83 38.46 54.83 4.279 4128 5.674	Sign	Shelf life periods (days) 4 8 12 16 20 24
	8 57.08 41.08 37.95 50.49 44.02 41.83 38.46	12 12 8 67.20 8 59.60 6 53.74 66.47 60.69 62.07	12 12 3 67.20 6 59.60 53.74 66.47 60.69 62.07	12 12 8 67.20 8 59.60 53.74 66.47 60.69 62.07	Floret wilting percentage Shelf life Periods (days)	Floret wilting percentage Shelf life periods (days) 12 16 20 24 16 20 24 16 20 24 16 20 24 16 20 24 24 24 25 20 24 25 20 24 25 20 24 25 20 24 25 20 20 20 26 20 20 20 26 20 20 20 27 20 20 28 20 20 29 20 20 20

seasons. However, the treatment of GA₃ at 300ppm approved to be the greatest treatment for inducing the highest floret opening percentage as compared with the control during the studied shelf life periods in both seasons, with the exception of GA₃ at 200ppm after 4 days of shelf life period in the first season which scored the highest value in this concern. On the other hand, using the treatments of kinetin at 100ppm and BA at 50ppm gave highly significant increments of this parameter in both seasons.

Referring the effect of storage periods on floret opening percentage data listed in Table (66) demonstrate that there were gradual decrease in floret opening percentage of Bird of paradise cut flower stalks with extending storage periods at $7 \pm 1^{\circ}$ C for different days (0-time, 7, 14, 21, 28, 35 and 32 days after 4, 8, 12, 16, 20, 24, 28 and 32 days of shelf life days in the two seasons. However, Bird of paradise cut flower stalks were stored at $7 \pm 1^{\circ}$ C for 0-time treatment showed the greatest significant increase in floret opening percentage of cut flower stalks when compared to the other ones under study in the two seasons. Moreover, storage periods at $7 \pm 1^{\circ}$ C for 42 days recorded highly significant decrease in floret opening percentage as compared to other different storage periods of Bird of paradise cut flower stalks in both seasons.

Regarding to the interaction effect between growth regulators and storage periods on floret opening percentage, data in Tables (67 & 68) reveal that all the combinations between growth regulators (GA₃ at 200ppm, GA₃ at 30ppm, BA at

Table (66): Effect of Storage periods (Days) treatments on Floret opening percentage and Floret wilting percentage of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Trea					Storage	periods	(Days)					L.S.D at					Storage	periods	(Days)					L.S.D at	
Treatments				7	14	21	78	20	35	42	7.0	10%	2.70	†	0	7	14	21	28	7.	35	42	5 %	1%	
	4		35.43	32.10	28.48	25.43	22.42	23.43	21.71	20 57	243	2047	4.047		37.14	33.33	30.95	27.62	24.76		22.86	20.00	3.025	4.005	
	8		44.00	39.62	33.62	29.14	11.64	26.29	24.67	20 05	23	1.977	2.01/		48.57	42.38	38.10	32 86	79 57	20.37	26.19	23.81	3.292	4 359	
Shelf	12		56.00	48.00	42.48	36 48	20.40	31.43	27.33	26.17		1./10	2.17.2		60.48	51.43	46.19	18 57	36.34	33,24	30.00	27.14	3 357	4 444	
Shelf life periods(days)	16		64.86	59.62	49.62	43.81	43.81	37.14	31.43	20 00	20.00	1.949	2.580		69.52	62.86	54 57	17.67	17.02	40.95	33.33	30.95	3 730	4 030	1.333
ntage ds(days)	20		71.24	64.29	55.62	50.00	50.00	44.00	40.00	20.00	32.37	1.915	2.536		74.76	67.62	72 27	57.77	00.00	47.14	41.91	34.76	2 30%	2.200	+.400
	24		77.14	69.71	63.14	64.00	54.86	48.19	44 00	11.00	39.32	1.866	2.470		81.91	72 38	16.33	05./1	00.95	52.86	50.00	45 74	12.24	3.373	4.465
	28	I st S	82.10	74.00	67.43	2	63.05	54.57	10 67	40.07	43.71	1.679	2.22	2 nd season	85.62	78 57	30.00	12.38	67.62	58.10	52.38	45 74	43.24	3.316	4.390
	4	I st season	,	Ē.	25 07	10.04	30.62	39.72		44.13	51.80	4.279	5.665	ason				21.76	35.79	43.68	47.02	20.67	28.37	6.220	8.235
	œ		15.38	27.18	38 45	30.43	47.29	55.23	00.00	56.32	71.07	4.128	5.465		19 43	200	32.08	41.39	50.00	58.54	63.08	00.00	79.48	7.881	10.43
Flo	12		32.80	40.75	50.13	30.13	61.43	72 15	14.10	76.72	90.60	5.674	7.512		33 31	10.01	44.24	52.66	63.10	71.46	87 51	04.01	97.86	8.832	11.69
Floret wilting	onen me		41.75		10.00	65.25	76.85	87 05	07.93	×		3.713	4.915		43 30	45.20	52.07	64.16	77.10	85.01		c	h	6.745	8.930
ilting percentage	life periods(days)	200	49 91	64 14	1 4	75.57	87.69			â	Ē	3.294	4.361			32.68	66.77	80.80	89.17			,	£	5.011	6635
		4.7	65 55	76.63	/0.03	88.09				e.		2.765	3.660			66.41	78.90	94.11	ų.			3		4.349	5 578
		87	70 70	/8./8	89.93	,			x	ř		1.784	2.362			78.88	90.63	9				ï	ä	2.683	2 557
		32		86.77				,	r	1	të d	1 100	1 456			86.02	į.	*			v	41	a	2.586	3 434

Table (67): Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret opening percentage of *Strelitzia reginae Ait* cut flower stalk during the first season of 2007-2008.

Treatme	ents				ening percer	ruge.		
catal					st season			
Growth	Storage			Shelf lif	e periods (d		24	28
egulators	periods	4	8	12	16	20		70.67
guintors	0	26.00	32.00	46.00	52.00	54.67	50.67	60.00
-	7	26.00	30.00	36.00	43.33	48.00		56.00
1	14	24.00	30.00	32.00	40.00	45.33	50.00	54.00
C	21	22.00	26.00	29.33	30.00	34.67	38.00	50.00
Control	28	20.00	22.00	26.00	28.00	30.00	36.00	44.00
-	35	20.00	22.00	23.33	26.00	28.67	32.00	38.00
+	42	20.00	20.00	22.00	24.00	26.00	30.67	
	0	38.00	48.00	60.00	68.00	76.00	80.00	78.00
+	7	34.00	43.33	48.00	62.00	68.00	74.00	
-		32.00	36.00	44.00	50.00	58.00	68.00	72.00
GA ₃	14	28.00	28.00	34.00	48.00	54.00	60.00	68.00
200ppm	21	26.00	26.00	30.00	36.00	46,00	52.00	54.00
	28	24.00	24.00	26.00	32.00	44.00	48.00	48.00
	35	22.00	23.33	24.00	28.00	34.00	44.00	46.00
	42		52.00	64.00	72.00	80.00	86.00	90.00
	0	44.00 36.00	48.00	56.00	68.00	72.00	78.00	84.00
"	7	30.00	40.00	48.00	52.00	64.00	70.00	76.00
GA_3	14	-	34.00	46.00	50.00	58.00	66.00	70.00
300ppm	21	26.00	30.00	36.00	44.00	52.00	54.00	60.00
DOOPE	28	24.00	28.00	32.00	38.00	48.00	52.00	52.00
	35	22.00	24.00	28.00	32.00	40.00	46.00	48.00
	42	20.00	34.00	50.00	58.00	66.00	72.00	76,00
BA 25 ppm	0	30.00	NE CONTROL O	40.00	54.00	60.00	66.00	70.00
	7	30.00	32.00	36.00	46.00	50.00	54.00	58.00
	14	27.33	28.00	34.00	36.00	46.00	46.00	54.00
	21	24.00	26.00 24.00	30.00	32.00	38.00	43.33	52.00
	28	22.00		26.00	28.00	32.00	36.00	46.67
	35	20.00	23.33	25.33	26.00	28.00	34.00	40.00
	42	20.00	23.33	56.00	66.00	74.00	80.00	84.00
	0	36.00	46.00	50.00	60.00	66.00	72.00	72.00
	7	32.00	40.00	43.33	51.33	56.00	66.00	66.00
BA 50	14	30.00	31.33	34.00	46.67	53.33	58.00	63.33
ppm	21	26.00	30.00	32.00	38.00	48.00	50.00	56.00
PPIII	28	24.00	27.33	28.00	32.00	43.33	46.00	50.00
	35	22.00	25.33	26.67	28.00	32.00	40.00	44.00
	42	22.00	23.33	54.00	68.00	72.00	78.00	80.00
	0	34.00	46.00	52.00	64.00	66.00	71.33	74.00
	7	32.00	38.00	46.00	54.00	58.00	66.00	70.00
Kin 50	14	28.00		36.00	48.00	50.00	54.00	64.00
ppm	21	26.00	28.00	32.00	40.00	46.00	50.00	54.00
Pp	28	24.00	26.67	26.00	30.00	40.00	46.00	48.00
	35	22.00	24.00	24.00	28.00	32.00	38.00	44.00
	42	20.00		62.00	70.00	76.00	84.00	88.00
	0	40.00	50.00	54.00	66.00	70.00	76.00	80.00
	7	34.00	46.00	48.00	54.00	58.00	68.00	74.00
V:- 100	14	28.00	38.00	42.00	48.00	54.00	62.00	68.00
Kin 100 ppm	21	26.00	32.00	34.00	42.00	48.00	52.00	56.00
ppm	28	24.00	28.00	30.00	34.00	44.00	48.00	52.00
	35	22.00	26.00		30.00	36.00	44.00	46.00
	42	20.00	23.33	26.00	5.156	5.067	4.937	4.44
	5%	4.091	5.230	4.541		6.708	6.537	5.88
L.S.D a	1%	5.416	6.924	6.012	6.826	0.700	0.007	

Table (68) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret opening percentage of Strelitzia reginae Ait cut flower stalk during the second season of 2008-2009.

Treat	ments	-		Flo	ret opening p	ercentage		
Growth	Storage				2nd seaso	n		
regulators	periods	4	-		elf life period	ls (days)		
	0		8	12	16	20	24	28
	7	26.67	33.33	46.67	53.33	56.67	63.33	72.6
	14	23.33	30.00	36.67	46.67	50.00	53.33	63.3
Control	21	20.00	30.00	33.33	43.33	46.67	50.00	60.0
	28	20.00	26.67	30.00	33.33	36.67	40.00	56.6
	35	20.00	23.33	26.67	30.00	33.33	36.67	53.3
	42	20.00	23.33	23.33	26.67	30.00	33.33	46.6
	0	36.67	53.33	23.33	23.33	26.67	36.67	40.0
	7	33.33	46.67	66.67	73.33	76.67	83.33	90.00
	14	33.33	40.00	53.33	63.33	70.00	73.33	80.00
GA ₃ 200ppm	21	26.67	30.00	36.67	53.33	60.00	66.67	73.33
200ppm	28	26.67	26.67	33.33	50.00	56.67	63.33	70.00
	35	23.33	26.67	30.00	40.00	50.00	53.33	56.67
	42	20.00	23.33	26.67	33.33	43.33	50.00	50.00
	0	46.67	56.67	66.67	30.00	33.33	43.33	43.33
	7	36.67	50.00	60.00	76.67	83.33	90.00	93.33
CA	14	33.33	43.33	50.00	70.00	76.67	80.00	86.67
GA ₃ 300ppm	21	30.00	36.67	43.33	60.00	63.33	70.00	80.00
эооррии	28	26.67	33.33	40.00	53.33	60.00	70.00	73.33
	35	23.33	30.00	36.67	50.00 40.00	53.33	60.00	63.33
	42	20.00	26.67	30.00	36.67	50.00	56.67	56.67
BA 25 ppm	0	30.00	36.67	53.33		40.00	56.67	50.00
	7	30.00	33.33	40.00	63.33 56.67	70.00	76.67	78.00
	14	30.00	30.00	40.00		63.33	73.33	73.33
	21	26.67	30.00	36.67	50.00	53.33	60.00	63.33
	28	20.00	26.67	33.33	33.33	50.00	53.33	60.00
	35	20.00	23.33	26.67	30.00	43.33	50.00	56.67
	42	20.00	23.33	26.67	30.00	36.67	50.00	50.00
	0	40.00	53.33	63.33	73.33	33.33	43.33	43.33
	7	36.67	46.67	56.67	66.67	80.00 70.0	86.67	88.00
BA 50	14	33.33	40.00	46.67	56.67		76.67	83.33
ppm	21	30.00	33.33	40.00	53.33	63.33 56.67	70.00	76.67
	28	26.67	30.00	36.67	43.33	50.00	66.67	70.00
	35	23.33	26.67	30.00	36.67	46.67	56.67	60.00
	42	20.00	23.33	30.00	33.33	36.67	53.33	53.33
-	0	36.67	50.00	60.00	73.33	76.67		46.67
	7	33.33	43.33	56.67	66.67	70.00	83.33	86.67
Cin 50	14	30.00	40.00	53.33	62.00	63.33	73.33	80.00
ppm	21	30.00	36.67	40.00	46.67	56.67	66.67	76.67
_	28	26.67	30.00	36.67	43.33	50.00	56.67	70.00
_	35	26.67	26.67	30.00	30.00	40.00	50.00	53.33
	42	20.00	23.33	26.67	30.00	36.67	43.33	200000000000000000000000000000000000000
_	0	43.33	56.67	66.67	73.33	80.00	90.00	46.67
	7	36.67	46.67	56.67	70.00	73.33	76.67	90.67
in 100	14	33.33	43.33	50.00	56.67	60.00	70.00	83.33 76.67
opm	21	30.00	36.67	43.33	53,33	56.67	66.67	73.33
	28	26.67	30.00	40.00	46.67	50.00	56.67	56.67
-	35	23.33	26.67	33.33	36.67	46.67	56.67	56.67
	42	20.00	23.33	26.67	33.33	36.67	46.67	46.67
7.17 at	5%	8.003	8.710	8.882	9.869	8.959	8.924	
	1%	10.59	11.53	11.76	13.07	11.86	11.81	8.773

25ppm, BA at 50ppm, Kin at 50ppm and Kin at 100ppm) and storage periods at 7± 1°C for 0, 7, 14, 21, 28, 35 and 42 days succeeded in increasing the floret opening percentage of Bird paradise cut flower stalks after 4,8,12,16,20,24 and 28 days from the treatment during the two seasons as compared to control. However, the combinations of GA₃ at 300ppm recorded the greatest values of this parameter, especially the combined between of GA3 at 300ppm and storage periods at 7± 1°C for 0time after 4,8,12,16,20,24 and 28 days from the treatment in the two seasons. Moreover, the interaction between kinetin at 100ppm and storage periods at 7± 1°C for 0-.time resulted highly significant increase of floret opening percentage of tuberose cut flower stalks as compared to control in the two seasons. Regardless control, the lowest mean values of floret opening percentage was registered by using the interaction between Benzyladenine at 25ppm and storage periods at 7± 1°C for 42 days after 4,8,12,16,20,24 and 28 days from the treatment in the two seasons.

5.1.e.-Floret wilting percentage:

Data in Table (65) reveal that all studied pre-harvest treatments significantly decreased floret wilting percentage of Bird of paradise cut flower stalks when compared with control after 4, 8, 12 and 16 days of shelf life periods after that till the end of longer when compared with control in the two seasons. However, GA₃ at 300ppm and kinetin at 100ppm scored the lowest values in this parameter. The differences between the aforesaid two treatments were not significant in both seasons.

Referring to the effect of storage periods on floret witling percentage data of both seasons presented in Table (66) reveal that floret witling percentage of Bird of paradise cut flower stalks was increased with extending storage periods at 7 ±1°C for different days (0-time) 7, 14, 21, 28, 35 and 42 days. However, Bird of paradise cut flower stalks were stored at 7 ±1°C for 42 days recorded the highest increases in floret wilting percentage as compared to other different storage periods in both seasons. Moreover, storage periods at 7 ±1°C for 0-time treatment showed the lowest values in floret wilting percentage of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

As for the interaction effect between growth regulators and storage periods on floret opening percentage, data in Tables (69 & 70) indicate that all the interaction treatments between growth regulators and storage periods decreased floret wilting percentage of Bird paradise cut flower stalks 4,8,12,16,20,24,28 and 32 days from the treatment during the two seasons as compared to control. However, the interaction of GA₃ at 300ppm resulted the highest effective decrease of floret wilting percentage, especially the combined treatment of GA3 at 300ppm and storage periods at 7± 1°C for 0-time after 4,8,12,16,20,24,28 and 32 days from the treatment in the two seasons under this study. Moreover, the interaction treatment between kinetin at 100ppm and storage periods at 7±1°C for 0time resulted highly decreased of floret wilting percentage of Bird paradise cut flower stalks as compared to control in both seasons. Furthermore, the floret wilting percentage of tuberose

Table (69) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret wilting percentage of *Strelitzia reginae Ait* cut flower stalk during the first season of 2007-2008.

Treatm	ents					ilting percen	tage		
Treatm	ients					st season	200		
Growth	Storage					periods (d	24	28	32
egulators	periods	4	8	12	16	20	83.33	90.63	98.17
	0		25.34	52.18	53.95	65.93	94.87	100.00	
	7		42.22	49.91	66.83	75.20		100.00	
	14	33.85	46.81	62.66	80.00	83.86	96.32		
Control	21	37.17	54.06	68.70	93.33	98.38			140
- Ontro	28	50.00	67.98	76.86	-	•	- +		
	35	50.00	73.13	63.03		•			
+	42	60.00	90.00	97.02					81.55
	0	-	12.33	26.60	39.18	48.68	62.50	75.72	94.86
-	7	-	23.22	37.44	45.33	61.68	70.36	84.68	94.00
+	14	22.64	33.84	49.72	60.04	75.79	85.26	94.43	
GA ₃	21	29.35	43.75	59.37	64.65	85.41	100.00		
200ppm -	28	34.83	50.63	73.01	89.21	96.76			
_	35	41.61	58.49	78.17	94.44		-		
		50.00	65.28	92.86					
	42	30.00	11.48	25.00	37.93	43.75	56.04	71.17	80.04
	0	+	20.70	39.25	44.16	58.45	66.52	81.00	90.46
1	7	19.90	30.00	41.40	61.68	68.99	80.28	94,73	
GA ₃	14		38.93	48.58	68.18	79.29	91.41	•	•
300ppm	21	25.80	46.89	66.81	77.58	88.61		-	-
эоорр	28	34.37	50.30	68.95	81.82	96.05	-	(*)	•
	35	35.46	67.38	86.21			-	-	
	42	45.00		39.94	45.30	51.52	69.64	89.73	94.83
BA 25	0	-	20.76		55.52	72.00	85.15	97.25	
	7	•	34.26	50.34	73.89	80.09	96.30	-	
	14	24.36	42.76	61.24	89.44	94.39	1.41	-	
ppm	21	29.30	54.06	68.62	94.21	99.82		-	
ppin	28	41.14	62.79	73.55	94.21	-			-
	35	50.00	60.73	84.59	-			-	
	42	55.00	78.08	86.97	20.42	48.58	65.00	76.18	80.91
	0	00.00	12.85	28.59	39.43	60.76	77.83	97.52	-
	7	00.00	22.50	36.06	46.67	71.91	88.17		
D 4 50	14	26.15	41.63	46.46	62.44	90.87	100.00		-
BA 50	21	34.39	46.21	65.38	73.85	98.79	-		
ppm	28	50.23	55.36	69.48	92.09	98.79			
	35	50.00	55.64	84.01	97.67				-
	42	54.60	73.95	94.89	20.12	47.27	64.17	77.50	90.00
	0	-	12.97	29.65	39.13	63.73	73.04	86.57	-
	7	-	25.77	38.46	45.50	75.79	88.03	100.00	-
***	14	25.09	37.37	47.77	61.24	84.00	- 88.03	-	
Kin 50	21	30.89	50.01	66.99	75.58	96.25			
ppm	28	33.49	52.78	75.06	85.00	90.23	+		
	35	40.91	49.77	84.95	93.94	-			
	42	50.00	64.14	91.63		12.62		70.55	81.88
	0		11.91	27.64	37.33	43.67	58.14	82.50	92.50
	7		21.61	33.82	45.34	57.14	68.65	94.68	- 72.50
I WARRY TO THE PARTY OF THE PAR	14	23.50	36.74	41.67	57.44	72.57	82.29		
Kin 100	21	27.41	43.98	52.40	72.92	81.48	93.88	+ :-	-
ppm	28	33.97	50.17	70.31	76.19	92.26	<u> </u>		
	35	40.91	46.15	73.33	82.08		-	•	
	42	48.00	-	84.62				1710	
		11.32	-	15.01	9.832	8.715	7.315	4.719	2.909
L.S.D at	5% 1%	14.99		19.87		11.54	9.684	6.248	3.852

Table (70) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Floret wilting percentage of Strelitzia reginae Ait cut flower stalk during the second season of 2008-2009.

Treat	ments			inae Ait cut	Floret wi	lting percen			
					2°	d season			
Growth	Storage				Shelf life	periods (da	(vs)		
regulators	periods	4	8	12	16	20	24	28	22
	0	-	35.06	53.06	62.78	74.76	85.87		32
	7		50.00	64.56	73.56	82.22	98.44	96.49	99.1
	14	45.56	55.56	72.78	79.33	91.00	11.89		-
Control	21	60.00	61.11	74.67	92.78	105.56		-	
	28	60.00	70.00	84.44		100.50		-	-
	35	60.00	80.67	94.44	-		1		-
	42	70.00	93.33	101.78	-				-
	0	24	16.13	28.54	39.61	49.52	63.83		05.0
	7		26.33	40.89	47.14	62.86	73.69	74.26	85.0
GA_3	14	23.33	35.00	48.00	60.00	80.98	93.33	83.25	97.50
200ppm	21	36.67	46.67	60.56	71.78	87.78	100.25	98.45	-
-coppin	28	40.00	56.89	70.67	78.00	95.56	100.23		
	35	47.56	62.22	73.33	94.44	- 23.30		+	-
	42	58.00	77.11	101.11	-	1	-	-	-
	0		12.44	27.14	36.79	44.49	58.24	70.07	-
	7	-	29.67	38.89	45.71	59.88	72.50	70.96	82.56
GA ₃	14	21.11	34.83	44.44	56.67	74.86	89.41	81.11	90.37
300ppm	21	22.00	45.00	54.00	70.56	80.00	88.57	95.00	-
	28	32.22	50.00	62,50	74.00	90.22	00.37	-	-
	35	33.56	53.33	65.00	82.50	96.00	-		-
	42	50.00	71.11	93.33	-				
BA 25 ppm	0	-	25.39	37.78	47.62	57.14	70.60		-
	7		39.56	54.44	62.02	73.97	88.79	85.41	91.05
	14	28.00	51.33	60.00	74.33	87.64	94.33	95,71	101.55
	21	43.89	56.67	73.33	81.17	97.89	-	-	-
	28	60.00	69.56	80.56	*	101.33	-	-	-
	35	60.00	68.89	94.22		101.55			-
	42	66.00	84.00	102.00			-	-	-
	0		15.33	28.41	38.10	50.00	63.75	75.88	01.06
1	7		24.00	35.56	45.24	6405	73.85	86.57	93.80
BA 50	14	27.67	37.50	48.00	63.33	80.87	90.29	97.92	93.80
ppm	21	33.33	48.33	60.00	71.56	89.33	100.43	- 71.72	-
	28	44.00	56.67	70.39	81.97	85.78	-	-	-
-	35	49.33	62.22	98.00	*	2			
	42	60.00	82.22	94.67	- 2		-	-	
	0		16.22	31.11	39.17	47.26	62.87	76.11	81.39
-	7		28.67	39.78	46.51	62.86	73.69	83.65	95.82
Kin 50	14	25.33	37.50	47.42	56.57	75.87	90.36	99.29	93.04
ppm	21	28.00	47.78	60.00	79.33	82.84	95.49	-	-
_	28	33.33	53.33	66.67	78.67	90.00	-		-
-	35	37.78	57.78	82.00	93.33	-	(8)		
	42	56.00	80.22		-		-		
-	0		15.33	27.14	38.89	45.57	59.69	73.01	81.17
	7		26.33	35.56	44.29	61.55	71.35	80.01	91.30
Cin 100 —	14	23.33	38.00	48.00	58.89	74.33	87.14	96.7	-
ppm -	21	26.67	44,44	59.17	72.50	80.80	95.05	-	
	28	36.22	53.33	65.00	74.53	92.49	-		-
	35	40.89	56.44	70.56	88.67	96.33			
	42	50.00	68.33	90.56	~			-	•
.S.D at	5%	16.46	20.85	23.37	17.85	13.26	11.51	7.098	6.843
	1%	21.79	27.61	30.94	23.63	17.55	15.23	9.398	9.059

cut flower stalks by using all the interaction treatments between growth regulators and storage periods was increased as flower cut stalks advanced in age after 4 days from the treatment till the end of age of longevity in the two seasons.

5.1.f.-Water uptake (g)/stalks.

As shown in Table (71) it is obvious that water uptake by Bird of paradise cut flower stalks increased as cut flower stalks prolonged in age after 4 days from the beginning treatment till the end of shelf life periods in the two seasons under the tested pre harvest treatments. However, all used pre harvest treatments succeeded increasing the water uptake by Bird of paradise cut flower stalks, especially the treatment of kinetin at 100ppm which induced the highest value in this parameter during all tested shelf life periods, with the exception of GA₃ at 300ppm in the first season which recorded the highest value in this respect at 20 days at shelf life periods. Moreover, using the treatments of GA₃ at 300ppm and 200ppm resulted in highly significant in this parameter during all tested shelf life periods in the two seasons of this study. Irrespective control, the lowest mean value of water uptake by Bird of paradise cut flower stalks was registered by using the treatment of BA at 25ppm during all tested shelf life periods in the two seasons.

The rest treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study.

Regarding to the effect of storage periods on water uptake, it is clear from Table (72) that the absorbed solution by Bird of paradise cut flower stalks increased as cut flower stalks

Table (71): Effect of some growth regulators treatments, on Water uptake and Water loss (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	3	L.S.D at					Regulators	Growth						L.S.D at						Regulators)						Tre
	1%	5%	Kin 100 ppm	Ci. too	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA3 300ppm	GA3 200ppm	Control			1%		5%	Kin 100 ppm	Kin 50 ppm		T	BA 25 ppm	GA3 300ppm	GA3 200ppm	Control			- CHICAGO	Treatments
	0.901	0.681	52.07		48.38	45.49	44.42	49.84	47.62	42.79			0.476	0.334	0.364	49.12	45.65	10.00	43 30	42.09	47.37	45.23	40.21			4	
	0.964	0.728	68.38		64 74	62.57	61.45	66.48	63.86	59.47			0.482	0.364	000	65.83	62.55	00.00	60.65	59.51	63.88	61.81	57.06		0	×	
	1.371	1.035	86.42	02.70	87 70	80.32	79.91	84.56	82.36	74.94			0.578	0.436		83.60	79.45	/8.99	70 00	77 40	82.16	80.07	71.94		12	13	Shalf
	1.063	0.803	98.65	94.00	04.65	92 84	91.95	96.30	94.65	87.63			0.472	0.356		95 93	92.46	91.14	02.00	09 68	94.03	92.58	85.08		16	onen me periods (days)	Shelf life
	1335	1.009	116.47	113.37	1C.com	100 < 1	109.38	115.71	113.39	103.55			1.073	0.810	112,33	112 50	111.37	107.98	00.001	106.36	114 17	112.00	101.16		20	(days)	/stalk
1.746	1 740	1.321	103.67	99.78	17.06	0000	97.81	102.74	103.67	95.13	2'	- 1	0.574	0.434	10138	101	97.88	96.61	93.33	0.00	101 00	98.61	93.18		24		
0.793	0 702	0.598	73.53	70.92	06.60	07.53	67.50	72.69	70.00	67.31	2 nd season		0437	0.330	/2.28		69.77	68.46	66.08	/1.00	71 00	69.63	66.22	1" season	28		
2.962	2 10	2 237	46.80	42.63	39.62	39.72	20 70	40 90	41.49	39.65			0.894	0.678	41.72		05 05	37.32	37.36	39.40	20.40	39.01	36.82		4		
0.957	0.772	0 733	59 43	57.44	55.24	20.90	20.74	56 74	55.73	58.24		9.791	0 764	0.577	57.41	24.00	22 66	53.39	55.38	33.87		54.05	55.45		8		
2.219	1.0/0	11.11	77 11	76.73	75.00	77.59	10.4	7451	74.37	78.40		0.131	6 101	4.676	75.29	/2.96	70.07	74.93	75.44	72.48	79.11	73 11	73.94		12	Shelf li	Wate
1.174	0.887	94.34		93.21	92.26	94.07	89.07	0	91.05	96.55		0.033		0.478	91.51	90.92		89.97	92.67	87.41	09.47	80.47	92.58		16	life periods (days)	Water loss (g)/stalk
1.383	1.045	116.43		116.39	113.15	115.60	113.08	1.7.70	113.48	116.60		0./16	0.541	0.541	112.64	114.07		111 87	113.09	111.21	113.08	117 00	113.83		20	(dave)	stalk
0.959	0.724	103.95	04.50	104 28	101.20	102.81	101.74	100.04	100 04	105.87		0.680	0.10.0	0 < 12	101.60	100.39	77.00	89 00	100.47	100.24	99.76	10.001	103.81	14	3/		
0.991	0.748	73.94	1.4	73 41	71.56	70.30	72.03	(0.17)	71 65	74 61		2.140	1.01/		72.31	71.20	70.23	30.05	69.16	70.99	70.38	/1./2	71 77	28	30		

Results and Discussion

Table (72); Effect of Storage periods (Days)treatments on Water uptake and Water loss (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

National Color Nati						1.1.	to the					Water	Water loss (g)/stalk	ılk		
nents 4 8 12 16 20 24 28 4 8 0 52.93 73.88 96.84 113.03 132.93 151.49 168.63 41.51 57.55 8 1 4 47.06 69.50 91.21 108.38 127.51 146.81 162.36 40.36 58.18 8 21 49.21 69.50 91.21 108.38 127.51 146.81 162.36 40.36 58.18 8 21 44.90 67.48 85.52 97.56 120.18 140.27 153.34 58.65 7 28 42.96 67.48 85.52 97.56 10.89 132.19 - 39.40 58.06 7 28 42.96 67.76 97.50 103.29 132.30 132.19 - 39.40 58.06 7 42 36.79 46.21 58.56 66.90 80.99 - 37.48 46.99 6					Chalf liv	uptake (g)	(dave)					Shelf li	Shelf life periods(days)	days)		
0 52.93 73.88 96.84 113.03 132.93 151.49 168.63 41.51 57.55 8 7 49.21 69.50 91.21 108.38 127.51 146.81 162.36 40.36 58.18 8 21 49.21 69.50 91.21 108.38 127.51 146.81 162.36 40.36 58.18 8 21 44.91 64.60 79.64 91.49 110.89 132.19 - 39.40 58.06 7 28 42.96 57.92 74.69 86.17 103.23 113.22 - 39.40 58.06 7 42 36.19 64.60 79.64 91.49 110.89 132.19 - 39.40 58.44 6 5 % 0.354 62.04 91.49 110.89 132.19 - 39.40 58.44 6 5 % 0.354 66.90 80.09 - - 39.40 58.44 6 <th>Treatme</th> <th>ents</th> <th></th> <th></th> <th>Suell</th> <th>ie bei ious</th> <th>30</th> <th>3.4</th> <th>36</th> <th>4</th> <th>×</th> <th>12</th> <th>16</th> <th>20</th> <th>24</th> <th>28</th>	Treatme	ents			Suell	ie bei ious	30	3.4	36	4	×	12	16	20	24	28
0 52.93 73.88 96.84 113.03 132.93 151.49 168.63 41.51 57.55 88 7 49.21 69.50 91.21 108.38 127.51 146.81 168.63 41.51 58.65 7 14 47.06 67.48 85.52 97.56 120.18 140.27 153.4 39.34 58.65 7 21 44.91 64.60 79.64 91.49 110.89 132.19 - 39.40 58.06 7 28 42.96 57.92 74.69 86.17 103.23 113.22 - 39.40 58.06 7 42 36.19 46.21 58.56 66.90 80.09 - - 37.00 50.34 65.34 6 5 % 0.354 0.354 0.432 0.432 1.073 0.574 0.434 0.330 0.678 0.574 0.574 0.574 0.574 0.574 0.574 0.574 0.574 0			4	8	12	0	0.7	1.7	I' season							
0 52.93 73.88 96.84 113.03 132.93 151.49 168.63 41.51 57.55 8 7 49.21 69.50 91.21 108.38 127.51 146.81 162.36 41.51 57.55 8 14 47.06 67.48 85.52 97.56 120.18 140.27 153.34 39.34 58.05 7 21 44.91 64.60 79.64 91.49 110.89 132.19 - 39.40 58.06 7 28 42.96 57.92 74.69 86.17 103.23 113.29 - 39.14 54.44 6 42 42.96 57.92 74.69 86.17 103.23 113.29 - 39.14 54.44 6 5 60 93.54 93.69 7 - - 39.14 54.44 6 4 42 36.19 64.21 73.8 66.90 80.09 - - 34.48									-				01.00	12221	146.13	157 57
7 49.21 69.50 91.21 108.38 127.51 146.81 162.36 40.36 58.18 8 14 47.06 67.48 85.52 97.56 120.18 140.27 153.34 39.34 58.05 7 21 44.91 64.60 79.64 91.49 110.89 132.19 - 39.40 58.05 7 28 42.96 57.92 74.69 86.17 103.23 113.32 - 39.40 58.06 7 42 36.19 64.60 79.64 91.49 110.89 132.19 - 39.40 58.06 7 45 36.19 64.21 58.56 66.90 80.09 - - 37.48 46.99 6 5% 0.354 0.436 0.436 0.436 0.437 0.574 0.534 0.503 1% 0.446 0.486 0.436 0.435 0.437 0.439 0.574 0.594		0	52.93		96.84	113.03	132.93	151.49	168.63	41.51	57.55	80.27	99.13	125.34	140.13	10.701
14 47.06 67.48 85.52 97.56 120.18 140.27 153.34 39.34 58.65 7 21 44.91 64.06 79.64 91.49 110.89 132.19 - 39.40 58.06 7 28 42.96 57.92 74.69 86.17 103.23 113.32 - 39.40 58.06 7 35 39.79 51.72 67.16 77.30 90.79 - 37.00 50.34 6 42 36.19 46.21 58.56 66.90 80.09 - 37.40 46.99 6 5 % 0.354 0.436 0.356 0.810 0.434 0.330 0.678 0.574 6 1 % 0.476 0.436 0.356 0.810 0.434 0.330 0.678 0.574 6 1 % 0.436 0.578 0.432 0.432 0.432 0.434 0.304 0.764 1 % 0.436 <th< th=""><th></th><th>7</th><td>49.21</td><td></td><td>91.21</td><td>108.38</td><td>127.51</td><td>146.81</td><td>162.36</td><td>40.36</td><td>58.18</td><td>80.21</td><td>101.19</td><td>124.03</td><td>147.97</td><td>167.59</td></th<>		7	49.21		91.21	108.38	127.51	146.81	162.36	40.36	58.18	80.21	101.19	124.03	147.97	167.59
21 44.91 64.60 79.64 91.49 110.89 132.19 - 39.40 58.06 7 28 42.96 57.92 74.69 86.17 103.23 113.32 - 39.14 54.44 6 35 39.79 51.72 67.16 77.30 90.79 - - 37.00 50.34 6 42 36.19 46.21 58.56 66.90 80.09 - - 37.00 50.34 6 5 % 0.354 0.364 0.436 0.356 0.810 0.434 0.330 0.678 0.678 0.504 1% 0.476 0.475 1.073 0.574 0.437 0.894 0.764 0 1% 0.476 0.475 1.073 0.574 0.437 0.894 0.764 0 1% 0.476 0.472 1.073 0.574 0.437 0.894 0.764 0 1 1.879 1.879		- 41	47.06		85.52	97.56	120.18	140.27	153.34	39.34	58.65	77.11	93.29	120.61	145.10	160.85
28 42.96 57.92 74.69 86.17 103.23 113.32 - 39.14 54.44 6 35 39.79 51.72 67.16 77.30 90.79 - - 37.00 50.34 6 42 36.19 46.21 58.56 66.90 80.09 - - 34.48 46.99 6 5%0 0.354 0.436 0.436 0.356 0.810 0.434 0.330 0.678 46.99 6 1%0 0.476 0.436 0.436 0.436 0.472 1.073 0.574 0.439 0.678 0.577 4 1%0 0.476 0.472 1.073 0.574 0.437 0.894 0.764 0 0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 14 49.54 69.54 87.95 100.54 142.91 156.00 42.24 60.39	Storage	21	44.91	64.60	79.64	91.49	110.89	132.19		39.40	28.06	71.99	91.21	115.20	141.03	a .
35 39.79 51.72 67.16 77.30 90.79 - - 37.00 50.34 6 42 36.19 46.21 58.56 66.90 80.09 - - 37.00 50.34 6 5% 0.354 46.21 58.56 66.90 80.09 - - 34.48 46.99 6 1% 0.354 0.364 0.436 0.356 0.810 0.434 0.330 0.678 0.577 4 1% 0.476 0.482 0.578 0.472 1.073 0.574 0.437 0.678 0.577 4 1% 0.476 0.472 1.073 0.574 0.437 0.894 0.704 0 1 0.858 76.26 98.76 115.13 133.50 150.46 46.31 60.16 80.16 1 49.54 69.54 87.95 100.54 142.91 156.00 42.24 60.39 17.34 88.26 106	(Days)	28	42.96	57.92	74.69	86.17	103.23	113.32	1	39.14	54.44	63.45	90.29	111.35	125.72	x.
42 36.19 46.21 58.56 66.90 80.09 - - 34.48 46.99 6 5 % 0.354 0.364 0.436 0.356 0.810 0.434 0.330 0.678 0.577 4 1 % 0.476 0.482 0.578 0.472 1.073 0.574 0.437 0.894 0.764 0 0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.89 28 45.67 60.18 81.90 93.62 114.92 135.11 - 41.37 50.72 35 42.07 54.28 69.95 77.34 88.26 106.05 117.24 - 41.95 56.97 42 38.59 48.51 61.90 69.32 81.73 - 41.95 56.97 <tr< th=""><th></th><th>35</th><td>39.79</td><td>51.72</td><td>67.16</td><td>77.30</td><td>90.79</td><td>3</td><td></td><td>37.00</td><td>50.34</td><td>62.49</td><td>83.86</td><td>102.28</td><td></td><td>t</td></tr<>		35	39.79	51.72	67.16	77.30	90.79	3		37.00	50.34	62.49	83.86	102.28		t
5 % 0.354 0.364 0.436 0.810 0.434 0.330 0.678 0.577 4 1% 0.436 0.364 0.436 0.432 1.073 0.574 0437 0.894 0.704 0 0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 7 51.97 71.83 93.41 110.05 129.48 149.11 164.62 43.36 60.84 8 21 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 28 45.67 60.18 81.90 93.62 114.92 135.11 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.37 59.72 35 42.07 54.28 69.95 79.76 93.01 - - 41.37 53.04 42 </th <th></th> <th>42</th> <td>36.19</td> <td>46.21</td> <td>58.56</td> <td>06.99</td> <td>80.09</td> <td>(30)</td> <td>,</td> <td>34.48</td> <td>46.99</td> <td>62.53</td> <td>75.55</td> <td>92.97</td> <td>1</td> <td></td>		42	36.19	46.21	58.56	06.99	80.09	(30)	,	34.48	46.99	62.53	75.55	92.97	1	
1% 0.476 0.482 0.578 0.472 1.073 0.574 0.437 0.894 0.764 0 0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.37 59.72 42 35.9 42.07 54.28 69.95 79.76 93.01 - 41.95 56.97 42 42.07 54.28 69.95 79.76 93.01 - 41.95 53.04 5% 0.681 0.728 1.321 0.598 2.237 0.723		% 5	0.354	0.364	0.436	0.356	0.810	0.434	0.330	829.0	0.577	4.676	0.478	0.541	0.513	1.617
0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.37 59.72 35 42.07 54.28 69.95 79.76 93.01 - 41.92 117.24 - 41.95 56.97 42 38.59 48.51 60.95 79.76 93.01 - 41.95 56.97 5% 0.681 0.728 0.803 10.06 117.24 - 41.95 56.97 5% 0.681 0.732 0.81.73 - 38.40 53.04 53.04 5% 0.681 0.728 0.803 1.009 1.321 0.598 2.237 0.723	L.S.D at	1%	0.476	0.482	0.578	0.472	1.073	0.574	0437	0.894	0.764	6.191	0.633	0.716	089.0	2.140
0 55.88 76.26 98.76 115.13 133.50 153.67 171.42 46.31 60.16 8 14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 8 21 46.86 66.18 81.90 93.62 114.92 135.11 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.37 56.97 35 42.07 54.28 69.95 79.76 93.01 - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5% 0.681 0.728 1.009 1.321 0.598 2.237 0.723									2 nd season				la A			
7 51.97 71.83 93.41 110.05 129.48 149.11 164.62 43.36 60.84 8 14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 21 46.86 66.18 81.90 93.62 114.92 135.11 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.95 56.97 35 42.07 54.28 69.95 79.76 93.01 - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5% 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723		0	55.88	76.26	98.76	115.13	133.50	153.67	171.42	46.31	60.16	81.06	101.30	123.76	149.74	170.57
14 49.54 69.54 87.95 100.54 122.69 142.91 156.00 42.24 60.59 21 46.86 66.18 81.90 93.62 114.92 135.11 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.95 56.97 35 42.07 54.28 69.95 79.76 93.01 - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5 % 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723			51.07	71.83	93.41	110.05	129.48	149.11	164.62	43.36	60.84	81.95	102.28	126.37	150.80	170.42
21 46.86 66.18 81.90 93.62 114.92 135.11 - 41.37 59.72 28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.95 56.97 35 42.07 54.28 69.95 79.76 93.01 - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5 % 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723	200	14	49.54	69.54	87.95	100.54	122.69	142.91	156.00	42.24	66.59	79.46	89.96	123.22	148.34	165.51
28 45.67 60.39 77.34 88.26 106.05 117.24 - 41.95 56.97 35 42.07 54.28 69.95 79.76 93.01 - - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5% 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723	Storage periods	21	46.86	66.18	81.90	93.62	114.92	135.11	C	41.37	59.72	99'77	93.51	118.92	143.39	Tr.
35 42.07 54.28 69.95 79.76 93.01 - - 38.40 53.04 42 38.59 48.51 61.90 69.32 81.73 - 37.18 48.41 5% 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723	(Days)	28	45.67	60.39	77.34	88.26	106.05	117.24	,	41.95	56.97	76.78	92.39	113.84	128.42	1
42 38.59 48.51 61.90 69.32 81.73 - - 37.18 48.41 5% 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723		35	42.07	54.28	69.95	79.76	93.01		F.	38.40	53.04	71.93	85.93	103.85	e	(C)
5% 0.681 0.728 1.035 0.803 1.009 1.321 0.598 2.237 0.723		42	38.59	48.51	06.19	69.32	81.73	(0)	ä	37.18	48.41	64.85	78.48	94.77	э	ı
		2 %	0.681	0.728	1.035	0.803	1.009	1.321	0.598	2.237	0.723	1.676	0.887	1.045	0.724	0.748
1% 0.901 0.964 1.371 1.063 1.335 1.748 0.793 2.962 0.957	L.S.D at	1%	0.901	0.964	1.371	1.063	1.335	1.748	0.793	2.962	0.957	2.219	1,174	1.383	0.959	0.991

6-

advanced in age after 4 days from the treatment till the end of longevity in the two seasons under storage periods treatments under study in most cases. It is clear that water uptake by Bird of paradise cut flower stalks as affected by storage periods at $7\pm1^{\circ}$ C in both seasons. The lowest water uptake value was recorded when storage periods were increased. The highest water uptake was with those stored at $7\pm1^{\circ}$ C for 0-time period compared with those stored for 7, 14, 21, 28, 35 and 42 days respectively, in both seasons. Whereas the values of water uptake was recorded highly significant by stored for 7day and 14 days storage periods compared with stored 21, 28, 35 and 42 days in the two seasons.

With regard to the interaction effect between growth regulators and storage periods on water uptake, data presented in Tables (73 & 74) demonstrate that all the interaction treatments between growth regulators and storage periods increased water uptake of bird of paradise cut flower stalks when compared to control in the two seasons. However, the combinations of kinetin at 100ppm and GA3 at 300ppm recorded the highest significant increase in this parameter, especially the interaction between (kinetin at 100ppm and storage period of 0-time) and (GA3 at 300ppm storage period of 0-time) after 4,8,12,16,20,24 and 28 days from the treatment from the treatment as compared to control in the two seasons. Irrespective control, the lowest mean values of water uptake of Bird of paradise cut flower stalks under all the interaction treatments was registered by using the interaction between BA at 25ppm and storage periods for 0-time after 4,8,12,16 and 20 days from the treatment in the two

Table (73) Effect of interaction between some growth regulators and Storage periods (Days) treatments on (g)/stalk of Strelitzia reginae Ait cut flower stalk during the first season of 2007-2008.

Treatn	ients			W	ater uptake (g	/stark		
					1st season	40		
Growth	Storage			Shelf	ife periods (da		24	28
egulators	periods	4	8	12	16	20	The same of the sa	163.47
	0	46.37	70.00	88.20	107.87	126.70	149.23	153.07
Ì	7	44.93	65.07	84.20	102.53	120.57	143.43	147.00
	14	43.73	63.50	80.50	92.80	114.60	135.07	-
Control	21	42.17	59.67	73.73	85.87	102.03	122.57	
	28	38.37	53.40	68.50	80.63	92.87	101.93	
	35	35.37	47.23	- 58.17	68.67	80.97		
	42	30.50	40.53	50.30	57.17	70.37	152.20	168.87
	0	53.60	71.30	97.03	113.83	135.67	153.20	164.30
	7	49.17	68.87	91.77	108.40	129.00	146.37	154.27
	14	46.47	68.20	86.73	98.03	122.33	140.90	134.27
GA ₃	21	45.10	65.57	80.37	92.43	115.27	133.70	
200ppm	28	43.93	58.83	76.40	87.13	106.33	116.07	
	35	41.27	52.37	69.20	79.33	92.73		
	42	37.07	47.57	59.00	68.87	82.73	-	175 42
	0	57.43	75.40	98.87	113.73	134.53	156.10	175.43
	7	52.73	70.77	93.50	110.37	132.93	149.87	168.90
	14	49.10	69.20	88.50	99.50	123.20	143.90	158.83
GA_3	21	46.93	67.13	82.77	94.67	116.57	138.80	
300ppm	28	44.13	60.73	76.27	89.37	109.17	118.97	
	35	41.93	54.87	71.27	81.00	96.90	•	
	42	39.30	49.03	63.97	69.60	85.87		
		48.00	72.20	97.17	113.20	135.13	148.93	158.50
BA 25 ppm	0	45.83	69.13	89.67	105.20	125.17	145.37	155.87
	7	44.73	66.07	84.27	95.20	117.30	137.37	148.20
	14	43.60	61.83	77.93	87.97	107.23	127.47	
	21	41.67	55.50	72.47	84.47	97.53	108.200). .
	28	36.70	48.67	64.13	75.37	86.77		-
	35 42	34.07	43.20	56.17	65.80	75.37	-	-
		48.83	70.73	97.10	112.40	133.00	148.53	166.37
	0	47.73	68.67	91.73	106.67	126.50	145.17	160.83
	7	45.37	67.67	85.07	96.73	116.87	138.53	152.03
BA 50	14	43.53	64.13	79.50	90.63	109.70	130.93	-
ppm	21	42.67	57.33	74.80	86.60	101.93	113.10	-
		39.10	51.00	67.27	76.33	89.97		
	35 42	36.50	45.03	57.47	68.60	77.87	*	
		55.77	76.07	97.17	113.03	132.43	151.23	170.90
	7	48.00	68.87	91.13	111.80	128.90	146.07	164.00
	14	48.17	68.10	85.10	96.10	121.13	138.70	153.47
Kin 50	21	45.57	65.60	78.93	92.00	116.57	133.70	
ppm	28	43.87	59.50	75.53	86.10	105.83	115.47	
	35	41.27	51.17	69.50	79.47	92.17	4	
	42	36.93	48.53	58.80	68.73	82.53	-	175.07
	0	60.53	81.47	102.33	117.13	133.07	153.20	176.87
	7	56.10	75.10	96.47	113.67	129.47	151.37	169.53
	14	51.83	69.60	88.47	104.57	125.83	147.40	159.57
Kin 100	21	47.50	68.23	84.23	96.87	108.87	138.17	-
ppm	28	46.07	60.17	78.86	88.87	108.93	119.53	-
	35	42.87	56.73	70.57	80.90	96.10	-	-
	42	38.93	49.53	64.23	65.50	85.87		- 0.073
	The second second second	0.851	0.963	1.154	0.942	2.144	1.147	0.873
L.S.D at	5% 1%	1.259	1.275	1.528	1.248	2.839	1.519	1.156

Table (74) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water uptake (g)/stalk of Strelitzia reginae Ait cut flower stalk during the second season of 2008-2009.

Treatn	ients				Water uptak	e (g)/stalk	A STATE OF THE REAL PROPERTY.	
					2 nd season	(g) stark		
Growth	Storage			Sh	elf life periods	(daye)		
regulators	periods	4	8	12	16	20	24	20
	0	48.60	73.63	91.33	110.13	129.20	151.87	165.4
	7	47.60	67.90	86.63	104.83	124.43	145.13	156.4
	14	47.20	66.60	83.33	95.90	118.00	137.90	149.3
Control	21	44.53	61.07	77.47	88.17	104.97	125.03	149.3.
	28	41.67	55.13	71.30	82.77	95.57	105.97	+ :
	35	37.33	49.13	61.83	71.93	83.30	-	
	42	32.60	42.80	52.67	59.70	69.40		
	0	56.70	73.03	97.10	115.60	134.47	152.37	171.57
	7	51.83	70.73	93.53	110.43	130.47	148.43	165.40
	14	48.70	70.10	88.37	100.40	123.23	143.10	156.53
GA ₃ 200ppm	21	47.00	67.07	82.37	94.30	117.07	136.37	130,33
	28	46.60	61.10	78.77	89.37	108.67	124.63	-
	35	43.23	55.73	71.60	81.33	94.57	124.03	1 - 5
	42	39.47	49.23	64.80	71.10	85.27	-	
	0	59.97	77.83	100.87	115.87	136.13	159.10	
	7	55.90	73.43	95.60	111.97	131.77	152.53	178.10
	14	51.37	71.13	90.43	102.87	125.27	145.43	
GA ₃ 300ppm	21	48.50	69.37	84.63	96.57	119.57	140.63	160.33
	28	47.30	63.93	80.37	91.13	111.43	121.50	-
	35	44.67	57.63	73.87	83.03	98.57	-	
BA 25 ppm	42	41.20	52.03	66.17	72.67	87.23		
	0	49.83	73.50	100.63	115.27	137.10	152.87	
	7	48.23	71.10	92.43	107.37	129.53	148.23	163.47 158.13
	14	47.37	68.27	86.23	97.93	120.27	140.37	151.53
	21	44.90	62.77	80.23	90.93	110.00	131.70	- 131.33
	28	43.80	57.17	74.87	85.97	101.90	111.47	-
	35	39.73	51.47	66.63	77.97	89.57	- 111.47	
	42	37.10	45.87	58.37	68.23	77.30	-	
	0	51.00	71.87	95.40	112.97	128.87	149.87	168.60
	7	49.87	70.40	93.03	108.70	127.13	146.93	163.07
	14	47.93	69.43	86.27	100.10	120.60	141.90	154.80
	21	45.53	65.63	80.83	91.97	112.63	133.73	134.00
	28	44.47	59.60	77.47	87.23	104.53	115.03	-
	35	41.23	5357	69.40	78.93	92.40	. 15.05	
	42	38.40	47.50	59.83	70.00	80.37	-	
	0	57.83	79.53	100.97	115.70	134.13	153.80	173.30
	7	51.93	72.03	93.60	110.93	130.33	148.87	166.00
<u></u>	14	50.47	69.13	88.20	99.50	123.07	142.23	157.13
Kin 50 ppm	21	47.70	67.50	81.67	94.30	118.37	135.93	137,13
	28	47.47	61.67	77.90	89.47	107.97	117.63	
	35	43.57	53.97	71.70	81.37	94.60	-	-
	42	39.40	49.33	64.83	71.33	85.10	-	
	0	67.23	84.40	105.00	120.40	134.57	155.80	179.43
	7	58.43	77.23	99.07	116.10	132.67	153.60	172.97
L	14	53.73	72.13	92.80	107.10	128.40	149.47	162.33
in 100 ppm	21	49.83	69.83	86.07	99.10	121.87	142.33	102.33
	28	48.60	63.77	80.73	91.90	112.27	124.47	
	35	44.70	58.47	74.63	83.73	98.03	-	
	42	41.93	52.83	66.63	72.20	87.43		-
L.S.D at	5%	1.301	1.927	2.739	2,124	2.669	3.494	1.583
	1%	2.385	2.551	3.627	2.812	3.353	4.626	2.096

seasons. Furthermore, water uptake of Bird of paradise cut flower stalks by using all the interaction treatments between growth regulators and storage periods was increased as flower cut stalks advanced in age after 4 days from the treatment till the end of age of longevity in the two seasons.

5.1.g.-Water loss (g)/stalks:

As shown in Table (71) it is obvious that all tested preharvest treatments succeeded in decreasing water loss of bird of paradise cut flowers stalks as compared with control in both seasons water loss by bird of paradise cut flower stalks increased as cut flower stalks prolonged in longevity of 4, 8, 12, 16 and 20 day then decreased after 20 days of shelf life periods. Moreover, GA₃ 300ppm and BA 50ppm recorded the lowest values of water loss as compared to control and other treatments under study.

Regarding to the effect of storage periods on water loss, Data shown in Table (72) reveal that water loss was increased as cut flower stalks advanced in age after 4 days from the treatment till the end of longevity in the two seasons under storage periods treatments under study. The lowest water loss value was recorded when storage periods were increased. The lowest water loss was those stored at 0-time and 7-time periods compared with those stored 14, 21, 28, 35 and 42 day respectively, in both seasons. The differences between the aforesaid two storage periods as 7-time and 14 days were not significant in both seasons. As for the interaction effect between growth regulators and storage periods on water loss, data in Tables (75 & 76) reveal that

Table (75) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water loss (g)/stalk of Strelitzia reginae Ait cut flower stalk during the first season of 2007-2008.

Treatn	nents				Water loss (g)/s	stalk		
					1st season			
Growth	Storage			Sh	elf life periods	(days)		
regulators	periods	4	8	12	16	20	24	28
	0	37.50	58.47	78.77	102.67	127.13	154.20	173.37
	7	39.40	61.33	83.43	106.40	130.90	158.70	171.27
	14	39.20	60.90	81.27	97.87	125.80	151.47	157.43
Control	21	38.63	58.13	76.23	92.80	114.77	140.63	-
	28	36.50	53.60	71.37	91.80	108.23	121.63	
	35	34.67	50.30	66.37	83.33	101.00	1-3	
	42	31.87	45.43	60.13	73.20	89.00		
	0	42.40	55.73	80.67	99.70	125.33	146.93	166.47
	7	39.73	57.33	79.23	99.60	124.90	145.90	167.53
GA ₃	14	37.93	56.87	74.97	91.07	119.13	142.37	158.67
200ppm	21	41.10	57.23	73.37	89.20	116.70	138.33	
	28	39.47	53.97	73.10	87.63	110.80	124.80	-
	35	37.30	49.30	68.13	82.27	100.43	-	-
	42	35.17	47.90	62.30	76.83	94.23	-	-
	0	42.90	53.33	75.50	92.60	116.07	142.90	166.67
	7	42.20	56.53	78.27	96.13	120.23	145.50	167.50
GA ₃	14	37.73	57.13	75.43	90.23	118.67	143.33	162.77
300ppm	21	39.03	57.07	73.77	88.80	115.00	142.13	
	28	39.37	54.93	71.7	89.57	113.67	127.83	4
	35	37.63	50.47	68.07	81.30	101.57		
	42	36.90	47.60	64.43	73.23	93.23	(*)	*
BA 25 ppm	0	37.50	57.83	81.13	100.90	126.80	144.37	160.27
	7	38.23	59.30	81.07	102.27	123.70	148.93	164.20
	14	39.20	60.93	80.07	94.60	119.70	145.07	159.63
	21	39.23	59.23	78.23	93.43	116.80	141.40	
	28	38.77	54.30	74.47	92.57	108.97	123.53	
	35	35.57	50.83	70.33	86.90	103.30		350
	42	33.00	45.20	62.77	78.00	92.37	-	
-	0	37.20	53.60	80.97	97.67	122.97	142.90	164.03
-	7	38.40	56.33	80.07	99.93	123.77	146.37	166.13
BA 50 ppm	14	37.37	56.73	75.87	90.60	117.27	141.80	161,60
BA 30 ppin	21	37.83	58.03	75.40	89.90	113.80	140.30	
-	28 35	38.90	54.13	73.20	90.97	110.13	126.40	
-	42	36.77 34.80	49.23	69.65	83.53	103.03	-	
-			45.63	61.73	77.20	92.13	-	8
-	7	43.87	59.47	80.77	99.47	123.30	147.17	169.70
-	14	38.47	55.13	77.20	101.87	122.97	142.80	166.73
Kin 50 ppm	21	41.57 39.80	57.63	75.83	91.83	121.33	143.07	161.93
rem 50 ppm	28	40.17	57.67	73.83	91.67	119.80	142.03	/5
-	35	38.50	55.00	74.23	89.87	114.20	127.67	
	42	34.73	48.83 48.90	67.40	86.23	102.60	(*	- 12
	0	49.17		61.43	75.53	94.23	-	
-	7	46.07	64.40	84.10	100.93	121.77	144.47	172.50
-	14	42.40	61.30	82.23	102.13	121.73	147.57	169.73
Kin 100	21	40.13	60.33	76.37	96.83	122.40	148.60	163.93
ppm	28	40.13	59.03 55.13	76.07	92.70	109.53	142.40	-
	35	38.57	53.43	75.80	89.63	113.47	128.17	
-	42	34.90	48.23	67.50	83.47	104.03	*	-
	5%	1.786		64.93	74.87	95.57	-	
L.S.D at	1%	2.364	1.527	12.37	1.265	1.431	1.358	4.277
	1/0	2.304	2.022	16.38	1.675	1.895	1.798	5.663

Table (76) Effect of interaction between some growth regulators and Storage periods (Days) treatments on Water loss (g)/stalk of Strelitzia reginae Ait cut flower stalk during the second season of 2008-2009.

Treatm	ients			Wate	er loss (g)/stal 2 nd season	k		
				Chalf li	ife periods (da	ivs)		
Growth	Storage			12	16	20	24	28
egulators	periods	4	8		105.40	129.33	157.77	174.07
	0	39.93	62.67	82.73	111.23	134.13	160.87	178.67
	7	42.73	64.93	86.03	103.17	128.33	154.77	169.57
	14	42.93	65.13	84.13	97.00	117.40	142.23	0.00
Control	21	41.93	60.53	81.40	95.47	112.37	126.43	-
	28	39.47	55.73	78.03	86.93	103.77	-	2
	35	37.13	52.47	72.03	76.63	90.83		
	42	33.40	4623	64.43	99.03	123.83	145.10	170.17
	0	45.27	56.60	79.80	99.03	125.73	147.87	168.43
	7	43.40	58.90	80.03		120.43	145.53	162.97
State Co. St. C.	14	41.33	59.17	77.20	93.37	118.07	140.87	
GA ₃	21	40.80	57.77	75.03	91.03	111.40	126.53	(4)
200ppm	28	42.30	56.00	75.40	90.13	98.97	-	-
	35	39.53	52.67	69.47	84.20	95.90	-	
	42	37.80	49.03	63.63	79.90		146.77	171.77
	0	46.70	56.70	77.43	94.73	119.00	147.50	169.23
	7	45.70	61.33	79.07	97.20	122.57	146.23	163.20
	14	42.33	59.07	78.43	93.37	121.20	143.00	105.25
GA_3	21	40.30	58.67	75.07	89.17	117.33		-
300ppm	28	41.77	57.93	75.83	90.50	113.73	128.70	
	35	31.30	54.17	70.77	83.57	103.03	•	
	42	38.20	49.33	64.97	74.97	94.70	-	162.10
	-	39.27	59.27	84.00	102.80	128.67	149.50	163.10
	7	40.73	61.40	83.23	101.93	129.13	150.80	165.97
		41.17	62.83	81.83	96.53	123.00	148.07	163.00
BA 25	14	41.10	60.17	80.50	96.13	118.20	144.97	•
ppm	21	40.63	55.67	78.03	92.30	113.33	126.37	•
	28	38.70	52.17	71.57	87.87	104.03		-
	35	36.47	46.77	63.93	80.93	92.83	-	
	42	39.57	54.17	79.80	100.03	117.73	143.87	167.00
	0		57.53	81.33	101.67	123.67	147.93	168.17
	7	40.77	59.57	76.73	95.03	121.00	146.37	165.77
BA 50	14	39.83	59.30	76.53	92.43	117.23	142.60	
ppm	21	40.87	56.23	75.17	92.77	113.23	127.63	-
22.51	28	39.30	52.00	72.00	85.23	105.27	-	-
	35	37.60	47.90	63.40	78.63	93.90	-	
	42		64.37	84.87	101.57	125.17	158.47	172.53
	0	47.57	57.83	80.00	100.73	125.13	151.50	168.97
	7	42.13 42.93	58.80	78.33	95.93	122.60	146.67	165.33
Kin 50	14		61.83	77.47	93.87	121.87	143.33	170
ppm	21	42.37	58.73	76.67	91.93	115.87	129.97	•
	28	44.23	51.90	74.80	89.03	106.27		
	35	41.37	48.63	65.20	79.43	97.83		-
	42	37.80		78.77	105.50	122.57	147.73	175.37
	0	65.90	67.33	83.93	103.50	124.20	149.13	173.50
	7	48.03	63.97	79.57	99.33	125.97	150.77	168.70
Kin 100	14	45.17	59.53	77.63	94.90	122.30	146.70	
Kin 100 ppm	21	43.63	59.77	78.53	93.60	116.97	133.33	
ppin	28	44.40	58.50	_	84.70	105.63	-	
	35	41.43	55.93	72.90 68.40	78.87	97.40		-
	42	39.00	51.00			2.746	1.916	1.980
	5%	5.519	1.912	4.434	2.347	3.659	2.536	2.621
L.S.D at	1%	7.863	2.531	5.870	3.107	3.033		

all the interaction treatments between growth regulators and storage periods increased water loss of Bird of paradise cut flower stalks during the two seasons when compared to control. However, the interactions of kinetin at 100ppm recorded the highest increases of water loss, especially the interaction between kinetin at 100ppm and storage period for 0-time after 4,8,12,16,20,24 and 28 days from the treatment as compared with control in the two seasons. Moreover, the interaction of (kinetin at 50ppm or GA3 at 300ppm) and storage periods for 0-time resulted highly increases of water loss of Bird of paradise cut flower stalks when compared to control in the two seasons.

6.1. Effect of some growth regulators as pre-treatments and storage periods on:

6.1. Chemical constituent determinations:

6.1.1.-Carotenoids percentage in petals:

Data in Table (77) indicate that all growth regulators treatments increased carotenoids in leaves/stalks (mg/g f.w.) of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of GA3 at 300ppm of Bird of paradise cut flower stalks exhibited to be the **most** effective one for inducing the highest significant increase in this parameter as compared to control in the two seasons, followed descendingly by kinetin at 100ppm and kinetin at 100ppm in the two seasons. On the reserve the lowest values of this parameter of tuberose cut flower stalks was registered by control in both seasons under study.

Table (77); Effect of some growth regulators treatments on Carotenoids percentage in petals, Total phenols percentage, Total sugars percentage, Reducing sugars percentage and Non-Reducing sugars percentage in petals and flower stalk of Strelitzia reginae Ait cut flower stalk during the two seasons of 2007-2008/2008-2009.

		Carotenoids percentage in petals	noids age in ils	Total phenols percentage in petals	renols age in	Total phenois percentage in flower stalk	nenols age in stalk	Total sugars percentage in petals	ugars age in is	Reducing sugars percentage in petals	ing rs age in Is	Non-Reducing sugars percentage in petals	lucing rs rge in ls	Total sugars percentage in flower stalk	ugars age in stalk	Reducing sugars percentage in flower stalk	ing rs ige in stalk	Non-Reducing sugars percentage in Nower stalk	ucing s ge in italk
Treatments	ments	l, season	2 nd season	l" season	2 nd season	Га	2 nd season	1" season	2"d season	l" season	2 nd season	l" season	2 nd season	l" season	2 nd season	l" season	2 nd season	1 ⁿ season	2 ^{md} seaso n
	Control	2.548	2.615	0.241	0.230	0.242	0.248	2.625	2.640	1.212	1.272	1.413	1.367	2.807	2.817	1.289	1.369	1.518	1.448
	GA ₃	2.963	3.075	0.181	0.187	0.194	0.206	3,180	3.337	1.585	1.549	1.615	1.788	3.210	3.260	1.553	1.574	1.658	1.686
	GA ₃	3.348	3.624	0.163	0.174	0.180	0.194	3.388	3.417	1,645	1.674	1.743	1.743	3.638	3.650	192.1	1.761	1.876	1.890
Growth	ВА 25 ррш	2.814	2.932	0.195	0.206	0.214	0.225	2.795	2.814	1.391	1.388	1.404	1.426	2.950	2.953	1.425	1.436	1.525	1.518
4	BA 50 ppm	2.901	3.052	0.204	0.193	0.227	0.210	2.990	2.986	1.446	1,465	1.544	1.521	3.154	3.170	1.535	1.534	1.619	1.636
	Kin 50 ppm	3.170	3.066	0.191	0.191	0.218	0.213	3.200	3.208	1.552	1.560	1.648	1.648	3.212	3.224	1.555	1.554	1.657	1.670
	Kin100ppm	3.255	3,662	0.162	0.172	0.178	0.190	3.370	3.381	1.629	1.680	1.741	1.701	3.662	3.680	1.728	1.725	1.934	1.955
	2 %	0.051	0.082	0.027	0.006	0.007	900.0	0.019	0.034	0.019	0.027	0.027	0.039	0.034	0.061	0.027	0.019	0.034	0.061
L.S.D at	1%	0.068	0.109	0.036	0.008	0.009	0.007	0.026	0.044	0.026	0.036	0.036	0.051	0.044	0.081	0.036	0.026	0.044	0.081

Regarding to the effect of storage periods on Carotenoids percentage in petals .It is quite clear from the data in Table (78) that there were gradual decrease in Carotenoids percentage in petals of bird of paradise cut flower stalks with extending storage periods at 7±1°C for different days (0-time, 7, 14, 21, 28, 35 and 42 days). However, storage periods at 7±1°C for 0-time treatment showed the highest significant increase in this parameter of bird of paradise cut flowers stalks when compared to the other ones under study in the two seasons. On the reverse the lowest values of these parameters of Bird of paradise cut flower stalks was registered by storage periods at 7±1°C for 42days as compared to different storage periods in both seasons.

Referring to the interaction effect between growth regulators and storage periods on Carotenoids percentage in petals Data in Table (79) reveal that all the combinations treatments between growth regulators and storage periods (0time,7,14,21,28,35 and 42 days) at 7±1°C increased Coroteniods percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments between GA3 at 300ppm and different storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) showed to be the most effective one for inducing the highest values of these parameters of Bird of paradise cut flower stalks as compared to control in the two seasons in most cases, especially the combined treatment between GA3 at 300ppm and storage periods at 7±1°C for 0-time in the two seasons of this study. Moreover, the combination treatments between kinetin at 100ppm or kinetin at 50ppm and storage periods at 4±1°C for 0-

Table (78): Effect of Storage periods (Days) treatments on Carotenoids percentage in petals, Total phenols percentage, Total sugars percentage, Reducing sugars percentage and Non-Reducing sugars percentage in petals and flower stalk of Strelitzia reginae Ait cut flower stalk during the two seasons of 2007-2008/2008-2009.

												3	2		0.000	Deducing sugars	Sugare	Non -Reducing	ucing
		Carotenoid percentage in petals	noid age in	Total phenols percentage in petals	nenols age in ils	Total phenols percentage in flower stalk	Fotal phenols percentage in flower stalk	Total sugars percentage in petals	igars ige in Is	Reducing sugars percentage in petals		Non-Reducing sugars percentage in petals	ucing centage als	lotal sugars percentage in flower stalk	ugars age in stalk	percentage in flower stalk	suge in stalk	sugars percentage in flower stalk	ge in stalk
Treatments	ents	l" season	2 nd season	1 st	2 nd season	l" season	2 nd season	l" season	2 nd season	l" season	2 nd season	1" season	2 nd season	l st season	2 nd season	l" season	2 nd season	1 st season	2 nd season
	0	4.368	4.430	0.354	0.358	0.371	0.380	4.626	4.629	2.301	2.286	2.325	2.342	4.892	4.898	2.426	2.430	2.466	2.468
	, ,	3.480	3.684	0.300	0.284	0.319	0.304	4.120	4.156	2.024	2.025	2.096	2.131	4.080	4.080	2.017	1.997	2.062	2.083
	. 2	3.775	3 432	0.241	0.233	0.257	0.253	3.551	3.356	1.666	1.754	1.886	1.807	3.629	3.652	1.740	1.775	1.890	1.877
Storage	± =	2,2.6	3.151	0.179	0.182	0.207	0.201	3.051	3.058	1.480	1.508	1.591	1.550	3.227	3.252	1.513	1.550	1.714	1.693
(Days)	17 00	07.5.0	2 703	0.127	0.145	0.144	0.166	2.515	2.679	1.233	1.239	1.282	1.440	2.729	2.730	1.258	1.255	1.470	1.475
	97	23.13	2 440	0 0 0 0 0 0 0 0 0 0 0 0 0	0.095	0.099	0.114	1.953	1.952	0.939	0.950	1.014	1.002	2.197	2.249	1.026	1.047	1.170	1.202
	8 8	2.008		0.057		0.058	0.067	1.730	1.748	0.817	0.828	0.913	0.920	1.880	1.893	0.866	0.890	1.014	1.003
	7 %	0.051	-		0.006	0.007	0.006	0.019	0.034	0.019	0.027	0.027	0.039	0.034	0.061	0.027	0.019	0.034	0.061
L.S.D at		0.068	0.109	0.036	0.008	600-0	0.007	0.026	0.044	0.026	0.036	0.036	0.051	0.044	0.081	0.036	0.026	0.044	0.081

Table (79): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Carotenoids percentage and Total phenols percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	L.S.D at	,	Min 100 ppm	100	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA ₃ 300ppm	GA3 200ppm	200	Control		L.S.D at		mdd oor mex	7	Kin 50 ppm	BA 50 ppm	BA 25 ppm	GA3 300ppm	CA3 200ppm	CA 200	Control	regi	Gr		INEA
. 70	1%	5%	opm		m	m	im	ppm	ppm				1%	5%	mdd	1	Om	pm	pm	ppm	mdd			regulators	Growth		INEALMENIS
			5.06	4.08	00	4.39	4.32	5.01	4.08	4.06					4.85	4.20		4.24	4.13	4.86	4.30	3.99	T		-	1	
			4.22	3.60		3 52	3.48	4.18	3.59	3.19					3.65	3.64		3 40	3.37	3.77	3.42	3.16			7		Carote
			3.82	3.37	+	-	3.28	3.83	3.34	3.07					3.46	3.80	1	3 10	3.12	3.51	3.28	2.98		:	1	torage	noids
0.288	300	0.217	3.62 3	3.20	+	-	2.83	3.58	3.17	2.59		0.00	0.180	0.136	3.25	3,22	+	781	2.76	3.28	2.95	2.56		i.	31	Storage periods(days)	Carotenoids percentage in petals
		-	29	2.93 2	+	7.7	2.42	3.24 2	2.59	2.17					2.79	3.88	1.43	+	2.35	2.95	2.47	2.11		0.7	70	s(davs	age in
		-	2.95 2	2.39 2	2 40.2	-	2.22	2.89 2	2.38 2	1.90	-				2.51	2.60	12.2	1	2.12	2.69	2.26	1.81		33		1	petals
_	+	+	67	2.19 0.	2.10	-	_	2.64 0	2.37 0	1.32 0	-	-	+	4	2.29 (2.27	2.02	-	.83	2.37	2.05	1.22		42	1		
		- 1	0.330 0	0.360 0	0.360 0	-	-	0.333	0.343 (0.407					0.307	0.360	0.3//	-	0.383	0.303	0.330	0.417		9	>		
		-	0.250	0.283	0.287	+	+	-	0.277	0.333					0.263	0.310	0.320		0310	0.273	0.290	0.330		-	1		Total
		1	0.213	0.223	0.233	0.230	0 250	0.213	0.223	0.273					0.207	0.253	0.257	0.000	0.250	0.217	0.233	0.270		14	STOTE	0	pheno
0.021	0.016	0.10	0.157	0.183	0.180	0.200	0.100	0 163	0.170	0.220	2nd	0.096	0.072		0.150	0.173	0.197	0.102	0 183	0.160	0.180	0.210	1st	21	Storage periods(days)	o per	is ner
		0.1.50	0 130	0.143	0.150	0.150	0.100	0.120	0 143	0.170	2nd season			-	0.100	0.130	0.143	0.150	-	-	0.123	0.160	1st season	28	ods(da	Ciliago	onton
		0.000	000	0.093	0.090	0.097	+	-	\rightarrow	0.117	_			-	0.080	0.073	0.103	0.080	+	-+-	3 0.067	0.100	ם	35	7	in per	Total phenois percentage in petate
		0.043	+	3 0.050	0.050	7 0.067	-	-		7 0.087				-	-	_	_	\vdash	-	-	-	-		-	-	415	-
		+	-	-	_	-	-	-	-	_		_	L	+	-	0.040 0	0.030 0	0.030 0	_	-	0.043	0.200 (42	L		
		0.550 0.	-	0 380 0	0.380 0.30	0.400 0.3	0.360 0.2	+	-	0.427 0				175.0	+	0.383	0.393 (0.390	_	-		0.440		0		Lotal	1
		0.277 (_	005.0)7	30	70	9	3	1510				0.200	+	0 327	0.337	0.330	83	-	3	0.373		7		al phe	
		0.230	+-	-	0.250	0.270	0.237	-	_	0 203				0.223		0 270	0.277	0.283	0.230	0.22.0	0350	0 287		14	Storag	nols p	
0000	0.015	0.177	0.200	-	0.203	0.220	0.180	0.190	0.237	0 737		0.024	0.018	0.1/3	0.44	777	0.227	0.210	0.183	0.197	0.103	0.220		21	e perio	ercenta	
		0.147	0.170	0170	0.163	0.170	0.153	0.170	0.130	0 100				0.110	V.107	0 157	0.167	0.150	0.113	0.133	0.1//	0 177	ı	28	Storage periods(days)	ge in fl	ı
		0.100	0.117		0 107	0.113	0.107	0.117	0.13/					0.090	0.097		0 120	0.090	0.087	0.090	-	_		35	۳	phenols percentage in flower stalk	
		0.047	0.0/7	0000	0.057	0.073	0.053	0.063	0.100					0.043	0.067	-	0.070	0.067	0.040	0.047	+	-		42	P	talk	

time and 7days resulted highly significant increase Carotenoids percentage in petals of Bird of paradise cut flower stalks as compared to control in both seasons. Irrespective control, the lowest values of these parameters of Bird of paradise cut flower stalks was recorded by using the combined treatments between BA at 25ppm and storage periods at 7±1°C for 42days in the two seasons under this study.

6.1.2.-Total phenols percentage in petals and flower stalks:

Data in Table (77) reveal that all growth regulators treatments decreased total phenols percentage in petals and flower stalks of Bird of paradise cut flower stalks 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, followed descendingly by GA₃ at 300ppm in the two seasons. Moreover, using the treatment of GA₃ at 200ppm of Bird of paradise cut flower stalks recorded highly decreases of total phenols percentage in petals and flower stalks as compared to control in the two seasons. On the reverse, the highest values of these parameter was registered by using control in the two seasons under this study.

Regarding to the effect of storage periods on total phenols in petals and flower stalks data in Table (78) reveal that there were gradual decrease in total phenols in petals and flower stalks of Bird of paradise cut flower stalks with extending storage periods at 7±1°C for different days (0-time,7,14,21,28,35 and 42 days) in the two seasons. However, Bird of paradise cut flower

stalks were stored at $7\pm1^{\circ}$ C for 42days resulted the highest significant decrease of these parameters as compared to different storage periods in both seasons. Moreover, storage periods at $7\pm1^{\circ}$ C for 0-time treatment gave the highest values total phenols in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

Referring to the interaction effect between growth regulators and storage periods on total phenols percentage in petals and flower data in Table (79) reveal that all the combinations treatments between growth regulators and different storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) decreased total phenols percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments between kinetin at 100ppm and different storage periods at 7±1°C for (0-time, 7, 14, 21, 28, 35 and 42 days) recorded the lowest values of this parameter of Bird of paradise cut flower stalks as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 7±1°C for 42days in the two seasons. Moreover using the combinations treatments between GA₃ at 300ppm and storage periods at 7±1°C for (0time,7,14,21,28,35 and 42 days)recorded highly decreases in total phenols percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in both seasons, especially the combined treatment between GA3 at 300ppm and storage periods at 7±1°C for 42days. On the reverse, the highest values of this parameter of Bird of paradise

Table (80): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total sugars percentage, Reducing sugars percentage and non reducing sugars percentage in petals of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Gontrol Storage periods(days) Storage periods(days) Storage periods(days) Countrol 0 7 14 21 28 35 42 7 144 21 28 35 42 9 7 144 21 28 35 42 42 42 42 144 120 131 131 935 42 42 9 42 131 132 134 132 134 134 132 134 <th>TREATMENTS</th> <th>S</th> <th>Tota</th> <th>sugars</th> <th>Total sugars percentage in petals</th> <th>tage in</th> <th>petals</th> <th></th> <th></th> <th>Reducin</th> <th>Reducing sugars percentage in petals</th> <th>rs perce</th> <th>entage</th> <th>in petal</th> <th>S</th> <th>ON</th> <th>n-Redu</th> <th>cing su</th> <th>Non-Reducing sugars percentage in petals</th> <th>rcentag</th> <th>e in pet</th> <th>tals</th>	TREATMENTS	S	Tota	sugars	Total sugars percentage in petals	tage in	petals			Reducin	Reducing sugars percentage in petals	rs perce	entage	in petal	S	ON	n-Redu	cing su	Non-Reducing sugars percentage in petals	rcentag	e in pet	tals
Mathematical National Paris Math				Storag	e perio	ls(days					Storage	period	s(days)					Storage	Storage periods(days)	s(days)		
1.10 1.20 1.15 1.20 1.15 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.21 1.20 1.22 1.21 1.20 1.22 1.21 1.20 1.22 1.21 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.20 1.22 1.22 1.23	Growth	0	7	14	21	28	35	42	0	7	14	21	28	35	42	0	7	14	21	28	35	42
4.33 3.69 3.15 2.62 1.97 1.41 1.20 2.15 1.80 1.31 0.95 0.67 0.58 4.65 4.22 3.61 3.12 2.68 2.07 1.90 2.33 2.12 1.81 1.49 1.32 0.98 0.90 4.89 4.22 3.81 3.26 2.78 2.07 2.40 2.16 1.85 1.61 1.39 1.12 0.98 0.90 4.49 3.88 3.26 2.74 2.19 1.66 1.34 2.25 1.90 1.66 1.31 1.11 0.83 0.67 4.58 4.08 3.49 2.91 1.62 2.30 1.95 1.73 1.66 1.31 1.11 0.83 0.67 4.63 4.21 2.84 2.92 2.82 2.02 2.30 1.95 1.73 1.60 1.32 0.67 4.63 4.21 2.82 2.07 2.38 2.17 1.78	0										18	t seas	n.									
4.65 4.22 3.61 3.12 2.68 2.07 1.90 2.33 2.12 1.81 1.49 1.32 0.98 0.90 4.89 4.39 3.84 3.39 2.88 2.25 2.07 2.40 2.16 1.85 1.61 1.39 1.12 0.98 4.49 3.88 3.26 2.74 2.19 1.66 1.34 2.25 1.90 1.66 1.31 1.11 0.83 0.67 4.58 4.08 3.40 2.91 2.42 1.85 1.92 1.79 1.79 1.79 1.79 1.79 0.83 0.73 0.73 5% 4.63 4.21 3.68 3.17 2.64 2.17 1.91 2.29 2.07 1.79 1.78 1.29 0.08 0.73 0.88 0.73 0.78 0.73 0.78 0.79 0.78 0.79 0.78 0.71 1.78 1.50 1.79 1.78 1.79 0.78 0.78	Control	4.33	3.69	3.15	2.62	1.97	1.41	1.20	2.15	1.80	1.03	1.31	0.95	0.67	0.58	2.18	1.89	2.11	1.32	1.02	0.74	0.62
4.89 4.39 3.84 3.39 2.88 2.25 2.07 2.40 2.16 1.85 1.61 1.39 1.11 0.83 0.67 4.49 3.88 3.26 2.74 2.19 1.66 1.34 2.25 1.90 1.66 1.31 1.11 0.83 0.67 4.58 4.08 3.40 2.91 2.42 1.85 1.62 2.30 1.95 1.73 1.31 0.11 0.83 0.73 5% 4.63 4.21 3.68 3.17 2.64 2.17 1.91 2.29 2.07 1.73 1.24 1.29 0.73 5% 4.82 4.32 3.40 2.83 2.26 2.07 2.38 2.17 1.78 1.60 1.37 1.12 0.98 5% 3.40 2.83 2.26 2.07 2.38 2.17 1.78 1.60 1.37 1.12 0.98 5% 4.53 3.40 2.84 1.4	GA ₃ 200ppm	4.65	4.22	3.61	3.12	2.68	2.07	1.90	2.33	2.12	1.81	1.49	1.32	86.0	06.0	2.32	2.10	1.80	1.63	1.36	1.09	1.00
4.49 3.88 3.26 2.74 2.19 1.66 1.34 2.25 1.90 1.66 1.31 1.11 0.83 0.67 4.58 4.08 3.49 2.91 2.42 1.85 1.62 2.30 1.95 1.73 1.36 1.20 0.85 0.73 9.63 4.63 4.21 3.68 3.17 2.64 2.17 1.91 2.29 2.07 1.79 1.78 1.60 1.37 1.00 0.88 9.64 4.82 4.31 3.83 3.40 2.83 2.26 2.07 1.79 1.78 1.60 1.37 1.00 0.88 1% 1.62 2.23 2.17 1.78 1.60 1.37 1.12 0.051 4.32 3.40 3.50 1.91 1.25 2.11 1.78 1.56 1.35 0.86 0.89 0.78 4.32 3.40 3.50 2.09 1.94 1.25 2.11 1.78	GA ₃ 300ppm	4.89	4.39	3.84	3.39	2.88	2.25	2.07	2.40	2.16	1.85	19.1	1.39	1.12	0.98	2.48	2.23	1.99	1.78	1.49	1.14	1.09
4.58 4.08 3.49 2.91 2.42 1.85 1.62 2.30 1.95 1.73 1.36 1.20 0.85 0.73 4.63 4.21 3.68 3.17 2.64 2.17 1.91 2.29 2.07 1.79 1.54 1.29 1.00 0.88 5% 4.82 4.39 3.83 3.40 2.83 2.26 2.07 2.38 2.17 1.78 1.60 1.37 1.12 0.98 5% 4.83 4.24 3.84 3.84 2.95 1.97 1.41 1.25 2.11 1.78 1.56 1.33 0.98 0.85 4.84 4.57 3.82 3.39 2.90 2.98 2.91 2.31 2.07 1.80 1.61 1.33 0.98 0.85 4.85 4.57 3.88 3.31 2.72 2.28 1.65 1.31 2.20 1.90 1.67 1.31 0.90 0.80 4.85 4.03 3.70 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.85 4.87 3.88 3.31 2.72 2.88 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80	BA 25 ppm	4.49	3.88	3.26	2.74	2.19	1.66	1.34	2.25	1.90	1.66	1.31	===	0.83	19.0	2.24	1.98	1.60	1.43	1.08	0.83	99.0
95% 4.63 4.21 3.68 3.17 2.64 2.17 1.91 2.29 2.07 1.79 1.54 1.29 1.00 0.88 95% 4.82 4.39 3.83 3.40 2.83 2.26 2.07 2.38 2.17 1.78 1.60 1.37 1.12 0.98 19% 3.40 2.83 2.26 2.07 2.38 2.17 1.78 1.60 1.37 1.12 0.98 19% 3.40 3.62 1.97 1.41 1.25 2.11 1.78 1.56 1.35 0.86 0.69 0.86 4.63 4.63 3.62 3.14 3.69 2.09 1.94 2.31 2.07 1.80 1.51 1.14 0.99 4.63 3.88 3.31 2.72 2.28 2.09 2.41 2.18 1.90 1.69 1.93 1.74 1.14 0.99 4.53 3.88 3.31 2.72 2.28 <th< th=""><th>BA 50 ppm</th><th>4.58</th><th>4.08</th><th>3.49</th><th>2.91</th><th>2.42</th><th>1.85</th><th>1.62</th><th>2.30</th><th>1.95</th><th>1.73</th><th>1.36</th><th>1.20</th><th>0.85</th><th>0.73</th><th>2.28</th><th>2.13</th><th>1.76</th><th>1.55</th><th>1.21</th><th>0.99</th><th>0.90</th></th<>	BA 50 ppm	4.58	4.08	3.49	2.91	2.42	1.85	1.62	2.30	1.95	1.73	1.36	1.20	0.85	0.73	2.28	2.13	1.76	1.55	1.21	0.99	0.90
85%	Kin 50 ppm	4.63	4.21	3.68	3.17	2.64	2.17	1.91	2.29	2.07	1.79	1.54	1.29	1.00	0.88	2.34	2.14	1.89	1.62	1.35	1.17	1.02
9% 8.9% 1% 2.068 2.068 4.32 3.40 3.16 2.68 1.97 1.41 1.25 2.11 1.78 1.56 1.35 0.86 0.69 0.56 4.63 4.53 3.82 3.39 2.09 2.09 1.94 2.31 2.07 1.80 1.51 1.33 0.98 0.85 4.53 3.88 4.57 3.82 3.39 2.09 2.29 2.41 2.18 1.90 1.69 1.42 1.14 0.99 4.53 3.88 3.31 2.72 2.28 1.05 1.31 1.09 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.09 2.32 1.31 2.20 1.90 1.67 1.41 1.19 0.90 0.80 4.59 4.07 3.50 2.90 2.32 1.23 1.74 1.41 1.19 0.90	Kin 100 ppm	4.82	4.39	3.83	3.40	2.83	2.26	2.07	2.38	2.17	1.78	1.60	1.37	1.12	86.0	2.43	2.22	2.04	1.80	1.46	1.14	1.09
9% 2nd saeson 4.32 3.40 3.16 2.68 1.97 1.41 1.25 2.11 1.78 1.56 1.35 0.86 0.69 0.56 4.63 4.53 3.82 3.39 2.09 1.94 2.31 2.07 1.80 1.51 1.33 0.98 0.85 4.88 4.57 3.82 3.39 2.09 2.28 2.01 2.41 2.18 1.90 1.69 1.42 1.14 0.99 4.53 3.88 3.31 2.72 2.28 1.31 2.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.28 1.31 2.20 1.90 1.67 1.31 1.14 0.80 0.60 4.59 4.07 3.50 2.90 2.32 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.53 3.70 3.50 2	-	_			0.051							0.051							0.068			
4.53 3.40 3.16 2.68 1.97 1.41 1.25 2.11 1.78 1.56 1.35 0.86 0.69 0.56 4.63 4.53 3.62 3.14 3.69 2.09 1.94 2.31 2.07 1.80 1.51 1.33 0.98 0.85 4.88 4.57 3.82 3.39 2.90 2.28 2.08 2.41 2.18 1.90 1.69 1.42 1.14 0.99 4.53 3.88 3.31 2.72 2.28 1.65 1.31 2.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.39 1.83 1.63 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.62 4.63 3.70 2.04 2.16 1.93 2.12 1.72 1.72 1.70 0.93	Н	_			0.068							0.068							960.0			
4.32 3.40 3.16 2.68 1.97 1.41 1.25 2.11 1.78 1.56 1.35 0.86 0.69 0.56 4.63 4.25 3.62 3.14 3.69 2.09 1.94 2.31 2.07 1.80 1.51 1.33 0.98 0.85 4.88 4.57 3.82 3.39 2.90 2.28 2.08 2.41 2.18 1.90 1.69 1.42 1.14 0.99 4.53 3.88 3.31 2.72 2.28 1.65 1.31 2.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.23 3.70 3.19 2.64 2.16 1.93 2.12 1.72 1.72 1.53 1.31 1.02 0.93											2n	d seas	on									
4.63 4.25 3.62 3.14 3.69 2.09 1.94 2.31 2.07 1.80 1.51 1.33 0.98 0.85 4.88 4.57 3.82 3.39 2.90 2.28 2.08 2.41 2.18 1.90 1.69 1.42 1.14 0.99 0.85 4.53 3.88 3.31 2.72 2.28 1.63 1.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.23 3.70 3.19 2.64 2.16 1.93 2.29 2.12 1.72 1.53 1.31 1.02 0.93	Control	4.32	-	3.16		1.97	1.41	1.25	2.11	1.78	1.56	1.35	98.0	69.0	0.56	2.22	1.62	1.59	1.33	1.1	0.72	69.0
4.88 4.57 3.82 3.39 2.90 2.28 2.08 2.41 2.18 1.90 1.69 1.42 1.14 0.99 4.53 3.88 3.31 2.72 2.28 1.65 1.31 2.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.23 3.70 3.19 2.64 2.16 1.93 2.29 2.12 1.72 1.53 1.31 1.02 0.93	GA ₃ 200ppm	4.63		3.62	3.14	3.69	2.09	1.94	2.31	2.07	1.80	1.51	1.33	86.0	0.85	2:32	2.18	1.83	1.63	2.36	1.11	1.09
4.53 3.88 3.31 2.72 2.28 1.65 1.31 2.20 1.90 1.67 1.33 1.14 0.80 0.67 4.59 4.07 3.50 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.63 3.70 3.19 2.64 2.16 1.93 2.29 2.12 1.72 1.53 1.31 1.02 0.93	GA ₃ 300ppm	4.88	4.57	3.82	3.39	2.90	2.28	2.08	2.41	2.18	1.90	1.69	1.42	1.14	0.99	2.47	2.39	1.92	1.70	1.48	1.14	1.10
4.59 4.07 3.50 2.90 2.39 1.83 1.63 2.29 1.93 1.74 1.41 1.19 0.90 0.80 4.62 4.23 3.70 3.19 2.64 2.16 1.93 2.29 2.12 1.72 1.53 1.31 1.02 0.93	BA 25 ppm	4.53	3.88	3.31	2.72	2.28	1.65	1.31	2.20	1.90	1.67	1.33	1.14	0.80	0.67	2.33	1.98	1.64	1.39	1.15	0.85	0.64
4.62 4.23 3.70 3.19 2.64 2.16 1.93 2.29 2.12 1.72 1.53 1.31 1.02 0.93	BA 50 ppm	4.59	_	3.50	2.90	2.39	1.83	1.63	2.29	1.93	1.74	1.41	1.19	0.90	080	2.30	2.14	1.76	1.49	1.20	0.92	0.83
	Kin 50 ppm	4.62	4.23	3.70	3.19	2.64	2.16	1.93	2.29	2.12	1.72	1.53	1.31	1.02	0.93	2.32	2.11	1.98	1.65	1.33	1.13	1.00
Kin 100 ppm 4.83 4.40 3.81 3.40 2.89 2.26 2.09 2.39 2.20 1.88 1.74 1.43 1.12 1.01 2.	Kin 100 ppm	4.83		3.81	3.40	2.89	2.26	2.09	2.39	2.20	1.88	1.74	1.43	1.12	1.01	2.44	2.20	1.93	1.66	1.46	1.14	1.08
	Н				0.089							0.072							0.103			
0.096	-				0.118							0.096							0.136			

As for the effect of interaction between growth regulators and storage periods on total sugars percentage in flower stalks, data in Table (81) demonstrate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) increased total sugars percentage in flower stalks of bird of paradise cut flower stalks as compared to control in the two seasons. However the highest significant increments of this parameter was registered by using the combinations treatments between kinetin at 100ppm and different storage periods at 7±1°C for (0time, 7,14,21,28,35 and 42 days) as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 7±1°C for 0time as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between GA3 at 300ppm and storage periods at 7±1°C for 0-time resulted highly increases in total sugars percentage in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. Any how, the lowest values of this parameters of Bird of paradise cut flower stalks was recorded by using the combined treatments between control or BA at 25ppm and storage periods at 7±1°C for 42days in the two seasons under this study.

6.1.4.-Reducing sugar percentage in petals and flower stalks

Data in Table (77) demonstrate that all growth regulators treatments increased reducing sugars percentage in petals and flower stalks of the Bird of paradise cut flower stalks as

Table (81); Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total sugars percentage, Reducing sugars percentage and non reducing sugars percentage in flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

14 3.30 3.62	e periods(days)				Re	9	sugars.	Dercents	Reducing sugars percentage in nower	wer stalk	*	Non	-Reducii	ıg sugar	s perce	Non-Reducing sugars percentage in flower		stalk
4 08.30		(days)					Storage	period	Storage periods(days)					Storage	Storage periods(days)	s(days)	ı	
30	21	28	35	42	0	7	4	21	28	35	42	0	7	14	21	28	35	42
.30							18	1st season	n n									
63	2.77	2.18	1.65	1.31	2.26	1.77	1.40	1.17	90'1	92.0	09.0	2.40	2.03	1.90	1.60	1.11	68.0	0.70
	3.21	2.71	2.18	1.94	2.41	2.06	1.78	1.53	1.29	0.87	0.83	2.35	1.99	1.84	1.68	1.42	1.32	Ξ
3.94	3.62	3.20	2.72	2.29	2.56	2.20	1.93	1.72	1.54	1.31	1.07	2.70	2.23	2.01	1.90	1.66	1.41	1.21
3.39	2.99	2.36	1.82	1.56	2.32	1.90	1.62	1.38	1.18	0.85	0.72	2.38	1.94	1.77	1.60	1.17	0.97	0.84
3.58	3.13	2.67	2.07	1.87	2.40	1.99	1.76	1.52	1.29	0.88	0.82	2.35	2.01	1.83	1.61	1.38	1.19	1.05
3.62	3.25	2.78	2.21	1.91	2.41	1.98	1.75	1.52	1.33	1.02	06.0	2.33	1.98	1.88	1.74	1.45	1.19	1.02
3.95	3.62	3.21	2.72	2.29	2.62	2.24	1.94	1.75	1.1	1.31	1.12	2.75	2.24	2.01	1.87	2.09	1.41	1.17
	0.089							0.072							0.089			
	0.118				ı			960.0							0.118			
							2 n	d seas	100									
3.31	2.77	2.21	1.68	1.33	2.25	1.85	1.54	1.38	==	0.78	0.67	2.36	1.96	1.77	1.39	1.10	06.0	0.65
3.63	3.24	2.69	2.52	1.97	2.39	1.93	1.86	1.59	1.30	1.03	0.92	2.37	2.08	1.77	1.65	1.39	1.49	1.06
3.99	3.66	3.21	2.72	2.28	2.60	2.19	1.90	1.73	1.53	1.31	1.07	2.68	2:22	2.09	1.93	1.68	1.42	1.21
3.39	2.97	2.35	1.83	1.59	2.34	1.80	1.69	1.42	1.17	0.83	0.71	2.38	2.04	1.70	1.55	1.18	1.00	0.87
3.62	3.17	3.69	2.04	1.87	2.41	1.96	1.73	1.51	1.30	0.97	0.85	2.36	2.08	1.88	1.66	2.39	1.07	1.01
3.95	3.31	2.76	2.24	1.92	2.38	1.90	1.77	1.54	1.31	1.08	06.0	2.35	2.06	2.18	1.77	1,45	1.16	1.02
3.98	3.65	3.21	2.72	2.30	2.64	2.25	1.93	1.74	1.07	1.34	1.10	2.77	2.24	2.05	1.91	2.15	1.38	1.19
	0.162							0.051							0.162			
	0.215							0.068		١			ı		0.215			
E 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5			3.24 3.24 3.66 2.97 3.17 3.17 3.65 0.162	3.24 2.69 3.66 3.21 2.97 2.35 3.17 3.69 3.17 3.69 3.31 2.76 3.65 3.21 0.162	2.77 2.21 1.68 3.24 2.69 2.52 3.66 3.21 2.72 2.97 2.35 1.83 3.17 3.69 2.04 3.33 2.76 2.24 3.65 3.21 2.72 0.162	2.77 2.21 1.68 1.33 3.24 2.69 2.52 1.97 3.66 3.21 2.72 2.28 2.97 2.35 1.83 1.59 3.17 3.69 2.04 1.87 3.31 2.76 2.24 1.92 3.65 3.21 2.72 2.30 0.162	2.77 2.21 1.68 1.33 2.25 3.24 2.69 2.52 1.97 2.39 3.66 3.21 2.72 2.28 2.60 2.97 2.35 1.83 1.59 2.34 3.17 3.69 2.04 1.87 2.41 3.31 2.76 2.24 1.92 2.38 3.65 3.21 2.72 2.30 2.64 0.162	2.77 2.21 1.68 1.33 2.25 1.85 1.5 3.24 2.69 2.52 1.97 2.39 1.93 1.8 3.66 3.21 2.72 2.28 2.60 2.19 1.9 2.97 2.35 1.83 1.59 2.34 1.80 1.6 3.17 3.69 2.04 1.87 2.41 1.96 1.7 3.31 2.76 2.24 1.92 2.38 1.90 1.7 3.65 3.21 2.72 2.30 2.64 2.25 1.9 0.162	2.77 2.21 1.68 1.33 2.25 1.85 1.5 3.24 2.69 2.52 1.97 2.39 1.93 1.8 3.66 3.21 2.72 2.28 2.60 2.19 1.9 2.97 2.35 1.83 1.59 2.34 1.80 1.6 3.17 3.69 2.04 1.87 2.41 1.96 1.7 3.31 2.76 2.24 1.92 2.38 1.90 1.7 3.65 3.21 2.72 2.30 2.64 2.25 1.5 0.162	2.77 2.21 1.68 1.33 2.25 1.85 1.54 1.38 3.24 2.69 2.52 1.97 2.39 1.93 1.86 1.59 2.97 2.35 1.83 1.59 2.34 1.80 1.69 1.73 3.17 3.69 2.04 1.87 2.41 1.96 1.73 1.51 3.31 2.76 2.24 1.96 1.77 1.54 3.65 3.21 2.72 2.38 1.90 1.77 1.54 0.162	2.77 2.21 1.68 1.33 2.25 1.85 1.54 1.38 1.11 0 3.24 2.69 2.52 1.97 2.39 1.93 1.86 1.59 1.30 1.11 0 2.97 2.32 1.97 2.39 1.93 1.86 1.59 1.30 1.53 1.51 1.01 1.01 1.01 1.01 1.01 1.01 1.01 1.01 1.02 1.03	2.77 2.25 1.85 1.38 1.11 0.78 3.24 2.69 2.52 1.97 2.39 1.93 1.86 1.59 1.30 1.03 0 3.66 3.21 2.72 2.28 2.60 2.19 1.90 1.73 1.53 1.31 0	2.77 2.25 1.84 1.11 0.67 3.24 2.69 2.52 1.97 2.39 1.93 1.86 1.59 1.03 1.03 0.67 3.64 3.21 2.72 2.28 2.60 2.19 1.90 1.73 1.53 1.31 1.07 3.97 2.35 1.83 1.80 1.69 1.42 1.17 0.83 0.71 3.17 3.69 2.04 1.87 2.41 1.96 1.73 1.51 1.08 0.90 3.31 2.76 2.24 1.96 1.73 1.51 1.08 0.90 3.65 3.21 2.72 2.38 1.90 1.77 1.54 1.10 0.85 3.65 3.21 2.72 2.38 1.90 1.77 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2.69 2.52 1.97 2.39 1.93 1.86 1.59 1.11 0.78 0.67 2.37 2.08 1.77 3.66 3.21 2.72 2.28 2.60 2.19 1.90 1.73 1.51 1.07 2.68 2.20 2.09 3.17 3.69 2.04 1.80 1.69 1.42 1.17 0.83 0.71 2.38 2.04 1.70 3.17 3.69 2.04 1.80 1.69 1.73 1.51 1.07 2.38 2.04 1.70 3.31 2.76 2.24 1.96 1.77 1.54 1.31 1.08 0.90 2.35 2.04 1.70 3.45 3.51 2.24 1.92 1.77 1.54 1.07 1.34 1.10 2.77 2.24 2.05</th><th>2.77 2.77 2.25 1.85 1.84 1.11 0.78 0.67 2.36 1.96 1.77 1.39 3.24 2.69 2.52 1.97 2.39 1.93 1.86 1.59 1.31 1.07 2.68 1.77 1.59 3.66 3.21 2.72 2.28 2.60 2.19 1.90 1.73 1.53 1.31 1.07 2.68 2.22 2.09 1.93 3.17 3.69 2.04 1.80 1.69 1.73 1.51 1.07 2.68 2.22 2.09 1.93 3.17 3.69 2.04 1.80 1.69 1.74 1.17 0.83 2.04 1.70 1.55 3.17 3.69 2.24 1.90 1.73 1.31 1.08 0.90 2.35 2.08 1.88 1.66 3.31 2.76 2.23 2.64 2.25 1.93 1.74 1.07 1.34</th><th>2.77 2.71 3.24 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.83 1.81 1.83 1.85 1.84 1.83 1.84 1.84 1.84 1.84 1.85 1.80 1.81 1.83 1.83 1.84 1.84 1.84 1.85 1.85 1.86 1.89<</th></th>	2nd sean 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2.09 1.93 3.17 3.69 2.04 1.80 1.69 1.74 1.17 0.83 2.04 1.70 1.55 3.17 3.69 2.24 1.90 1.73 1.31 1.08 0.90 2.35 2.08 1.88 1.66 3.31 2.76 2.23 2.64 2.25 1.93 1.74 1.07 1.34	2.77 2.71 3.24 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.83 1.81 1.83 1.85 1.84 1.83 1.84 1.84 1.84 1.84 1.85 1.80 1.81 1.83 1.83 1.84 1.84 1.84 1.85 1.85 1.86 1.89<

compared to control in the two seasons. However, using the treatment of GA₃ at 300ppm resulted the highest significant increment of this parameter of tuberose cut flower stalks as compared to control as an average of both seasons in most cases, followed descendingly by kinetin at 100ppm in the two seasons. Moreover, using the treatment of kinetin at 50ppm and BA at 50ppm recorded highly increases in these parameter as compared to control in the two seasons under this study.

Concerning the effect of storage periods on reducing sugars percentage in petals and flower stalks, data presented in Table (78) indicate that there were gradual decrease in reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks with extending storage periods at 7±1°C for different days (0-time,7,14,21,28,35 and 42 days) in the two seasons. However, Bird of paradise cut flower stalks were stored at 7±1°C for 0-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 7±1°C for 7 days. Moreover storage periods at 7±1°C for 42 days treatment recorded highly significant decrease in Reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

With respect to the effect of interaction between growth regulators and storage periods on Reducing sugars percentage in flower stalks, data in Table (80) demonstrate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) increased reducing sugars percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However the highest significant increments of this parameter was registered by using the combinations treatments between GA₃ at 300ppm and different storage periods at 7±1°C for (0-time, 7,14,21,28,35 and 42 days) as compared to control in the two seasons in most cases, especially the combined treatment between GA₃ at 300ppm and storage periods at 7±1°C for 0-time as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between kinetin at 100ppm and storage periods at 7±1°C for 0-time resulted highly increases in reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. Furthermore, the lowest values of this parameters of Bird of paradise cut flower stalks was recorded by using the combined treatments between control or BA at 25ppm and storage periods at 7±1°C for 42days in the two seasons under this study.

With regard to the effect of interaction between growth regulators and storage periods on reducing sugars percentage in flower stalks, data in Table (81) demonstrate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) increased reducing sugars percentage in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the highest significant increments of this parameter was registered by using the combinations treatments

between kinetin at 100ppm and different storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 7±1°C for 0-time as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between GA₃ at 300ppm and storage periods at 7±1°C for 0-time resulted highly increases in reducing sugars percentage in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. Anyhow, the lowest values of this parameters of Bird of paradise cut flower stalks was recorded by using the combined treatments between control or BA at 25ppm and storage periods at 7±1°C for 42days in the two seasons under this study.

6.1.5.-Non- reducing sugars percentage in petals and flower stalks

Data in Table (77) reveal that all growth regulators treatments increased Non-Reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the highest values of this parameter was recorded by using kinetin at 100ppm as compared to control in the two seasons in most cases, followed descendingly by GA₃ at 300ppm in the two seasons. Moreover using the treatments of GA₃ at 200ppm and kinetin at 50ppm of non-reducing sugars percentage in petals and flower stalks respectively recorded highly increases in these parameter of tuberose cut flower stalks as compared to control in the two seasons.

Concerning the effect of storage periods on non-reducing sugars percentage in petals and flower stalks, data in Table (78) reveal that there were gradual decrease in Non-Reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks with extending storage periods at 7±1°C for different days (0-time,7,14,21,28,35 and 42 days)in the two seasons. However, Bird of paradise cut flower stalks were stored at 7±1°C for 0-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 7±1°C for 7 days. Moreover storage periods at 7±1°C for 42 days treatment recorded highly significant decrease in non-reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

As for the effect of interaction between growth regulators and storage periods on Non-Reducing sugars percentage in petals, data in Table (80) demonstrate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) increased non-reducing sugars percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However the highest significant increments of this parameter was registered by using the combinations treatments between GA₃ at 300ppm and different storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) as compared to control in the two seasons in most cases, especially the combined treatment between GA₃ at 300ppm and storage periods at 7±1°C for 0-time

as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between kinetin at 100ppm and storage periods at 7±1°C for 0-time resulted highly increases in non-reducing sugars percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. Furthermore, the lowest values of this parameters of bird of paradise cut flower stalks was recorded by using the combined treatments between control or BA at 25ppm and storage periods at 7±1°C for 42days in the two seasons under this study.

Referring to the effect of interaction between growth regulators and storage periods on non-reducing sugars percentage in flower stalks, data in Table (81) demonstrate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42 days) increased non-reducing sugars percentage in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However the highest significant increments of this parameter was registered by using the combinations treatments between kinetin at 100ppm and different storage periods at 7±1°C for (0-time, 7, 14, 21, 28, 35 and 42 days) as compared to control in the two seasons in most cases, especially the combined treatment between kinetin at 100ppm and storage periods at 7±1°C for 0-time as compared to the other ones of this study in the two seasons. Moreover the combinations treatments between GA₃ at 300ppm and storage periods at 7±1°C for 0-time resulted highly increases in non-reducing sugars percentage in flower stalks of Bird of paradise cut flower stalks as compared

to control in the two seasons. Any how, the lowest values of this parameters of Bird of paradise cut flower stalks was recorded by using the combined treatments between control or BA at 25ppm and storage periods at $7\pm1^{\circ}$ C for 42days in the two seasons under this study.

6.1.6.-Total nitrogen and total protein percentage in petals and flower stalks:

Data in Table (82) reveal that all growth regulators treatments increased total nitrogen and total protein percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm of Bird of paradise cut flower stalks exhibited to be the most effective one for producing the highest values of these parameters as compared to control in the two seasons in most cases, followed descendingly by BA at 50ppm in the two seasons. Moreover, using the treatment of GA₃ at 300ppm recorded highly significant increments of theses parameters as compared to control in the two seasons. On the opposite, the lowest values of total nitrogen and total protein percentage in petals of Bird of paradise cut flower stalks was recorded by control in the two seasons. Furthermore, data in Table (82) reveal that all growth regulators treatments increased total nitrogen and total protein percentage in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm of Bird of paradise cut flower stalks appeared to be the most effective one for producing the highest values of these parameters as compared to control in the two seasons in most

Table (82): Effect of some growth regulators treatments on Total nitrogen percentage, Total protein percentage, phosphorus percentage and potassium percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Trea	Treatments	Total nitrogen percentage in petals	itrogen ntage etals	Total protein percentage in petals	rotein ntage stais	Total nitrogen percentage in flower stalk	itrogen tage in stalk	Total protein percentage in flower stalk	orotein tage in stalk	Phosphorus percentage in petals	horus tage in als	Phosphorus percentage in flower stalk	ohorus itage in r stalk	Potassium percentage in petals	tage in	Potassium percentage in flower stalk	siu
i e	ille il s	I st season	2 nd season	I st season	2 nd season	1 st	2 nd season	L" season	2 nd season	I st season	2 nd season	l" season	2 nd season	1" season	2 nd season	l" season	2 nd season
	Control	2.273	2.694	17.02	16.84	2.403	2.414	15.02	15.09	0.373	0.371	0.260	0.259	2.675	2.680	1.900	1.908
	GA ₃ 200ppm	2.963	2.910	18.52	18.17	2.491	2.487	15.57	15.54	0.398	0.392	0.276	0.284	2.741	2.755	2.120	2.148
	GA ₃ 300ppm	3.075	2.994	19.22	18.71	2.626	2.623	16.41	16.39	0.434	0.425	0.301	0.298	2.789	2.794	2.215	2.218
Growth Regulator	BA 25 ppm	3.008	2.988	18.80	18.68	2.522	2.514	15.77	15.71	0.402	0.403	0.269	0.268	2.738	2.721	2.014	2.028
í	BA 50 ppm	3.082	2.995	19.27	18.72	2.577	2.571	16.10	16.07	0.426	0.429	0.292	0.296	2.780	2.802	2.143	2.166
	Kin 50 ppm	2.976	2.827	18.60	18.29	2.519	2.518	15.74	15.74	0.400	0.40	0.282	0.283	2.751	2.750	2.120	2.148
	Kin 100 ppm	3.091	3.076	19.32	19.22	2.673	2.636	16.71	16.47	0.443	0.440	0.292	0.293	2.791	2.805	2.202	2.210
	5 %	0.051	0.047	0.339	0.299	0.027	0.019	0.185	0.115	0.006	0.006	0.007	0.005	0.008	0.013	0.019	0.019
L.S.D at	1%	0.068	0.063	0.435	0.396	0.036	0.026	0.245	0.152	0.009	0.007	0.010	0.007	0.011	0.017	0.026	0.026

cases, followed descendingly by GA₃ at 300ppm in the two seasons. Moreover, using the treatment of BA at 50ppm recorded highly significant increments of theses parameters as compared to control in the two seasons. On the opposite, the lowest values of total nitrogen and total

protein percentage in flower stalks of Bird of paradise cut flower stalks was recorded by control in the two seasons.

With respect to the effect of storage periods on total nitrogen and total protein percentage in petals and flower stalks, data listed in Table (83) demonstrate that there were gradual decrease in Total nitrogen and total protein percentage in petals and flower stalks of Bird of paradise cut flower stalks with extending storage periods at 7±1°C for different days (0-time,7, 14,21,28,35 and 42days) in the two seasons. However, Bird of paradise cut flower stalks were stored at 7±1°C for 0-time recorded the highest significant increase of these parameters as compared to different storage periods in both seasons, followed descendingly by storage periods at 7±1°C for 7 days. Moreover storage periods at 7±1°C for 42 days treatment recorded the lowest mean values in Total nitrogen and total protein percentage in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons. Referring to the interaction effect between growth regulators treatments and storage periods treatments on total nitrogen and total protein in petals and flower stalks, data in Table (84) indicate that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-

Table (83): Effect of Storage periods (Days) treatments on Total nitrogen percentage, Total protein percentage, phosphorus percentage and potassium percentage in petals and flower stalk of Strelitzia reginae Air.cut flower stalk during the two seasons of 2007-2008/2008-2009.

Treatments		0	7	Storage 14	(days) 21	28	35	42	L.S.D at	1%
	sea		3.080	3.039	3.003	2.936	2.892	2.839	0.051	0.068
percentage in petals	I" 2nd season season	3.129 3.116	80 3.060	39 2.976	03 2.911	36 2.884	92 2.839	39 2.798	0.047	0.063
	on season	6 19.56	0 19.25	6 18.99	1 18.77	18.35	18.08	17.74	0.339	0.435
percentage in petals	2 nd season	19.48	19.12	18.60	18.20	18.02	17.74	17.49	0.299	0.396
perce	l, l	2.602	2.596	2.585	2.582	2.524	2.484	2.459	0.027	0.036
percentage in flower stalk	2 nd season	2.607	2.597	2.576	2.542	2.513	2.480	2.449	0.019	0.026
Perce flowe	l ⁴ season	16.26	16.22	16.16	16.01	15.77	15.52	15.37	0.185	0.245
Total protein percentage in flower stalk	2 nd season	16.30	16.23	16.10	15.89	15.71	15.50	15.30	0.115	0.152
Phos	l" season	0.415	0.420	0.425	0.418	0.408	0.399	0.392	0.006	0.009
Phosphorus percentage in petals	2 nd season	0.416	0.419	0.420	0.414	0.405	0.399	0.391	0.006	0.007
Phos perce flow	I ⁿ	0.289	0.290	0.296	0.286	0.277	0.267	0.266	0.007	0.010
Phosphorus percentage in flower stalk	2 nd season	0.289	0.292	0.293	0.288	0.279	0.272	0.268	0.005	0.007
Pot: percenta	l*	2.750	2.780	2.780	2.764	2.745	2.724	2.712	0.008	0.011
Potassium percentage in petals	2 nd season	2.771	2.782	2.780	2.775	2.754	2.733	2.720	0.013	0.017
Pot: perce flowe	I" season	2.119	2.160	2.151	2.124	2.094	2.043	2.025	0.019	0.026
Potassium percentage in flower stalk	2 nd season	2.132	2.165	2.158	2.132	2.104	2.081	2.052	0.019	0.026

Table (84): Effect of interaction between some growth regulators and Storage periods(Days) treatments on Total nitrogen percentage and Total protein percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	flow	flower stalk of Strelitzia reginae All	ik of	Strein	Za reg	mae	AII. LE				C				ŀ		. Cal Hower state unting the tho seasons of the				١	H						l	Γ
TREATMENTS	SINS	To	tal nit	rogen	Total nitrogen percentage in petals	tage i	n petal	s	To	Total protein	itein	percentage in petals	tage in	petals		Tot	al nitr	l uago	percent stalk	age in	Total nitrogen percentage in flower stalk		Total	protei	n perc	entage	Total protein percentage in flower stalk	ver sta	ik K
		:	ć			0/9	.			Sto	1306 L	Storage neriods(days)	s(days				Stor	age p	Storage periods(days)	(days				Sto	rage p	eriod	Storage periods(days)		
Growth	- -	-	7	14	14 21 28 3	×	3,	42	•	-	4	21	78	35	42	0	7	4	21	28	35	42	0	7	4	21	28	35	42
regulators	ors		-	:				:				-		1	1st season	ason											1		
Continue	T	97.6	376	3.75	2.74	2.71	2.67	2.64	17.4	17.3	17.2	17.1	6.91	16.7	16.5	2.45	2.46	2.46	2.42	2.37	2.35	2.31	15.3	15.4	15.4	15.1	14.8	14.7	14.5
GA: 200ppm	ma	3.08	3.08	3.99	2.98	2.91	2.88	2.84	19.3	19.3	24.9	18.6	18.2	18.0	17.7	2.57	2.54	2.52	2.51	2.45	2.42	2.43	1.91	15.9	15.7	15.7	15.3	15.1	15.2
GA3 300ppm	mdc	3.27	3.19	3.15	3.03	3.00	2.95	2.93	20.5	19.9	19.7	6.81	18.8	18.5	18.3	2.71	2.66	2.66	2.66	2.63	2.55	2.51	6.91	16.6	9.91	9.91	16.5	15.9	15.7
BA 25 ppm	8	3.11	3.08	3.10	3.04	2.98	2.90	2.84	19.5	19.3	19.4	0.61	18.6	18.1	17.8	2.58	2.55	2.54	2.53	2.50	2.48	2.48	1.91	15.9	15.9	15.8	15.6	15.5	15.5
BA 50 ppm	E	3.22	3.17	3.08	3.10	3.04	3.01	2.94	20.1	8.61	19.2	19.4	0.61	18.8	18.4	2.62	2.66	2.64	2.56	2.54	2.51	2.50	16.4	9.91	16.5	0.91	15.9	15.7	15.6
Kin 50 ppm	me	3.08	3.02	3.05	3.00	2.95	2.93	2.82	19.3	18.9	1.61	18.8	18.4	18.3	17.6	2.55	2.56	2.55	2.56	2.53	2.47	2.41	0.91	0.91	15.9	16.0	15.8	15.4	15.1
Kin 100 nnm	muc	3.36	3.27	3.15	3.13	2.97	2.90	2.86	21.0	20.5	19.7	19.5	18.6	1.8.1	17.9	2.73	2.74	2.73	2.70	2.64	2.61	2.56	17.1	17.1	17.1	16.9	16.5	16.3	0.91
3	20%				0.136							0.869							0.072				-0			0.489		İ	
at at	1%				0.180							1.152							960.0				15			0.647			T
														174	s pu	2nd season	_											Ì	
Control		18.0	2.76	2.73	2.68	2.68	2.62	2.58	17.6	17.3	17.0	8.91	16.8	16.4	1.91	2.45	2.46	2.47	2.44	2.40	2.35	2.34	15.3	15.4	15.4	15.3	15.0	14.7	14.6
GA, 200nnm	шоп	3.04	3.08	+	2.87	2.91	2.77	2.77	19.0	19.3	18.4	17.9	18.2	17.3	17.3	2.58	2.57	2.54	2.48	2.43	2.41	2.38	1.91	1.91	15.9	15.5	15.2	15.1	14.9
GA, 300ppm	mdd	3.21	3.12	3.02	2.98	2.94	2.85	2.84	20.1	19.5	18.9	18.6	18.4	17.8	17.8	2.70	2.69	2.65	2.63	2.60	2.57	2.52	6.91	16.8	16.6	16.5	16.2	16.0	15.8
BA 25 ppm	md	3.15	3.1	3.05	2.99	2.91	2.88	2.83	19.7	19.4	1.61	18.7	18.2	18.0	17.7	2.58	2.56	2.54	2.52	2.51	2.46	2.43	1.6.1	16.0	15.9	8.6	1.5.0	4.01	15.6
BA 50 ppm	md	3.15	3.12	2.98	2.96	2.90	2.97	2.88	19.7	19.5	18.6	18.5	18.	18.6	18.0	2.64	2.64	2.60	2.56	2.55	2.52	2.49	16.5	0.01	16.0	16.0	15.7	15.5	15.3
Kin 50 ppm	mdı	3.07	3.00	2.96	2.80	2.87	2.88	2.81	19.2	18.8	18.5	17.5	18.0	18.0	17.6	2.57	2.55	2.55	2.52	2.51	2.48	2.45	1.0.1	0.01	-	13.1	1.5.1		0 31
Kin 100 ppm	mdd	3.37	3.25	3.15	3.02	2.97	2.91	2.86	21.0	20.3	19.7	18.9	18.6	18.2	17.9	2.72	2.71	2.68	2.64	2.60	2.57	2.53	17.0	16.9	16.7	16.5	5.01	1.0.1	13.8
9	2%				0.125							0.790							0.051							0.303			
at at	%				0.166							1.047							890.0							0.401			

time,7,14,21,28,35 and 42days) succeeded in increasing total nitrogen and total protein in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments of kinetin at 100pm showed to be the most effective one for producing the highest significant increase of these parameters, especially the combined treatment between kinetin at 100pm and storage periods at 7±1°C for 0-time and 7days as compared to

control in the two seasons of this study. Moreover, the combined treatment between GA_3 at 300ppm and different storage periods at $7\pm1^{\circ}C$ C for (0-time,7,14,21,28,35 and 42days) particularly storage periods for 0-time of Bird of paradise cut flower stalks recorded highly significant increase of these parameters in the two seasons.

Anyhow the lowest values of these parameters was recorded by using the combinations treatments between control and different storage periods at 7±1°C (0-time,7,14,21,28,35 and 42days) as compared to the other ones under study in the two seasons.

6.1.7.-Phosphorus percentage in petals and flower stalks:

Data in Table (82) reveal that all growth regulators treatments increased phosphorus percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm of Bird of paradise cut flower stalks gave the highest values of these parameters as compared to control in the two seasons in most cases, followed descendingly by GA₃ at 300ppm as

an average of both seasons. Moreover, using the treatment of BA at 50ppm recorded highly significant increments of theses parameters as compared to control in the two seasons. On the reserve, the lowest values of phosphorus percentage in petals of Bird of paradise cut flower stalks was recorded by control in the two seasons. Furthermore, data in Table (82) reveal that all growth regulators treatments increased phosphorus percentage in flower stalks of bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of GA₃ at 300ppm of Bird of paradise cut flower stalks recorded the highest values of these parameters as compared to control in the two seasons in most cases, followed descendingly by BA at 50ppm as an average of both seasons. Moreover, using the treatment of kinetin at 100ppm recorded highly significant increments of theses parameters as compared to control in the two seasons.

On the reserve, the lowest values of phosphorus percentage in flower stalks of Bird of paradise cut flower stalks was recorded by control in the two seasons.

As for the effect of storage periods on phosphorus percentage in petals and flower stalks, data listed in Table (83) demonstrate that there were gradual increase in phosphorus percentage in petals and flower stalks of Bird of paradise cut flower stalks with extending storage periods at 7±1°C till 14 days and then deceased to the end of storage periods at 7±1°C for 42 days in the two seasons. However, Bird of paradise cut flower stalks were stored at 7±1°C for 14 days recorded the highest significant increase of these parameters as compared to

different storage periods at 7±1°C for (0-time,7,21,28,35 and 42days) in both seasons, followed descendingly by storage periods at 7±1°C for 7 days. Moreover storage periods at 7±1°C for 42 days treatment recorded the lowest mean values in Phosphorus percentage in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

As for the interaction effect between growth regulators treatments and storage periods treatments on Phosphorus percentage in petals and flower stalks, data in Table (85) reveal that all the combinations treatments between growth regulators and storage periods at 7±1°C for (0-time,7,14,21,28,35 and 42days) increased Phosphorus percentage in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments of kinetin at 100pm or GA₃ at 300ppm approved to be the most effective one for producing the highest significant increase of these parameters, especially the combined treatment between kinetin at 100pm or GA₃ at 300ppm and storage periods at 7±1°C for 7days and 14days as compared to control in the two seasons of this study. Moreover, the combined treatment between BA at 50ppm and different storage periods at 7±1°C C for (0-time, 7, 14, 21, 28, 35 and 42days) particularly storage periods for 14days of Bird of paradise cut flower stalks recorded highly significant increase of these parameters in the two seasons.

Table (85): Effect of interaction between some growth regulators and Storage periods(days) treatments on phosphorus percentage and potassium percentage in petals and flower stalk of Strelitzia reginae Ait, cut flower stalk during the two seasons of 2007-2008/2008-2009.

						١		I							r			200000		0.000	20127		D	foreign	oard u	i entage i	Detection percentage in flower stalk	r stalk	
TREATMENTS	SIL	-	hosph	orus pe	ercenta	Phosphorus percentage in pet	etals		Ph	Phosphorus percentage in flower stalk	us per	centage	in Now	er stalk			Potass	rotassium percentage in perais	rcental	e in pe	SIE!			3			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	-		Stol	rage p	eriod	Storage periods(days)				Sto	rage	Storage periods(days)	s(day	1	1		Sto	Storage periods(days)	eriod	s(day)	1	+	1		rage	Derion -	Storage periods(uays	1	
Growth		0	7	41	21	28	35	42	0	7	4	21	28	35	42	0	7	41	21	28	35	42	0	7	41	21	28	35	42
0				1											1st season	nosi			-				Ī						
Control		0.37 0	0.38	0.38	0.38	0.37	0.36	0.36	0.27	0.28	0.28	0.26	0.25	0.23	0.24	5.69	5.69	2.71	5.69	5.69	2.64	2.61	1.92	1.93	1.93	16.1	1.88	1.87	1.86
GA ₃ 200ppm	T	0.40	0.40	0.41	0.40	0.40	0.40	0.38	0.28	0.28	0.29	0.28	0.27	0.26	0.26	2.76	2.78	2.77	2.75	2.73	2.71	2.70	2.13	2.18	2.20	2.17	2.13	2.02	2.00
GA ₃ 300ppm		-	-	+	+	+	0.42	0.41	0.30	0.31	0.32	0.31	0.30	0.28	0.29	2.79	2.81	2.82	2.80	2.70	2.76	2.76	2.22	2.26	2.25	2.23	2.20	2.18	2.15
BA 25 ppm	T	+	+	+	+	-	0.40	0.39	0.28	0.29	0.29	0.27	0.25	0.25	0.25	2.72	2.78	2.77	2.76	2.73	17.7	2.70	2.03	2.10	2.06	2.02	1.98	1.96	1.95
BA 50 ppm	T	-	+	-	0.43	0.42	0.41	0.40	0.30	0.30	0.31	0.30	0.29	0.28	0.27	2.78	2.80	2.82	2.79	2.77	2.75	2.74	2.15	2.03	2.19	2.16	2.14	2.08	2.07
Kin 50 ppm		_	+-	0.42	0.40	0.40	0.39	0.38	0.28	0.29	0.29	0.28	0.27	0.28	0.28	2.77	2.78	2.77	2.76	2.74	2.73	2.72	2.15	2.18	2.18	2.16	2.14	2.03	2.01
Kin 100 ppm		+-	-	0.46	0.45	0.44	0.42	0.42	0.31	0.28	0.30	0.30	0.29	0.28	0.28	2.81	2.83	2.81	2.80	2.78	2.76	2.75	2.23	2.26	2.25	2.21	2.18	2.15	2.13
45.	5%	-			0.017							0.019							0.021							0.051			
at at	1%				0.023							0.025			1				0.028							0.068			
															2nd season	eason													
Control		0.38	0 38	0.37	0.37	0.37	0.36	0.36	0.26	0.28	0.27	0.26	0.25	0.25	0.24	2.69	2.70	2.71	2.69	2.68	2.66	2.64	1.93	1.95	1.94	1.91	1.90	1.88	1.86
GA ₃ 200ppm	md	-	0.40	0.40	0.40	0.39	0.38	0.37	0.29	0.29	0.30	0.29	0.28	0.28	0.27	2.78	2.79	2.78	2.76	2.74	2.72	2.70	2.14	2.19	2.19	2.16	2.14	2.12	2.10
GA ₃ 300ppm	mdı	-	_	4,0	0.43	0.42	0.41	0.40	0.30	0.30	0.31	0.31	0.30	0.29	0.28	2.81	2.82	2.81	2.81	2.79	2.77	2.76	2.23	2.27	2.25	2.23	2.21	2.18	2.16
BA 25 ppm	E	+-	_	0.41	0.41	0.40	0.40	0.39	0.28	0.29	0.28	0.27	0.26	0.24	0.25	2.72	2.74	2.74	2.73	2.71	2.70	2.70	2.06	2.10	2.11	2.05	1.98	1.96	1.94
BA 50 ppm	E	-	0.44	0.44	0.44	0.43	0.42	0.41	0.30	0.30	0.31	0.31	0.29	0.28	0.27	2.82	2.82	2.81	2.88	2.80	2.76	2.75	2.17	2.21	2.20	2.18	2.16	2.13	2.11
Kin 50 ppm	m	0.41	0.41	0.42	0.41	0.40	0.40	0.39	0.29	0.29	0.29	0.28	0.27	0.28	0.28	2.78	2.78	2.79	2.77	2.76	2.73	2.72	2.16	2.19	2.18	2.16	2.15	2.13	2.05
Kin 100 ppm	mde	0.45	0.45	0.45	0.44	0.43	0.42	0.42	0.30	0.30	0.30	0.29	0.29	0.28	0.29	2.81	2.83	2.83	2.81	2.80	2.79	2.77	2.23	2.25	2.24		2.20	2.17	2.15
4 5	20%				0.015							0.014							0.034							0.051			
at at	1%				0.020							0.018							0.046							0.068		۱	

6.1.8.-Potassium percentage in petals and flower stalks:

Data in Table (82) reveal that all growth regulators treatments increased Potassium percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of kinetin at 100ppm of Bird of paradise cut flower stalks showed to be the most effective one for producing the highest values of these parameters as compared to control in the two seasons in most cases, followed descendingly by GA3 at 300ppm and BA at 50ppm as an average of both seasons. On the reserve, the lowest values of Potassium percentage in petals of bird of paradise cut flower stalks was recorded by control in the two seasons. Furthermore, data in Table (82) reveal that all growth regulators treatments increased Potassium percentage in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, using the treatment of GA₃ at 300ppm of Bird of paradise cut flower stalks approved to be the most effective one for producing the highest values of these parameters as compared to control in the two seasons in most cases, followed descendingly by kinetin at 100ppm average of both seasons. On the reserve, the lowest values of Potassium percentage in petals of bird of paradise cut flower stalks was recorded by control in the two seasons.

With respect to the effect of storage periods on potassium percentage in petals and flower stalks, data presented in Table (83) demonstrate that Bird of paradise cut flower stalks were stored at 7±1°C for 7 days recorded the highest significant

increase of potassium percentage in petals and flower stalks as compared to different storage periods at 7±1°C for (0-time,14,21,28,35 and 42days) in both seasons, followed descendingly by storage periods at 7±1°C for 14 days. Moreover, storage periods at 7±1°C for 42 days treatment recorded the highest significant decrease in potassium percentage in petals and flower stalks of Bird of paradise cut flower stalks when compared to the other ones under study in the two seasons.

Regarding to the interaction effect between growth regulators treatments and storage periods treatments on potassium percentage in petals and flower stalks, data in Table (85) reveal that all the combinations treatments between growth 7±1°C for (0periods at regulators and storage time,7,14,21,28,35 and 42days) increased potassium percentage in petals and flower stalks of bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments of kinetin at 100pm or GA₃ at 300ppm approved to be the most effective one for producing the highest significant increase of these parameters, especially the combined treatment between kinetin at 100pm or GA₃ at 300ppm and storage periods at 7±1°C for 7days and 14days as compared to control in the two seasons of this study. Moreover, the combined treatment between BA at 50ppm and different storage periods at 7±1°C C for (0-time,7,14,21,28,35 and 42days) particularly storage periods for 7and14days of Bird of paradise cut flower stalks recorded highly significant increase of these parameters in the two seasons.

Part II: The second experiment: :(pulsing and holding solutions of (Strelitzia reginae)

7.1.Effect of pulsing solutions and holding solutions treatments on:

7.1.a.-Vase life (days) or longevity:

Data presented in Table (86) reveal that all pulsing solution treatments prolonged the vase life of Bird of paradise cut flower stalks when compared to control in the two seasons. The treatment of STS at 1:4mM for 30 minutes showed the highest significant increase in vase life of bird of paradise cut flower stalks as compared to control (distilled water) or the other ones under study in the two seasons. Furthermore, the treatments could be arranged descendingly as follows: STS ay 1:4mM for 30 minutes > Benzyladenine at 10ppm for 24 hours > kinetin at 20ppm for 24 hours > sucrose at 10% for 24 hours > control (distilled water) or 24 hours in the two seasons.

Regarding to the effect holding solution treatments on vase life data shown in Table (86) indicate that all holding solution treatments prolonged vase life of Bird of paradise cut flower stalks as compared to control in both seasons. However, holding Bird of paradise cut flower stalks base in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded that highest significant increase in flower longevity when compared to control in the two season. Furthermore, regardless control the lowest value of vase life of Bird of paradise cut flower stalks was registered by using holding solution contained (sucrose at 4%) in the two seasons.

Table (86): Effect of pulsing solutions, Holding solutions treatments and their interaction of vase life(days) of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Stain during inc the				(davs)					Vase l	Vase life (days)		
Treetments			181	1st					2 nd s	season		
			Holding solutions	Scason					Holding solutions	ions		mean
Pulsing solutions	D.W	Sucrose 4	Sucrose 4% +CA 200	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	mean	D.W	Sucrose 4 %	Sucrose 4% +CA 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm +8HQS 200 ppm	
D.W	16.50	22.10	25.97	28.50	29.10	24.433	18.10	21.80	26.30	27.50	28.40	24.420
Kin.20 ppm	21.90	25.50	30.00	33.90	34.20	29.100	20.70	26.80	29.80	30.60	32.50	28.080
BA 10 ppm	23.70	27.20	31.70	25.60	35.90	30.820	22.50	27.00	32.50	33.20	33.50	29.740
Sucrose 10 %	19.00	24.10	27.60	29.90	33.20	26.760	20.70	24.90	28.10	29.60	30.40	26.740
STS 1:4 ml	24.40	31.80	32.80	35.90	36.80	32.340	23.90	30.80	32.90	33.60	34.80	31.200
mean	21.100	26.140	29.613	32.760	33.840		21.180	26.260	29.920	30.900	31.920	
	Pulsir	Pulsing solutions	Holdin	Holding solutions	interaction		Pulsing solutions	olutions	Holdi	Holding solutions	interaction	ction
L.S.D at	70 V	1%	2 %	1 %	2 %	% 1	2 %	%1	5 %	1 %	5 %	1 %
	0 620	0 706	0.529	0.706	1.184	1.579	0.315	0.420	0.315	0.420	0.704	0.939
	0.023	200										

Moreover, the treatment of holding solution contained (sucrose at 4% + 8-HQS at 200ppm) and (sucrose at 4% + citric acid at 200ppm) respectively resulted highly significant increase in vase life of Bird of paradise cut flower stalks when compared to control in the two seasons.

As for the effect of interaction between pulsing solution and holding solution treatments on vase life, data in Table (86) reveal that all interaction between pulsing solution and holding solution treatments of bird of paradise cut flower stalks recorded increases in vase life as compared to control in the two season, especially the treatment of pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted the highest significant increase vase life of Bird of paradise cut flower stalks as compared to control or other ones under study in the two seasons. Furthermore, the treatment of interaction between (pulsing solution of STS at 1:4 mM for 30 minutes and holding solution contained sucrose at 4% + 8-HQS at 200ppm) and interaction treatment between (pulsing solution of BA at 10ppm for 24 hours and holding solution contained sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted highly significant increase vase life as compared to control (D.W. treatment) in the two seasons. The differences between the aforesaid two treatments were not significant in both seasons.

7.1.b.-Change percentage in fresh weight of cut flower stalks:

Data in Table (87) reveal that all tested pulsing solutions treatments statistically increased changes percentage in fresh weight of cut flower stalks in both seasons. However, pulsing bird of paradise cut flower stalks bases in silver thiosulphate (STS) (1:4mM) for 30 minutes recorded the highest significant increase in change percentage in fresh weight of cut flower stalks after 4, 8, 12, 16, 20, 24, 28, 32 days from the treatment until the end of longevity compared to other treatments under study in the two seasons.

Moreover, using pulsing solution of Benzyladenine at 10ppm for 24 hours succeeded in increasing in change percentage in fresh weight of Bird of paradise cut flower stalks as compared to control (distilled water (D.W.)) in both seasons. Irrespective control (distilled water), the lowest value of change percentage in fresh weight of Bird of Paradise cur flower stalks was registered by using pulsing treatment of sucrose at 10% for 24 hours in most cases during all longevity in the two seasons.

Regarding to the effect of holding solution treatments on the change percentage in fresh weight Data in Table (88) indicate that, change percentage in fresh weight of Bird of Paradise cut flower stalks was devised after 4 days from the treatment until the end of longevity 32days in both seasons. However, the treatment of Bird of Paradise cut flower stalks bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant

Table (87): Effect of pulsing solutions treatments, on Change percentage in fresh weight and Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

		Ch	ange pe	Change percentage in fresh weight of cut flower stalk	in fresh	weight of	cut flo	wer sta	k			Water balance (g)/stalk	alance (g)/stalk		
Trea	Ireatments			Shel	Shelf life periods(days)	riods(day	/s)					Shelf life periods(days)	e perio	ds(days)		
		4	8	12	16	20	24	28	32	4	8	12	16	20	24	28
									1st season	'n						
	D.W	8.91	7.42	4.10	1	-4.40	11.65	-18.03	-22.84	7.99	7.05	5.72	1.05	-1.51	-7.85	-11.41
	Kin.20 ppm	10.18	9.01	6.45	3.36	-0.54	-5.36	-11.94	-17.87	9.43	8.72	6.94	3.51	0.09	-4.02	-8.12
solutions	BA 10 ppm	11.55	10.51	7.25	4.68	-0.05	-4.32	-10.85	-15.66	11.26	10.27	7.39	4.81	0.79	-3.29	-2 84
	Sucrose 10	9.06	7.44	5.36	1.90	-3.19	-7.69	-15.18	-19.86	9.03	7.97	5.63	3.05	-0.62	-4.89	-10.33
	STS 1:4 ml	12.31	11.72	8.35	5.82	1.72	-2.98	-7.90	-13.34	12.22	10.89	8.35	5.01	1.80	-2.17	472
L.S.D	5 %	0.973	0.456	0.617	0.496	0.553	0.636	0.722	0.644	0.171	0.318	1.038	0.947	0 274	1 027	1361
at	1%	1.298	0.609	0.834	1.110	0.738	0.848	0.963	0.859	0.228	0.425	1.384	1.263	0.365	1.370	1.637
									2 nd season	on						
	D.W	10.29	8.52	5.17	1.92	-3.41	10.37	-14.72	-21.99	9.73	8.50	6.20	-3.13	-1.21	-7.05	-10.48
Pulsing	Kin.20 ppm	11.22	10.27	7.03	4.14	-0.67	-5.53	-11.31	-16.63	10.39	9.97	7.23	4.45	0.64	-3.21	-6.64
solutions	BA 10 ppm	12.13	10.59	7.28	4.42	0.09	-4.47	-10.18	-15.49	12.00	10.95	7.91	5.22	2.53	-2.25	-5.66
	Sucrose 10	9.91	8.58	5.18	1.55	-2.82	-8.10	-13.35	-19.13	10.60	5.57	6.23	2.89	-0.27	-5.54	-8.99
	STS 1:4 ml	13.19	11.88	8.29	5.61	1.34	-3.15	-8.52	-13.99	12.63	11.09	8.75	5.94	2.25	-1 53	-5 50
L.S.D	5%	1.172	1.133	1.299	1.364	1.391	1.764	2.975	2.022	0.956	1,032	0.506	0.828	1.860	0.491	0.668
aı	1%	1.564	1.512	1.733	1.819	1.856	2.353	3.969	2.697	1.275	1.377	0.674	1.105	2.481	0 655	0.891

Table (88): Effect of holding solutions treatments, on Change percentage in fresh weight and Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Name						in free	doiou de	of cut flo	wer stalk				Water	Water balance (g)/stalk	talk		
D.W 8.30 6.28 2.68 0.42 -5.17 -11.33 -18.31 -2.3.80 7.91 6.29 3.69 0.2				Change	Dercents	311 III agi	an weign	(daye)					Shelf li	e periods (days)		
National Paris Nati	I reat	ments	-	0		16	20	24	28	32	4	8	12	16	20	24	28
Sucrose 4% 4.99 3.78 0.32 2.68 0.42 -5.17 -11.33 -18.31 -23.80 7.91 6.29 3.69 0.50			+	0							1st season						
Sucrose 4% 4.99 3.78 0.32 -3.24 -7.73 -14.49 -21.86 -27.38 4.87 4.27 1.34 -2.42 -2.24 -2		D.W	8.30	6.28	2.68	0.42	-5.17	-11.33	-18.31	-23.80	7.91	6.29	3.69	0.75	-3.25	-8.48	-7.78
Sucrose 4% 11.36 10.91 8.33 5.77 0.84 -3.03 -8.71 -13.96 11.17 10.32 8.53 8.53 8.54 8.54 9.55 9.55		Sucrose 4 %	4.99	3.78	0.32	-3.24	-7.73	-14.49	-21.86	-27.38	4.87	4.27	1.34	-2.19	-5.20	-10.53	-15.14
Sucrose 4%	holding	Sucrose 4% +CA 200	11.36	16.01	8.33	5.77	0.84	-3.03	-8.71	-13.96	11.17	10.32	8.53	5.55	2.05	-1.93	-5.87
Sucross 4%+CA 1.204 16.24 14.76 12.01 9.22 4.89 0.21 -5.62 -9.97 14.97 13.89 11.63 200 ppm + 8HQS 1.236 1.24 14.76 12.01 9.22 4.89 0.21 -5.62 -9.97 14.97 13.89 11.63 200 ppm + 8HQS 1.226 0.634 0.635 0.635 0.636 0.722 0.644 0.171 0.318 1.038 1.384 1 1v, 1.228 0.609 0.834 1.110 0.738 0.848 0.963 0.859 0.228 0.425 1.384 1 1v, 1.228 0.609 -3.62 -9.53 -13.89 -21.12 9.68 7.25 5.29 sucross 4%+CA 13.59 12.75 -7.41 -12.97 13.45 11.73 9.37 sucross 4%+CA 13.52 2.02 -7.41 -13.36 -1.35 -9.18 10.34 7.25 2.00 ppm 1.754 1.7	Solutions	Sucrose 4 % + 8HQS 200	11.12	10.37	8.16	4.71	0.72	-3.37	-9.41	-14,44	11.02	10.13	8.85	5.27	2.17	-1.87	-5.13
s,w 0.973 0.456 0.617 0.496 0.553 0.636 0.722 0.644 0.171 0.318 1.038 0 s,w 1.298 0.609 0.834 1.110 0.738 0.848 0.963 0.859 0.228 0.425 1.384 1 n,w 9.17 7.98 4.25 0.99 -3.62 -9.53 -13.89 -21.12 9.68 7.25 5.29 sucrose 4% 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 sucrose 4% 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 sucrose 4% +CA 13.59 12.70 2.32 -2.07 -7.41 -12.97 13.45 11.73 9.37 sucrose 4% +CA 15.48 11.75 9.42 5.06 0.59 -4.32 -9.18 16.26 14.78 17.25		Sucrose 4% +CA 200 ppm + 8HQS	16.24	14.76	12.01	9.22	4.89	0.21	-5.62	76.6-	14.97	13.89	11.63	8.06	4.77	0.59	-3.52
n.w 0.17 7.98 0.609 0.834 1.110 0.738 0.848 0.963 0.859 0.228 0.425 1.384 1 n.w 1.% 1.298 0.609 0.834 1.110 0.738 0.848 0.963 0.859 0.228 0.425 1.384 1.384 sucrose 4% 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 sucrose 4% 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 sucrose 4% 6.30 5.15 1.38 -1.95 -2.42 -7.41 -12.97 13.45 11.73 9.37 sucrose 4% 1.0.24 8.53 5.70 2.32 -2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 sucrose 4% 1.42 1.54 1.54 1.54 2.97 -9.18 16.26 14.		200 ppm	0.973	0.456	0.617	0.496	0.553	0.636	0.722	0.644	0.171	0.318	1.038	0.947	0.274	1.027	1.254
D.W 9.17 7.98 4.25 0.99 -3.62 -9.53 -13.89 -21.12 9.68 7.25 5.29 Sucrose 4%, +CA 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 Sucrose 4%, +CA 13.59 12.70 9.86 6.87 2.14 -2.42 -7.41 -12.97 13.45 11.73 9.37 Sucrose 4%, +CA 10.24 8.53 5.70 2.32 -2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 Sucrose 4%, +CA 17.42 11.75 9.42 5.06 0.59 -4.32 -9.18 10.31 9.94 7.25 Sucrose 4%, +CA 17.42 11.75 9.42 5.06 0.59 -4.32 -9.18 10.31 9.94 7.25 Sucrose 4%, +CA 17.43 11.75 9.42 5.06 0.59 -4.32 -9.18 10.31 9.94 7.25 <t< th=""><th>L.S.D at</th><th>19%</th><td>1 298</td><td>0 609</td><td>0.834</td><td>1.110</td><td>+</td><td>0.848</td><td>0.963</td><td>0.859</td><td>0.228</td><td>0.425</td><td>1.384</td><td>1.263</td><td>0.365</td><td>1.370</td><td>1.637</td></t<>	L.S.D at	19%	1 298	0 609	0.834	1.110	+	0.848	0.963	0.859	0.228	0.425	1.384	1.263	0.365	1.370	1.637
D.W 9.17 7.98 4.25 0.99 -3.62 -9.53 -13.89 -21.12 9.68 7.25 5.29 Sucrose 4%, +CA 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 Sucrose 4%, +CA 13.59 12.70 9.86 6.87 2.14 -2.42 -7.41 -12.97 13.45 11.73 9.37 Sucrose 4%, +CA 10.24 8.53 5.70 2.32 -2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 Sucrose 4%, +CA 17.42 15.48 11.75 9.42 5.06 0.59 -4.32 -9.18 16.26 14.78 12.25 200 ppm + 8HQs 17.12 11.33 1.299 1.364 1.391 1.764 2.975 2.022 0.956 1.032 0.506 4 1.55.4 1.31 1.386 2.353 3.969 2.697 1.277 1.377 0.674											2 nd season						
Sucrose 4% + CA 6.30 5.15 1.38 -1.95 -6.38 -12.85 -19.10 -25.02 5.65 5.37 2.15 Sucrose 4% + CA 13.59 12.70 9.86 6.87 2.14 -2.42 -7.41 -12.97 13.45 11.73 9.37 Sucrose 4% + CA 10.24 8.53 5.70 2.32 -2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 Sucrose 4% + CA 17.42 15.48 11.75 9.42 5.06 0.59 -4.32 -9.18 16.26 14.78 12.25 200 ppm + 8HQs 17.42 15.48 11.39 1.364 1.391 1.764 2.975 2.022 0.956 1.032 0.506 5% 1.56.4 1.31 1.784 2.975 2.022 0.956 1.032 0.506 4 1.56.4 1.31 1.856 2.353 3.969 2.697 1.275 1.377 0.674		D.W	9.17	7.98	4.25	0.99	-3.62	-9.53	-13.89	-21.12	89.6	7.25	5.29	1.49	-2.21	-6.61	-10.58
Sucrose 4% +CA 13.59 12.70 9.86 6.87 2.14 -2.42 -7.41 -12.97 13.45 11.73 9.37 8102 ppm Sucrose 4% +CA 2.32 2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 200 ppm + 8HQS 200 ppm + 8HQS 40 ppm		Sucrose 4 %	6.30	5.15	1.38	-1.95	-6.38	-12.85	-19.10	-25.02	5.65	5.37	2.15	0.24	-3.35	-9.45	-13.45
Sucross 4% + CA 200 ppm Sucross 4% + CA 200 ppm + 84109s 10.24 8.53 5.70 2.32 -2.67 -7.41 -13.36 -18.93 10.31 9.94 7.25 200 ppm + 84109s 17.42 15.48 11.75 9.42 5.06 0.59 -4.32 -9.18 16.26 14.78 12.25 200 ppm + 84109s 17.17 11.13 1.299 1.364 1.391 1.764 2.975 2.022 0.956 1.032 0.506 1.032 1.377 0.504 1.007	holding	Sucrose 4% +CA 200 ppm	13.59	12.70	-	6.87	2.14	-2.42	-7.41	-12.97	13.45	11.73	9.37	1.17	3.55	-1.53	-4.43
Sucrose 4% +CA 17.42 15.48 11.75 9.42 5.06 0.59 -4.32 -9.18 16.26 14.78 12.25 200 ppm + 8HQs 1.172 1.133 1.299 1.364 1.391 1.764 2.975 2.022 0.956 1.032 0.506 2.000		Sucrose 4 % + 8HQS 200 ppm	10.24		5.70	2.32	-2.67	-7.41	-13.36	-18.93	10.31	9.94	7.25	3.48	1.20	-2.59	-6.57
5% 1.172 1.133 1.299 1.364 1.391 1.764 2.975 2.022 0.956 1.032 0.506		Sucrose 4% +CA 200 ppm + 8HQS	-	-			5.06	0.59	-4.32	-9.18	16.26	14.78	12.25	5.99	4.75	19.0	-2.31
1 2 1 2 1 2 1 2 2 2 3 5 3 3 9 9 9 2 6 9 1 1 2 7 5 1 3 7 0 6 7 4		200 ppm	+-	+	1.299	-	-	-	2.975	2.022	0.956	1.032	0.506	0.828	1.860	0.491	0.668
1.304 1.312 1.733 1.813	L.S.D at	_	1.564	-	1.733	1.819	1.856	2.353	3.969	2.697	1.275	1.377	0.674	1.105	2.481	0.655	0.891

increase in change percentage in fresh weight of cut flower stalks as compared to control (D.W.) and the other ones under study in the two seasons. Moreover, holding solution contained (sucrose at 4% + citric acid at 200ppm) + (sucrose at 4% + 8-HQS at 200ppm) of Bird of Paradise cut flower stalks bases resulted highly significant increase in change percentage in fresh weight when compared to control (distilled water) in the two seasons.

While, using the treatment of holding solution contained (sucrose at 4%) recorded the lowest values of change percentage in fresh weight of Bird of Paradise cut flower stalks when compared to control (D.W.) in the two seasons.

As for the effect of interaction between pulsing solution and holding solution treatments on change percentage in fresh weight, Data in Table (89&90) reveal that, the interaction treatments between (pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant increase in change percentage in fresh weight of bird of paradise cut flower stalks as compared to control (distilled water) during the two seasons. Moreover, using the interaction between (pulsing solution of kinetin at 20ppm for 24 hours and BA at 10ppm for 24 hours respectively and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted highly significant increase in change percentage in fresh weight of Bird of paradise cut flower stalks

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Table (89): Effect of interaction between pulsing solutions and holding solutions treatments on change percentage in fresh weight of Strelitzia reginae Ait. cut flower stalk during first season 2007-2008. -15.07 -15.34-25.06 -12.34-26.22 -18.58 -23.54 1.440 1.920 -27.13-13.01-29.55 -11.56 -9.23 -8.95 -6.38 -31.63 -17.67 -18.47 -17.41 -23.85 -21.34-6.57 -16.45-29.01 -7.93 -15.51 -11.82 -16.94 1.615 -16.99-19.05 -20.80.24.68 -10.51-11.82 -4.13 -4.96 2.155 -12.96-15.35-11.21 -18.87 -21.05-8.52 -3.68 -8.08 -1.67 -23.05 -7.59 -7.45 -7.31 -3.47 Change percentage in fresh weight of cut flower stalk -11.16 -12.90-16.46-6.43 -10.21 1.422 1.897 -18.08 -10.56-2.55 -3.99 -3.96 -1.16 -20.98 -6.94 -6.80 -5.47 -1.87 -2.51 -8.69 -1.75 2.54 0.20 -1.83 3.39 -13.6391.1 Shelf life periods (days) 1.237 1.651 -10.91 -0.58 -2.47 -5.29 -4.27 -6.85 -6.99-0.29-6.85 -3.60 -2.73 -0.41 -6.99 6.48 2.39 2.23 6.27 2.81 3.62 3.62 9.29 -8.41 2.07 1.05 st season 1.110 1.480 10.12 1.72 10.15 1.13--4.39 -0.8211.55 7.89 6.59 2.73 7.68 7.51 -5.11 -3.51 3.62 7.02 6.91 4.63 3.01 3.80 2.43 69.0 5.87 16 10.45 1.380 12.74 10.87 11.13 -0.296.59 4.48 14.51 1.841 7.16 13.06 69.0 9.19 8.08 1.17 -0.821.57 6.59 5.32 888 3.05 0.89 3.81 9.81 0.53 12.84 13.64 1.020 1.361 12.24 14.03 12.93 15.63 13.15 15.42 1.72 9.88 8.57 8.54 99.5 9.85 8888 7.71 4.03 4.18 7.82 4.96 5.91 17.86 2.176 14.20 2.903 10.45 10.89 13.39 16.86 10.64 15.31 13.75 11.23 17.42 4.74 13.33 6.49 3.35 9.52 8.13 8.03 9.59 9.45 10.70 8.92 4.63 Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4 % + 8HQS 200 ppm Holding Solutions Sucrose 4% +CA 200 ppm **Treatments** Sucrose 4 % Sucrose 4 % Sucrose 4 % Sucrose 4 % D.W D.W D.¥ 2% 1% Pulsing solutions Sucrose 10 % STS 1:4 ml Kin.20 ppm BA 10 ppm L.S.D at D.W

Results and Discussion

Table (90): Effect of interaction between pulsing solutions and holding solutions treatments on change percentage in fresh weight of Strelitzia reginae
Ait. cut flower stalk during the second season 2008-2009.

	Treatments		0	hange perce	Change percentage in fresh weight of		cut flower stalk	K	
					2 nd s				
Pulsing solutions	Holding				Shelf life p	Shelf life periods (days)			
0	Solutions	4	8	12	16	20	24	28	32
	D.W	8.05	6.67	2.53	-0.75	-5.80	-15.66	-12.35	-26.42
	Sucrose 4 %	5.61	3.63	0.58	-3.17	-7.12	-17.40	-24.83	-30 31
D.W	Sucrose 4% +CA 200 ppm	12.03	10.44	7.21	5.03	-1.16	-5.50	-11.11	-16.47
	Sucrose 4 % + 8HQS 200 ppm	9.62	7.91	5.26	1.34	-3.30	-8.47	-15.05	-20.91
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	16.12	13.93	10.24	7.13	0.34	-4.84	-10.26	-15.82
	D.W	8.69	8.36	4.63	1.96	-3.57	-8.50	-15.60	-20.67
	Sucrose 4 %	6.63	6.34	2.13	-1.14	-5.76	-11.49	-17.54	-24.11
Kin.20 ppm	Sucrose 4% +CA 200 ppm	12.73	12.09	9.98	7.62	2.74	-2.15	-6.98	-12.55
	Sucrose 4 % + 8HQS 200 ppm	10.48	8.49	4.97	1.24	-4.12	-8.87	-15.04	-19.87
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	17.58	16.05	13.44	11.02	7.37	3.34	-1.39	-5.95
	D.W	10.58	8.91	4.79	1.67	-2.82	-7.26	-14.49	-19.26
	Sucrose 4 %	6.49	5.46	1.07	-1.55	-5.17	-10.38	-16.87	-22.70
BA 10 ppm	Sucrose 4% +CA 200 ppm	14.13	13.32	10.71	7.95	3.38	-1.12	-5.68	-11.37
	Sucrose 4 % + 8HQS 200 ppm	11.09	8.91	6.47	3.34	-1.52	-5.95	-11.18	-16.06
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	18.35	16.37	13.34	10.69	6.59	2.38	-2.66	-8.07
	D.W	7.10	5.80	1.73	-1.15	-4.96	-10.17	-15.26	-21.84
-15 51 Sucrose 1	Sucrose 4 %	4.66	3.22	-0.01	-3.90	-8.92	-14.93	-20.43	-26.38
15.510 %	Sucrose 4% +CA 200 ppm	14.03	12.99	9.27	4.83	0.95	-3.99	-8.91	-15.51
	Sucrose 4 % + 8HQS 200 ppm	8.23	6.78	4.27	1.07	-4.37	-9.68	-15.84	-21.62
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	15.51	14.13	10.64	6.89	3.18	-1.74	-6.32	-10.28
	D.W	11.44	10.16	7.57	3.22	-0.97	-6.07	-11.74	-17.42
	Sucrose 4 %	8.13	7.13	3.11	-001	-4.94	-10.02	-15.84	-21.59
STS 1:4 mi	Sucrose 4% +CA 200 ppm	15.05	14.63	12.15	8.92	4.79	0.67	-4.38	-8.97
	Sucrose 4 % + 8HQS 200 ppm	08.11	10.57	7.55	4.59	-0.03	-4.09	-9.70	-16.22
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	19.52	16.91	11.08	11.32	7.84	3.77	-0.96	-5.77
L.S.D at	5%	2.622	2.534	2.904	3.050	3.111	3.944	6.653	4.521
	1%	3.497	3.380	3.875	4.068	4.150	5.262	8.875	6.031

after 4, 8, 12, 16, 20, 24, 28 and 32 days from the treatment as compared to control and other ones under study in the two seasons. Furthermore, using the interaction between (pulsing solution)\ of (distilled water for 24 hours) or (pulsing solution of sucrose at 10% for 24 hours) and holding solution contained (sucrose at 4%) registered highly significant decrease in change percentage in fresh weight of Bird of paradise cut flower stalks as compared to the other treatments under this study after 4, 8, 12, 16, 20, 24, 28 and 30 days from the treatment in the two seasons.

7.1.c.-Water balance (g) stalks:

Data in Table (87) indicate that water balance of Bird of Paradise cut flower stalks was decreased after 4 days from the treatment till the end of age of longevity. Generally, most pulsing solution treatments highly significant increased the water balance of Bird of Paradise cut flower stalks after 4, 8, 12, 16, 20, 24 and 28 days from the treatment compared to control in the two seasons. Furthermore, the treatments of STS at (1:4mM) for 30 minutes after 4, 8, 12, 16, 20, 24 and 28 days from the treatment was the most effective one in this regard compared with the other ones in the two seasons.

Referring to the effect holding solution treatments on water balance, data presented in Table (88) demonstrate that water balance of Bird of Paradise cut flower stalks was decreased after 4 days from the treatment to the end of age of longevity 28days in both seasons. However, holding Bird of Paradise cut flower stalks bases in holding solution contained

(sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted the highest significant increase in water balance as compared to the other ones and control (distilled water) under study in the two season. Moreover, the lowest values of water balance of Bird of Paradise cut flower stalks was registered by using holding solution contained (sucrose at 4%) after 4, 8, 12, 16, 20, 24 and 28 days from the treatment when compared to control (distilled water) and other treatment in the two seasons. The rest treatments occupied an intermediate position between the abovementioned treatments in both seasons of this study.

Concerning the interaction effect between pulsing solution and holding solution treatments on water balance, data in Tables (91 & 92) demonstrate that all the interactions between pulsing and holding solutions succeeded in increasing water balance of Bird of paradise cut flower stalks as compared to the control (distilled water) in the two seasons in most cases. However, the combinations of holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant increase of water balance, especially the combined treatment between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) after 4 days from the treatment to the end of longevity in the two seasons.

Moreover, the combinations between pulsing solution of BA at 10ppm for 24hours or kinetin at 20ppm for 24hours respectively, and holding solution contained (sucrose at 4% +

Table (91): Effect of interaction between pulsing solutions and holding solutions treatments on Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during first season 2007-2008.

				Wate	Water balance (g)/stalk	alk		
	Treatments				1st season			
				Shelf	Shelf life periods (days)	ıys)		
Pulsing solutions	Holding	4	æ	12	16	20	24	28
0	CHOUNTED	6.40	4 97	2.67	-0.80	-4.63	-12.30	-15.80
	D.W	0.40	3.07	0.73	-5.80	-6.87	-14.47	-17.47
	Sucrose 4 %	5.90	7.03	8 93	3.93	1.03	-4.43	-8.50
D.W	Sucrose 4% +CA 200 ppm	9.10	7.00	6.80	2.83	76.0	-4.43	-8.50
	Sucrose 4 % + 8HQS 200 ppm	8.30	11.37	9.22	5.07	1.93	-3.60	-6.80
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	17.71	(5.11)	3.33	09.0	-3.47	-8.33	-12.50
	D.W	7.13	3.00	1.73	-1.67	-5.13	06.6-	-14.30
	Sucrose 4 %	4.00	0.17	7.60	5.10	1.53	-1.47	-5.23
Kin.20 ppm	Sucrose 4% +CA 200 ppm	10.00	0 50	10.80	5.00	2.10	-1.60	-5.63
	Sucrose 4 % + 8HQS 200 ppm	14.60	1413	11.73	8.50	5.43	1.20	-2.93
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	14.00	27.7	4.70	1.60	2.87-	-8.47	-11.13
	D.W	9.43	1 03	1.80	-0.47	-4.40	-8.33	-13.37
	Sucrose 4 %	5.10	11.53	8 90	6.53	3.33	-1.07	-5.53
BA 10 ppm	Sucrose 4% +CA 200 ppm	12.27	5911	9.07	6.80	2.77	-0.80	-5.20
	Sucrose 4 % + 8HQS 200 ppm	12.73	16.50	10.50	09.6	5.13	2.20	-1.23
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	10.47	537	3.00	-0.07-	-3.57	-9.10	-13.33
	D.W	0.07	3.30	1 00	-2.00	-5.90	-11.13	-18.50
	Sucrose 4 %	0.80	0.37	7.20	5.47	1.43	-2.37	-7.30
Sucrose 10 %	Sucrose 4% +CA 200 ppm	10.03	0.57	7.43	4.93	1.63	-2.33	-7.10
	Sucrose 4 % + 8HQS 200 ppm	10.37	10.77	9.53	6.93	3.30	0.47	-5.43
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.00	777	4 77	2.40	-1.70	-4.20	-8.37
	D.W	9.90	5.43	1 93	-1.00	-3.70	-8.80	-12.07
	Sucrose 4 %	6.60	0.50	10.00	6.70	2.93	-0.30	-2.80
STS 1:4 ml	+CA 200	13.57	12.03	10.13	6.77	3.40	-0.20	0.80
	Sucrose 4 % + 8HQS 200 ppm	13.50	16.20	14.93	10.20	8.07	2.67	-1.17
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	04:71	02.01	7 371	2118	0.612	2.297	2.804
I C D at	5%	0.382	0.017	3.096	2.825	0.817	3.064	3.741
L.S.D at	1%	40C.U	0.770	1				

Table (92): Effect of interaction between pulsing solutions and holding solutions treatments on Water balance (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the second season 2008-2009.

	Treatments			W:	Water balance (9)/stalk	/etall/		
Dulcina	Holding				2 nd season			
Suominos Suumi	Solutions				Shelf life periods (days)	(days)		
	D.W.	1 4	000	12	16	20	24	70
	Sucrose 4 %	1.93	6.30	4.07	0.43	-3.60	-9.90	1
D.W	Sucrose 4% +CA 200 ppm	10.30	3.9/	1.17	-1.43	-5.60	-12.63	
	Sucrose 4 % + 8HOS 700	02.21	10.67	8.03	-5.73	1.43	-4 43	
	Mdd 007 c Ourse 4% + CV 200	9.33	8.97	7.27	-2.40	-0.47	5 17	
	200 ppm + 8HQS 200 ppm	14.23	12.60	10.47	-6.53	2 17	3 10	
	D.W	9.67	8.20	5 10	1 57	2.17	-5.10	
K: 70	Sucrose 4 %	3.00	5.73	213	0.00	-2.33	-6.30	
Mdd 07.11.2	Sucrose 4% +CA 200 ppm	13.13	11.67	0.40	0.90	-4.23	-9.13	6
	Sucrose 4 % + 8HQS 200 ppm	9.80	0 37	673	5.13	3.30	-0.73	
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	16 33	7.07	0.73	4.77	1.20	-1.83	
	D.W	10.10	14.6/	12.77	9.90	5.27	1.97	
	Sucrose 4 %	10.10	8.53	5.87	2.07	-1.93	-4.97	-0 73
BA 10 ppm	Sucrose 4% +C A 200 mm	1.23	6.10	2.96	1.30	2.87	-7 53	
1	Sucrose 4 % + 8HOS 200 ppm	14.10	13.30	10.07	7.50	4.13	-013	
	Sucrose 4% +C \ 200 ppm	00.11	10.70	7.43	5.00	1.47	-1 17	
	5 mm + 8HQS 200 ppm	17.57	16.10	13.20	10.23	610	7.1.7	
-1-	S D.W	9.80	6.47	4.43	0.80	263	2.33	1
Sucrose 10 %	Sucrose 4 %	5.30	4.43	1.37	-1.17	4 02	-/.8/	1
	Sucrose 4% +CA 200 ppm	12.87	9.10	8.37	6.03	1 97	-10./3	
	Sucrose 4 % + 8HQS 200 ppm	10.00	9.37	6.10	3.30	1 53	-5.10	٠
	Sucrose 4 % +CA 200 ppm + 8HQS 200 ppm	15.03	13.47	10.87	5.47	700	-4.4/	-8
	D.W	10.90	6.73	6 97	L3 C	2.00	-1.33	
CTC 1.	Sucrose 4 %	7.83	6.60	3 13	2.37	-0.53	-4.03	-7
010134 1111	Sucrose 4% +CA 200 ppm	14.87	13 93	11.00	1,00	-4.87	-7.20	<u>1</u>
1	Sucrose 4 % + 8HQS 200 ppm	11.40	02.11	07.00	7.90	7.00	0.77	ن.'
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	18.13	16.87	0.70	6.73	2.27	-0.33	-5
L.S.D at	5%	2 137	3 300	13.93	10.90	7.40	3.17	-0
	1%	2.850	2,300	1.130	1.852	4.159	1.098	1.493
		1.000	3.079	806.1	2 471	2 2 40	1001	

citric acid at 200ppm + 8-HQS at 200ppm) resulted highly significant increase in this parameter, also the combinations of STS at 1:4mM for 30 minutes as compared to control (distilled water) in this concern in the two seasons. Anyhow, the water balance values of Bird of paradise cut flower stalks by using all the combinations between pulsing and holding solutions was decreased as flower cut stalks prolonged in age after 4 days from the treatment to the end of longevity in the two seasons. On the contrary, the combinations of sucrose at 4% as holding solution decreased water balance stalks of *S. reginae* during all longevity periods, except for the combined treatment between sucrose at 4% and STS 1:4ml as it succeeded in increasing the water balance stalks of *Strelitzia. regine* in tow seasons.

7.1.d.-Floret opening percentage:

Data in Table (93) demonstrate that all pulsing solution treatments highly significant increased the floret opening percentage of tuberose cut flower stalks when compared to the untreated stalks (distilled water) after 12, 16, 20, 24 and 28 days from the treatment in the two seasons. However, the treatment of STS at 1:4mM for 30 minutes and BA at 10ppm for 24 hours gave the highest values of floret opening percentage of Bird of Paradise cut flower stalks after 20, 24 and 28 days from the treatment when compared to control (D.W.) in the two seasons.

As for the effect holding solution treatments on floret opening percentage, data in Table (94) indicate that holding Bird of paradise cut flower stalks bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm)

Table (93): Effect of pulsing solutions treatments, on Floret opening percentage and Floret wilting percentage of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

3				Floret ope	Floret opening percentage	ıtage					Floret w	Floret wilting percentage	inga		
117	1 reatments			Shelf	Shelf life periods(days)	s(days)					Shelf	Shelf life periods/days)	s(davs)		
		4	00	12	16	20	24	28	8	12	16	20	24	28	32
								I st	1st season						
	D.W	27.73	39.52	50.00	53.64	61.88	69.80	77.28	21.80	34.31	46.00	56.19	74 00	01 33	
Dilising	Kin.20 ppm	29.80	42.05	56.28	59.84	69.17	77.93	87.04	19.36	24.75	37 14	43.81	50.17	71.32	,
Pulsing	8A 10 ppm	12 25	45 10	60.44	(7) (7)	2				11.70	37.14	45.81	39.17	74.16	85.07
solutions	and or no	10.20	45.19	60.44	63.67	70.84	78.64	90.44	17.47	22.07	34.31	40.54	56.66	70.46	80.60
	Sucrose 10 %	29.04	39.80	53.96	57.07	65.60	74.28	84.36	21.70	29.16	41.24	50.15	66 03	70 77	8
	STS 1:4 ml	32.80	43.44	60.80	65 60	73 00	200	00 73					00.00	19.11	90.96
	n o				00.00	15.00	02.24	90./3	15.60	19.32	31.24	38.10	53.23	67.06	75.19
L.S.D at	0 /0	2.493	3.289	3.415	4.223	4.413	4.150	3.431	5.832	5.621	6.744	5.507	6.209	4.976	4.996
	1%	3.329	4.387	4.555	5.633	5.886	5.536	4.577	7.779	7.498	8.997	7.347	8.283	6.639	6.665
								2 nd	season	1000					
	D.W	30.00	40.00	52 67	5777	17.17	2000								
	Kin.20 ppm	32.67	44 67	50.33	67.67	04.6/	/2.00	80.67	23.10	37.18	49.93	56.73	79.47	94.60	
Pulsing	RA 10	31 22	44.00	55.55	/0.20	/1.33	78.67	88.67	19.43	30.14	42.48	46.59	63.07	77.21	86.66
solutions	ndd or wa	01.33	44.00	60.40	65.73	72.67	79.73	90.53	20.17	26.29	38.73	43.37	60.49	75.38	84.68
	Sucrose 10 %	30.93	41.33	57.87	67.33	70.53	77.47	84.93	26.77	34.29	43,40	49.88	67.58	80.07	91.69
	STS 1:4 ml	33.73	44.40	61.73	68.00	77.07	87.33	92.00	16.39	24.67	35.01	42.29	54 77	60 <1	77.0
CDat	5 %	5.336	10.57	5.378	8.133	6.399	9.586	9.259	6.642	5 533	8 730	0 000		9.51	11.92
tion at	1%	7.119	14.10	7.175	10.850	925.8	20 20				0.700	0.090	9.5//	10.33	10.88
				7.1.70	0.000	0.030	12.79	12.35	8.860	7.380	11.66	11.60	12 78	13 79	14 51

				ann anna		20000				-	Floret Wilting percentage	IIIg percei	Hage		4
				Floret ope	Floret opening percentage	(dane)					Shelf life	Shelf life periods (days)	(days)		
	Treatments		0	Shell III	Shell life periods (uays)	20	24	28	8	12	16	20	24	28	ı
		4	×	71				1st season	no						-
		73.84	34 00	43.64	49.20	56.80	65.29	76.04	34.31	47.93	90.09	69.75	81.19		
	D.W	27.13	35.60	48.92	55.13	61.64	96.89	81.84	18.79	30.93	45.20	55.19	71.22	83.59	91.07
Holding	Sucrose 4% +CA 200	31.11	43.85	96.09	61.00	96.69	80.44	87.25	15.17	20.31	37.46	40.84	56.47	72.99	81.12
solutions	Sucrose 4 % + 8HQS	33.40	46.32	62.52	64.24	72.72	83.04	91.48	14.41	16.17	25.53	34.52	52.25	66.28	73.33
	Sucrose 4% +CA 200	36.40	50.23	65.44	70.24	79.37	85.16	93.24	13.24	14.26	21.69	28.49	47.96	62.07	71.79
	ppm + 8HQS 200 ppm						0317	2.431	5 833	1 29 5	6.744	5.507	6.209	4.976	4.996
	2%	2.495	3.289	3.415	4.223	4,413	4.150	3.431	1000		2000	7277	8 283	6 639	6.665
L.S.D at	-	3.329	4.387	4.555	5.633	5.886	5.536	4.577	7.77	7.498	8.997	1.747	0.00		
	0 / 1							2 nd season	ason						
		1000	20,40	47.33	54.67	19 69	66.67	78.00	34.59	49.51	62.56	70.80	86.56	9	
	D.W	77.97	20.40	5.7+			4	00.00	53.10	36.38	48.41	54.55	69.92	82.83	91.75
	Sucrose 4 %	29.33	37.60	52.40	00.09	66.40	/4.00	80.00	CC:12	2					+
Holding	Sucrose 4% +CA 200	33.47	45.33	62.67	67.07	74.00	84.27	19.06	17.23	24.60	38.09	42.74	58.76	71.87	- 2
solutions	Sucros	32.53	45.60	62.80	19.99	74.13	83.33	89.73	17.94	22.29	32.57	37.28	56.99	70.20	
	Sucrose 4% +CA 200	37.07	49.47	08.99	72.67	79.07	86.93	92.40	14.56	19.89	27.92	33.47	53.09	67.65	
	ppm + 8HQS 200 ppm	-		-	+	6 300	9886	9 259	6.642	5.533	8.738	8.695	9.577	10.33	
	2 %	5.336	10.57		+	-	+	13.35	098.8	7 380	11.66	11.60	12.78	13.78	
L.S.D at	10%	7.119	14.10	7.175	10.850	8.536	12.79	12.33	0.000	_	-				-

resulted the highest significant increase in floret opening percentage as compared to control (distilled water) and the other ones under study in both seasons. Moreover, holding solution contained (distilled water) and the other ones under study in both seasons. Moreover, holding solution contained (sucrose at 4% + citric acid at 200ppm) + (sucrose at 4% + 8-HQS at 200ppm) recorded highly significant increase in floret opening percentage of Bird of paradise cut flower spites as compared to control (D.W.) in both seasons.

Referring to the interaction effect between pulsing solution and holding solution treatments on floret opening percentage, data in Tables (95 & 96) reveal that all the combinations between pulsing solutions and holding solutions treatments succeeded in increasing floret opening percentage of Bird of paradise cut flower stalks as compared to control "D.W" i.e distilled water during the two seasons. However, the combinations of holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the most effective one for inducing the highest values of this parameters, especially the combined treatment between pulsing solution of STS at 1:4mM for 30minutes and holding solution contained (sucrose at 4% + Citric acid at 200ppm + 8-HQS at 200ppm) after 4 days from the treatment till the end of longevity in the two seasons in most cases.

Table (95): Effect of interaction between pulsing solutions and holding solutions treatments on Floret opening percentage of Strelitzia reginae Ait. cut flower stalk during first season 2007-2008.

	T Cartille III S			Floret	Floret opening percentage	age		
					1st season			
Pulsing	Holding			She	Shelf life periods (days)	lays)		
solutions	Solutions	4	8	12	16	20	24	28
	D.W	20.00	30.00	35.00	44.00	48.80	56.00	65.00
	Sucrose 4 %	21.67	32.00	44.00	50.00	55.00	64.00	73.20
N.W	Sucrose 4% +CA 200 ppm	30.00	44.00	55.0	55.00	64.00	75.00	80.00
-1	Sucrose 4 % + 8HQS 200 ppm	32.00	45.00	56.00	26.00	09.99	76.0	83.20
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	35.00	46.60	00.09	63.20	75.00	78.00	85.00
	D.W	24.00	35.00	46.60	50.00	58.00	69.87	78.00
	Sucrose 4 %	28.00	34.00	48.80	56.00	63.20	70.00	80.00
Kin.20 ppm	Sucrose 4% +CA 200 ppm	30.00	44.67	00.09	00.09	70.00	80.00	90.00
-	Sucrose 4 % + 8HQS 200 ppm	32.00	46.60	62.00	63.20	72.00	83.20	93.20
3.	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	35.00	50.00	64.00	70.00	82.67	86.60	94.00
	D.W	26.00	38.00	46.60	52.00	00'09	00.99	83.20
	Sucrose 4 %	30.00	40.00	52.00	56.33	64.00	70.00	88.00
BA 10 ppm S	Sucrose 4% +CA 200 ppm	33.53	46.60	09.99	00.99	72.00	83.20	90.00
<i>5</i> 1	Sucrose 4 % + 8HQS 200 ppm	35.00	48.00	00.89	70.00	75.00	86.00	95.00
<i>J</i> 1	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	38.00	53.33	00.69	74.00	83.20	88.00	00'96
	D.W	23.20	31.00	40.00	48.00	53.20	09.99	74.00
	Sucrose 4 %	26.00	34.00	46.60	53.33	00.09	68.80	78.00
Sucrose 10 %		28.00	40.00	00.09	56.00	08.89	76.00	86.60
		32.00	46.00	00.09	00.09	70.00	80.00	90.00
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	36.00	48.00	63.20	00.89	76.00	80.00	93.20
	D.W	26.00	36.00	50.00	52.00	64.00	00.89	80.00
	Sucrose 4 %	30.00	38.00	53.20	00.09	00.99	72.00	90.00
S 13 1:4 ml	Sucrose 4% +CA 200 ppm	34.00	44.00	63.20	00.89	75.00	88.00	89.67
S		36.00	46.00	09.99	72.00	80.00	90.00	96.00
S	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	38.00	53.20	71.00	00'92	80.00	93.20	00.86
L.S.D at	5%	5.579	7.354	7.636	9.442	6.867	9.280	7.672
1	1%	7.443	9.810	10.19	12.60	13.16	12.38	10.23

Results and Discussion

Table (96): Effect of interaction between pulsing solutions and holding solutions treatments on Floret opening percentage of Strelitzia reginae Ait. cut flower stalk during the second season 2008-2009.

an ma	duting the second season roop roop.							
	Treatments			Floret op	Ploret opening percen	nage		
				Shelf	periods	(days)		
Pulsing solutions	Solutions	4	∞	12		20	24	28
	nw .	23.33	33.33	40.00	46.67	53.33	60.00	66.67
	5.1	76 67	11 11	46 67	53.33	60.00	66.67	80.00
	Sucrose 4 %	26.67	22.22	60.00	60.00	66 67	00.08	86 67
D.W	Sucrose 4% +CA 200 ppm	33.33	46.67	60.00	00.00	00.0/	00.00	62.22
	Sucrose 4 % + 8HQS 200 ppm	30.00	40.00	53.33	60.00	66.67	/3.33	83.33
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	36.67	46.67	63.33	66.67	76.67	80.00	86.67
	n w	26.67	40.00	50.00	53.33	63.33	66.67	83.33
	Sucrose 4 %	30.00	36.67	53.33	60.00	66.67	73.33	86.67
Kin 20 nnm	Sucrose 4% +CA 200 ppm	33.33	46.67	63.3	66.67	73.33	86.67	93.33
medel owners	Sucross 4 % + 8HOS 200 nnm	33.33	46.67	63.33	60.00	73.33	80.00	86.67
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	40.00	53.33	66.67	73.33	80.00	86.67	93.33
	D.W.	26.67	40.00	46.67	53.33	63.33	66.67	80.00
	Sucrose 4 %	30.00	40.00	53.33	56.67	66.67	73.33	90.00
RA 10 ppm	Sucrose 4% +CA 200 ppm	33.33	46.67	66.67	73.33	76.67	83.33	93.33
	Sucrose 4 % + 8HOS 200 ppm	30.00	46.67	66.67	73.33	76.67	86.67	94.00
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	36.67	46.67	68.67	72.00	80.00	88.67	95.33
	D.W	26.67	33.33	46.67	60.00	63.33	66.67	76.67
	Sucrose 4 %	26.67	40.00	53.33	66.67	66.67	73.33	83.33
Sucrose 10 %	Sucrose 4% +CA 200 ppm	33.33	40.00	60.00	66.67	73.33	80.00	86.67
.4	Sucrose 4 % + 8HOS 200 ppm	34.00	46.67	64.00	70.00	74.00	83.33	88.00
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	34.00	46.67	65.33	73.33	75.33	84.00	90.00
	D.W	28.00	35.33	53.33	60.00	70.00	73.33	83.33
	Sucrose 4 %	33.33	38.00	55.33	63.00	72.00	83.33	90.00
STS 1:4 ml	Sucrose 4% +CA 200 ppm	34.00	46.67	63.33	68.67	80.00	91.33	93.33
	Sucrose 4 % + 8HQS 200 ppm	35.33	48.00	66.67	70.00	80.00	93.33	96.67
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	38.00	54.00	70.00	78.00	83.33	95.33	96.67
	5%	11.93	23.63	12.03	18.19	14.31	21.43	20.70
L.S.D at	1%	15.92	31.53	16.04	24.26	19.09	28.39	27.02

7.1.e.-Floret wilting percentage:

Data presented in Table (93) reveal that most pulsing solution treatments succeeded in decreased the floret wilting percentage of Bird of paradise cut flower stalks when compared to control (distilled water) in the two seasons. However, pulsing Bird of Paradise cut flower stalks bases in silver thiosulphate (STS) (1:4mM) for 30 minutes recorded the lowest values of this parameter after 12, 16, 20, 24 and 28day from the treatment in floret wilting percentage compared to the other treatments under study.

With respect to the effect holding solution treatments on floret wilting percentage, data in Table (94) reveal that all holding solution treatments of bird of paradise cut flower stalks bases highly significant decrease in floret wilting percentage as compared to control (distilled water) in both seasons. However, holding Bird of paradise cut flower stalks bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) recorded the highest significant decrease in floret wilting percentage as compared to control (D.W. treatment) in the two seasons. Furthermore, using the treatment of Bird of paradise cut flower stalks bases in holding solution contained (sucrose at 4% + 8-HQS at 200ppm) recorded highly significant decrease in floret wilting percentage as compared to control in the two seasons.

Regarding the interaction effect between pulsing solution and holding solution treatments on floret wilting percentage, data in Tables (97 & 98) indicate that all the interactions

Table (97): Effect of interaction between pulsing solutions and holding solutions treatments on Floret wilting percentage of Strelitzia reginae Ait. cut flower stalk during first season 2007-2008.

				Flore	Floret wilting percentage	ntage		
	Treatments				1st season			
	Holding			Shell	Shelf life periods ((days)		
Pulsing solutions	Solutions	8	12	16	20	24	28	32
	D.W	44.00	68.18	74.92	90.28	98.98	1	1961
	Sucrose 4 %	20.84	40.19	53.36	65.56	81.84	98.90	ĸ
D.W	Sucrose 4% +CA 200 ppm	15.14	26.87	44.19	48.21	66.87	86.25	92.50
	Sucrose 4 % + 8HQS 200 ppm	14.77	1963	31.94	42.09	63.34	74.66	84.31
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	14.24	16.67	25.59	34.83	58.99	70.56	82.68
	D.W	34.76	43.04	56.00	65.76	75.04	92.43	1
	Sucrose 4 %	19.59	30.62	42.72	54.25	68.93	83.10	93.51
Kin.20 ppm	Sucrose 4% +CA 200 ppm	14.90	20.00	38.67	40.00	55.00	71.11	80.00
	Sucrose 4 % + 8HQS 200 ppm	14.32	16.03	25.48	32.28	50.69	64.42	71.45
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	13.20	14.05	22.86	26.74	46.21	59.73	70.40
	D.W	30.40	39.01	54.15	60.00	76.17	84.55	
	Sucrose 4 %	16.50	27.41	42.52	50.13	67.70	77.40	81.95
BA 10 ppm	Sucrose 4% +CA 200 ppm	14.20	16.41	35.46	36.41	51.83	66.67	75.56
	Sucrose 4 % + 8HQS 200 ppm	13.77	14.73	20.38	32.09	46.56	63.31	67.53
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	12.47	12.81	19.02	24.06	41.03	60.40	69.10
	D.W	43.92	55.00	62.71	79.33	80.72	100.00	,
	Sucrose 4 %	19.54	34.15	48.72	57.52	73.03	87.46	97.46
Sucrose 10 %	Sucrose 4% +CA 200 ppm	16.50	22.67	41.36	44.95	63.10	76.29	83.39
	Sucrose 4 % + 8HQS 200 ppm	14.74	17.33	30.00	37.14	58.29	70.53	76.61
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	13.80	16.64	23.40	31.83	55.01	64.56	72.32
	D.W	18.49	34.44	52.50	53.37	75.06	86.00	95.00
	Sucrose 4 %	17.47	22.30	38.67	48.48	64.60	71.11	75.56
STS 1:4 ml	Sucrose 4% +CA 200 ppm	15.08	15.63	27.64	34.64	45.56	64.61	74.15
	Sucrose 4 % + 8HQS 200 ppm	14.47	13.10	19.84	29.00	42.38	58.47	66.77
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	12.48	11.12	17.58	25.00	38.58	55.11	64.47
1000	5%	13.04	12.57	15.08	12.31	13.88	11.13	11.17
Labat at	1%	17.40	16.77	20.12	16.43	18.52	14.84	14.90

Table (98): Effect of interaction between pulsing solutions and holding solutions treatments on Floret wilting percentage of Strelitzia reginae Ait. cut flower stalk during the second season 2008-2009.

				Floret	Floret wilting percentage	tage		
	Treatments				2nd season			
				Shelf	Shelf life periods (days)	iys)		
Pulsing	Holding	0	13	91	20	24	28	32
solutions	Solutions	0011	05 99	76.11	86.11	100.00	1	
	D.W	44.00	44.44	1119	29 99	83.33	19.86	a.
	Sucrose 4 %	22.00	20.33	45.75	51.17	71.67	80.83	88.33
D.W	Sucrose 4% +CA 200 ppm	14.0/	26.03	1198	41 67	79.07	78.33	87.26
	Sucrose 4 % + 8HQS 200 ppm	20.17	70.07	30.56	37.96	71.67	77.33	91.64
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	14.67	20.95	51.57	68.03	87.78	98.10	
	D.W	33.00	47.16	16.67	52.78	90.89	79.17	88.33
	Sucrose 4 %	18.33	38.89	40.07	43.52	56.17	71.93	81.67
Kin.20 ppm	Sucrose 4% +CA 200 ppm	14.67	20.05	36.11	3611	26.67	71.83	79.50
ĺ	Sucrose 4 % + 8HQS 200 ppm	18.33	20.92	30.11	32.50	46.67	65.00	75.17
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	12.83	19.91	58.33	6349	80.5	95.33	
	D.W	33.00	44.44	76.00	50.70	66.39	80.00	89.43
	Sucrose 4 %	16.50	27.78	46.00	37.78	55.19	67.79	73.62
BA 10 ppm	Sucrose 4% +CA 200 ppm	18.33	16.61	25.55	33.75	50.67	67.32	72.37
(f) (c)	Sucrose 4 % + 8HQS 200 ppm	18.33	19.91	07.77	31.35	49 63	66.64	71.34
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	14.67	19.41	77.87	27.16	90.88		1
	W	44.00	21.67	63.33	73.34	20.00	85.83	98.10
	707	33.00	44.44	50.00	24.92	17.77	20.00	05 90
Sucrose 10	Sucrose 4 %	20.17	30.00	42.00	46.63	62.50	74.33	00.30
%	Sucrose 4% +CA 200 ppm	18.33	25.00	34.29	39.70	59.64	71.31	20.70
	Sucrose 4 % + 8HQS 200 ppm	18 33	20.31	27.38	34.62	55.46	67.72	(8.43
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	10.01	37.78	53.33	62.83	76.39	88.10	98.10
	D.W	18.94	25.75	38.25	47.58	59.56	70.56	78.43
	Sucrose 4 %	50.71	50.00	30.06	35.00	48.27	64.44	72.96
STS 1:4 ml	Sucrose 4% +CA 200 ppm	18.33	10.01	28.57	35.00	47.33	62.22	71.22
	Sucrose 4 % + 8HQS 200 ppm	12.34	18.86	25.68	31.02	42.04	62.22	68.89
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	14.05	12.37	19.54	19.44	21.42	13.78	24.32
SDat	5%	19.81	16.50	26.06	25.94	28.57	30.82	32.45

between pulsing solutions and holding solution treatments resulted in highly significant decreases in floret wilting percentage of bird of paradise cut flower stalks during the two seasons as compared with control. However, the interaction of holding solution contained (sucrose at 4% + Citric acid at 200ppm + 8-HQS at 200ppm) approved to be the most effective one for inducing the lowest values of this parameter, particularly, the combined treatment between pulsing solution of STS at 1:4mM for 30 Minutes and holding solution contained (sucrose at 4% + Citric acid at 200ppm + 8-HQS at 200ppm) after 4 days from the treatment to the end of longevity in the two seasons as it induced the lowest floret wilting percentage. Furthermore, the values floret wilting percentage of the combinations between pulsing solution and holding solutions was increased as flower cut stalks prolonged in age after 4 days from the treatment till the end of age of longevity in the two seasons.

7.1.f.-Water uptake (g)/stalks:

Data in Table (99) indicate that water uptake of Bird of Paradise cut flower stalks was increased after 4 days from the treatment until the end of age of longevity in the two seasons. Generally, all pulsing solution treatments highly significant increased the water uptake of bird of paradise cut flower stalks after 4, 8, 12, 16, 20, 24 and 28days from the treatment compared to control in the two seasons. However, the highest significant increased of water uptake of bird of Paradise cut

Table (99): Effect of pulsing solutions treatments, on Water uptake and Water loss (g)/stalk of Strelitzia reginae Air cut flower stalk during the two seasons of 2007-2008/2008-2009.

				Water	Water uptake (g)/stalk	stalk					Wate	Water loss (g)/stalk	talk		
Tre	Treatments			Shelf	Shelf life periods(days)	(days)					Shelf	Shelf life periods(days)	(days)		
		4	œ	12	91	20	24	28	4	8	12	91	20	24	28
								181 S.	1st season						
	D.W	45.27	66.69	89.48	108.25	126.67	149.39	162.72	37.27	62.94	83.76	107.21	128.18	157.24	174.13
	Kin.20 ppm	48.59	74.45	94.33	113.24	131.77	152.14	167.12	39.16	65.73	87.39	109.73	131.68	156.16	175.24
Pulsing solutions	BA 10 ppm	49.81	75.22	96.47	115.08	133.75	153.75	169.33	38.55	64.95	80.68	110.27	132.96	157.04	172.17
	Sucrose 10 %	47.96	71.86	93.13	111.63	129.54	150.65	166.19	38.93	63.89	87.50	108.58	130.17	155.54	176.52
	STS 1:4 ml	55.91	77.42	61.86	116.51	134.80	157.31	174.40	43.69	66.53	89.83	111.50	133.00	159.48	179.12
L.S.D.at	5 %	0.532	0.582	0.574	0.486	0.442	0.706	0.572	0.559	699.0	1.190	1.103	0.499	1.197	1.395
	1%	0.741	0.776	0.766	0.649	0.589	0.941	0.763	0.745	0.892	1.588	1.471	999'0	1.596	1.860
								2 ^{md} s	season						
	D.W	45.75	69.82	88.91	108.59	125.48	149.57	164.07	36.01	61.32	82.71	111.73	126.69	156.61	174.55
	Kin.20 ppm	51.49	74.93	96.58	114.20	133.01	153.29	168.29	41.10	64.97	89.35	19.601	132.37	156.50	174.93
Pulsing	BA 10 ppm	51.56	73.85	98.38	115.24	134.24	154.37	170.20	39.56	62.90	90.47	110.02	131.71	156.63	175.86
	Sucrose 10 %	51.73	72.59	98.75	113.19	131.78	149.02	166.42	41.15	64.03	92.52	110.31	132.05	154.56	175.41
	STS 1:4 ml	61.11	79.49	101.80	116.49	137.31	159.37	177.98	48.48	68.40	93.05	110.55	135.06	160.90	18357
Te O S. I	2 %	1.854	1.727	1.778	1.259	1.431	1.319	1.514	2.015	2.039	1.860	1.575	2.154	1,436	1.730
	1%	2.473	2.304	2.373	1.679	1.909	1.760	2.020	2.688	2.720	2.481	2.101	2.873	1.916	2.307

flower stalks was registered by using pulsing solution of STS at 1:4mM for 30 minutes in the two seasons.

As for the effect holding solution treatments on water uptake, data in Table (100) demonstrate that water uptake of Bird of paradise cut flower stalks was increased after 4 days from the treatment to the end of age of longevity 28 days in both seasons. However, holding bird of paradise cut flower stalks bases in holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) resulted the highest significant increase in water uptake as compared to the other ones under study in both seasons. Moreover, holding solution contained (sucrose at 4% + citric acid at 200ppm) and (sucrose at 4% + 8-HQS at 200ppm) recorded highly significant increase in water uptake of Bird of paradise cut flower stalks as compared to control (distilled water) in the two seasons. Furthermore, the lowest value of water uptake of Bird of paradise cut flower stalks was registered by using holding solution contained (sucrose at 4%) when compared to control (D.W) and other treatments in the two seasons.

Concerning the interaction effect between pulsing solutions and holding solutions treatments on water uptake, data in Tables (101 & 102) demonstrate that all the combinations between pulsing solutions and holding solutions succeeded in increasing water uptake of Bird of paradise cut flower stalks as compared to control in the two seasons with the exception of the combination of sucrose at 4% as a holding solution in most

cut flower stalk

162.40 169.23 164.20 161.57 174.13

169.23

28

Table (100): Effect of holding solutions treatments, on Water uptake and Water loss (g)/stalk of Strelitzia reginae Ait.cut flower stalk during the two seasons of 2007-2008/2008-2009.

176.13 174.79 178.81 1.730 174.32 180.27 2.307 172.20 178.87 178.03 178.81 1.860 169.27 1.395 28 158.38 1.916 1.436 158.07 158.47 155.97 154.31 156.23 156.40 156.48 1.596 160.41 155.94 1.197 24 130.53 2.873 131.32 130.22 2,154 129.41 127.87 131.35 131.50 130.25 136.41 135.01 0.499 999.0 20 Shelf life periods (days) Water loss (g)/stalk 110.57 1.575 110.80 109.59 112.13 19 2.101 108.47 108.85 109.45 108.30 1.471 112.21 1.103 109.1 1.860 89.26 88.38 2.481 92.98 88.98 88.51 87.46 1.190 1.588 90.26 84.77 87.57 87.51 2.039 2.720 64.43 63.69 67.36 62.49 63.64 63.86 0.669 0.892 69.19 65.37 65.61 67.51 2.015 2.688 41.06 41.57 37.90 41.75 44.03 0.745 0.559 33.43 41.87 41.08 39.86 41.36 4 season season 176.67 1.514 160.87 175.83 2.020 175.30 16955 0.763 2nd 164.21 173.00 161.49 157.06 0.572 17291 28 151.72 158.99 1.319 1.760 151.85 156.54 146.53 154.55 154.36 156.99 0.706 151.93 145.41 0.941 24 135.28 1.909 133.77 127.97 130.61 1.431 122.67 133.40 135.02 134.21 131.77 133.67 0.589 0.442 20 Shelf life periods (days) Water uptake (g)/stalk 114.97 116.56 1.679 1.259 113.07 114.72 116.36 113.61 109.43 112.96 106.57 114.02 0.486 0.649 16 100.63 1.778 2.373 91.13 68.76 96.51 0.766 98.27 96.10 99.14 0.574 93.95 86.11 96.31 17 1.727 2.304 75.42 73.58 79.21 0.776 98.79 75.69 77.75 0.582 73.80 75.74 74.61 65.95 œ 2.473 1.854 57.32 54.33 55.20 51.25 43.55 0.532 56.05 47.77 38.30 52.53 52.89 0.741 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm 200 ppm + 8HQS Sucrose 4% +CA Sucrose 4% +CA 200 ppm 8HQS 200 ppm Sucrose 4% +CA Sucrose 4 % + Sucrose 4 % + Sucrose 4 % 200 ppm Sucrose 4 % 200 ppm D.W D.W Treatments 2% 1% 2 % 1% L.S.D at solutions holding holding L.S.D at

Results and Discussion

184.90

167.70

178.23

3.386

4.517

158.20 173.10 168.73 172.80

159.27

170.17

178.63

163.37

173.33

-328-

Table (101): Effect of interaction between pulsing solutions and holding solutions treatments on Water uptake (g)/stalk of Strelitzia reginae Ait. cut flower stalk during first season 2007-2008.

	Treatments			Wa	Water uptake (g)/stalk	talk		
Pulcino	П.П.			2	1st season	-	1 1	1 1
Solutions	Holding				Shelf life periods	ls (ls (days)	13
Summons	Solutions	4	*	12	16			
	D.W	44.70	71.67	90.23	109.33	3		128.00 12
	Sucrose 4 %	30.33	54.43	78.87	98.30	0		116.73
D.W	Sucrose 4% +CA 200 ppm	50.30	74.43	92.60	110.77	7		129.57
	Sucrose 4 % + 8HQS 200 ppm	48.30	74.00	91.60	110.23	23		128.97
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	52.70	75.40	94.10	112.63	53		130.07
	D.W	46.77	73.90	93.40	112.47	47		131.90
	Sucrose 4 %	36.97	68.27	86.73	107.50	50	-	123.40
Kim.20 ppm	Sucrose 4% +CA 200 ppm	51.97	76.00	95.27	=	114.10		133.57
	Sucrose 4 % + 8HQS 200 ppm	52.57	76.60	97.13	_	115.67		134.47
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	54.67	77.47	99.13	=	116.47	± 1	135.53
	D.W	48.73	75.43	96.07	=	115.67	5.67 133.77	133.77
	Sucrose 4 %	38.27	69.73	87.90	=	110.07		126.07
BA 10 ppm	Sucrose 4% +CA 200 ppm	52.37	76.13	97.47	Ξ	14043		135.53
	Sucrose 4 % + 8HQS 200 ppm	53.67	76.37	98.93	_	116.97		136.40
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	56.00	78.43	102.00	11	118.27		137.00
	D.W	46.00	71.47	92.27	_	111.20		129.70
	Sucrose 4 %	36.07	65.30	85.13	10	105.27		119.70
Sucrose 10 %	Sucrose 4% +CA 200 ppm	50.90	72.90	95.47	=	113.13	3.13 131.87	131.87
	Sucrose 4 % + 8HQS 200 ppm	51.80	73.40	95.00	11	113.00	3.00 132.47	132.47
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	55.03	76.23	97.80		115.57	COUNTY OF THE PARTY OF THE PART	133.97
	D.W	52.63	76.53	97.80	=	116.13	6.13 135.47	135.47
	Sucrose 4 %	49.87	72.03	91.90	_	112.17	12.17 127.47	127.47
ST S 1:4 ml	Sucrose 4% +CA 200 ppm	57.13	78.97	99.70	_	117.67		136.47
	Sucrose 4 % + 8HQS 200 ppm	58.10	78.33	98.87		117.73		136.07
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	61.83	81.23	102.67	_	18.87		138.53
L.S.D at	5%	1.197	1.301	1.284	_	1.088		0.988
	1%	1.597	1.736	1.713		.451		

7.1.g.-Water loss (g)/stalks:

Data shown in Table (99) reveal that all pulsing solution treatments highly significant increased the water loss of Bird of Paradise cut flower stalks after 8, 12, 16, 20, 24 and 28 days from the treatment compared to the control (distilled water) in the two seasons. However, the treatment of STS at 1:4mM for 30 minutes after 4, 8, 12, 16, 20, 24 and 28days from the treatment recorded the highest values in this regard compared with the others ones under study in the two seasons.

Regarding to the effect holding solution treatments on water loss, data presented in Table (100) demonstrate that holding Bird of paradise cut flower stalks bases in holding solutions contained (sucrose at 4%) recorded highly significant decrease in water loss after 4, 8, 12, 16, 20 and 24 day from the treatment as compared to control (distilled water) in the two seasons. Moreover, the other treatments of holding solution of Bird of paradise cut flower stalks were decreased of water loss after 8, 12, 16, 20 and 24 days from the treatment as compared to control in the two seasons, irrespective 4 and 28 day from the treatment the abovementioned treatment of holding solutions were increased of water loss as compared to control (distilled water) in both seasons.

With regard to the interaction effect between pulsing solutions and holding solutions treatments on water loss, data in Tables (103 & 104) indicate that most the combinations between pulsing solutions and holding solutions decreased water loss of bird of paradise cut flower stalks as compared to control

Table (103): Effect of interaction between pulsing solutions and holding solutions treatments on Water loss (g)/stalk of Strelitzia reginae Ait, cut flower stalk during first season 2007-2008.

	Treatments			W:	Water loss (p)/stalk	4lb		
					1st season			
Pulsing solutions	Holding			She	Shelf life periods (days)		
0	Solutions	4	8	12	16	20	24	28
	D.W	38.30	66.70	87 57	11013	137.63	10.0	200
	Sucrose 4 %	26.43	51.37	78 13	104 10	103.60	154.00	1/4.50
D.W	Sucrose 4% +CA 200 ppm	41.20	66.50	83.67	106.83	128 53	152 321	176.70
	Sucrose 4 % + 8HQS 200 ppm	40.00	66.10	84.80	107.40	108 00	155.03	174.73
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	40.43	64.03	84.63	10757	128.13	150.00	175 63
	D.W	39.63	68.30	90.07	111 87	125 27	16027	173.03
	Sucrose 4 %	32.37	63.67	85.50	109 17	128.53	156.03	171.00
Kin.20 ppm	Sucrose 4% +CA 200 ppm	41.17	66.23	87.67	109.00	132.03	154 40	77 77
	Sucrose 4 % + 8HQS 200 ppm	42.57	67.10	86.33	110.67	132.37	155.27	178.00
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	40.07	63.33	87.40	107.97	130.10	154.73	176.07
	D.W	39.30	67.67	91.37	114.07	136.63	161 17	171 73
	Sucrose 4 %	33.17	64.80	86.10	110.53	130.47	156 70	171 50
BA 10 ppm	Sucrose 4% +CA 200 ppm	39.80	64.60	88.57	107.90	132.20	156 20	179 97
	Sucrose 4 % + 8HQS 200 ppm	40.93	64.73	89.87	110.17	133.63	156.50	180 47
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	39.53	62.93	89.50	108.67	131.87	154.63	177 70
	D.W	39.33	66.10	89.27	111.27	133.27	159.97	172 87
2	Sucrose 4 %	32.27	62.00	84.13	107.27	125.60	154.13	173.67
Sucrose 10 %	Sucrose 4% +CA 200 ppm	40.87	63.53	88.27	107.67	130.43	154.70	179.07
	Sucrose 4 % + 8HQS 200 ppm	41.23	63.83	87.57	108.07	130.83	155.00	178.60
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	40.93	63.97	88.27	108.63	130.67	153.90	178.40
	D.W	42.73	68.77	93.03	113.73	137.17	158.90	173.87
CTC 1 4 L	Sucrose 4 %	42.93	66.60	89.97	113.17	131.17	158.03	174.73
3131:4 ml	Sucrose 4% +CA 200 ppm	43.77	65.97	89.70	110.97	133.53	160.53	182 37
	Sucrose 4 % + 8HQS 200 ppm	44.60	66.30	88.73	110.97	132.67	159.37	178 37
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	44.43	65.03	87.73	108.67	130.47	160.57	186.27
L.S.D at	5%	1.249	1.495	2.662	2.466	1.116	2.676	3.118
	1%	1.666	1.994	3.551	3.20	1 489	3 570	4 160

Table (104): Effect of interaction between pulsing solutions and holding solutions treatments on Water loss (g)/stalk of Strelitzia reginae Ait. cut flower stalk during the second season 2008-2009.

					Water loss (g)/stalk	(B)/stain		
	Treatments				2 nd St	2nd season		
					Shelf life po	Shelf life periods (days)		
Pulsing	Holding		0	13	16	20	24	28
solutions	Solutions	4	0 000	00 88	110.03	132.67	161.53	177.93
	D.W	39.27	16/19/	00.00	02.001	174 33	153.13	172.67
	Sucrose 4 %	27.93	52.87	01.77	07.001	126.40	15930	176.03
3	Sucress 40. +CA 200 ppm	42.70	64.47	85.17	117.30	120.40	1.40.73	171.47
D.11	Sucrose 4 to 1 to	36.90	61.07	81.93	111.33	123.33	27.77	174 67
	Sucrose 4 % + 8HQS 200 ppm	12.77	60.23	81.37	119.27	126.73	159.37	10.1.1
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	77.00	08 89	90.20	112.57	137.07	159.63	174.57
	D.W	10.00	64 93	88.93	110.90	133.20	158.10	174.23
	Sucrose 4 %	40.20	5.50	86.73	110 70	131.47	154.67	177.80
Kin.20 ppm		39.37	03.17	02.02	108 27	130.40	154.63	174.40
•	-	47.83	05.90	95.07	00.501	120 73	155.47	173.67
	Sucrose 4%, +CA 200 ppm + 8HQS 200 ppm	39.33	65.03	88.33	103.50	27.021	167 07	172.60
		41.37	66.93	96.23	113.70	138.07	17.101	172 43
	D.W	31.23	61.57	86.30	111.03	125.53	150.05	00.001
	Sucrose 4 %	00.00	50 77	88 97	106.47	128.73	157.57	180.80
BA 10 ppm	Sucrose 4% +CA 200 ppm	38.00	11.60	29 00	100 77	132.83	153.87	174.10
	-	45.90	17.79	03.00	1001	132.80	157.100	179.37
	Superson 40% +CA 200 nnm + 8HOS 200 ppm	41.30	63.97	91.20	109.13	00:30	162 40	170.40
	Outlose 1/a control of the control o	38 43	64.53	96.30	112.10	135.57	04.001	
	D.W	71.47	63.40	95.83	111.17	133.10	153.60	173.50
1	Sucrose 4 %	17.77	24.40	01.13	108 73	132.90	156.07	178.73
Sucrose 10	-	42.00	04.40	00.00	109 77	127.33	154.40	177.37
%	Sucrose 4 % + 8HOS 200 ppm	41.00	05.20	06.60	100 77	131 37	155.33	177.03
	Success 4%, +CA 200 npm + 8HOS 200 ppm	42.87	65.30	90.03	103:77	01.001	150 90	178 47
		50.03	71.57	94.17	112.23	138.10	00.661	77 97 1
	D.W	48 67	02.69	91.73	112.13	140.43	158.40	11011
	Sucrose 4 %	10:01	68 63	01 07	110.80	131.60	162.73	16.181
STS 1:4 m	-	46.6/	00.00	10:10	100 63	133 13	158.93	183.30
	-	48.50	66.47	92.33	100.00	50.551	164.63	189.33
	Suci 03c + 7.9 200 nom + 8HOS 200 nom	48.53	67.63	90.97	108.77	132.03	20:40	898 £
	10se 470 + CA 700 ppm	4 506	4.559	4.159	3.521	4.816	5.211	2.000
I S D at	5%	6.011	6 082	5.549	4.697	6.425	4.284	901.6
L.S.D at	10/	6.011	0.00	0.00	100000			

Results and Discussion

(distilled water) in the two seasons. However the interactions of pulsing solution of sucrose at 4% recorded the highest values of this parameter. However, the combined treatment between pulsing solution of distilled water and holding solution contained gave the potent water loss after 4 days from the treatment till the end of longevity in the two seasons under study. Furthermore, the water loss values of Bird of paradise cut flower stalks under all combination between pulsing and holding solutions was increased as cut flower stalks advanced in age after 4 days from the treatment to the end of age of longevity in the two seasons.

7.2. Effect of pulsing solutions and holding solutions treatments on :

7.2. Chemical constituent determinations:

7.2.1.-Carotenoids content (%) in petals:

According to data presented in Table (105), it could be concluded that all pulsing solution treatments of Bird of paradise cut flower stalks bases succeeded in increasing carotenoids content (%) in petals after (initial, 14 and till the end of longevity) from the treatments as compared to control in the two seasons. However, pulsing Bird of paradise cut flower stalks bases in STS at 1:4mM for 30 minutes resulted the highest significant increase in this parameter as compared to control in the two seasons. Furthermore, coroteniods content (%) in petals of Bird of paradise cut flower stalks under all pulsing treatments was decreased as flower cut stalks advanced in age after initial from the treatment till the end of longevity in both seasons.

Table (105): Effect of pulsing solutions treatments on Carotenoids percentage in petals, Total phenols percentage in petals and flower stalk and Total, Non-Reducing sugars Reducing, Non-Reducing sugars percentage in petals of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	wearing 1							-	o slonedo	Total phenois percentage in	_	Total sugars percentage in	ntage in	Red	Reducing sugars	s	NOH-IVE	Non-Reducing Sales	
		Carotenoids percentage in	ds percer	ntage in	Total ph	Total phenois percentage in	centage ii		Allers some	Aller		petals		berce	percentage in petals	als	bercen	percentage in petals	SIR
			petals			petals		-	Hower	ade (daye)	Shell	Shelf life periods (days)	(days)	Shelf lif	Shelf life periods (days)	days)	Shelf life	Shelf life periods (days)	days)
Treat	Treatments	Shelflif	Shelf life periods (days)	(days)	Shelf	Shelf life periods (days)	ls (days)	She	II life per	n) spo	-	14	End	Initial	14	End	Initial	14	End
		Initial	14	End	Initial	4	End	Initial	14	End	\dashv	-							
									1 st season	no									
						0000	5150	0.407	7 0 326	0.215	5 4.593	3 3.161	1.523	2.240	1.419	0.674	2.353	1.741	0.849
	D.W	4.833	3.433	1.305	0.407	0.30		_	-	+	0 4.593	3 3.255	1.584	2.240	1.479	0.718	2.353	1.776	998.0
	Kin.20 ppm	4.833	3.662	1.573	0.407	0.277	+	+	-	+	7 4 593	3 3.222	1.569	2,240	1.443	0.709	2.353	1.779	0.861
Pulsing	DA 10 nnm	4.833	3.682	1.629	0.407	0.289	0.204	4 0.407	0.298			-		+		0110	1353	1 793	806 0
solutions	andd at vo	4 033	3.538	1 489	0.407	0.305	0.225	5 0.407	0.308	08 0.223	23 4.593	3 3.343	1.648	2.240	1.551	0./40	666.7	201.1	0.034
	Sucrose 10 %	4.003	2000		+	0.770	0 184	10.407	+	0.283 0.193	93 4.593	3 3.374	1.688	2.240	1.583	0.754	2.353	16/.1	0.934
	STS 1:4 ml	4.833	4.025	C18.1	0.407		-	-	+	0.008	80	0.033	0.023	Mile	0.023	0.023	E	0.040	0.023
L.S.D	2 %	i	0.104	0.090		0.008	0.007	+	+	+	-	40.0	1500		0.031	0.031	,	0.054	0.031
at	1%		0.239	0.120	,	0.011	0.009	- 60		0.014 0.011	- 110	0.044							
									buc	nd season									
									.			1	1	2773	1.428	0.685	2.380	1.764	0.836
		. 070	3176	1 309	0.397	7 0.290	0 0.185	_	0.433 0.	0.331 0.2	0.231 4.653	53 3.192	175.1		-				0.00
	D.W	4.8/3	-	-	+	+	+	-	0 433	0.302 0.2	0.209 4.653	53 3.295	5 1.595	5 2.273	1,483	0.719	2.380	1.8.1	0.87
	Kin.20 ppm	4.873	3.772	1.598		-	-	-	-	+	-	4.653 3.070	0 1.578	8 2.273	1.451	0.711	2.380	1.619	0.867
Pulsing	BA 10 ppm	4.873	3.741	1.696	6 0.397	7 0.278	-	-	-	+	-	1988 637 4	7 1 656	6 2.273	1.557	0.742	2.380	1.810	0.914
solutions	Sucrose 10 %	4.873	3.412	1.534	4 0.397	7 0.291		0.189 0.	0.433 0	0.325 0.	-	+	-	+	-	0.757	2.380	1.807	0.943
	eTe 1.4 m	4 873	3 4.037	7 1.872	72 0.397	0.256		0.147 0.	0.433 0	0.287 0.	0.195 4.0	4.653 3.397	1.699	-	+	+	-	+	0.003
	III +:1 c1c		+	+	-	0 007	-	0.008	0	0 600.0	0.007	- 0.242	0.016	- 9	0.023	0.023		0.239	-
L.S.D	% \$		0.163	3 0.111	-	1	+		-	+	0000	0.323	23 0.022	22	0.031	0.031		0.319	0.031
at	1%		0.217	7 0.149	- 65	0.0	0.000	0.011		510.0									

Concerning the effect holding solution treatments on carotenoids content (%) in petals, Data presented in Table (106) demonstrate that all holding solution treatments resulted increases in carotenoids content (%) in petals of Bird of paradise cut flower stalks after (initial, 14, and end days) as compared to control in the two seasons. However, the highest significant increase in this parameter was registered by using holding solution contained (sucrose 4% + citric acid at 200ppm + 8-HQS at 200ppm) after (14 and end days) from the treatment as compared to control in the two seasons. Irrespective control, the lowest values of the percentage in carotenoids in petals of Bird of paradise cut flower stalks was recorded by holding solution contained (sucrose at 4%) in both seasons. The rest treatments occupied on intermediate position between the abovementioned treatments in both seasons of this study.

Furthermore, the percentage of carotenoids in petals of bird of paradise cut flower stalks under all holding solution treatments decreased as flower cut stalks advanced in age after initial from the treatment till end of age of longevity in the two seasons.

According to the interaction effect between pulsing solution and holding solution treatments on carotenoids content (%) in petals, data in Table (107) reveal that all the combinations treatments between pulsing solution and holding and holding solution succeeded in increasing the percentage of carotenoids in petals of bird of paradise cut flower stalks as compared to control (D.W) in the two seasons. However the

Table (106): Effect of Holding solutions treatments on Carotenoids percentage in petals, Total phenols percentage in petals and flower stalk and Total, Reducing, Non-Reducing sugars percentage in petals of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

		Carotenoids		percentage	Total pl	Total phenols percentage	centage	Total pho	Total phenois percentage	_	Total sugars percentage in petals	igars perce	ntage	percen	percentage in petals	tals	percent	percentage in petals	tals
		-	-			in petals		1 UI	in Hower staik		Shelf life periods (days)	periods (days)	Shelf life	Shelf life periods (days)	days)	Shelf life	Shelf life periods (days)	days)
	Treatments	Shelf life per	e periods	iods (days)	Shelfli	Shelf life periods (days)	(days)	Shell III	Shell life perious (uays)	+	-	-	1	Initial		Fnd	Initial	4	End
		Initial	14	End	Initial	14	End	Initial	4	End	Initial	=	End						
								1st sea	season										
						715.0	0100	0.407	0.135	0.227	4.593	2.856	1.465	2.240	1.321	0.653	2.353	1.353	0.812
	D.W	4.833	2.989	1.263	0.407	0.310	0.213	0.40				3000	1001	2 240	1.455	0.700	2.353	1.779	0.881
	Sucrose 4 %	4.833	3,384	1.437	0.407	0.307	0.219	0.407	0.323	0.226	4.593	3.233	1.00.1	2	202	525.0	2353	1 855	1000
	Sucrose 4% +CA 200	4.833	3.844	1.627	0.407	0.277	0.195	0.407	0.28	0.196	4.593	3.437	1.679	2.240	1.583	0.757	7.333	Cro.1	1
Holding	ppm Sucrose 4 % +	4.833	3.816	1.650	0.407	0.281	0.203	0.407	0.291	0.217	4.593	3.319	1.587	2.240	1.463	0.712	2.353	1.856	0.875
	8HQS 200 ppm Sucrose 4% +CA 200	4 833	4.127	1.835	0.407	0.261	0.185	0.407	0.277	0.193	4.593	3.507	669'1	2.240	1.652	0.773	2.353	1.855	0.926
	mdd bbm						1000		1100	00.00		0.033	0.023	(4)	0.023	0.023	æ	0.040	0.023
	2 %	,	0.104	0.090	(n)	0.008	0.007		0.011	2000					1000	0.031		0.054	0.031
L.S.D at	%1		0.239	0.120		0.011	0.009	*	0.014	0.011		0.044	0.031		100.0	0.031			
								2nd Se	season										
					-				0.000	515.0	1,653	595.0	1.468	2.273	1.331	699.0	2.380	1.534	0.799
	D.W	4.873	3.075	1.297	0.397	0.297	0.193	0.433	0.343	0.53.0	7.000					0.403	2000	1 645	0.885
	70 1 2000000	4 873	3.455	1.458	0.397	0.293	0.183	0.433	0.328	0.231	4.653	3.095	1.587	2.273	1.449	0.705	7.300	2	200
	Sucrose 4% +CA 200		3 00 5	1 738	0 397	0.265	0.148	0.433	0.289	0.206	4.653	3.459	1.682	2.273	1.591	0.753	2.380	1.867	0.929
Holding solutions		6/0.4	2.00	-	+	0300	691.0	0 433	0.304	0.228	4.653	3.357	1,606	2.273	1.476	0.713	2.380	1.881	0.893
		4.873	3.990	1.013	0.397	+	+								3	300.0	036.0	1 884	0.931
	Sucrose 4% +CA 200 ppm + 8HOS 200	4.873	4.152	1.903	0.397	0.251	0.143	0.433	0.281	0.206	4.653	3.545	1.706	2.273	1.00.1	0.773	7.300	500	2
	mdd			-	+	2000	0 008		0.009	0.007	0	0.242	0.016		0.023	0.023	(1)	0.239	0.023
	2 %		0.163	6	-	0.00	+	+		0000		10333	0.002		0.031	0.031	2	0.319	0.031
L.S.D at	%1	ĕ	0.217	0.149	- 6	0.009	0.011	•	0.013	0.009		O.C. Color							

The second second second		L.S.D at			01.01.41111	CTC 1:4 ml				%	Sucrose 10				med or see	RA 10 nnm					Kin.20 ppm					D.W	DW		Suomnos	ruising	B
	1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	C	D W + CA 200 ppm + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Successive CA 200 ppm	Sucrose 4%	S. W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Successed 1/0	Sucross A o/	D.W.	Sucrose 4% +CA 200 ppm + 8HOS 200	Sucrose 4 % + 8HOS 700 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W		Holding	ricatilicili
			4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	4.833	+,000	4.000	A 922	4 833	4.833	4.833	4.833	4.833	Initial	5	
0.310	0.232	0.222	4 567	4 223	4.410	3.717	3.207	3.830	3.343	3.613	3.113	2.890	4.167	4.033	4.007	3.187	3.017	4.060	3.953	3.757	3.550	2.990	1.013	4013	3 527	1 411	3.353	2.840	14	Shelf life periods (days)	1 st season
0.268	0.201	2.073	2.772	1 070	1 923	1 667	1.440	1.760	1.513	1.510	1.423	1.237	1.930	1.660	1.713	1.537	1.307	1.920	1.667	1.673	1.387	1.220	1.490	1.440	1.313		1 173	1110		avel	Carotenoids p
	i	4.873	4.8/3	4.0/3	4.6/3	4.073	4 973	4 873	4.873	4 873	4.873	4 873	4.873	4 873	4 873	4 873	4.873	4.873	4.873	4.873	4.873	4.873	4.873	4.873	4.873	4.8/3	4.873	Initial			Carotenoids percentage in petals
0.484	0.363	4.567	4.257	4.423	3.813	3.123	3.727	3,303	3.747	2.140	2.000	7.200	4.105	3.830	3.23/	3,337	3 307	4 123	4.073	3.953	3.620	3.090	4.133	3.953	3.553	3.460	2.977	14	Shelf life periods (days)	2nd season	
0 222	0.249	2.230	1.907	2.080	1.633	1.510	1.833	1.530	1.627	1.430	1.250	2.037	1.610	1.853	1.600	1.580	1.300	520.1	1,40.1	1 877	1 417	1.210	1.500	1.397	1.303	1.210	1.133	End	ays)		

combinations of pulsing solution of STS at 1:4mM for 30 minutes gained the highest values of parameter, particularly the interaction between pulsing solution of STS at 1:4mM for 30 minutes and (holding solution contained sucrose 4% + CA 200ppm + 8-HQS 200ppm) followed descendingly by holding solution contained (sucrose 4% + CA 200ppm) and (sucrose 4% + 8-HQS 200ppm) after (14 and end days) from the treatment as compared to control in the two seasons. Moreover the of solution (pulsing between treatment interaction (Benzyladenine at 10ppm for 24hours) and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) and (pulsing solution of (kinetin at 20ppm for 24hours) and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) respectively resulted highly significant increases of the percentage of carotenoids in petals of bird of paradise cut flower stalks after (14 and end days) from the treatment as compared to control in both seasons. On the reverse, the lowest values of this parameter was registered by using interaction between pulsing solution of control (D.W) for 24hours and holding solution control (D.W) and interaction between pulsing solution of sucrose at 10% for 24hours and holding solution contained (distilled water) respectively in the two seasons after

(14 and end days) from the treatment and this study.

7.2.2.-Total phenols content (%) in petals and flower stalk:

It is obvious from data presented in Table (105) that all pulsing treatments of bird of paradise cut flower stalks bases decreased total phenols content (%) in petals when compared to

control with the exception of pulsing solution of sucrose at 10% for 24hours after (14days and the end) from the treatment in the two seasons. Moreover, all pulsing treatments of bird of paradise cut flower stalks decreased total phenols content (%) in flower stalk as compared to control except for pulsing treatment of sucrose at 10% for 24hours after (end) from the treatment in the two seasons and BA at 10% for 24hours in the first seasons. Furthermore, the highest significant decrease of total phenols content (%) in petals and flower stakes of Bird of paradise cut flower stalks was registered by using pulsing treatment of STS at 1:4mM for 30minutes after (14days and end days) from the treatment as compared to control in the two seasons. Anyhow, total phenols contents (%) in petals and flower stalks of paradise cut flower stalks under all pulsing treatments was decreased after the initial days from the treatment as flower cut stalks prolonged in age till the end of longevity in the two seasons.

As for the effect holding solution treatments on total phenols content (%) in petals and flower stalk, data in Table (106) reveal that all holding solution treatments succeeded in decreasing the percentage of total phenols in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in two seasons, especially, holding solution contained (sucrose at 4% + citric acid at 200ppm). On the reverse, the highest values of the percentage of total phenols in petals and flower stalks was recorded by using the treatment of holding solution contained (distilled water) as control, followed descendingly by (sucrose at 4%) in the two seasons. Furthermore, the percentage of total phenols in petals and flower

stalks of Bird of paradise cut of flower stalks was decreased as flower cut stalks advanced in age after (initial) from the treatment till the end of age of longevity in the two seasons.

Regarding to the interaction effective between pulsing solution and holding solution on Total phenols contents (%) in petals, data in Table (108) indicate that most the interaction treatments between pulsing solution and holding solution resulted decreases in the percentage of total phenols in petals and flower stalks of Bird of paradise cut flower stalks as compared to control (D.W) in the two seasons. However, the interaction of pulsing solution of STS at 1:4mM for 30 minutes exhibited the most effective for inducing the lowest values of this parameter, especially the interaction between pulsing solution of STS at 1:4mM for 30 minutes and holding solution contained (sucrose at 4% + CA 200ppm + 8-HQS at 200ppm) and holding solution contained (sucrose at 4% + CA 200ppm) respectively as compared to the other ones under study in the two seasons after (14 and end days) from the treatment. Moreover, the highest values of this parameter was recorded by using the interaction treatment of pulsing solution of (sucrose at 10% for 24hours) and holding solution contained (distilled water) as control and the interaction of pulsing solution of distilled water as control and holding solution contained distilled water as control respectively in most cases after (14 and end days) from the treatment in the two seasons under this study. Any how, the percentage of total phenols in petals and flower stalks of bird of paradise cut flower stalks was decreased as flower cut stalks prolonged in age after (initial) from the

Table (108): Effect of interaction between pulsing solutions and holding solutions treatments on Total phenols percentage in petals and flower stalk of Strelitzia reginae Ait, cut flower stalk during the two seasons of 2007-2008/2008-2009.

	A COMMENT		Tota	Total phenols percentage in petals	percentage	in petals			Total ph	Total phenols percentage in flower stalk	entag	e in f
Pulsing	Holding	Shelf	Shelf life periods (days)	de (dave)	Chal	2 season	0n		Ist season			
solutions	Solutions	Initial	14	End	Shell	пе	ds (days)	Shelf life	life	periods (days)		Shelf life periods (days)
	D.W	0.407	0.55.0	0 227	0 207	+	End	Initial	╁	End	-	Initial
	Sucrose 4 %	0.407	0.313	177.0	0.397	0.313	0.200	0.407	0.377	0.230	0.	0.433
D.W	Sucrose 4% +CA 200 ppm	0.407	0.000	0.223	0.397	0.307	0.187	0.407	0.327	0.220	0.4	0.433
	Sucrose 4 % + 8HQS 200 ppm	0.407	0.290	0.207	0.397	0.277	0.173	0.407	0.307	0.203	0.433	33
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	0.407	0.29/	0.2.0	0.397	0.293	0.193	0.407	0.320	0.223	0.433	33
	D.W	0.407	0.277	0.200	0.397	0.260	0.170	0.407	0.300	0.200	0.433	33
	Sucrose 4 %	0.407	0.500	0.210	0.397	0.287	0.183	0.407	0.320	0.223	0.433	22
Kin.20 ppm		0.407	0.297	0.210	0.397	0.290	0.177	0.407	0.330	0.50	0 4	3 6
model com	To	0.407	0.273	0.180	0.397	0.253	0.130	0.407	0.280	0.200	0.433	3 0
	Sucrose 4 70 + oHQS 200 ppm	0.407	0.273	0.193	0.397	0.287	0.157	0.407	0 772	0100	0.700	, ,
	Sucrose 4 /0 +CA 200 ppm + 8HQS 200 ppm	0.407	0.243	0.180	0.397	0.240	0.123	0.407	0 270	0 103	0.422	, ,
	C.W	0.407	0.310	0.217	0.397	0.297	0.193	0.407	0 373	0000	0.400	"
B A 10	Sucrose 4 %	0.407	0.303	0.213	0.397	0.287	0 187	0.407	0.323	0.230	0.433	100
BA 10 ppm	Sucrose 4% +CA 200 ppm	0.407	0.280	0 200	0 397	0.777	0.10/	0.40/	0.320	0.233	0.433	w.
	Sucrose 4 % + 8HQS 200 ppm	0.407	0.283	0.000	0.337	117.0	0.143	0.407	0.283	0.203	0.433	w
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	0.407	0.270	0 190	0.307	0.250	0.16/	0.407	0.290	0.217	0.433	w
	D.W	0.407	0.233	0.150	0.397	0.250	0.140	0.407	0.273	0.200	0.433	33
9	Sucrose 4 %	0.407	0.333	0.240	0.39/	0.320	0.210	0.407	0.343	0.240	0.433	w
%	Sucrose 4% +CA 200 ppm	0.407	0.527	0.243	0.39/	0.303	0.213	0.407	0.333	0.243	0.433	Co
	Sucrose 4 % + 8HQS 200 ppm	0.407	0.000	112.0	0.397	0.2/3	0.177	0.407	0.287	0.21	0.433	درا
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	0.407	0.230	0.220	0.397	0.283	0.180	0.407	0.293	0.223	0.433	ಧ
	D.W	0.407	0.277	0.203	0.39/	0.273	0.163	0.407	0.283	0.200	0.433	Ç.)
	Sucrose 4 %	0.407	0.307	0.200	0.39/	0.270	0.177	0.407	0.310	0.210	0.433	S.
STS 1:4 ml	Sucrose 4% +CA 200 ppm	0.407	0747	0210	0.397	0.277	0.170	0.407	0.307	0.203	0.433	53
	Sucrose 4 % + 8HOS 200 ppm	0.407	0.247	0.170	0.397	0.243	0.117	0.407	0.257	0.170	0.433	54
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	0.407	002.0	0.190	0.397	0.257	0.150	0.407	0.280	0.213	0.433	53
1 0 1	5%	0.707	0.240	0.150	0.397	0.233	0.120	0.407	0.260	0.170	0.433	
Lab.D At	1%		810.0	0.015		0.015	0.018	,	0.014	0.018		
			0.023	0.020	4	0.020	0.025		0000	0000		1

treatment till the end of age of longevity under all the interaction between pulsing solution and holding solution treatments in the two seasons.

7.2.3.-Total sugars content (%) in petals and flower stalks:

Data in Table (105&112) reveal that all pulsing solution treatments of Bird of paradise cut flower stalks succeeded in increasing total sugars content (%) in petals after (initial, 14, end days) from the treatment as compared to control (distilled water) in the two seasons. However, pulsing Bird of paradise cut flower stalks bases in STS at 1:4mM for 30 minutes showed to be the most effective one for inclosing the highest values of this parameter in the two seasons. Moreover the lowest values of total sugars content (%) in petals was registered by using control distilled water for 24hours in the two seasons. Furthermore, data in Table (106) indicate that all pulsing solution treatments increased the percentage of total sugars in flower stalks as compared to control in the two seasons. However, pulsing treatment of STS at 1:4mM 30 minutes exhibited the most effective one for producing the highest values of this parameter followed dissentingly sucrose at 10% for 24hours in the two seasons with the lowest values of this parameter was recorded by using control for 24hours in the two seasons.

With regard to the effect holding solution treatments on total sugars content (%) in petals and flower stalks, data presented in Tables (106 & 113) reveal that all holding solution treatments censed increments in the percentage of total sugars in

Table (112): Effect of pulsing solutions treatments on Total, Reducing, Non-Reducing sugars percentage in flower stalk and potassium percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	L.S.D at				solutions	Pulsing				L.S.D at				Solutions	Pulsing						Trea
- 70	10%	5 %	STS 1:4 ml	Sucrose 10 %	BA 10 ppm	Kin.20 ppm	D.W		1.70	10/	5 %	3131:4 ml		Sucrose 10 %	BA 10 ppm	Kin.20 ppm	D.W				Treatments
			4.940	4.940	4.940	4.940	4.940		я		0	4.783	1.705	4 793	4.783	4.783	4.783		Initial		Total
0.111	0.004	0.004	3.814	3.739	3.485	3.509	3.371		0.107		0.084	3.913	3./34	2 724	3 40	3.466	3.323		14	onen me perious (uays)	Total sugars percentage in flower stalk
0.062	0.046		1.867	1.765	1.969	1.715	1.665		0.062	0.040	0 046	1.859	1./62	1.001	1681	1.678	1.622		End	(uaya)	entage in
		11.	2 763	2.763	2.763	2.763	2.763		r			2.357	2.357	7,007	7 7 7 7	2357	2.357		Initial	She	Reducin
0.054	0.040	1.040	1 849	1.771	1.652	1.659	1.576		0.069	0.052	0.060	1.829	1.769	1.022	1.00.1	1 2 1	1 533		14	Shell life periods (days)	Reducing sugars percentage in flower stalk
0.031	0.023	0.900	0005	0.851	0.808	0.818	0.794	2 nd	0.044	0.033		0.903	0.848	0./93	0.793	0 700	0 777	I st	End	(days)	rcentage in k
<u>*</u>	ā	2.510		2510	2.510	2.510	2.510	Season	ı			2.427	2.427	2.427	2.427	2 121	2 427	I st season	Initial	Shell	Non
0.124	0.093	1.966	1.500	1 068	1.833	1.850	1.795		0.107	0.084		2.085	1.965	1.778	1.835	1.790	700		14	Shelf life periods (days)	Non-Reducing sugars percentage in flower stalk
0.044	0.033	0.961	0.714	2	0.888	0.897	0.841		0.054	0.040		0.956	0.814	0.888	0.879	0.845			End	(days)	sugars er stalk
	Ći .	2.677	2.077		2.677	2.677	2.677			5		2.680	2.680	2.680	2.680	2.680			Initial	Shelf life	Potassium
0.017	0.013	2.741	2.714		3713	2.721	2.694		0.021	0.016	200.00	2 747	2.706	2.707	2.728	2.692				f life periods (days)	
0.015	0.012	2.694	2.671	2.00.3	2 6/65	2.673	2.635		0.020	0.015	2,000	2 605	2.665	2.663	2.677	2.635		rand.		(days)	percentage in petals
•	r	1.933	1.933	1.933	1022	1.933	1.933			.0	1.907	1007	1.907	1.907	1.907	1.907		Initial		Shelf	Potassiui
0.044	0.033	2.197	2.147	2.132		2 139	2.105		0.149	0.111	2.197		2.153	2.126	2.133	1.895		14	Perious (uays)	life periods	Potassium percentage in flower stalk
0.054	0.040	2.103	2.046	2.050	1.000	2038	2.002		0.024	0.018	2.078		2.041	2.009	2.029	1.967		End	(uays)	dans	e in flower

Table (113): Effect of Holding solutions treatments on Total, Reducing , Non-Reducing sugars percentage in flower stalk and potassium percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

		Total su	Total sugars percentage in	ntage in	Redu	Reducing sugars	rs etalk	Non -Reducing sugars necentage in flower stalk	in Nower	gars	ГОтазата	petals		flower stalk	flower stalk	
	Transmissi	- 1	Nower stalk	(dane)	Shelflife	Shelf life periods (days)	davs)	Shelf life	Shelf life periods (days)	days)	Shelf lif	Shelf life periods (days)	days)	Shelf lif	Shelf life periods (days)	(days)
	Leamens	Shelf ii	Shell life periods (days)	(days) End	Initial	7	End	Initial	7	End	Initial	7	End	Initial	7	End
						l" se	l" season									
		4 783	7515	1.598	2.357	1.411	0.747	2.427	1.746	0.851	2.680	2.660	2.610	1.907	2.069	1.962
	D.W	1,700	2 504	3291	7357	1.613	0.808	2.427	1.981	0.867	2.680	2.688	2.633	1.907	2.111	2.011
	Sucrose 4 %	4.783	5.374	2,07				1	. 000	0.000	009 €	2 742	969 6	1.907	2,195	2.082
Holding	Sucrose 4% +CA 200 ppm	4.783	3.728	1.795	2.357	1.833	0.883	2.427	1.895	0.912	7.680	74/"7	2.020	1000		000
solutions	Sucrose 4 % + 8HQS 200 ppm	4.783	3.567	1.679	2.357	1.666	0.780	2.427	1.901	668'0	2.680	2.733	2.683	1.907	2.011	2.009
	Sucrose 4% +CA 200 ppm +	4.783	3.790	1.856	2.357	1.861	0.901	2.427	1.929	0.955	2.680	2.757	2.713	1.907	2.117	2.060
	8HQS 200 ppm						0.000		0.084	0.040		0.016	0.015		0.111	0.018
	5 %	,	0.084	0.046	0.	0.052	0.033		0.004	oto:n					91.0	A 0.04
L.S.D at	1%0	9	0.107	0.062		690.0	0.044		0.107	0.054		0.021	0.020	E	0.149	0.024
						7	2nd season									
		4 940	1 221	1.614	2.763	1.445	0.765	2.510	1.776	0.849	2.677	2.665	2.613	1.933	2.087	1.965
	D.W	1.7.1				0171	2100	2510	1 994	0.885	2.677	2.697	2.629	1.933	2.104	1.991
	Sucrose 4 %	4.940	3.613	1.701	7.703	1.019	0.010						2000	1 033	001.0	2116
Holding	Sucrose 4% +CA 200 ppm	4.940	3.748	1.811	2.763	1.841	0.886	2.510	1.907	0.925	2.677	2.736	7.697	1.955	6	
solutions		4.940	3.610	1.722	2.763	1.707	0.806	2.510	1.903	0.916	2.677	2.727	2.687	1.933	2.143	2.040
	Sucrose 4% +CA 200 ppm +	4.940	3.726	1.861	2.763	1.893	0.905	2.510	-1.833	0.956	2.677	2.757	2.711	1.933	2.207	2.127
	8HQS 200 ppm			+	-	0000	0.003		0.093	0.033		0.013	0.012	×	0.033	0.040
	5 %	9	0.084	0.040		0.040				+		0.017	0.015		0.044	0.054
L.S.D at	%1	r.	0.111	0.062	•	0.054	0.031		0.124	0.0	0	0.01	2000			

Results and Discussion

petals and flower stalks of bird of paradise cut flower stalks as compared to control in the two seasons. However, the highest values of the percentage of total sugars in petals and flower stalks was recorded by using holding solution contained (sucrose at 4% + citric acid at 200ppm + 8- HQS at 200ppm) as compared to the other treatments after (initial, 14 days, end days) from the treatment under this study in the two seasons, with the exception of (sucrose at 4% + citric acid at 200ppm) after 14 days in flower stalks in the second seasons. On the other hand, using the treatment of holding solution contained distilled water recorded the lowest values of the percentage of total sugars in petals and flower stalks after (initial, 14 and end days) from the treatment in both seasons. Furthermore, the percentage of total sugars in petals and flower stalks of Bird of paradise cut flower stalks was decreased as flower cut stalks prolonged in age after initial till the end of age of longevity in the two seasons.

As for the interaction effective between pulsing solution and holding solution treatments on total sugars content (%) in petals and flower stalks, data in Table (109) reveal that all the combinations treatments between pulsing solutions and holding solutions increased total sugars percent in petals and flower stalk of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations of pulsing solution of STS at 1:4mM for 30 minutes gave the most effective for producing the highest values of the percentage of total sugars in petals and flower stalks, especially the combined treatment of STS and holding solution contained (sucrose 4% + CA 200ppm

Table (109): Effect of interaction between pulsing solutions and holding solutions treatments on Total sugars percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

			Total		ontage in p	atale			Total sug:	Foral sugars percentage in flower stalk	tage in How	er staik	
	Treatment		- 1	ugars perc	I otal sugars percentage in petals	ctals					6	pur	
			1st season			2nd season			l" season			2" season	
		Shelf li	Shelf life periods (days)	(days)	Shelf lit	Shelf life periods (days)	(days)	Shelf li	Shelf life periods (days)	(days)	Shelf li	Shelf life periods (days)	days)
Pulsing solutions	Holding Solutions	Initial	41	End	Initial	14	End	Initial	7	End	Initial	14	End
	Md	4.593	2.773	1.393	4.653	2.780	1.397	4.783	3.087	1.573	4.940	3.153	1.597
	Sucrose 4 %	4.593	3.140	1.503	4.653	3.230	1.493	4.783	3.343	1.597	4.940	3.390	1.653
N C	Sucroses 4% +CA 200 pnm	4.593	3.270	1.593	4.653	3.270	1.590	4.783	3.390	1.680	4.940	3.457	1.717
:	Sucrose 4 % + 8HOS 200 ppm	4.593	3.233	1.503	4.653	3.280	1.513	4.783	3.340	1.560	4.940	3.383	1.633
	Sucrose 4% +CA 200 nnm + 8HOS 200 nnm	4.593	3.387	1.620	4.653	3.400	1.610	4.783	3.453	1.700	4.940	3.473	1.723
		4.593	3.863	1.463	4.653	2.877	1.467	4.783	3.170	1.590	4.940	3.247	1.630
	Surrosa 4 0/2	4.593	3.203	1.560	4.653	3.247	1.570	4.783	3.423	1.643	4.940	3.470	1.690
Kin 20 nnm	Sucrose 4% +CA 200 ppm	4.593	3,433	1.657	4.653	3.457	1.663	4.783	3.563	1.727	4.940	3.600	1.770
	Sucrose 4 % + 8HOS 200 npm	4.593	3.317	1.547	4.653	3.360	1.577	4.783	3.523	1.650	4.940	3.553	1.693
	Sucrose 4% +CA 200 npm + 8HOS 200 npm	4.593	3.457	1.693	4.653	3.533	1.700	4.783	3.650	1.780	4.940	3.673	1.793
		4.593	2.817	1.443	4.653	2.823	1.453	4.783	3.073	1.600	4.940	3.183	1.603
	Sucroses 4 %	4.593	3.170	1.537	4.653	2.240	1.540	4.783	3.387	1.683	4.940	3.437	1.680
BA 10 ppm	Sucrose 40% +CA 200 nnm	4.593	3,407	1.650	4.653	3.443	1.647	4.783	3.500	1.700	4.940	3.583	1.733
	Sucrose 4 % + 8HOS 200 ppm	4.593	3.287	1.547	4.653	3.367	1.560	4.783	3.430	1.670	4.940	3.503	1.687
	Sucrase 4% +CA 200 npm + 8HOS 200 npm	4.593	3.430	1.670	4.653	3.477	1.690	4.783	3.610	1.753	4.940	3.717	1.777
		4.593	2.910	1.490	4.653	2.923	1.487	4.783	3.230	1.617	4.940	3.270	1.627
	Sucrose 4 %	4.593	3.327	1.647	4.653	3.377	1.643	4.783	3.727	1.713	4.940	3.713	1.723
Sucrose 10	Sucrose 4%, +CA 200 ppm	4.593	3.520	1.717	4.653	3.543	1.723	4.783	3.980	1.810	4.940	3.913	1.810
%	Sucrose 4 % + 8HOS 200 ppm	4.593	3.377	1.657	4.653	3.387	1.687	4.783	3.720	1.720	4.940	3.787	1.737
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	4.593	3.583	1.730	4.653	3,603	1.740	4.783	4.013	1.950	4.940	4.013	1.930
	D.W	4.593	2.917	1.533	4.653	2.920	1.537	4.783	3.223	1.610	4.940	3.253	1.613
	Sucrose 4 %	4.593	3.333	1.660	4.653	3.380	1.690	4.783	4.090	1.737	4.940	4.053	1.757
CTS 1-4 ml	Sucrose 49% +CA 200 ppm	4.593	3.557	1.780	4.653	3.580	1.787	4.783	4.207	2.060	4.940	4.187	2.023
	Sucrose 4 % + 8HOS 200 ppm	4.593	3.383	1.683	4.653	3.390	1.693	4.783	3.823	1.793	4.940	3.823	1.860
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	4.593	3.680	1.783	4.653	3.713	1.790	4.783	4.223	2.097	4.940	3.753	2.080
	%5		0.073	0.052		0542	0.037		0.180	0.104	я	0.084	0.104
L.S.D at	%-I		0.098	690.0		0.723	0.049		0.240	0.139		0.113	0.139

+ 8-HQS 200ppm) and holding solution contained (sucrose 4% + CA 200ppm) after (14 and end days) from the treatment as compared to control in both seasons. Moreover, the combined treatment of sucrose 10% and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) recorded highly increases in this parameter after (14, and end days) from the treatment as compared to control (D.W) in the two seasons. Furthermore, the percentage of total sugars in petals and flower stalks under all the interaction treatments between pulsing solution and holding solution of Bird of paradise cut flower stalks was decreased as flower cut stalks advanced in age after initial till the end of longevity in two seasons.

7.2.4.-Reducing sugars content (%) in petals and flower stalks:

Data in Table (105&112) indicate that pulsing Bird of paradise cut flower stalks bases in STS at 1:4mm for 30 minutes gained the highest significant increase in reducing sugars content (%) in petals after (14 and end days) from the treatment as compared to control (distilled water) in the two seasons. Moreover, pulsing solution of sucrose at 10% for 24 hours recorded highly significant increase in this parameter as compared to control in the two seasons. Anyhow, Reducing sugars content (%) in petals under all tested treatments was decreased as flower cut stalks advanced in age after (initial) from the treatment till the end of longevity as well as total

sugars and non reducing sugars content (%) in petals in the two seasons.

Furthermore, data in Table (106) reveal that all pulsing solution treatments of Bird of paradise cut flower stalks recorded increases in the percentage of reducing sugars in flower stalks as compared to control in the two seasons. However, the highest of values of this parameter was registered by using pulsing solution of STS at 1:4mM for 30 minutes followed descendingly by sucrose at 10% for 24hours and kinetin at 20ppm for 24hours in the two seasons. The lowest values of this parameter was registered by using control (distilled water) for 24hours in the two seasons under this study.

As for the effect holding solution treatments on reducing sugars content (%) in petals and flower stalks, data in Tables (106 & 113) reveal that all holding solution treatments increased the percentage of reducing sugars in petals and flower stalks of bird of paradise cut flower stalks as compared to control in the two seasons. However, using holding solution contained (sucrose at 4% + citric acid 200ppm + 8-HQS at 200ppm) exhibited to be the most effective treatment for producing the highest values of this parameter as compared to the other treatments of this study in the two seasons, followed descendingly by holding solution contained (sucrose at 4% + citric acid at 200ppm) after (14 and end days) in both seasons. On the reverse, the lowest value of the percentage of reducing sugars in petals and flower stalks of Bird of paradise cut flower stalks was recorded by using control (distilled water) in the two

season. Any how, the percentage of reducing sugars in petals and flower stalks of Bird of paradise cut flower stalks was decreased as flower cut stalks advanced age after (initial) from the treatment till the end of age of longevity in the two seasons.

Referring to the interaction effective between pulsing solution and holding solution treatments on reducing sugars percentage in petals and flower stalk, data in Table (110) reveal that all the combinations treatments between pulsing solutions and holding solutions increased Reducing sugars percent in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations of pulsing solution of STS at 1:4mM for 30 minutes gave the most effective for producing the highest values of the percentage of Reducing sugars in petals and flower stalks, especially the combined treatment of STS and holding solution contained (sucrose 4% + CA 200ppm) and holding solution contained (sucrose 4% + CA 200ppm) after (14 and end days) from the treatment as compared to control in both seasons.

Moreover, the combined treatment of sucrose 10% and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) recorded highly increases in this parameter after (14, and end days) from the treatment as compared to control in the two seasons. Furthermore, the percentage of Reducing sugars in petals and flower stalks under all the interaction treatments between pulsing solution and holding solution of Bird of paradise cut flower stalks was decreased as flower cut stalks

Table (110): Effect of interaction between pulsing solutions and holding solutions treatments on Reducing sugars percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

7	Strength regime Alt. Cut flower states carried the tree seasons of	, cure cure											
	Treatment		Reducing	Reducing sugars percentage in petals	rcentage i	in petals		Red	ucing su	gars perc	Reducing sugars percentage in flower stalk	lower sta	×
		_	st season		7	nd season			st season		2	2nd season	
Pulsing	Holding	Shelf life	Shelf life periods (days)	(days)	Shelf life	Shelf life periods (days)	(days)	Shelf life	Shelf life periods (days)	(days)	Shelf life	Shelf life periods (days)	(days)
solutions	Solutions	Initial	14	End	Initial	14	End	Initial	14	End	Initial	14	End
	D.W	2.240	1.270	0.580	2.273	1.287	0.640	2.357	1.357	0.713	2.763	1.423	0.727
	Sucrose 4 %	2.240	1.367	0.657	2.273	1.373	0.660	2.357	1.477	0.790	2.763	1.497	0.803
D.W	Sucrose 4% +CA 200 ppm	2.240	1.493	0.713	2.273	1.490	0.707	2.357	1.670	0.817	2.763	1.690	0.823
		2.240	1.383	0.693	2.273	1.397	0.697	2.357	1.443	0.747	2.763	1.517	0.787
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.240	1.583	0.727	2.273	1.593	0.720	2.357	1.717	0.817	2.763	1.753	0.830
	D.W	2.240	1.330	0.653	2.273	1.337	099.0	2.357	1.390	0.753	2.763	1.450	0.767
	Sucrose 4 %	2.240	1.413	069.0	2.273	1.407	0.697	2.357	1.530	0.803	2.763	1.530	0.817
Kin.20 ppm	Sucrose 4% +CA 200 ppm	2.240	1.563	092.0	2.273	1.567	0.753	2.357	1.770	0.857	2.763	1.800	0.863
	Sucrose 4 % + 8HOS 200 ppm	2.240	1.433	0.710	2.273	1.447	0.700	2.357	1.650	0.737	2.763	1.667	0.793
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	2.240	1.653	0.777	2.273	1.660	0.783	2.357	1.817	0.843	2.763	1.847	0.850
	M.O.	2.240	1.290	0.647	2.273	1.297	0.657	2.357	1.377	0.740	2.763	1.417	0.757
	Sucrose 4 %	2.240	1.390	069.0	2.273	1.390	0.693	2.357	1.487	0.783	2.763	1.510	0.800
BA 10 ppm	Sucrose 4% +CA 200 ppm	2.240	1.497	0.743	2.273	1.523	0.733	2.357	1.773	0.837	2.763	1.770	0.840
	Sucrose 4 % + 8HOS 200 ppm	2.240	1.423	0.700	2.273	1.427	0.703	2.357	1.677	0.743	2.763	1.683	0.777
	Sucrose 4% +CA 200 ppm + 8HOS 200 ppm	2.240	1.613	0.763	2.273	1.617	0.770	2.357	1.797	0.863	2.763	1.880	0.867
	W.O.	2.240	1.350	0.687	2.273	1.353	069.0	2.357	1.473	0.750	2.763	1.467	0.780
	Sucrose 4 %	2.240	1.547	0.727	2.273	1.550	0.727	2.357	1.757	0.857	2.763	1.760	0.850
Sucrose 10	Sucrose 4% +CA 200 ppm	2.240	1.643	0.773	2.273	1.650	0.770	2.357	1.907	0.907	2.763	1.897	0.897
%	Sucrose 4 % + 8HOS 200 ppm	2.240	1.520	0.720	2.273	1.530	0.730	2.357	1.800	0.793	2.763	1.823	0.800
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.240	1.693	0.793	2.273	1.700	0.793	2.357	1.910	0.933	2.763	1.910	0.930
	D.W	2.240	1.367	769.0	2.273	1.380	0.697	2.357	1.457	0.780	2.763	1.470	0.793
	Sucrose 4 %	2.240	1.560	0.737	2.273	1.527	0.737	2.357	1.817	0.807	2.763	1.797	0.807
STS 1:4 ml	Sucrose 4% +CA 200 ppm	2.240	1.717	0.793	2.273	1.727	0.803	2.357	2.043	1.000	2.763	2.05	1.007
	Sucrose 4 % + 8HOS 200 ppm	2.240	1.557	0.737	2.273	1.580	0.737	2.357	1.760	0.880	2.763	1.847	0.873
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.240	1.717	0.807	2.273	1.737	0.810	2.357	2.067	1.050	2.763	2.077	1.047
	%8	,	0.052	0.052	ı	0.052	0.052		0.116	0.073	9	0.000	0.052
L.S.D at	1%	r	0.069	690.0	(B)	0.069	690.0		0.155	0.098		0.120	0.069

advanced in age after initial till the end of longevity in two seasons.

7.2.5.-Non reducing sugars content (%) in petals and flower stalks:

Data in Table (105&112) reveal that all pulsing solution treatment of bird of paradise cut flower stalks bases scored increases of non reducing sugars content (%) in petals after (14days and end days) from the treatment as compared to control in the two seasons. However, pulsing solution of STS at 1:4mM for 30 minutes gave the highest significant increase in this parameter after (14 and end days) from the treatment as compared to control in the two seasons, with the exception of sucrose at 10% for 24 hours in the first season after (14 day from the treatment) and (kinetin at 20ppm for 24hours or sucrose at 10% for 24 hours) after (14 days from the treatment) in the second season under this study. Furthermore, data in Table (106) reveal that pulsing Bird of paradise cut flower stalks bases in STS at 1:4mM for 30 minutes appeared to be the most effective treatment for inducing the highest values of the percentage of non-reducing sugars in flower stalks after (initial, 14 and end days) from the treatment as compared to control in the two seasons. However, using the treatment of pulsing solution of sucrose at 10% and kinetin at 20ppm resulted highly increases after (14 and end days) in most cases when compared to control in both seasons. Moreover using the treatment of control (D.W) resulted the lowest of values of this parameter in the two seasons.

Referring to the effect holding solution treatments on non-reducing sugars content (%) in petals and flower stalks, data in Tables (106 & 113) reveal that all holding solution treatments succeeded in increasing the percentage of non-reducing sugars in petals and flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the greatest values of this parameter was registered by using holding solution contained (sucrose at 4% + citric acid at 200ppm + 8-HQS at 200ppm) as compared to control in the two seasons, with the exception of holding solution contained (sucrose at 4% + 8-HOS at 200ppm) in the percentage of non reducing sugars in petals after 14 days from the treatment in the first season, and sucrose 4% in the percentage of non-reducing sugars in flower stalks after 14 days from the treatment in the first season, and (sucrose 4%), (sucrose 4% + CA 200ppm) and (sucrose 4% + 8-HOS at 200ppm) respectively in the percentage in non-reducing sugars in flower stalks after 14 days from the treatment in the two season. Moreover, the lowest values of this parameter was registered by using holding solution contained (D.W) as control after (initial, 14 and end days) from the treatment in both seasons under this study.

According to the interaction effective between pulsing solution and holding solutions treatments on Non-Reducing sugars percentage in petals and flower stalk, data in Table (111) indicate that most the combinations treatments between pulsing and holding solution succeeded in increasing the percentage of non-reducing sugars in petals and flower stalks of Bird of paradise cut flower stalks as compared to control (D.W) in the

Table (111): Effect of interaction between pulsing solutions and holding solutions treatments on Non-Reducing sugars percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

	Treatment	- z	on-Reduc	ing sugar	Non-Reducing sugars percentage in petals	ge in peta	S	Non-	Reducing	sugars p	Non -Reducing sugars percentage in flower stalk	in flower	stalk
			Ist season			2nd season			1st season			2 nd season	
	Holding	Shelf li	Shelf life periods (days)	s (days)	Shelf li	Shelf life periods (days)	s (days)	Shelf life	fe periods (days)	(days)	Shelf li	Shelf life periods (days)	(days)
Pulsing solutions	Solutions	Initial	14	End	Initial	14	End	Initial	14	End	Initial	14	End
	D.W	2.353	1.503	0.813	2.380	1,493	0.757	2.427	1.730	0.860	2.510	1.730	0.870
	Sucrose 4 %	2.353	1.773	0.847	2.380	1.857	0.833	2.427	1.867	0.807	2.510	1.893	0.850
D.W	Sucrose 4% +CA 200 ppm	2.353	1.777	0.880	2.380	1.780	0.883	2.427	1.720	0.863	2.510	1.767	0.893
	Sucrose 4 % + 8HQS 200 ppm	2.353	1.850	0.810	2.380	1.883	0.817	2.427	1.897	0.813	2.510	1.867	0.847
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.353	1.803	0.893	2.380	1.807	0.890	2.427	1.737	0.883	2.510	1.720	0.893
	D.W	2.353	1.533	0.810	2.380	1.540	0.807	2.427	1.780	0.837	2.510	1.797	0.863
	Sucrose 4 %	2.353	1.790	0.870	2.380	1.840	0.873	2.427	1.893	0.840	2.510	1.940	0.873
Kin.20 ppm	Sucrose 4% +CA 200 ppm	2.353	1.870	0.897	2.380	1.890	0.910	2.427	1.793	0.870	2.510	1.800	0.907
	Sucrose 4 % + 8HOS 200 ppm	2.353	1.883	0.837	2.380	1.913	0.877	2.427	1.873	0.913	2.510	1.887	0.900
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.353	1.803	0.917	2.380	1.873	0.917	2.427	1.833	0.937	2.510	1.827	0.943
	D.W	2.353	1.527	0.797	2.380	1.527	0.797	2.427	1.697	0.860	2.510	1767	0.847
	Sucrose 4 %	2.353	1.780	0.847	2.380	1,850	0.847	2.427	1.900	0.900	2.510	1.927	0.880
BA 10 ppm	Sucrose 4% +CA 200 ppm	2.353	1.910	0.907	2.380	1.920	0.913	2.427	1.727	0.863	2.510	1.813	0.893
	Sucrose 4 % + 8HQS 200 ppm	2.353	1.863	0.847	2.380	1.940	0.857	2.427	1.753	0.927	2.510	1.820	0.910
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.353	1.817	0.907	2.380	1.860	0.920	2.427	1.813	0.890	2.510	1.837	0.910
	D.W	2.353	1.560	0.803	2.380	1.570	0.797	2.427	1.757	0.867	2.510	1.803	0.847
	Sucrose 4 %	2.353	1.780	0.920	2.380	1.827	0.917	2.427	1.970	0.857	2.510	1.953	0.873
Sucrose 10 %	Sucrose 4% +CA 200 ppm	2.353	1.877	0.943	2.380	1.893	0.953	2.427	2.073	0.903	2.510	2.017	0.913
	Sucrose 4 % + 8HQS 200 ppm	2.353	1.857	0.937	2.380	1.857	0.957	2.427	1.920	0.927	2.510	1.963	0937
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.353	1.890	0.937	2.380	1.903	0.947	2.427	2.103	1.017	2.510	2.103	1.000
	D.W	2.353	1.550	0.837	2.380	1.540	0.840	2.427	1.767	0.830	2.510	1.783	0.820
	Sucrose 4 %	2.353	1.773	0.923	2.380	1.853	0.953	2.427	2.273	0.930	2.510	2.257	0.950
STS 1:4 ml	Sucrose 4% +CA 200 ppm	2.353	1.840	0.987	2.380	1.850	0.983	2.427	2.163	1.060	2.510	2.137	1.017
ACCUMENT TOOM TOOM	Sucrose 4 % + 8HQS 200 ppm	2.353	1.827	0.947	2.380	1.810	0.957	2.427	2.063	0.913	2.510	1.977	0.987
	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	2.353	1.963	0.977	2.380	1.977	0.980	2.427	2.157	1.047	2.510	1.677	1.033
	5%		0.090	0.052	,	0.535	0.052	,	0.180	0.090	Æ	0.208	0.073
L.S.D at	1%	¥2	0.120	0.069	×	0.713	0.069		0.240	0.120		0.277	0.098

two season. However the combination treatments of STS at 1:4mM for 30 minutes is being the most effective for inducing the highest values of this parameters, particularly the combined treatment of STS and hording solution contained (sucrose 4% + CA 200ppm + 8-HOS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) in petals in the two seasons, Moreover the highest values of this parameter in flower stalks was registered by using the combined treatment of STS and holding solution contained (sucrose 4% + CA 200ppm) or holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) after (14 and end days) from the treatment as compared to control (D.W) in both seasons, with the exception of the combined treatment of STS and holding solution contained (sucrose 4%) in flower stalks after 14 days from the treatment in the two seasons and the combined treatment of STS and holding solution contained (sucrose 4% + CA 200ppm + 8-HOS 200ppm) in flower stalk at the end of age of longevity in the second season. Any how, the percentage of Non-Reducing sugars in petals and flower stalks under all the interaction treatments between pulsing solution and holding solution of Bird of paradise cut flower stalks was decreased as flower cut stalks advanced in age after initial till the end of longevity in two seasons.

7.2.6.-Potassium content (%) in petals:

Data in Table (112) demonstrate that all pulsing solution treatments of bird of paradise cut flower stalks bases increased of potassium content (%) in petals after (14 and end days) from

the treatment as compared to control in the seasons. However, pulsing Bird of paradise cut flower stalks bases in STS at 1:4mM for 30 minutes caused the highest significant increase of this parameter as compared to control in the two seasons. Moreover, pulsing solution of kinetin at 20ppm for 24hours resulted highly increase in this concern in the two seasons when compared to control. Furthermore, potassium content (5) in petals of Bird of paradise cut flower stalks under all tested pulsing solution treatments was increased till 14 day from the treatment and then decreased after that day to the end of age of longevity in the two seasons in this study.

Furthermore, data in Table (112) reveal that all pulsing solution treatments of Bird of paradise cut flower stalks succeeded in increasing potassium content (%) in flower stalk after (initial, 14 and end days) from the treatment as compared to control in the two seasons. However, pulsing solution of STS at 1:4mM for 30 minutes showed to be the most effective one for inducing the highest significant increase in this parameter as compared to control in the was seasons.

Furthermore, potassium content (%) in flower stalk by using all tested pulsing solution treatments was increased after (initial day) from the treatment till (14 days) and then decreased after that day to the end of longevity in the two seasons, with exception of control (D.W) in the first season was decreased till (14 days) and then increased after that day to the end of age of longevity.

As for the effect holding solution treatments on Potassium content (%) in petals and flower stalks, Data in Table (113) reveal that most holding solution treatments increased the percentage of potassium in petals and flower stalks of Bird of paradise cut flower stalks after (initial, 14 and end days) from the treatment as compared to control in the two seasons. However, the treatment of holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) approved to be the most effective treatment for inducing the highest values of the percentage of potassium in petals and flower stalks in most cases in the two seasons. Furthermore, the percentage of potassium in petals and flower stalks of bird of paradise cut flower stalks was increased after initial from the treatment till 14 days and then decreased after that day till the end of age of longevity under all holding solution treatments as flower cut stalks advanced in age in most cases in the two seasons.

Regarding to the interaction effective between pulsing solution and holding solution on potassium percentage in petals and flower stalk ,data in Table (114) reveal that all the combinations treatments between pulsing solution and holding solution increased the percentage of potassium in petals and flower stalks of Bird of paradise cut flower stalks as compared to control (D.W) in the two seasons. However, the combinations treatments of STS at 1:4mM for 30 minutes recorded the highest values of the percentage potassium in petals and flower stalks especially the combined treatment of STS and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) followed descendingly by the combined treatment between STS

Sucrose 10 % STS 1:4 ml BA 10 ppm Kin.20 ppm L.S.D at solutions Pulsing D.W Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009 1% Sucrose 4% +CA 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm D.W Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4 % Sucrose 4 % + 8HQS 200 ppm Sucrose 4% +CA 200 ppm Sucrose 4 % + 8HQS 200 ppm Sucrose 4% +CA 200 ppm Sucrose 4% +CA 200 ppm Sucrose 4% +CA 200 ppm Sucrose 4 % + 8HQS 200 ppm Sucrose 4 % Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4 % Sucrose 4% +CA 200 ppm + 8HQS 200 ppm Sucrose 4 % + 8HQS 200 ppm Sucrose 4% +CA 200 ppm + 8HQS 200 ppm D.W Sucrose 4 % Sucrose 4 % + 8HQS 200 ppm Sucrose 4 % Treatment Holding Solutions 2.680 2.680 2.680 2.680 2,680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 2.680 Initial Shelf life periods (days) 1st season 2.787 2.707 2.683 2.740 2.723 2.680 2.650 2.740 2.723 2.730 2.677 2.663 2.777 2.730 2.760 2.730 2.713 2.697 2.710 2.627 2.677 2.680 14 Potassium percentage in petals 2.707 0.045 0.034 2.743 2.703 2,690 2.630 2.600 2.703 2.637 2.630 2.703 2.683 2.690 2.627 2.610 2.727 2.690 2.703 2.643 2.677 2.630 2.653 2.627 2.590 2.620 2.677 2.577 2.677 Initial Shelf life periods (days) 2nd season 2.787 2.710 2,737 2.730 0.037 2.750 2.770 2.690 2,723 2.697 2.683 2.753 2.723 2.727 2.727 2.747 2.650 2.703 2.687 2.633 2.690 2.667 2.777 2.703 2.733 2.713 14 0.026 2.700 2.623 0.035 2.633 2.633 2.710 2.700 2.633 2.697 2.700 2.627 2.700 2.683 2.613 2.697 2.603 2.717 2.693 2.643 2.610 2.657 2.607 2.603 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 1.907 Initial Potassium percentage in flower stalk 1.907 1.907 1.907 1.907 1.907 1.907 Shelf life periods (days) 1st season 0.249 2.247 2.183 2.153 2.197 2.183 2.160 2.073 2.153 2.173 2.077 2.073 2.220 2.207 2.023 2.020 2.117 2.047 1.937 2.167 2.060 2.073 14 0.054 0.041 2.097 2.027 2.133 2.023 2.063 2.043 2,110 2.077 2.077 1.943 2.007 2.027 2.037 1.987 2.110 2.013 2.113 1.940 2.050 1.940 1.887 1.987 1.970 1.813 1.413 End Initial Shelf life periods (days) 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 1.933 .933 1.933 .933 .933 1.933 1.933 1.933 1.933 1.933 .933 1.933 .933 2.173 2.123 2.210 2.073 2.227 2.203 2.260 2.140 2.180 2.133 2.210 2.097 0.098 2.133 2.120 2.227 2.120 2.213 2.063 2.073 2.160 2.120 2.143 2.070 0.0732.200

Table (114): Effect of interaction between pulsing solutions and holding solutions treatments on potassium percentage in petals and flower stalk of

2.030

1.907 1.930

2.077 2.077

2.020

season 4

0.120

0.090 2.160 2.150

2.150 1.990

2.063

2.120

2.027 2.083 2.023 2.140 2.013 2.130

1.977

2.140 2.133

1.990 1.940 1.987

2.023 1.943 and (sucrose 4% + CA 200ppm) in the petals. Moreover, the highest increases of the percentage of potassium in flower stalks was registered by the using the combined treatment of STS and sucrose 4% + CA 200ppm) followed descendingly by the combined treatment between STS and (sucrose 4% + CA 200ppm + 8-HQS 200ppm) in the two seasons. Furthermore, the combinations treatments of kinetin at 20ppm for 24hours resulted highly increases in this parameter in petals and flower stalks, particularly the combined treatment between kinetin 20ppm and (sucrose 4% + CA 200ppm) as compared to control (D.W) in the two seasons.

7.2.7.-Total nitrogen and total protein percentage in petals and flower stalks:

Data presented in Table (115) indicate that all pulsing solution treatments recorded increases of the percentage of total nitrogen and total protein in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, pulsing Bird of paradise cut flower stalks bases in STS at 1:4mM for 30 minutes approved to be the most effective treatment for inducing the greatest values of this parameter, followed descending by kinetin at 20ppm for 24hours after (initial, 14 and end days) from the treatment in the two seasons. On the reverse, the lowest values of the percentage of total nitrogen and total protein in petals of bird of paradise cut flower stalks was registered by using the treatment of control and BA at 10ppm in the first season, and control and sucrose at 10% in the

Table (115): Effect of pulsing solutions treatments on Total nitrogen percentage, Total protein percentage and phosphorus percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Total nitrogen percentage | Total protein percentage | Total nitrogen | Total nitrogen | Total protein percentage | Phosphorus percentage in | Phos

Ţ		101	in petals	in petals		in i	in netals	centage	Tarran I	Total nitrogen	gen	Total	Total protein percentage	rcentage	Ph	osph	osphorus perc	Phosphorus percentage in	_	osphorus percentage in Phosphorus percentage in
-	reatments	Shel	f life per	Shelf life periods (days)	8)	Shelf lif	Shelf life periods (days)	(dave)	percent	percentage in flower stalk	ver stalk	in	flow	er sta	in flower stalk	-	-	-	petals	-
		Initial	14	E-d	+			Column	- Circle	outer me perious (uays)	is (uays)	Suci	lie	period	onen me periods (days)			periods (days) Shelf life periods (days)	Shelf life periods (days)	
		-	H	H	H		1	Ella	THE STATE OF	-	End	Initial		14	14 End	_	End	End Initial	End Initial 14	End Initial 14 End
										1st season	son		- 3							
	D.W	2.940	2.836	6 2.827	-	18.37	17.73	17.67	2.483	2.494	2.483	15.52		15.59	15.59 15.52	\dashv	15.52	15.52 0.340	15.52 0.340 0.398	15.52 0.340 0.398 0.397
Pulsing	Kin.20 ppm	2.940	2.929	9 2,897		18.37	18.30	18.11	2.483	2.561	2.553	15.52		16.01	16.01 15.96	-	15.96	15.96 0.340	15.96 0.340 0.403	15.96 0.340 0.403 0.407 0.260
solutions	BA 10 ppm	2.940	2.868	8 2.859		18.37	17.93	17.87	2.483	2.603	2.596	15.52		16.27	16.27 16.23		16.23	16.23 0.340	16.23 0.340 0.397 0.407	16.23 0.340 0.397 0.407 0.260
	Sucrose 10 %	2.940	2.880	0 2.887		18.37	18.00	18.05	2.483	2.577	2.526	15.52		16.10	16.10 15.79	+	15.79	15.79 0.340 0.390	15.79 0.340 0.390 0.393	15.79 0.340 0.390 0.393 0.260
	STS 1:4 ml	2.940	2.943	3 2.955	_	18.37	18.40	18.47	2.483	2.615	2.598	15.52		16.34	16.34 16.24		16.24 0.340	16.24 0.340 0.419	16.24 0.340 0.419 0.423	16.24 0.340 0.419 0.423 0.260
L.S.D at	5%	3	0.061	0.061	=	ř	0.393	0.377	,	0.052	0.046			0.099	0.099 0.090	0.090	0.090	0.090 - 0.009	0.090 - 0.009 0.009	0.090 - 0.009 0.009
	1%	,	0.082	2 0.082	82	•	0.525	0.502	6	0.069	0.062			0.131	-	-	0.120	0.120 - 0.013	0.120 - 0.013 0.012	0.120 - 0.013 0.012 -
										2 nd season	ason						-			
	D.W	3.043	2.959	9 2.957	-	19.02	18.50	18.48	2.533	2.522	2.484	15.83		15.76	15.76 15.53		15.53	15.53 0.350	15.53 0.350 0.397	15.53 0.350 0.397 0.401
Pulsing	Kin.20 ppm	3.043	3.069	3.081	_	19.02	19.18	19.26	2.533	2.551	2.535	15.83		15.95	15.95 15.85	-+	15.85	15.85 0.350 0.415	15.85 0.330 0.415 0.413	15.85 0.350 0.415 0.413 0.263
solutions	BA 10 ppm	3.043	3.025	3.033		19.02	18.91	18.96	2.533	2.613	2.576	15.83		16.33	16.33 16.10	+	16.10	16.10 0.350	16.10 0.350 0.413 0.410	16.10 0.350 0.413 0.410 0.263
	Sucrose 10 %	3.043	3.003	3.025	_	19.02	18.77	18.91	2.533	2.592	2.570	15.83		16.20	16.20 16.06	-	16.06	16.06 0.350	16.06 0.350 0.407	16.06 0.350 0.407 0.411 0.263
	STS 1:4 ml	3.043	3.137	3.103		19.02	19.60	19.40	2.533	2.602	2.593	15.83		16.26	16.26 16.21	+	16.21	16.21 0.350 0.430	16.21 0.350 0.430 0.428	16.21 0.350 0.430 0.428 0.263
L.S.D at	5 %		0.073	0.066		*	0.458	0.408	2	0.046	0.040	E	1,000	0.280	0.280 0.269	-	0.269	0.269 - 0.006	0.269 - 0.006 0.006	0.269 - 0.006 0.006 -
	1%	,	0.098	0.088			119.0	0.544	â.	0.062	0.054	360		0.373	0.373 0.359	+	+	0.359	0.359 - 0.007	0.359 - 0.007 0.007

second season of this study. Furthermore, data in Table (115) reveal that all pulsing solution treatments succeeded in increasing the percentage of total nitrogen and total protein in flower stalks of bird of paradise cut flower stalks in the two seasons except for Kin at 20ppm after 14days in the second season. However, the greatest values of this parameter was recoded by using pulsing solution of STS at 1:4mM for 30 minutes after (initial, 14 and end days) in the two seasons with the exception of BA at 10ppm after 14 days in the second season. Moreover, pulsing solution of BA at 10ppm for 24hours resulted highly significant increase of this parameter as compared to control in the two seasons. The lowest values of these parameters was registered by using control (D.W) in the two seasons. With respect to the effect holding solution treatments on total nitrogen and total protein percentage in petals, data in Table (116) reveal that holding bird of paradise cut flower stalks bases in holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) appeared to be the most effective for producing the highest values of the percentage of total nitrogen and total protein in petals after (initial, 14 and end days) from the treatment as compared to control in the two seasons, followed descendingly by (sucrose 4% + CA 200ppm) in both seasons.

In addition, the lowest values of the percentage of total nitrogen and total protein in petals of bird of paradise cut flower stalks was registered by using holding solution contained (sucrose 4% + 8-HQS 200ppm) and control (distilled water) respectively in the first and second season after (14 and end days) from the treatment in this study.

Concerning the effect holding solution treatments on Total nitrogen and total protein percentage in flower stalks, data presented in Table (116) indicate that all holding solution treatments succeeded in increasing the percentage of total nitrogen and total protein in flower stalks of Bird of paradise cut flower stalks as compared control (D.W) in the two seasons. However, the highest values of these parameter was recorded by using holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) when compared to control in most cases in the two seasons.

On the reverse, the lowest values of the percentage of total nitrogen and total protein in flower stalk of Bird of paradise cut flower stalks was recorded by holding solution contained distilled water as control and (sucrose 4% + 8-HQS 200ppm) respectively after (14 and end days) from the treatment in both seasons in this study.

Referring to the interaction effective between pulsing solution and holding solution treatments on Total nitrogen and total protein content (%) in petals, data in Table (117) demonstrate that all the combinations treatments between pulsing solution and holding solution increased the percentage of total nitrogen and total protein in petals of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments of STS at 1:4mM for 30 minutes approved to be most effective one for producing the highest values of this parameter, especially the combined treatment of STS and holding solution contained (sucrose 4% +

Table (116): Effect of Holding solutions treatments on Total nitrogen percentage, Total protein percentage and phosphorus percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Treatments		Total nitrogen						200			10th protein percentage	CHI present	-						
Treatr				percentag	Total pre	Total protein percentage	-	1000	Total mingers process	-					notale		in No	in flower stalk	
Treatu		•	n notale		-	in petals		in No	in flower stalk		in Ho	in Hower stalk			permis	1		17	
	ments		III perans		2000	-	dane	Shelflife	Shelf life periods (days)	avs)	Shelf life	Shelf life periods (days)	days)	Shelf life	Shelf life periods (days)	days)	Shelf life periods (days)	periods (a	lays)
		Shelf life	Shelf life periods (days)	days)	Shell III	Shell life periods (days)		2000		+			+	Initial	14	End	Initial	71	End
		Initial	14	End	Initial	41	End	Initial	14	End	Initial	-	-						
			1					I" season	u										
				000	10.37	17.60	17 94	2 483	2.503	2.487	15.52	15.65	15.55	0.340	0.383	0.381	0.260	0.303	0.306
	D.W	2.940	2.862	7.870	76.01	1007		+	+	0,0	15.53	16.03	16.00	0.340	0.389	0.394	0.260	0.305	0.309
	Sucrose 4 %	2.940	2.874	2.867	18.37	17.96	17.92	2.483	2.563	2.560	15.52	70.01	10.00	0.0					000
	Sucrose 4% +CA 200	2.940	2.919	2.903	18.37	18.25	18.15	2.483	2.635	2.596	15.52	16.47	16.23	0.340	0.410	0.413	0.260	0.323	0.329
	mdd											1000000		07.0	907.0	0.411	036.0	0 307	0.313
solutions	Sucrose 4 % + 8HQS	2.940	2.860	2.851	18.37	17.88	17.82	2.483	2.505	2.492	15.52	15.66	15.58	0.340	0.405	0.41	0.200	0.50	
	mdd 007												00.71	0340	1.64.0	0.427	0.260	0.327	0.330
S	Sucrose 4% +CA 200	2.940	2.941	2.933	18.37	18.38	18.33	2.483	2.653	2.621	15.52	15.52	16.38	0.540	0.421	1			
dd	ppm + 8HQS 200 ppm								6500	0.046	1	660.0	060.0		600.0	0.009	¥.	600.0	0.007
8	2 %	·	190.0	0.061	jų.	0.393	0.377	•	760.0	0.040					4	0.00		0.013	0100
L.S.D at	701		0.082	0.082	ï	0.525	0.502	EX.	690.0	0.062	ĸ	0.131	0.120		0.013	0.012		0.010	
	0/1							2nd se	season										
								-	2010	2016	15.83	15.72	15.52	0.350	0.393	0.395	0.263	0.308	0.306
	D.W	3.043	2.991	2.969	19.02	18.70	18.55	2.555	0007	C04.7	79.01					2010	0.163	0.310	0.311
	Sucrose 4 %	3,043	3.047	3.031	19.02	19.05	18.95	2.533	2.555	2.544	15.83	15.97	15.90	0.350	0.404	0.403	0.202	2100	
	Sucrose 4% +CA 200	3.043	3.057	3.072	19.02	19.10	19.20	2.533	2.651	2.610	15.83	16.57	16.31	0.350	0.423	0.423	0.263	0.334	0.335
Holding	mdd															617.0	0.363	0.315	0.318
solutions	Sucrose 4 % + 8HQS	3.043	3.001	3.021	19.02	18.76	18.88	2.533	2.519	2.503	15.83	15.75	15.64	0.350	14.0	0.412	500		
	mdd oor								27.41	0196	15.83	16.50	16.37	0.350	0.431	0.430	0.263	0.339	0.337
	Sucrose 4% +CA 200	3.043	3.096	3.107	19.02	19.35	19.42	2.533	7.041	2.012	00.01								
d	ppm + 8HQS 200 ppm			+	-	0.450	0.408		0.046	0.040		0.280	0.269	Ģ	9000	900.0	Е	0.007	0.008
	5 %	¥	0.073	0.066		0.+20	0.100		0.000	0.064		0.373	0.359		0.007	0.007	-	0.009	0.011
L.S.D at	%1	r	0.098	0.088		0.611	0.544	,	0.062	0.034	9								

Table (117): Effect of interaction between pulsing solutions and holding solutions treatments on Total nitrogen percentage and Total protein percentage in petals of Strelitzia reginae Ait, cut flower stalk during the two seasons of 2007-2008/2008-2009.

		L.S.D at				STS 1:4 ml					Office 10 %					mdd ov vo	BA 10 nam				and of second	Kin 20 nnm				0.7	DW			solutions	Pulsing	
	1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Contract 407 C and	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Solutions	Holding		- Catillett
	,	î	2.940	2.940	2.940	2.940	2.940	1000	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	2.940	Initial	Shelf		
0.100	1810	0137	3.040	2.830	3.017	2.887	2.943	0.00.1	2 800	2 877	2.940	2.863	2.830	2.893	2.857	2.893	2.840	2.857	2.897	2.863	2.997	2.987	2.900	2.983	2.873	2.750	2.793	2.780	14	Shelf life periods (days)	1st season	Total
0.102	0 102	0127	3 087	2.833	3.013	2.893	2,947	4.007	7 9 67	7 997	2 960	2 867	2 860	2.900	2.857	2.867	2.860	2.813	2.840	2.820	2.967	2.930	2.930	2.973	2.863	2.710	2.787	2.800	End	ds (days)	=	Total nitrogen percentage in petals
ĵ.		21012	3 043	3 043	3.043	3.043	3.043	3.043	3.043	2010	3 043	3 042	3 043	3.043	3.043	3.043	3.043	3.043	3.043	3.043	3.043	3.043	3.043	3.043	3 043	3.043	3.043	3 043	Initial	Shelf		ercentage
0.219	0.104	2.21/	3 717	3 037	3 157	3.193	3.080	3.030	2.96/	2.703	2,040	2040	2000	3060	3 040	3.010	3 030	2 987	3.130	3 043	3 107	3.067	2.997	3 043	2020	3 027	2 907	2 000	14	Shelf life periods (days)	2nd spason	in petals
0.196	0.14/	3.221	3 777	2 (12)	1 111	3.080	3.043	3.047	2.983	3.010	0.00/	3.000	3.000	3 063	3 067	3 083	3 007	2 047	3 173	3 070	3 170	3.083	2 960	2 077	2000	1011	2.093	2 002	E day	de (dave)	1	
ŧ		18.58	18.38	10.30	10.30	82.81	18.38	18.38	18.38	18.38	18.58	18.38	10.30	10.00	10.00	18 38	10.30	10.00	18.39	10.30	10.20	82.81	18.38	18.38	10.00	10.30	86.81	Initial	OHE!!	Ch. III		
1.173	0.880	19.00	17.69	18.85	10.04	1004	18 40	18.06	17.98	18.38	17.90	17.69	18.08	17.85	10.08	10.75	17.65	10.10	10.90	17.00	10.01	10.13	18.65	17.96	17.19	17.46	17.38	14	me perio	` -	Elor	T
1.123	0.842	19.29	17.71	18.83	18.08	10.00	18 47	19.92	18.02	18.50	17.92	17.88	18.13	17.85	17.92	17.88	17.58	17.75	17.63	18.54	10.31	18.31	18.58	17.90	16.94	17.42	17.50	End	re periods (days)	=	rotal protein percentage in petals	
	1	19.02	19.02	19.02	19.02	17.02	10.00	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	19.02	Initial	Shelf		ercentage	
366	1.024	20.10	18.98	19.73	19,96	19.20	1000	18 94	18.54	18.45	19.00	18.71	19.13	19.00	18.81	18.94	18.67	19.56	19.02	19.42	19.17	18.73	19.02	18.25	18.92	18.17	18.13	14	Shelf life periods (days)	2 nd season	in petals	
717	0.913	20.17	18.96	19.58	19.25	19.02	10.01	1904	18.65	18.81	19.29	18.75	19.15	19.17	19.27	18.79	18.42	19.83	19.19	19.50	19.27	18.50	18.90	18.46	18.83	18.13	18.08	End	ds (days	ň		

CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) after (14 and end days) from the treatment as compared to control (D.W) in both seasons. Moreover, the combined treatment of kinetin at 20ppm and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) recorded highly increases in the percentage of total nitrogen and total protein in petals of bird of paradise cut flower stalks after 14 and end days from the treatment as compared to control (D.W) in the two seasons.

Additionally data in Table (118) reveal that most the combinations treatments between pulsing solution and holding solution increased the percentage of total nitrogen and total protein in flower stalks of Bird of paradise cut flower stalks as compared to control in the two seasons. However, the combinations treatments of Benzyladenine at 10ppm for 24hours and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200pm) and holding solution contained (sucrose 4% + 8-HQS 200ppm) showed to be the most effective one for inducing the highest values of this parameter after (14 and end days) from the treatment as compared to control (D.W) in both seasons. Moreover, the combined treatment of STS at 1:4mM for 30 minutes and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) or holding solution contained (sucrose 4% + CA 200ppm) and holding solution contained (sucrose 4%) resulted highly increases in the percentage of total nitrogen and total protein in flower stalks of bird of paradise cut

Table (118):Effect of interaction between pulsing solutions and holding solutions treatments on Total nitrogen percentage and Total protein percentage in flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

		L.S.D at				STS 1:4 ml					%	Sucrose 10					mdd or va	7					Kin.20 nnm					D.W			Sugnatoria	Sulting	D. Isi	
	1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose + /0 + orros 200 ppm	Sucrose 4 % + 8HOS 200	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucress 4 of the Street Point	Sucrose 40% +C x 200	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	-	-	Supreme 4 0/	D.W.	Sucrose 4% +CA 200 ppm + 8HOS 200	Sucrose 4 % + 8HOS 200 ppm	Sucrose 4% +CA 200 nnm	Sucrose 4 %	D.W	Solutions	Holding		reatment
			2.483	2.483	2.400	2 483	2.483	2.483	2.483	2.483	2.483	2.483	2.400	2 492	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.403	2.483	2 402	2.483	2.483	Initial	Shelf		
0.133	01110	0116	2.667	2.550	2.000	2 660	2617	2.580	2.663	2.463	2.663	2.567	2.327	2 500	2 683	2 587	2.637	2.580	2.527	2.607	2.480	2.660	2.610	2.450	2.397	2.44/	2.333	200	2 440	2.433	14	Shelf life periods (days)	1st season	Tota
0.139	0.104	V01 0	2.627	2.510	2.65/	2017	2617	2 580	2.643	2.450	2.500	2.537	2.500	2000	2 637	2 567	2.627	2.600	2.550	2.603	2.487	2.653	2.590	2.433	2.593	2.447	2.543	104.4	2 457	2 373	End	ds (days)	ň	Total nitrogen
1			2.533	2.533	2.533	2.000	2 522	7 522	2.533	2.533	2.533	2.533	2.533	2.000	2 522	2 522	2533	2 533	2.533	2.533	2.533	2.533	2.533	2.533	2.533	2.533	2.533	2.333	7 522	2 533	Initial	Shelf		
0.139	0.104	0104	2 650	2.553	2.650	2.3/3	2 577	7 507	2 677	2.483	2.710	2.563	2.527	2.0//	2.505	2 502	7 687	2 507	2 520	2.600	2.487	2.653	2.577	2.440	2.600	2.490	2.553	2.403	+	+	-	life period	2nd spas	age in flo
0.120	0.090	2.040	2 620	2 553	2.620	080.7	2.393	2 502 0	2 670	2 463	2.643	2.590	2.483	2.05/	2.500	2.023	2 622	3 550	2 490	2 580	2.493	2.643	2.557	2.403	2.570	2.443	2.520	2.443	+	+	E. J	Shelf life periods (dave)	On	percentage in flower stalk
	ě	12.32	10.00	15.50	15.52	15.52	15.52	15.52	10.01	15.50	15.52	15.52	15.52	15.52	13.32	13.32	15.52	15 57	15.52	10.00	15.50	15.52	15.52	+	15.52	15.52	15.52	15.52	+	+	+	Shalf life		
0 204	0.220	10.07	13.34	1504	16.63	16.35	16.13	10.05	10.40	15.40	16.65	16.04	15.79	16.77	16.17	16.48	10.13	13./9	16.20	16.00	15 50		1	+	16.23	15.29	15.96	15.25	H	1	110		181	To
2260	0.201	16.42	15.09	15 60	16.60	16.35	16.13	16.52	10.01	10.00	15 63	15.85	15.63	16.48	16.04	16.42	16.25	13.94	10.2/	10:04	15 54	16.58	16.10	15.21	16 21			15.35	14.83	H	perious (days)	on	xotal protein percentage in flower stalk	al number
	,	15.83	15.83	10.00	15.83	15.83	15.83	15.83	15.85	15.05	15.02	15.83	15.83	15.83	15.83	15.83	15.83	15.83	15.83	10.83	15.03	15.03	15.03	15.03	15.82	15.83	15.83	15.83	15.83	Initial	Shelf		percent	
0000	0.625	16.56	15.96	10.30	16 56	16.08	16.15	16.73	15.52	10.94	10.02	1600	15 70	16.73	16.15	16.79	16.23	15.75	16.25	15.54	80.01	10.10	13.23	15.25	+		+	-	15.65	14	Shelf life periods (days)	2nd season	age in flo	
0000	0.601	16.38	15.96	10.38	16.20	16.13	16.21	16.69	15.40	10.52	10.19	12.02	15.53	16.60	16.00	16.40	15.94	15.56	16.13	15.58	+	+	+	+	+		+		15.27	End	ods (day	on	wer sta	

flower stalks after 14 and till the end of the longevity as compared to control (D.W) in the two seasons under this study.

7.2.8.-Phosphorus content (%) in petals and flower stalks:

Data in Table (115) demonstrate that all pulsing solution treatments of bird of paradise cut flower stalks resulted increments in phosphorus (%) in petals as compared to control in the two seasons. However, the highest significant increase of this parameter was registered by using pulsing solution of STS at 1:4mM for 30 minutes as compared to other treatments in the two seasons after (14, end days) from the treatment under this study.

Furthermore, Data presented in Table (115) reveal that all pulsing solution treatments of Bird of paradise cut flower stalks increased phosphorus content (%) in flower stalk after (14 and end days) from the treatment when compared to control in the two seasons. However, the highest significant increase of this parameter was registered by using pulsing solution of STS at 1:4mM for 30 minutes after (14 and end days) from the treatment as compared to control (D.W) in the two seasons. Anyhow, phosphorus content (%) in flower stalk under all tested pulsing treatments was increased as flower cut stalks prolonged in age after (initial) from the treatment until (end days) of age of longevity in both seasons.

As for the effect holding solution treatments on Phosphorus content (%) in petals and flower stalks, data in Table (116) reveal that all holding solution treatments increased the percentage of phosphorus in petals and flower stalks of bird of paradise cut flower stalks as compared to control in the two

Table (119): Effect of interaction between pulsing solutions and holding solutions treatments on phosphorus percentage in petals and flower stalk of Strelitzia reginae Ait. cut flower stalk during the two seasons of 2007-2008/2008-2009.

Treatment Phosphorus percentage in petals Phosphorus percentage in flower stalk

		L.S.D at			3131:4:11	CTC 1.4 ml				%	Sucrose 10				andd or year	RA 10 mm				ppm	Kin.20				0.17	D W			solutions	Pulsing	
	1%	5%	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	p.w	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Sucrose 4% +CA 200 ppm + 8HQS 200 ppm	Sucrose 4 % + 8HQS 200 ppm	Sucrose 4% +CA 200 ppm	Sucrose 4 %	D.W	Болицона	Solutions	Holding	
			0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	Initial	Onen	Shalf	
0.020	0000	0.021	0.450	0.420	0.440	0.393	0.390	0.407	0.397	0.390	0.383	0.373	0.417	0.400	0.400	0.390	0.380	0.413	0.410	0.413	0.387	0.390	0.417	0.397	0.407	0.390	0.380	14	onen me perious (uays)	life parior	1st season
0.020	020.0	0000	0.450	0.420	0.443	0.400	0.400	0.410	0.400	0.393	0.390	0.373	0.423	0.420	0.407	0.400	0.383	0.423	0.417	0.410	0.393	0.393	0.427	0.400	0.413	0.387	0.357	End	is (uays)	le (dann)	
į	.7	0.550	0.250	0350	0350	0.350	0.350	0.350	0.350	0.350	0.350	0350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	Initial	Shell		eason 2nd co
0.017	0.013	0.403	0.420	0.447	0.447	0.417	0 403	0.417	0.407	0.420	0.403	0.300	0.423	0.410	0.427	0.410	0 397	0 433	0.417	0.423	0 403	0.400	0.417	0.403	0.400	0.387	0 377	14	Snell life periods (days)	* 3C430H	and constant
0.017	0.013	0.437	0.420	0.443	0.443	0.407	0.407	0.423	0.410	0.407	0.397	0.707	0.407	0.420	0.700	0.403	0.403	0.430	0.417	0.400	0.555	0 303	0.407	0.40/	0.393	0.303	0 272	End	is (days)		
ì	g.	0.260	0.260	0.260	0.260	002.0	002.0	0.200	0.260	0.250	0.260	0.200	0.250	002.0	002:00	0.250	0.260	002.0	0.260	0.260	0.200	002.0	0.260	0.260	0.200	002.0	0.760	Initial	Shelf		Phosph
0.028	0.021	0.350	0.320	0.343	0.320	0.317	0.30/	0.303	0.500	0.293	0.300	0.333	0.307	0.327	0.310	0.303	0.337	0.310	0.000	0.307	0.303	0.30/	0.297	0.307	0.293	0.290		14	Shelf life periods (days)	I" season	Phosphorus percentage in flower stalk
0 022	0.017	0.353	0.330	0.347	0.327	0.327	0.303	0.307	0.317	0.297	0.303	0.337	0.310	0.333	0.313	0.300	0.340	0.317	0.337	0.317	0.310	0.317	0.300	0.313	0.293	0.290		End	is (days)	-	ntage in fle
	(2)	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	mina	Initial	Shell		wer stalk
0000	0.015	0.383	0.343	0.377	0.320	0.317	0.327	0.310	0.320	0.303	0.307	0.337	0.313	0.330	0.310	0.310	0.340	0.317	0.333	0.317	0.313	0.310	0.293	0.310	0.300	0.293	-		Shelf life periods (days)	2 nd season	
3500	0.018	0.363	0.340	0.367	0.320	0.317	0.320	0.313	0.320	0.307	0.307	0.337	0.317	0.333	0.320	0.310	0.340	0.320	0.337	0.317	0.307	0.327	0.300	0.320	0.293	0.290	End	(efum) and	ls (dave)	5	

seasons. However, the treatment of holding solution contained (sucrose 4% + CA at 200ppm + 8-HQS 200ppm) gave the greatest significant increase in the percentage of phosphorus in petals and flower stalk of Bird of paradise cut flower stalks as compared to control (D.W) in the two seasons, followed in descending order by (sucrose 4% + 8-HQS at 200ppm) after (14 and end days) from the treatment in the two seasons. On the reverse, the lowest values of this parameter was registered by using control (D.W) and (sucrose at 4%) in the two seasons.

Concerning the effect of interaction between pulsing solution and holding solution treatments on phosphorus content (%) in petals and flower stalks, data in Table (119) indicate that all the interaction treatments between pulsing and holding solutions increased phosphorus percentage in petals and flower stalks of bird of paradise cut flower stalks as compared control in the two seasons. However, the combined treatments between STS at 1:4mM for 30 minutes and holding solution contained (sucrose 4% + CA 200ppm + 8-HQS 200ppm) appeared to be the most effective one produce the highest values of the percentage of total phosphor use in petals and flower stalks of bird of paradise cut flower stalks as compared to control (D.W) in the two seasons, followed descendingly by using the combined treatment between STS and holding solution contained (sucrose 4% + CA 200ppm) and the combined treatment between STS and holding solution contained (sucrose 4% + 8-HOS 200pm) in the two seasons.

The results of this parameters may be discussed in the same was as previously mentioned in the first part (tuberose)