Assiut Journal of Agricultural Science, 37 (4) (173-187)

EFFECT OF SPRAYING GIBBERELLIC ACID AND WETTING AGENT FILM ON YIELD AND FRUIT QUALITY OF ZAGHLOUL DATE PALMS UNDER ASSIUT CLIMATIC CONDITIONS

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Abstract: The aim of this study was to maximize yield and improve fruit quality of Zaghloul date palms by spraying GA_3 (50 ppm) or Sida Film (as wetting agent, 1 cm^3/1L) at three different growth stages of dates (Hababouk, Kimri and Khelal stages). Therefore, this investigation was carried out at the Fruit Orchard, Faculty of Agriculture, Assiut University in 2001 and 2002 on twenty one palms using split-plot arrangement of complete randomized block design (CRB) with 3 replicates, one palm each. The chosen palms were pollinated with a known male palm leaving 9 bunches/palm with 8:1 leaf/bunch ratio throughout the two studied seasons. According to the obtained results from this study, it could be concluded that all treatments with GA_3 or Sida film significantly increased bunch weight and consequently yield weight/palm. Moreover, GA_3 was superior than Sida film and it was more effective at the 1st growth stage of dates (Hababouk stage). In addition, either GA_3 or Sida film resulted in significant increase in physical characters of fruits, and showed no constant effect on chemical characters of Zaghloul dates. These results are important for economic and horticultural point view. It could be recommended under these conditions and the resembling conditions that spraying either GA_3 (50 ppm)or Sida film (1 cm^3/1L) at Hababouk stage was useful to get high yield with good dates quality.

Key words: Zaghloul date palms, wetting agent, bunch weight, yield, fruit quality.

Introduction

Zaghloul date palm cv. is considered one of the best soft date palm cvs. in Egypt. Therefore, many efforts were done by date palm growers to improve yield or fruit quality of dates. One of these efforts is applying some growth regulators (i.e. GA_3 or IAA) and other certain specific compounds. Hussein *et al*. (1976) pointed out that spraying GA (100 to 1000 ppm) on bunches of Barhi date palms at 3-4 weeks after pollination increased

average bunch weight, but failed to improve fruit quality. Untreated (control) fruits coloured and ripened earlier 7-15 day than treated fruits with 250-1000 ppm of GA_3. All treatments with GA_3 lowered dry weight per fruits.

Asif *et al*. (1982) found that pre-harvest application of GA_3 (100 ppm) at late Kimri stage of Gur and Khalas date palm cvs. tended to increase fruit length and fruit diameter. As well as, GA_3 increased fruit weight, fruit size, pulp and pulp/seed ratio. In addition to that GA_3 application, particularly in Khalas cv., delayed fruit ripening which could be considered advantageous in extending rutab stage.

Abou Aziz *et al.* (1983) deduced that GA_3 applications at 50 or 100 ppm, 60 days after full bloom of Sewy spadices increased bunch weight, average fruit weight, flesh weight, length and diameter of fruit.

El-Kassas (1983) found that both bunch or flesh weight per fruit increased with GA_3 application at 50, 100 or 200 ppm within two weeks after pollination of Zaghloul date palm. He added that flesh weight percentage increased as increasing GA_3 concentration, while seed weight % decreased. Accordingly, flesh/seed ratio tended to increase as a result of GA_3 applications. Also, GA_3 treatments increased fruit length and diameter.

Mohammed *et al*. (1986) showed that GA_3 application (50, 100 or 150 ppm) on bunches of Zahdi and Sayer date palm cvs. during the slow period of development (12-14 week after full bloom and pollination) had no marked improvement in length, diameter, weight, volume of fruit and pulp weight of both cultivars except for Zahdi cv. at 150 ppm of GA_3.

Moreover, Al-Juburi *et al*. (2001a) reported that GA_3 application (100 ppm) on bunches of Khaniczy date palm cv., Al-Juburi *et al*. (2001b) applied GA_3 (150 ppm, 20 day after pollination) on bunches of Barhi date palm. They noticed that GA_3 had no constant effect on physical and chemical characteristics of dates.

Moustafa and Seif (1993) found that spraying GA_3 (50, 100, 150 or 200 ppm) four weeks after fruit set of Seewy dates had no effect on fruit set, flesh moisture % and TSS% during the 1st season of the study. While, all GA_3 treatments decreased TSS% and total sugars % especially at (50 or 200 ppm). These findings could be attributed to delaying fruit ripening by GA_3 application and also due to the dilution effect of increasing fruit weight.

Hussein *et al*. (1993a,b) found that spraying GA_3 (50 or 100 ppm) on bunches of Zaghloul and Samani date palm cvs. significantly increased bunch weight, as well as fruit length, diameter, weight and

size. These findings might be attributed to stimulation effects of GA_3 on growth as results of cell division and cell enlargement. While GA_3 application delayed fruit ripening with 2-3 weeks in comparison with untreated control palms. Moreover, GA_3 increased total acidity (TA%). Contrary to that GA_3 caused slight reduction in TSS% and total sugars %. These results might be due to effect of GA_3 on delaying fruit ripening and increasing moisture content in fruits.

Kassam *et al*. (1994) reported that bagging spathes of Zaghloul and Samani cvs. during flowering and fruit setting period showed a beneficial effect concerning fruit set, yield and dates quality. El-Salhy (2000) reported that bagging of Zaghloul date palm cv. (45 days after pollination) resulted in increasing bunch weight and consequently yield/palm. Physical and chemical properties of fruits were improved, except pulp % of fruit and TSS%.

Therefore, the objectives of this study were examining the effect of spraying date palm bunches with GA_3 or Sida film (as wetting agent) on bunches of Zaghloul date palm during three different growth stages (Hababouk, Kimri and Khelal stages) on yield and fruit quality of Zaghloul date palms grown under Assiut climatic conditions.

Materials and Methods

This study was carried out on Zaghloul date palm cv. during two successive seasons 2001 and 2002 in the Experimental Pomology Orchard, Department of Horticulture, Faculty of Agriculture, Assiut University. Twenty-one date palms, 25 years old, approximately have the same number of leaves/palm were subjected to the same horticultural practices and leaf-pruning leaving 9 bunches/palm and according 1:8 bunch/leaf ratio (El-Kassas *et al*., 1995, Abd El-Hamid, 2000 and El-Salhy, 2001). Moreover, one known male palm was used as a pollinator for the selected palms during the two studied seasons. The experiment was conducted as split plot arrangement of complete randomized block design with three replicates, one palm each, whereas, GA_3 or Sida film was considered as whole plot (A), while 3 different growth stages of dates were splits (B). To study effect of spraying GA_3 (50 ppm) or Sida film (1.0 cm^3/1L, as wetting agent registered under No. 972 at Ministry of Agriculture, Egypt) during three different growth stages of Zaghloul dates seven different treatments were achieved as follows; 1) untreated (control) palms, sprayed only with water, 2) spraying GA_3 (50 ppm) during 3 different growth stages of dates, i.e, Hababouk (one month after pollination), Kimri and

Khelal stages, and 3) as well as spraying Sida film (1.0 cm^3/1L). For realizing the objective of this investigation, changes in yield components (bunch weight (kg) and yield weight (kg/palm), as well as physical and chemical characters of mature dates were examined in response to the aforementioned treatments. All bunches were harvested when they reached to the commercially derived colour at the first week of September. Bunches weights were recorded, then the yield per palm was determined. Sixty mature fruits (at Khelal stage) were picked at random from each replicate for the determination of physical and chemical fruit properties as outlined in A.O.A.C. (1985). Furthermore, all recorded data were tabulated and statistically analyzed according to Snedecor and Cochran (1990) using L.S.D. at 0.05 level in comparing treatments means of this study.

Results and Discussion

1-Effect of GA_3 and Sida film (as wetting agent) on bunch weight and yield/palm:

As shown in Table (1) it could be observed that all treatments with GA_3 or Sida film induced significant increases in bunch weight (kg) and yield weight/palm of Zaghloul date palm cv. in the two studied seasons of this study.

Concerning effects of spraying GA_3 (50 ppm) at different 3 growth stages of dates, it was clear that GA_3 was more effective at Hababouk stage rather than other 2 growth stages, whereas GA_3 induced the heaviest bunch weight at 1st stage, followed by Khelal stage, then Kimri stage during the two seasons of this study, all in comparison with untreated control palms.

Regarding Sida film effects on bunch weight, it could be noticed that spraying Sida film showed the same trend of GA_3 through the two seasons of this investigation. However, spraying GA_3 showed superior effects on increasing bunch weight than Sida film effects on this parameter.

The rate of increment in bunch weight in response to GA_3 or Sida film spraying were (14.48 and 5.42% av. two seasons) due to GA_3 or Sida film spraying, respectively, comparison to unsprayed ones. Such increment were attained to (9.34, 5.85 and 7.18% av. two seasons) as treated at the 1st, 2nd or 3rd growth stages of dates, respectively.

Data of interaction, indicated that all GA_3 treatments increased the bunch weight than Sida film treatments and the highest bunch weight obtained due GA_3 spraying at the 1st growth stage of dates.

These obtained results could be attributed with enhancement effects of spraying GA_3 on cell enlargement of dates during active growth stages.

Consequently heavy weight fruit and bunch could be obtained at harvest.

Regard to the effects of spraying GA_3 (50 ppm) at 3 different growth stages of Zaghloul dates, it was clear that GA_3 significantly increased yield weight (kg/palm) during the two studied seasons, whereas GA_3 was more effective at Hababouk stage (1st stage of dates growth), whereby GA_3 produced the heaviest weight of yield/palm in comparison with other treatments and untreated control palms.

Concerning effects of spraying Sida film (1.0 cm^3/1L) at different growth stages, it was obvious that Sida film resulted in significant increase in yield weight (kg/palm). Moreover, Sida film showed the same trend of spraying GA_3 on yield weight throughout the two seasons of the study.

The interaction between the two studied factors significantly increased the yield (kg/palm), however, all GA_3 spraying signify-cantly increased the yield kg/palm comparable to Sida film spraying, especially during the second seasons. The increment percentage of yield kg/palm due to spraying GA_3 and Sida film were (14.77 and 7.07% av. two seasons) as comparable to unsprayed, respectively. Moreover, the highest yield kg/palm was obtained as spraying GA_3 at the first growth stage during the second season (176.22 kg/palm). Such, results may be to effect of treatments in increasing the bunch weight. The increase in bunch weight surely reflected in increasing the yield of treated palm.

These obtained findings are on the line of the early results and reported by Hussein *et al*. (1976) on Barhi dates, El-Kassas (1983) on Zaghloul dates and Hussein *et al*. (1993) on Zaghloul and Samani dates, where they deduced that spraying GA_3 on different concentrations resulted in significant increases in bunch weight and consequently yield weight/palm. On the other hand, Al-Juburi and Al-Masry (2003) on Khadrawy dates found that spraying GA_3 (100 ppm) showed no constant effects on yield weight (kg/palm).

2- Weight and volume of fruits:

Data presented in Table (2) illustrated significant increase in both weight (g) and volume (cm^3) of Zaghloul dates as affected by spraying GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) at the 3 different growth stages throughout the two studied seasons.

Concerning GA_3 effects on both weight or volume of dates, it was obvious that spraying GA_3 at the three different growth stages of Zaghloul dates enhanced both of weight or volume of dates during the two seasons of this work. According to the obtained results, it could be noticed that GA_3 was more

Table(1): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on bunch weight (kg) and yield weight (kg)/palm of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Bunch weight (kg)				Yield weight (kg)/palm			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	16.58	15.17	15.50	15.75	149.22	136.53	139.50	141.75
GA_3	17.58	16.42	17.27	17.09	158.22	147.78	155.43	153.81
Sida film	18.83	16.00	17.17	16.66	164.70	144.00	154.53	154.41
Mean	17.66	15.86	16.65		157.38	142.77	149.82	
Season 2002								
Control	15.68	15.92	16.42	16.05	141.12	143.28	147.78	144.06
GA_3	19.58	18.92	19.50	19.33	176.22	170.28	175.50	174.00
Sida film	17.50	16.33	16.75	16.86	157.50	146.97	150.75	151.74
Mean	17.59	17.06	17.56		158.28	153.51	158.01	
L.S.D. 0.05								
	Season 2001				Season 2002			
	Bunch Wt.		Yield Wt.		Bunch Wt.		Yield Wt.	
Compound (A):	0.17		1.63		0.26		2.24	
Appl. Time (B)	0.40		3.80		0.30		2.60	
Inter. AxB:	0.59		5.21		0.53		4.57	

Table (2): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on fruit weight (g) and fruit volume (cm^3) of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Fruit weight (g)				Fruit volume (cm^3)			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	18.05	17.66	17.81	17.84	19.33	18.67	18.50	18.83
GA_3	22.47	22.04	20.02	21.51	23.17	22.33	20.50	22.00
Sida film	20.74	21.67	18.57	20.33	22.00	23.83	20.83	22.22
Mean	20.42	20.46	18.80		21.50	21.61	19.94	
Season 2002								
Control	15.63	17.76	16.73	16.71	16.67	18.33	17.33	17.44
GA_3	21.80	20.86	17.96	20.21	22.17	21.83	18.33	20.78
Sida film	20.08	20.00	16.96	19.01	22.17	22.00	18.50	20.89
Mean	19.17	19.54	17.17		20.34	20.72	18.05	
L.S.D. 0.05								
	Season 2001				Season 2002			
	Fruit Wt.		Fruit V.		Fruit Wt.		Fruit V.	
Compound (A):	0.66		0.50		0.28		0.51	
Appl. Time (B)	0.41		0.43		0.26		0.36	
Inter. AxB:	0.70		0.75		0.45		0.63	

effective on fruit weight or volume when it was sprayed at Hababouk stage than the other growth stages tested during the course of this study. As well as, spraying Sida film (1.0 cm^3/1L) at the three different growth stages of dates induced the same trend of GA_3 spraying effects on both weight or volume of dates, all results were in comparison with untreated control palms. The increment percentage of fruit weight due to spraying at the 1^{st}, 2^{nd} and 3^{rd} growth stages of dates were attained to (17.89, 12.94 and 4.08% av. two seasons), respectively. Such increment of fruit weight due to spraying over unsprayed were (20.76 & 13.86% av. two seasons) due to GA_3 and Sida film spraying, respectively. As interaction, the highest fruit weight were obtained from bunches that sprayed with GA_3 at the first growth stage of dates. The positive action of GA_3 on stimulating cell elongation process, enhancing the water absorption and stimulating the biosynthesis of proteins (Thomas, 1979) could explain the present results.

These obtained results of this study are in agreement with those found by Asif *et al*. (1982) on Khalas dates and Hussein *et al*. (1993a,b) on Zaghloul and Samani dates, where they pointed out that spraying GA_3 improved weight and volume of fruits. On contrary to that Mohammed *et al*. (1986) showed that applying GA_3 on bunches of Zahdi and Sayer date palm cvs. (at 12-14 weeks after pollination) had no marked improvement in weight or volume of fruits. Moreover, El-Salhy (2000) reported that bagging bunches of Zaghloul date palms (45 days after pollination) resulted in improving physical properties of fruits, except pulp %/fruit.

3- Length and diameter of fruit:

As shown in Table (3), data indicated that significant differences were exhibited by spraying GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) at the three different growth stages in both length and diameter of Zaghloul dates in comparison with untreated (control) palms during the two studied seasons.

Regarding effects of spraying GA_3 (50 ppm) at the three different growth stages of dates, it was clear that GA_3 spraying resulted in significant increase in both length or diameter of dates throughout the two seasons of this work. Furthermore, GA_3 spraying showed superior effects on both length and diameter of dates than Sida film effects on this parameter during the two seasons of this study. However, Sida film spraying took the same trend of GA_3 spraying effects on this connection during the 1^{st} season, and all reversible trend in the 2^{nd} season in comparison with untreated control palms.

Concerning effects of GA_3 or Sida film spraying on length or diameter of dates during the different growth stages, both GA_3 or Sida film showed dramatic effects on length or diameter of dates under the conditions of this study.

The results obtained from this study are in harmony with those reported by Asif *et al*. (1982) on Gur and Khalas date palms, El-Kassas (1983) working with GA_3 on Zaghloul date palms, Mohammed *et al*. (1986) on Zahdi and Sayer date palms, and Hussein *et al*. (1993 a,b) on Zaghloul and Samani date palms where they demonstrated that treatments with GA_3 increased both length and diameter of fruit. As well as Kassam *et al*. (1994) and El-Salhy (2000) deduced that bagging Zaghloul and Samani bunches improved fruit physical characteristics except pulp % per fruit.

On the other hand, Hussein *et al*. (1976) on Barhi date palms, Al-Juburi *et al*. (2001a,b) on Khaniczy and Barhi date palms, and Al-Juburi and Al-Masry (2003) on Khadrawy date palms showed that spraying GA_3 had no constant effect on fruit characteristics or failed to improve fruit quality.

4- Flesh weight and seed weight percentage/fruit:

Data recorded in Table (4) indicated that spraying GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) at the three different growth stages of Zaghloul dates resulted in significant differences in both flesh weight (g) or seed weight % of dates during the two studied seasons.

Concerning effect of spraying GA_3 (50 ppm) at the different growth stages of Zaghloul dates, it could be observed that GA_3 resulted in significant increase in flesh weight/fruit.

On contrary to that spraying GA_3 induced a significant decrease in seed weight %. Moreover, spraying GA_3 at Hababouk or Kimri stage showed a superiority effect on flesh weight, seed weight % per fruit than spraying it at the other growth stages studied during this study, all data were compared with untreated control palms in the two studied seasons.

As well as, spraying Sida film at the different 3 growth stages induced significant increase in flesh weight/fruit, while it caused a significant decrease in seed weight % with the exception of Sida film spraying during the 1st growth season induced a slight increase in seed weight %, all results in comparison with untreated control palms.

Furthermore, data of interaction declared that the highest flesh weight recorded as GA_3 spraying at the 1st growth stage of dates (20.74 & 19.14 g) in two studied seasons, respectively. However, the least

Table(3): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on fruit length and fruit diameter of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Fruit length (cm)				Fruit diameter (cm)			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	4.83	5.04	4.81	4.89	2.63	2.48	2.62	2.58
GA_3	5.14	5.39	5.60	5.38	2.70	2.63	2.77	2.70
Sida film	4.63	5.23	5.01	4.96	2.59	2.62	2.74	2.65
Mean	4.87	5.22	5.14		2.64	2.58	2.71	
Season 2002								
Control	5.00	4.67	4.93	4.87	2.27	2.07	2.27	2.20
GA_3	5.07	5.27	4.97	5.10	2.43	2.60	2.53	2.52
Sida film	4.47	4.87	4.97	4.77	2.00	2.07	2.33	2.13
Mean	4.85	4.94	4.96		2.23	2.25	2.38	
L.S.D. 0.05								
	Season 2001				Season 2002			
	Fruit L.		Fruit D.		Fruit L.		Fruit D.	
Compound (A):	0.34		0.15		0.27		0.04	
Appl. Time (B)	0.16		0.10		0.14		0.09	
Inter. AxB:	0.28		0.18		0.24		0.16	

Table(4): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on flesh weight (g) and seed weight (%) of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Flesh weight (g)				Seed weight (%)			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	16.51	15.90	16.08	16.16	8.53	9.97	9.71	9.40
GA_3	20.74	20.49	18.57	19.93	7.70	7.03	7.24	7.32
Sida film	18.77	19.67	16.60	18.35	9.45	9.23	10.61	9.76
Mean	18.67	18.69	17.08		8.56	8.74	9.19	
Season 2002								
Control	13.78	15.89	14.92	14.86	11.84	10.53	10.82	11.06
GA_3	19.14	19.14	16.28	18.19	7.71	8.24	9.35	8.43
Sida film	18.03	18.05	15.30	17.13	10.21	9.76	9.78	9.92
Mean	16.98	17.69	15.50		9.92	9.51	9.98	
L.S.D. 0.05								
	Season 2001				Season 2002			
	Flesh Wt.		Seed Wt.		Flesh Wt.		Seed Wt.	
Compound (A):	0.59		0.27		0.25		0.68	
Appl. Time (B)	0.40		N.S.		0.36		0.42	
Inter. AxB:	0.69		1.23		0.62		0.73	

seed weight % obtained for GA_3 spraying at the 2nd growth stage of dates in the first season (7.03%), GA_3 exhibited more effects on flesh weight or seed weight % than Sida film. These obtained results from this work are in agreement with those reported by Asif *et al*. (1982) on Gur and Khalas date palms, El-Kassas (1983) on Zaghloul date palms, where they reported that spraying GA_3 increased flesh weight or flesh/seed ratio/fruit, decreased seed weight %/fruit. On versus to that Mohammed *et al*. (1986) on Zahdi and Sayer date palms, Al-Juburi *et al*. (2001a,b) on Khaniczy or Barhi date palms, and Al-Juburi and El-Masry (2003) on Khadrawy date palms showed that GA_3 application had no constant effects on flesh weight or seed weight % per fruit of the studied date palm cvs.

5- Total soluble solids % (TSS%) and total sugars % (based on fruit fresh weight):

As shown in Table (5) data reveled that all treatments with GA_3 or Sida film at three different growth stages of Zaghloul dates induced significant effect in TSS% in dates extract in 2001 and 2002 seasons.

Concerning the effect of spraying GA_3 (50 ppm) at 3 different growth stages of dates, it could be noticed that GA_3 resulted in the highest level of TSS% at the 2nd and the lowest level of TSS% in dates at the 3rd growth stage (Khelal stage), in comparison with untreated (control) palms during the two studied seasons.

Regarding Sida film (1.0 cm^3/1L) effect on TSS%, it was observed that spraying Sida film caused a significant reduction in TSS% in dates during the 1st season, while induced a slight increase in TSS% in dates at the 2nd season, all in compared with untreated (control) palms.

In comparing GA_3 with Sida film, it was clear that GA_3 showed superior effects rather than Sida film specially at the 2nd growth stage of dates (Kimri stage) under the conditions of this study.

Furthermore, data presented in Table (5) indicated that spraying GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) at 3 different growth stages of dates resulted in significant increases in total sugars % based on fresh weight of mature dates during the two studied seasons.

Regarding effect of GA_3 on total sugars % in dates extract, it was found that spraying GA_3 at the 2nd growth stage (Kimri stage) was more effective that other growth stages whereas GA_3 gave the highest level of total sugars %, followed by GA_3 at the 3rd growth stage (Khelal stage), while produced the lowest level of total sugars at the 1st growth stage (Hababouk stage), all in compared with untreated (control) palms in the two seasons.

Concerning effect of Sida film on total sugars % in dates, it was noticed that Sida film took the same trend of GA_3 during the two studied season. Nevertheless, GA_3 showed superior in improving total sugars % in dates than Sida film, all in comparison with untreated (control) palms.

These obtained findings from this study are in disagreement with those reported by Moustafa and Seif (1993) on Seewy date palms and Hussein *et al*. (1993a,b) on Zaghloul and Samani date palms, where they found that spraying GA_3 caused slight reduction in TSS% and total sugars % and they deduced that the obtained results by them could be due to the delaying effects of GA_3 on fruit ripening and increasing moisture contents in fruits.

On the other hand, Al-Juburi and Al-Masry (2003) deduced that GA_3 had no constant effect on TSS% in date fruits, while Kassam *et al*. (1994) and El-Salhy (2000) reported that bagging of Zaghloul date bunches improved chemical properties of fruits.

6-Reducing and non-reducing sugars % (based on fruit fresh weight)

Data presented in Table (6) showed that all treatments with both GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) at three different increase in reducing sugars content % based on bunch weight of dates during the two studied seasons of this research.

Regarding to effects of spraying GA_3 (50 ppm) at 3 different growth stages, it could be noticed that GA_3 spraying was more effective at the 2nd growth stage of Zaghloul date (Kimri stage) during the 1st season while it was more effective at the 3rd growth stages (Khelal stage) during the 2nd season.

Concerning the effects of spraying Sida film (1.0 cm^3/1L) at 3 different growth stages, it was observed that spraying Sida film gave the highest level of reducing sugars content % at the 3rd growth stage (Khelal stage) during the two studied seasons compared with untreated (control) palms.

7- Non-reducing sugars % (based on fresh weight of fruit):

Moreover, data recorded in Table (6) indicated that all treatments with GA_3 (50 ppm) or Sida film (1.0 cm^3/1L) induced slight decrease in non-reducing sugars content % in Zaghloul dates during the 1st season, while all treatment caused significant increase in non-reducing sugars content % based on fresh weight of dates during the 2nd seasons in comparison with untreated (control) palms.

In comparison between spraying GA_3 and Sida film at 3 different

Table(5): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on total soluble solids (TSS%) and total sugars (%) of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Total soluble solids (TSS%)				Total sugars % (fresh w. basis)			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	29.17	33.00	30.00	30.72	25.77	27.25	24.99	26.00
GA_3	31.67	34.50	30.50	32.22	25.89	27.82	27.61	27.11
Sida film	29.33	30.08	30.50	29.97	26.68	26.70	26.74	26.71
Mean	30.06	32.53	30.33		26.10	27.25	26.51	
Season 2002								
Control	29.33	31.50	30.00	30.28	24.09	23.72	22.33	23.38
GA_3	31.50	32.17	31.17	31.61	25.88	28.04	26.80	26.91
Sida film	31.33	31.83	29.50	30.89	23.11	27.99	25.86	25.65
Mean	30.72	31.83	30.22		24.36	26.58	24.99	
L.S.D. 0.05								
	Season 2001				Season 2002			
	TSS%		T. sugars %		TSS%		T. sugars %	
Compound (A):	0.69		0.14		0.92		0.77	
Appl. Time (B)	0.31		0.23		0.34		0.42	
Inter. AxB:	0.53		0.39		0.59		0.73	

Table(6): Effect of spraying GA_3 (50 ppm) and Sida film (1.0 cm^3/1L) at Hababouk, Kimri and Khelal stages on reducing sugars (%) and non-reducing sugars (%) of Zaghloul date palm in 2001 and 2002 seasons.

Compound (A)	Reducing sugars (%)				Non-reducing sugars (%)			
	Application time (B)				Application time (B)			
	Hababouk stage	Kimri stage	Khelal stage	Mean	Hababouk stage	Kimri stage	Khelal stage	Mean
Season 2001								
Control	14.04	15.45	13.13	14.21	11.71	11.80	11.86	11.79
GA_3	14.14	16.13	15.87	15.38	11.75	11.69	11.74	11.73
Sida film	15.13	14.26	15.52	14.97	11.55	12.44	11.22	11.74
Mean	14.44	15.28	14.84		11.67	11.98	11.61	
Season 2002								
Control	13.81	12.90	11.69	12.80	10.29	10.82	10.65	10.58
GA_3	13.33	16.58	15.63	15.18	12.55	11.46	11.17	11.73
Sida film	12.25	15.87	14.33	14.15	10.86	12.12	11.53	11.50
Mean	13.13	15.12	13.88		11.23	11.47	11.12	
L.S.D. 0.05								
	Season 2001				Season 2002			
	Red-sugars %		Non-red-sugars %		Red-sugars %		Non-red-sugars %	
Compound (A):	0.54		N.S.		0.88		0.28	
Appl. Time (B)	0.38		0.34		0.67		0.24	
Inter. AxB:	0.65		0.60		1.17		0.42	

growth stages of Zaghloul dates, it could be found that spraying GA_3 was more effective at the 1st growth stage (Kimri stage) during the two studied seasons, while spraying Sida film was more effective of the 2nd growth stage (Kimri stage) during the two studied seasons compared with untreated (control) palms.

From this study, it could be recommended that using either GA_3 (50 ppm) or Sida film (1 cm^3/L) spraying at Hababouk stage can improve yield and fruit quality of Zaghloul date palm cv. under this study condition or the resembling once .

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تأثير رش حمض الجبريليك وغشاء المادة اللاصقة المبللة على محصول وجودة ثمار نخيل البلح الزغلول تحت ظروف أسيوط المناخية

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أجريت هذه الدراسة فى مزرعة كلية الزراعة جامعة أسيوط خلال موسمى 2001 ، 2002 على صنف نخيل البلح الزغلول بهدف دراسة تأثير رش حمض الجبريليك (50 جزء فى المليون) وغشاء المادة المبللة (السيدا فيلم تركيز 1 سم^3 / 1 لتر) خلال أطوار النمو الثلاثة لثمرة البلح الزغلول (الحبابوك ، الكمرى ، الخلال) على وزن المحصول وخصائص الثمار الطبيعية والكيميائية . وقد خصص لهذا البحث 21 نخلة وترك 9 سوباطات بكل منها فى حدود نسبة الأوراق إلى السوباطات (1:8) ولقحت جميعها بحبوب لقاح ذكر نخيل معلوم خلال موسمى الدراسة . وصممت التجربة بنظام القطع المنشقة كاملة العشوائية وكررت كل معاملة ثلاث مرات مع تخصيص نخلة لكل مكررة ، وتم جمع المحصول فى طور الخلال فى الأسبوع الأول من سبتمبر وأوضحت النتائج المتحصل عليها أن :

- رش حمض الجبريليك فى أطوار النمو الثلاثة لثمرة البلح الزغلول أدت إلى تحسين وزن السوباطة ووزن المحصول/نخلة وكذلك استخدام المادة اللاصقة (السيدا فيلم) إلا أن الأول تفوق كثيراً على الثانى خاصة فى طور النمو الأول (الحبابوك) مقارنة بالثمار غير المعاملة (الكنترول).
- أحدث رش كل من حمض الجبريليك ومادة السيدا فيلم تحسناً ملحوظاً فى الصفات الطبيعية التى درست لثمرة البلح الزغلول إلا أن حمض الجبريليك كان أفضل من السيدا فيلم فى هذا الشأن.
- لوحظ وجود تباين فى تأثيرات كل من حمض الجبريليك والسيدا فيلم بين الإيجابية والسلبية على الصفات الكيميائية التى درست لثمرة البلح الزغلول خلال أطوار النمو الثلاثة وكذلك من موسم نمو إلى آخر إلا أن التأثيرات الإيجابية تفوقت على التأثيرات السلبية للمعاملات مقارنة بخصائص الثمار غير المعاملة (الكنترول) و خاصة عند رشها في طور الحبابوك لنمو ثمرة البلح.

وتحت ظروف هذه الدراسة والظروف المماثلة يمكن التوصية برش حمض الجبريليك بتركيز 50 جزء فى المليون أو السيدا فيلم (1 سم^3 / 1 لتر) فى الطور الأول (الحبابوك) لنمو ثمرة البلح الزغلول أى بعد شهر من العقد وذلك لتحسين كمية المحصول والخصائص الطبيعية ومعظم الخصائص الكيميائية للثمار .