RESULTS AND DISCUSSION

4. RESULTS AND DISCUSSION

4.1. Survival plant percentage on survival plant percentage and plant growth characters.

Data in Table 6 show the effect of propagation materials, growth stimulants and disinfectants as well as their interaction on survival plant percentage and plant growth aspects expressed as plant height, number of leaves and offshoots per plant during both seasons of study.

4-1-a. Effect of propagation materials.

Such data in Table 6 indicate that irrespective of plant height which was not significantly affected as a result of using old crown pieces (stumps) or offshoots in propagation, each of survival plant percentage, number of leaves and offshoots per plant were significantly differed among the studied propagation materials during both seasons of study. In this respect, using old crown pieces in planting exhibited the highes values in all measured growth traits except plant height only as compared with using offshoots in planting. Obtained results are true during the two seasons of study. In this connection, such increments in plant survival percentage and plant growth aspects in case of old crown (stumps) may be due to the highest or more reserve nutrient substance and higher buds number present in stumps which in turn encourage the success of more root formation and plantlets to emerge and growth more than one bud consequently increased the percentage of survival plants and vegetative growth compared to offshoots. Obtained results are increment with those

Table (6): Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on survival plant and growth characteristics of globe artichoke during 2009/2010 and 2010/2011 seasons.

Properties / Treatments		Season I				Season II			
		Survival plant (%)	Plant height (cm)	Leaves number/ plant	Offshoots number/ plant	Survival plant (%)	Plant height (cm)	Leaves number/ plant	Offshoots number/ plant
Stumps		51.38	35.44	27.38	1.72	54.30	33.83	28.72	1.67
Offshoots		43.75	36.72	21.38	1.20	51.38	35.66	22.16	1.32
L.S.D.		6.57	N.S.	2.86	0.43	N.S.	N.S.	0.63	0.29
Yeast		40.83	32.91	25.50	1.32	37.50	33.75	27.83	1.61
Garlic Ex.		65.83	40.00	24.50	1.64	80.83	38.33	26.00	1.81
Salicylic		30.00	35.50	23.66	1.34	41.66	31.91	24.33	1.29
Borax		50.00	39.00	25.16	1.57	63.33	35.58	25.50	1.28
Anti fungi		63.75	38.58	25.00	1.84	59.16	34.75	26.50	1.82
Control		35.00	30.50	22.50	1.05	34.58	34.16	22.50	1.16
L.S.D.		8.72	3.42	1.99	N.S.	10.28	3.14	2.03	0.40
Stumps	Y	46.66	32.66	28.66	1.33	35.00	33.00	29.33	1.63
	G	68.33	39.16	27.00	2.21	83.33	38.50	30.33	1.78
	S	30.00	37.00	27.33	1.53	43.33	33.16	28.33	1.83
	B	60.00	38.83	30.00	1.88	70.00	31.00	29.00	1.63
	A	65.00	38.83	28.00	1.83	61.66	34.83	29.33	1.76
	Con	38.33	26.16	23.33	1.53	32.50	32.50	26.00	1.40
Offshoots	Y	35.00	33.16	22.33	1.31	40.00	34.50	26.33	1.58
	G	63.33	40.83	22.00	1.08	78.33	38.16	21.66	1.84
	S	30.00	34.00	20.00	1.16	40.00	30.66	20.33	0.75
	B	40.00	39.16	20.33	1.26	56.66	41.16	22.00	0.92
	A	62.50	38.33	22.00	1.85	56.66	34.66	23.66	1.88
	Con	31.66	34.83	21.66	0.58	36.66	35.83	19.00	0.93
L.S.D.		N.S.	4.85	2.82	N.S.	N.S.	4.45	2.87	0.57

Y = yeast extract solution, G = garlic extract solution , S = salicylic acid , B = borax solution, A = anti fungi, Con = control treatment

reported by **Moustafa (1969), Abd El Al and Mustafa (1974) , Kasim (1994), Aboul- Nasr (1995), Salamah (1997) Abo El-Fadel (1999) and Badawy *et al* (2006)** all working on globe artichoke. They reported that using stumps in propagation had an improving effect on the percentage of survival plant and vegetative growth trails of plant in the filed compared with other used propagation materials (offshoots and ovoli). On the other side **Attia and Baha El Din (1958), Marsella and follesa (1974), Agwah *et al* (1990), El-Shal (1994), El-Gazar *et al.* (1995)** and **Kasim *et al.* (2003)** reported that offshoots was better in this regard.

4-1-b. Effect of growth stimulants and antiseptics materials.

Data in Table 6 indicate clearly that percentage of survival plants, plant height, leaves number and offshoots number per plant were significantly affected as a result of application of growth stimulants and antiseptics substances during the two season of study except the number of offshoots during the first season only compared to the control treatment. In this respect either soaking the propagation materials (stumps and offshoots) pre planting in garlic extract solution (50 ml/l) and antifungi mixture (3 g. Rizolex + 2g. Topsen M70 + 1.5 g. Redomil plus) or dipping in borax (5%) reflected the highest values, respectively in all studied growth aspects compared with the control and salicylic acid . In addition , the highest values of survival plant percentage and plant height were recorded as a result of soaking stumps and offshoots in garlic solution for 10 minutes, while the highest number of leaves per plant were recorded as a result of using yeast solution at 5 g/l for 20 minutes

but the highest number of offshoots were recorded in case of using mixture of antifungi (Rizolex plus Topsen plus Redomil). Such results are true during both season of growth. Such improvement effect of using garlic extract may be due to it contain antagonistic substances and growth hormones and vitamins which affect the pathogens and plant growth. Also borax and antifungicides caused a decreasing in number of fungi opulation in the soil. Obtained results are coincided with those reported by **Kovacs (1964), Basra *et al.* (2005), Basra *et al.* (2007), Tong fei *et al.* (2007), Resende *et al.* (1996), Sharma *et al.* (1999), Gowely *et al.* (1996), Hasan (2007), El– Zohiri (2009), El Abagy *et al.* (2010) and Ahmed (2011).**

4-1-c. Effect of the interaction.

Data in the same Table indicate that irrespective of the percentage of plant stand during both seasons and offshoots number during the first season which were not significantly affected as a result of the interaction treatments, all of the studied growth parameters i. e. plant height and number of leaves per plant in both seasons and number of offshoots in the second one were significantly affected due to the interaction among propagation materials and tested growth stimulants and antiseptic compounds. However, the highest values were recorded in general by using garlic extract in most cases combined with using stumps or offshoots without significant differences

4-2. Flowering behavior.

Data presented in Figures 1 , 2 , 3 and 4 show the effect of propagation materials, growth stimulants and antiseptic

substance and their interaction on flowering behavior of globe artichoke plants expressed as number of days elapsed from planting to flowering and to start harvesting during both seasons of growth.

4-2-a. **Effect of propagation materials** .

With regard to the effect of propagation materials (stumps or offshoots) data in Figures 1, 2, 3 and 4 show that both number of days from planting till flowering and number of days from planting to the first harvest did not significantly affect due to using either stumps or offshoots in propagation. However , the lowest number of days elapsed from planting until starting of blooming and harvesting was recorded in case of using offshoots in propagation. Obtained results are true during both seasons of study. In this connection, the reducing of number of days to the flower bud formation as a result of using offshoots in propagation may be attributed to the increase of rooting of offshoots that can help in active growing and bud development . In this respect, **Dellacecca and Pace (1976)** reported that no differences between offshoots and stumps. Also **El Shal *et al.* (1993 a,b and c)** and **Abo El-Fadel (1999)** show that the use of offshoots gave significant increase in earliness over that obtained from crown pieces and ovoli methods. However, contra results were reported by **Moustafa (1969) Abd El Al** and **Moustafa (1974) and Salamah (1997)** who found that using old crown pieces (stumps) clearly decreased number of days after planting until blooming.

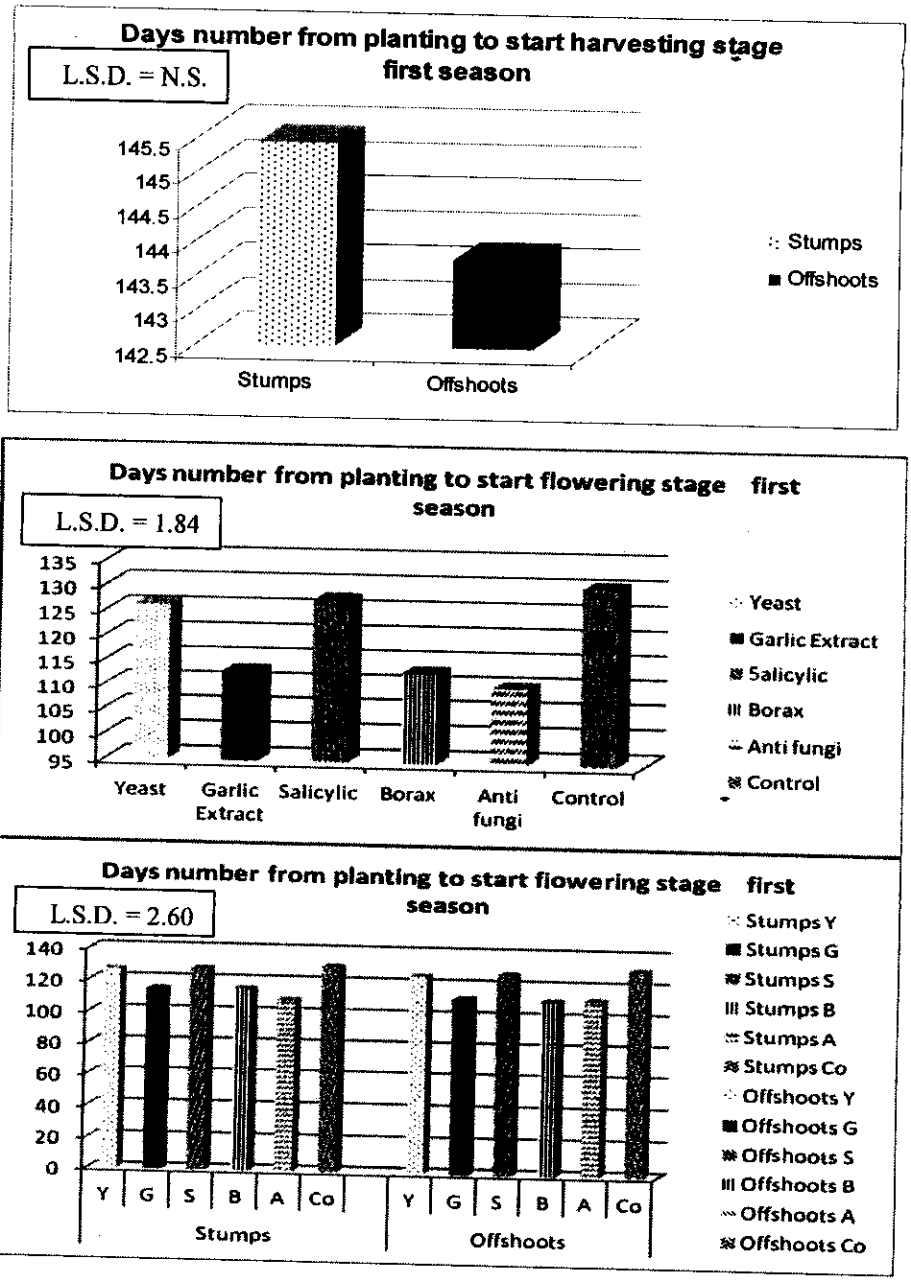

Fig. 1 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flowering behavior (days number from planting to start flowering stage) of globe artichoke during season of 2009/2010.

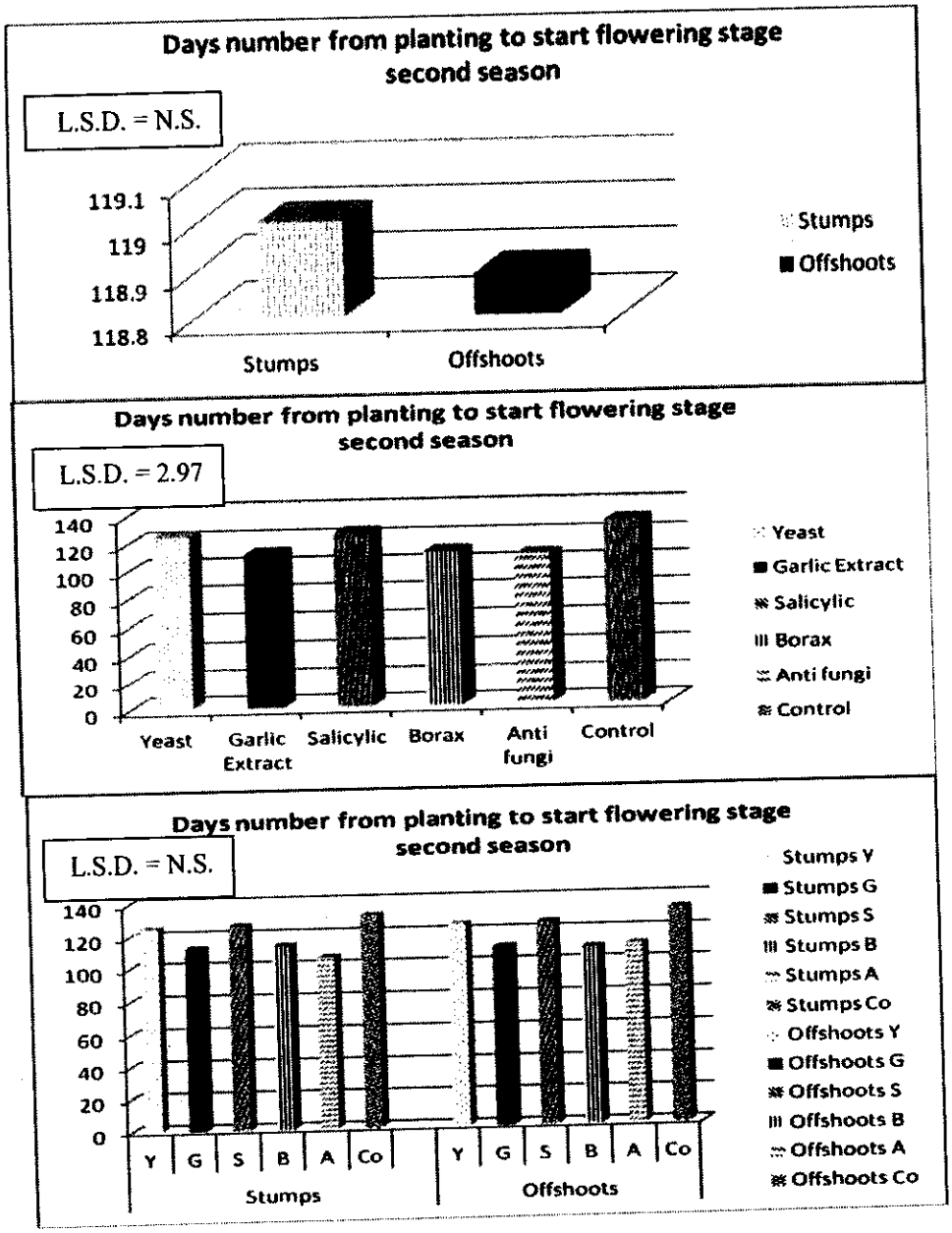

Fig. 2 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flowering behavior (days number from planting to start flowering stage) of globe artichoke during seasons 2010/2011.

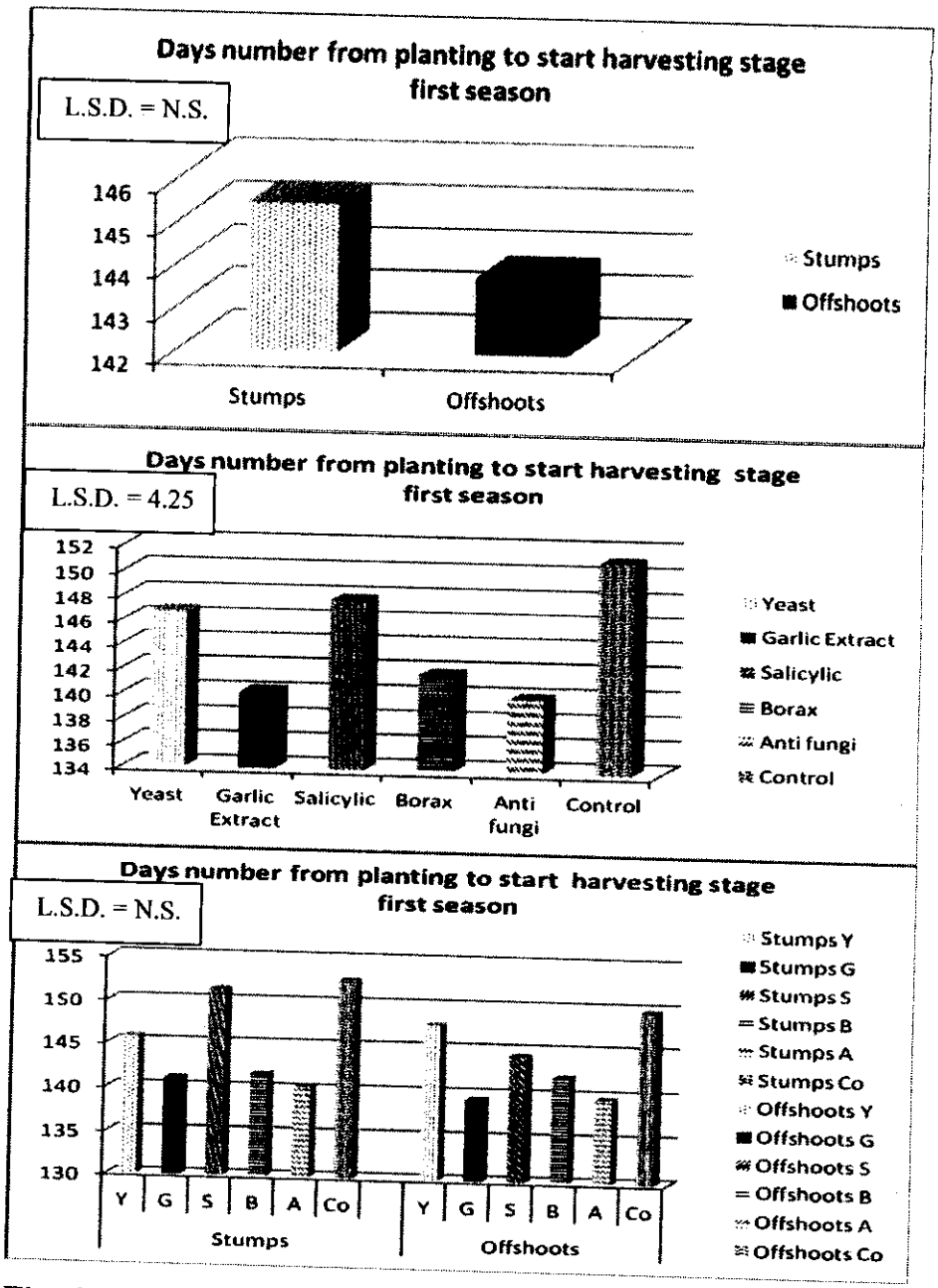

Fig. 3 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flowering behavior (days number from planting to start harvesting stage) of globe artichoke during season 2009/2010.

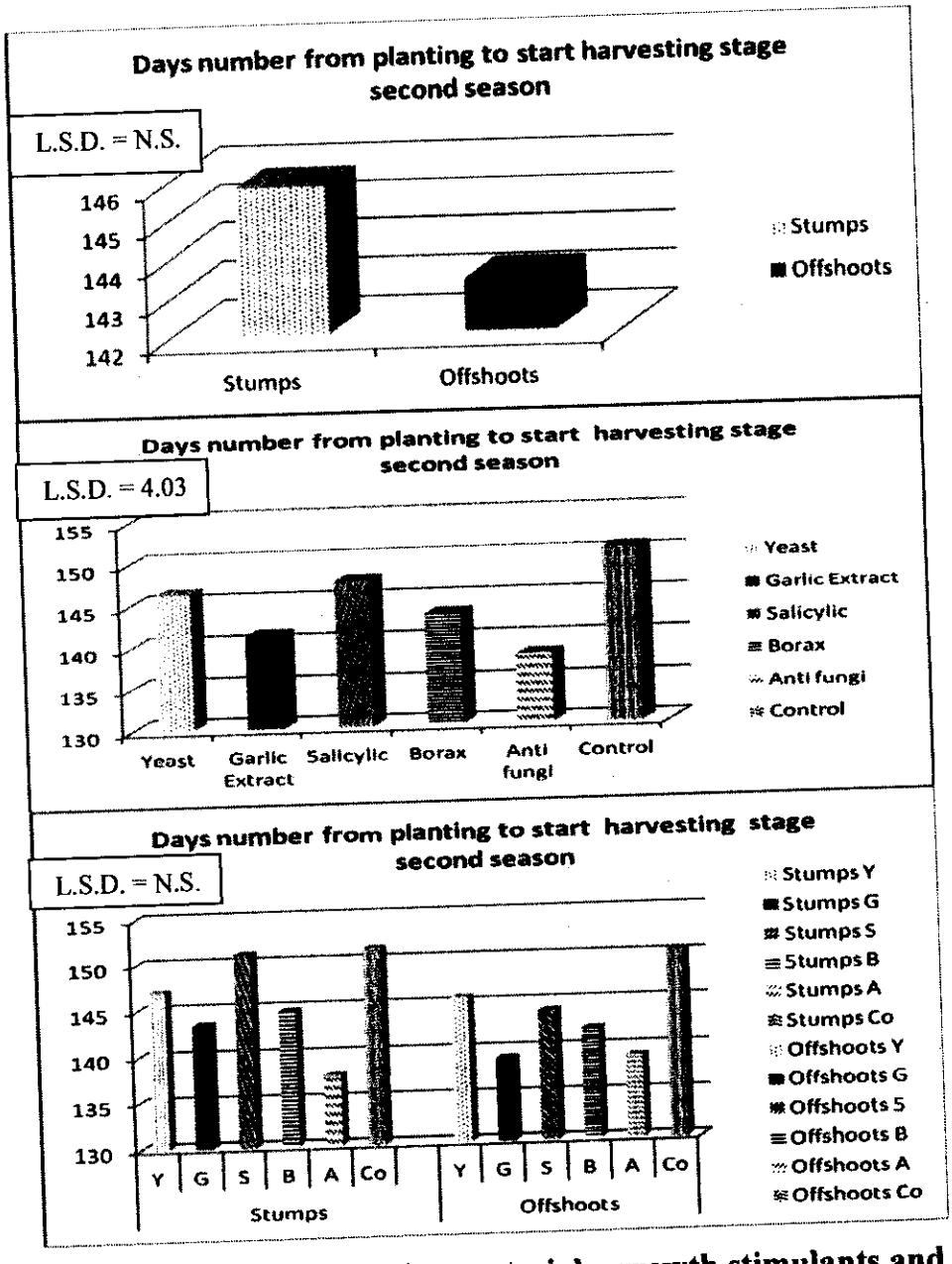

Fig. 4 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flowering behavior (days number from planting to start harvesting stage) of globe artichoke during seasons 2010/2011.

4-2-b Effect of growth stimulants and antiseptic materials

The same data in Figures 1, 2, 3 and 4 show clearly that both number of days elapsed from planting to plant blooming and number of days from planting until first harvest for the flowering head were significantly affected due to the application of all tested growth stimulants and antiseptic materials compared to the control during both seasons of growth. In this regard, the most effective treatment which reflected the lowest number of days to the anthesis and harvesting was the used of fungicides (Rizolex + Topsen + Redomil 3:2:1.5 g/l , respectively) followed by using garlic extract and borax. Obtained results may attributed to the main role of such substance in protecting the plants from infection and keep it well health and accelerate development and reach the flowering stage earlier than the control . Obtained results are in accordance with those reported by **Ali (2010)** on common bean mentioned that using salicylic acid at 25 and 50 ppm exhibited the highest values of number of flowers and pods produced by plant as well as fruit set percentage.

4-2-c. **Effect of the interaction.**

As for the effect of the interaction between propagation materials and growth stimulants and antiseptic materials, data in Figurs 1, 2, 3 and 4 indicate the the lowest number of days from planting until flowering bud appearance was notice as a result of using stumps in propagation combined with using antifangi compounds. Also the same treatment reflected the lowest number of days to the first flower bud harvesting followed by using garlic extract with the same method of propagation during the two seasons of study.

4-3. **Flower head yield and its components.**

Data recorded in Tables 7 and 8 show the effect of propagation materials and pre planting growth stimulants and antiseptic treatments as well as their interaction on total produced yield and its components (early, late and total yield) either for plant or feddan during both seasons of study.

4-3-a. **Effect of propagation materials.**

Such data in Tables 7 and 8 indicate that both the total produced yield and its components (early and late yield) either for plant or feddan were significantly affected as a result of the used propagation materials during both seasons of study except early yield per plant in the first season and late yield per plant as well as early yield per feddan in the second season, respectively which were not significantly affected. In addition, using old crown pieces in propagation produced the higher number of flower heads per plant and per feddan during both season of growth compared with using offshoots in propagation . Such increments in total yield and its components for both plant and feddan may be attributed to the presence of more buds and storge nutrient materials in stumps which affect positively on plant growth Table 6 and consequently increased the produced early and late yield as well as total yield . In this regard, **El-Shal (1994)**, **El-Gazar *et al.* (1995)**, **Salamah (1997)** and **Badawy *et al* (2006)** indicated that growing artichoke by stumps significantly increased early and late yield per plant and per feddan more than using offshoots in propagation. Adverse results were reported by **Beshr and Moustafa (1981)**, **Agwah *et al.* (1990)**, **Abo El Fadel (1999)** and **Kasim *et al.* (2003)** They

Table 7 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on number of flower head yield per plant of globe artichoke during 2009/2010 and 2010/2011 seasons.

Properties / Treatments		Season I			Season II		
		Early yield /plant	Late yield /plant	Total yield /plant	Early yield /plant	Late yield /plant	Total yield /plant
Stumps		3.18	4.58	7.77	3.20	4.63	7.84
Offshoots		2.58	4.12	6.70	2.55	4.05	6.56
L.S.D.		N.S.	0.42	0.23	0.46	N.S.	0.54
Yeast		2.42	4.08	6.51	2.42	3.90	6.19
Garlic Ext.		3.17	4.81	7.98	3.55	4.74	8.29
Salicylic		2.99	4.18	7.17	2.96	4.28	7.24
Borax		2.93	4.23	7.17	2.80	4.28	7.08
Anti fungi		3.49	5.39	8.89	3.42	5.20	8.63
Control		2.29	3.40	5.69	2.11	3.64	5.75
L.S.D.		0.39	0.39	0.49	0.39	0.51	0.72
Stumps	Y	2.64	4.04	6.68	2.60	3.99	6.60
	G	3.70	5.01	8.71	4.17	5.33	9.50
	S	3.40	4.52	7.93	3.40	4.40	7.80
	B	3.10	4.52	7.63	2.99	4.44	7.44
	A	3.73	6.00	9.73	3.78	5.77	9.55
	Con	2.54	3.38	5.92	2.29	3.84	4.14
Offshoots	Y	2.21	4.11	6.33	2.24	3.80	5.78
	G	2.64	4.61	7.25	2.93	4.15	7.08
	S	2.57	3.84	6.42	2.52	4.15	6.68
	B	2.76	3.94	6.70	2.61	4.12	6.73
	A	3.26	4.78	8.05	3.07	4.63	7.71
	Con	2.04	3.41	5.46	1.93	3.44	5.37
L.S.D.		N.S.	0.56	0.69	N.S.	N.S.	N.S.

Y = yeast extract solution, G = garlic extract solution, S = salicylic acid, B = borax solution, A = anti fungi, Con = control treatment

Table 8 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on number of flower head yield per feddan* of globe artichoke during 2009/2010 and 2010/2011 seasons.

Properties / Treatments		Season I			Season II		
		Early yield per fedan	Late yield per fedan	Total yield per fedan	Early yield per fedan	Late yield per fedan	Total yield per fedan
Stumps		6.70	9.72	16.42	7.37	10.45	18.32
Offshoots		4.67	7.48	12.15	5.42	8.45	13.91
L.S.D.		1.78	0.57	2.19	N.S.	1.55	1.58
Yeast		4.03	6.69	10.72	3.58	5.90	9.34
Garlic Ext.		8.45	12.70	21.16	11.65	15.35	27.01
Salicylic		3.55	5.04	8.59	4.92	7.18	12.10
Borax		5.96	8.59	14.56	7.17	10.85	18.26
Anti fungi		8.90	13.79	22.69	8.13	12.35	21.99
Control		3.23	4.78	8.01	2.90	5.06	7.97
L.S.D.		1.34	1.93	2.94	1.46	2.17	4.38
Stumps	Y	4.89	7.55	12.45	3.63	5.60	9.24
	G	10.21	13.64	23.86	14.08	17.73	31.84
	S	4.05	5.42	9.47	5.83	7.73	13.56
	B	7.50	10.89	18.39	8.39	12.43	20.82
	A	9.65	15.59	25.25	9.30	14.20	26.51
	Con	3.90	5.21	9.11	2.96	5.00	7.96
Offshoots	Y	3.17	5.82	8.99	3.53	6.20	9.45
	G	6.70	11.75	18.46	9.21	12.98	22.19
	S	3.05	4.66	7.71	4.00	6.64	10.64
	B	4.42	6.29	10.72	5.95	9.27	15.71
	A	8.15	11.98	20.13	6.96	10.51	17.47
	Con	2.56	4.36	6.92	2.84	5.13	7.98
L.S.D.		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

Y = yeast extract solution, G = garlic extract solution , S = salicylic acid , B = borax solution, A = anti fungi , Con = control treatment

*expressed as 1000 heads

indicated that using offshoots in propagation was superior compared with the other used methods in propagation (stumps and ovoli).

4-3-b. **Effect of growth stimulants and antiseptic materials.**

As for the effect of pre planting treatment of propagation materials with growth stimulants and antiseptic materials on total produced yield and its components , the same data in Tables 7 and 8 investigate that treatment propagation materials (offshoots and stumps) with different studied growth stimulants and antiseptic materials significantly increased early, late and total produced yield compared with the control treatment during both seasons of study. In this respect, pre planting treatment propagation materials with the mixture of antifungi (Rizolex plus Topsen plus Redomil at 3:2:1.5 g/l respectably) followed by garlic extract at 50 ml/l , salicylic acid at 100 ppm and borax at 5% reflected the highest values for early , late and total produced yield for both plant and feddan during the two seasons of growth . In this regard, such increase in total produced yield and its components are connected with the effect of such tested substances on number of offshoots in Table 6 and in turne number of produced flower heads. Obtained results are agree with those reported by **Abou Hussein *et al.* (1975), Shafshak (1987), Gaafar *et al.* (1989), Helmy (1992), Agwah and Mahmoud (1994), Farag *et al.* (1994), Ghosh and Hasan (1997), Prasad *et al.* (1997), Abd EL Mageed and Khafagi (1998), El Desouky *et al.* (1998), Ibrahim (1998), Sharma *et al.*(1999), Antony *et al.* (2003), Amer (2004), Shafshak *et al.* (2004), Hasan (2007), El -Zohiri (2009), Musuthi *et al.***

(2009), Ali (2010) , El Abagy *et al.* (2010) and Shafshak *et al.* (2010) on deferent studied vegetable crops.

4-3-c. **Effect of the interaction**

With regard to the effect of the interaction among the tested propagation materials and growth stimulants and antiseptic materials the same data in Tables 7 and 8 indicate that using old crown pieces (stumps) in propagation combined with pre planting treatment soaking of propagation materials in antifungi mixture or garlic extract solution exhibited the highest values for early, late and total produced yield during both seasons of study for both plant and feddan.

4-4. **Flower head physical quality.**

Data recorded in Tables 9 and 10 show the effect of propagation materials and growth stimulants as well as antiseptic compounds on physical flower head quality expressed as average weight of head , head length and diameter as well as edible part weight during the two seasons of study.

4-4-a. **Effect of propagation materials.**

Such data in Tables 9 and 10 indicate that irrespective of average head weight for early yield during the first season of study which was significantly affected as a result of using stumps or offshoots in propagation, all of average head weight, length and diameter as well as edible part weight for early or late yield did not significantly affect due to using offshoots or old crown parts (stumps) in propagation during the two seasons of growth. In this connection, using offshoots in propagation reflected the highest values during the first season while during

Table 9 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flower head physical quality of globe artichoke during 2009/2010 season.

Properties / Treatments		Season I							
		Average head weight (g)		Head length (cm)		Head diameter (cm)		Edible part weight (g)	
		Early yield	Late yield	Early yield	Late yield	Early yield	Late yield	Early yield	Late yield
Stumps		211.08	242.79	9.48	10.92	8.27	7.61	50.16	97.57
Offshoots		221.90	247.03	9.75	11.03	8.28	7.76	50.37	98.36
L.S.D.		4.65	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Yeast		215.96	240.17	9.71	10.93	8.21	7.65	47.23	90.20
Garlic Ext.		221.66	263.50	9.61	11.34	8.05	7.60	54.88	105.73
Salicylic		215.62	244.49	9.56	10.58	8.35	7.76	48.41	95.45
Borax		224.16	245.67	9.56	10.81	8.20	7.75	52.36	99.28
Anti fungi		220.38	258.22	9.70	11.30	8.57	7.85	53.57	107.03
Control		201.16	217.41	9.55	10.88	8.28	7.51	45.15	90.50
L.S.D.		16.54	4.81	N.S.	N.S.	N.S.	N.S.	2.52	3.90
Stumps	Y	211.60	235.10	9.93	10.83	8.86	7.80	47.53	89.10
	G	215.92	259.70	9.20	10.73	8.06	7.50	54.06	103.60
	S	199.66	245.15	9.30	10.83	8.30	7.76	47.46	95.46
	B	222.53	248.33	9.60	10.83	8.23	7.50	52.43	99.06
	A	215.10	252.66	9.36	11.36	8.60	7.55	55.05	108.63
	Con	201.66	215.83	9.50	10.93	8.10	7.56	44.43	90.43
Offshoots	Y	220.33	245.25	9.50	11.03	8.06	7.50	46.93	91.30
	G	227.40	267.30	10.03	11.95	8.03	7.70	55.70	107.86
	S	231.57	243.84	9.83	10.33	8.40	7.75	49.36	95.43
	B	225.79	243.01	9.53	10.80	8.16	8.00	52.30	99.50
	A	225.66	263.78	10.05	11.23	8.55	8.15	52.10	105.43
	Con	200.66	219.00	9.60	10.83	8.46	7.46	45.86	90.60
L.S.D.		N.S.	6.81	0.51	N.S.	N.S.	N.S.	N.S.	5.52

Y = yeast extract solution , G = garlic extract solution , S = salicylic acid , B = borax solution , A = anti fungi , Con = control treatment

Table 10 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flower head physical quality of globe artichoke during 2010/2011 season.

Properties / Treatments		Season II							
		Average head weight (g)		Head length (cm)		Head diameter (cm)		Edible part weight (g)	
		Early yield	Late yield	Early yield	Late yield	Early yield	Late yield	Early yield	Late yield
Stumps		218.26	243.59	9.63	11.37	8.34	7.84	50.59	96.94
Offshoots		208.23	243.34	9.60	11.48	8.26	7.67	50.41	98.44
L.S.D.		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	1.36
Yeast		223.50	227.03	9.70	11.23	8.11	7.65	45.68	90.43
Garlic Ext.		210.70	260.11	9.53	11.44	8.50	7.76	55.73	111.40
Salicylic		204.96	246.99	9.46	11.66	8.11	7.53	48.05	93.61
Borax		225.30	246.99	9.93	11.20	8.47	7.85	52.61	99.16
Anti fungi		214.55	256.83	9.51	11.49	8.47	8.03	54.68	102.50
Control		200.50	222.85	9.59	11.52	8.15	7.72	46.25	89.00
L.S.D.		16.00	4.87	N.S.	N.S.	0.33	N.S.	1.77	3.67
Stumps	Y	236.66	232.70	9.63	11.16	8.30	7.66	45.83	88.23
	G	208.30	255.89	9.80	11.43	8.60	7.83	54.76	110.30
	S	210.93	244.61	9.60	11.76	8.43	7.76	49.03	93.20
	B	231.60	247.33	9.83	11.03	8.25	7.96	52.16	99.00
	A	222.10	258.34	9.43	11.43	8.50	8.10	54.86	102.46
	Con	200.00	222.66	9.53	11.40	7.96	7.75	46.90	88.46
Offshoots	Y	210.33	221.37	9.76	11.30	7.90	7.63	45.53	92.63
	G	213.10	264.33	9.26	11.45	8.40	7.70	56.70	112.50
	S	198.99	249.36	9.33	11.56	7.80	7.30	47.06	99.03
	B	219.00	246.65	10.03	11.36	8.70	7.73	53.06	99.33
	A	207.00	255.33	9.60	11.55	8.45	7.96	54.50	102.63
	Con	201.00	223.03	9.65	11.65	8.33	7.70	45.60	89.53
L.S.D.		N.S.	6.89	N.S.	N.S.	0.46	N.S.	N.S.	N.S.

Y = yeast extract solution , G = garlic extract solution , S = salicylic acid , B = borax solution , A = anti fungi , Con = control treatment

the second season the highest values were recorded in case of using stumps in propagation. Obtained results are similar to those reported by **Kasim *et al.* (2003)** In case of offshoots and **Badawy *et al* (2006)** in case of using stumps. However , **Agwah *et al.* (1990) and El-Abagy (1993)** did not show any effects due to using different propagation materials.

4-4-b. Effect of growth stimulants and antiseptic substances.

Data in the same Tables indicate that pre planting treatments with difference growth stimulants and antiseptic materials increased all physical quality indices compared with the control treatment. Obtained results are true during both seasons of study. In addition, the differences among the tested treatments and the control reached the level of significance in case of average head weight and edible part weight in early and late yield during both seasons of study. Also, head diameter were significant in case of early yield in second season only. Moreover, the highest values were recorded as a result of treatment the propagation materials with garlic extract in case of head weight and edible part weight in late yield in both season and second season only in case of head weight and edible part weight respectively, and edible part weight in early yield during both seasons of study. However, using antifugi mixture reflected the highest values in head diameter in early and late yield in the first season and late yield in the second one. Also, the same treatment gave the highest values in edible part weight in late yield in the first season. In these regard, treatment propagation materials with borax as antiseptic substances resulted in the highest values of average head weight in early yield during the

first season and head weight and had length for early in the second season . Furthermore , using yeast extract and salicylic acid as growth stimulants in treating the propagation materials pre-planting exhibited the highest values in head length in early and late yield, respectively during the first season in case of yeast extract and the second season in case of salicylic acid in this connection **El-Zohiri (2009)** using salicylic acid , **Agwah *et al.*** (1990) and **Hasan (2007)** using antifungi, **Shafshak *et al.* (2004)** using garlic extract and salicylic acid, **Shafshak (1987)** reported that using of such growth stimulants (boron) and antiseptic material inhansed the assayed fruit chemical quality traits.

4-4-c. **Effect of the interaction.**

Data in Tables 9 and 10 indicate that no significant differences as a result of the interaction among the tested propagation materials and the growth stimulants and antiseptic substance in most measured physical quality traits in both seasons except average head weight in late yield during both seasons and average head length in early yield during the first season . Also, average edible part weight in late yield during the first season and average head diameter in early yield during the second one. However, using offshoots with different pre planting treatments exhibited the highest values in most physical quality characters in both seasons.

4-5. Chemical fruit quality.

Data presented in Tables 11 and 12 show the effect of propagation materials and pre planting treatment with growth stimulants and antiseptic substances as well as their interaction

on flower head chemical quality expressed as dry matter, inuline, fibers and carbohydrates percentage in early and late yield during both seasons of study.

4-5-a. **Effect of propagation materials.**

Such data presented in Tables 11 and 12 clearly show that there were no significantly differences among the tested propagation materials in all assayed chemical constituents in early flower head yield and late one during both seasons of study. In this respect, the highest values were recorded in case of using old crown (stumps) in propagation compared with using offshoots . Obtained results may be due to no differences in genetically potentiality between the used part in propagation . Such results are agreement with those reported by **Salamah (1997), Abo El-Fadel (1999) and Badawy *et al* (2006).**

4-5-b. Effect of growth stimulants and antiseptic compounds.

The same data in Tables 11 and 12 indicate that pre planting soaking of propagation materials in growth stimulants and antiseptic compounds significantly enhanced dry matter, inuline and total carbohydrates percentage in early and late yield of flower head during both seasons of study compared with the control treatment. However it decreased fiber contents in produced flower heads during the two season of growth compared with the control treatment. In this regarded, the highest values of dry matter, inuline and total carbohydrates percentage and the lowest values of fiber content were recoded as a results of pre planting soaking of propagation materials i.e., stumps and offshoots in garlic extract solution at rate of 50 ml/l. Obtained results are coincided with those reported by

Table 11Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flower head chemical quality of globe artichoke during 2009/2010 and 2010/2011 seasons.

Properties / Treatments		Season I				Season II			
		Dry matter (%)		Inuline %		Dry matter (%)		Inuline %	
		Early yield	Late yield	Early yield	Late yield	Early yield	Late yield	Early yield	Late yield
Stumps		10.787	15.094	0.522	0.395	10.637	15.238	0.520	0.399
Offshoots		10.677	15.024	0.520	0.394	10.579	15.294	0.515	0.400
L.S.D.		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Yeast		10.143	14.647	0.479	0.354	9.995	14.582	0.461	0.360
Garlic Ext.		11.547	15.537	0.601	0.465	11.560	15.945	0.593	0.474
Salicylic		10.372	14.883	0.485	0.382	10.263	15.337	0.487	0.386
Borax		11.283	15.447	0.564	0.427	11.108	15.337	0.565	0.431
Anti fungi		11.102	15.705	0.534	0.402	10.815	15.762	0.523	0.409
Control		9.947	14.137	0.464	0.338	9.905	14.637	0.477	0.338
L.S.D.		0.394	0.359	0.012	0.085	0.443	0.479	0.015	0.004
Stumps	Y	10.130	14.510	0.484	0.355	9.913	14.333	0.457	0.360
	G	11.833	15.273	0.604	0.462	11.837	15.930	0.595	0.476
	S	10.193	14.970	0.479	0.385	10.357	15.213	0.490	0.381
	B	11.793	15.623	0.571	0.431	11.080	15.393	0.577	0.425
	A	10.720	15.653	0.540	0.403	10.723	15.843	0.521	0.414
	Con	10.053	14.533	0.455	0.334	9.910	14.717	0.480	0.341
Offshoots	Y	10.157	14.783	0.475	0.353	10.077	14.830	0.464	0.360
	G	11.260	15.800	0.598	0.467	11.283	15.960	0.590	0.472
	S	10.550	14.797	0.491	0.380	10.170	15.460	0.484	0.391
	B	10.773	15.270	0.558	0.422	11.137	15.280	0.553	0.437
	A	11.483	15.757	0.528	0.401	10.907	15.680	0.525	0.405
	Con	9.840	13.740	0.472	0.341	9.900	14.557	0.475	0.335
L.S.D.		**0.557**	**0.508**	**0.017**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**0.005**

Y = yeast extract solution, G = garlic extract solution , S = salicylic acid , B = borax solution, A = anti fungi , Con = control treatment

Table 12 Effect of propagation materials, growth stimulants and antiseptic substance as well as their interaction on flower head chemical quality of globe artichoke during 2009/2010 and 2010/2011 seasons.

Properties / Treatments		Season I				Season II			
		Fiber contents (mg/g dw)		Total carbohydrates (%)		Fiber contents (mg/g dw)		Total carbohydrates (%)	
		Early yield	Late yield	Early yield	Late yield	Early yield	Late yield	Early yield	Late yield
Stumps		4.957	7.360	7.954	6.209	4.965	7.351	7.949	6.211
Offshoots		4.896	7.393	7.954	6.218	9.903	7.411	7.965	6.232
L.S.D.		N.S.	N.S.	N.S.	N.S.	N.S.	0.032	N.S.	N.S.
Yeast		4.991	8.000	7.409	6.600	4.999	7.976	7.408	6.599
Garlic Ext.		4.687	6.572	8.594	5.962	4.678	6.559	8.598	5.955
Salicylic		4.946	7.396	7.975	6.294	4.965	7.381	7.959	6.299
Borax		4.720	6.827	8.303	5.424	4.814	6.839	8.303	5.430
Anti fungi		4.906	7.041	8.201	6.002	4.930	7.031	8.201	6.074
Control		5.309	8.422	7.243	6.998	5.219	8.499	7.273	6.973
L.S.D.		0.114	0.108	0.023	0.012	0.076	0.114	0.038	0.023
Stumps	**Y**	5.042	7.995	7.410	6.607	5.021	7.981	7.408	6.602
	G	4.697	6.579	8.592	5.921	4.700	6.527	8.600	5.920
	S	4.911	7.366	7.975	6.294	4.951	7.329	7.949	6.297
	B	4.743	6.828	8.307	5.429	4.879	6.805	8.301	5.431
	A	4.965	7.004	8.201	6.013	4.903	6.953	8.200	6.061
	Con	5.383	8.387	7.241	6.990	5.337	8.511	7.238	6.956
Offshoots	**Y**	4.940	8.005	7.408	6.594	4.977	7.970	7.408	6.597
	G	4.677	6.565	8.595	6.003	4.656	6.591	8.596	5.990
	S	4.981	7.426	7.975	6.294	4.979	7.434	7.970	6.300
	B	4.698	6.825	8.298	5.419	4.748	6.874	8.305	5.429
	A	4.846	7.078	8.202	5.991	4.957	7.109	8.203	6.087
	Con	5.236	8.458	7.245	7.005	5.101	8.486	7.308	6.990
L.S.D.		N.S.	N.S.	N.S.	0.017	0.108	N.S.	N.S.	0.032

Y = yeast extract solution , G = garlic extract solution , S = salicylic acid , B = borax solution , A = anti fungi , Con = control treatment

Abou El-Yazied and Mady (2012) on broad bean they found that application of yeast extract or boron increased total carbohydrates content in seeds.

4-5-c. **Effect of the interaction .**

With regard to the effect of the interaction, data in the same Tables reveal that irrespective of dry matter percentage in early and late yield and inuline in early yield and carbohydrates in late yield during the first season and inuline percentage in late yield and fiber content in early yield and carbohydrates in late yield during the second season which were significantly affected due to the interaction treatments all other determined chemical quality traits were not significantly affected during both seasons of study. However, the highest values of dry matter and inuline percentage and the lowest values of fiber content were obtained as a results of pre planting soaking of stumps in garlic extract while the highest values of fiber and total carbohydrates contents especially in late yield were noticed in case of the interaction treatment between using offshoots in propagation without soaking in any antiseptic and growth stimulates solution during both seasons of study.