

**EFFECT OF POLLEN GRAINS CONCENTRATION ON
BUNCH WEIGHT AND FRUIT QUALITY OF
HALAWY AND HAYANY DATE
PALM CULTIVARS**

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ABSTRACT: This experiment was executed throughout two successive seasons of 2006 and 2007 on two date palm cultivars; Halawy and Hayany grown at the Experimental Orchard of Assiut University, Faculty of Agriculture. Eight palms of 17 years old from each cultivar were chosen to study the effect of either fresh or stored pollen grains at three concentrations (5, 10 and 20 %) on bunch weight and fruit quality of these two date palm cultivars. The traditional pollination (control) was executed by inserting five male strands, either from stored or fresh strands, into each female spathe. The experimental design was a completely randomized block.

Generally, Initial fruit set (IFS) under different treatments took the same trend during the two studied seasons. The concentration of 5% pollens in the pollination mixture recorded the lowest IFS%, fruit retention (%) (FR) and bunch weight (BW). As the concentration of pollen grains increased more than 5%, the IFS%, FR% and BW were significantly increased towards maximum value in the control or traditional pollination (TP). Generally, the results of fruit and flesh weight took an opposite trend of fruit set or bunch weight in both cultivars and seasons. The least value of fruit and flesh weight was produced from the traditional pollination method, while the highest value was produced from the pollination using pollens at 5% concentration. Data also revealed that there were no significant differences between stored or fresh pollen on most of the studied traits in both cultivars and seasons. Generally, T.S.S. % took the same trend during the two studied seasons of both cultivars. The

highest T.S.S.% was recorded by using pollen grains at 5% concentration and then, the percentages of T.S.S. was gradually decreased with increasing the pollen concentration. The results of total sugars took the same trend of the T.S.S.% where the lowest value was obtained from the traditional pollination method. Total and reducing sugars (%) reached the highest value by using 5% pollen concentration.

Key words: Pollination, *Phoenix dactylifera*, dioecious, pollencarrier, initial fruit set.

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) is considered as one of the most important fruit crops in the Arab world. The importance of date palm was reflected on the people who lived at the desert because of the wide range of its benefits. It provides the family with many of the life necessities.

Egypt is ranked the first among the date producing countries while Iran being the second followed by Saudi Arabia. Thus, Egypt considered being the leading Arab countries producing dates (FAO production year book, 2002). The number of fruitful female in Egypt is about 11,402,969 and Assiut Governorate contributed with 456310 fruitful female palms.

Date palm is a heterogeneous and has 18 pairs of chromosomes (Purseglove, 1978 and Osman, 1979) and is characterized as a

dioecious plant with separate female and male trees. The pollination process of date palm is the most important horticultural practices which executed in the date palm orchards for obtaining the economic yield. The traditional pollination method of female trees is achieved by inserting a number of male strands inside each female spadix just it starts open. The pollination is repeated as long as the female spadix opens. Pollination is normally carried out just after sunrise or before sunset when temperature and other conditions are favorable for pollination. The common method used is ascending the worker on the female palm and inserting the dry male strands into the female one. This process is a very dangerous for the workers and needs more exertion and time especially when the trees reach high elevations. Moreover, this process requires knowledge and high skills to properly finish it, as

well as the skilful workers are decreasing now. For those reasons, the farmers began to create simple equipments to pollinate the female palm without ascending it. Accordingly, the mechanical pollination spares more time, workers and pollen grains quantity.

Many investigators (Sial, 1984; Hamood *et al.*, 1986; Simon, 1987; Ashour *et al.*, 2004) used the mechanical pollination by using the dusters. They mixed the pollen grains in lower quantity with carriers to make a homo mixture and then using the common duster equipments such as manual duster or motorized back-pack duster. Many workers (Khalil and Al-Shawaan, 1983; Moustafa, 1985; Mostafa, 1994; El-Sese *et al.*, 2000a and Ragab *et al.*, 2004) used the wheat flour as a carrier while others (El-Kassas and Mahmoud, 1986 and Mostafa, 1994) used the talc powder. Some researchers used the powder of male flowers as a carrier and gave good results (Hussein *et al.*, 1985 and Mostafa, 1994).

The objective of the present work was to study the effect of pollen grains concentration as well as pollen freshness on bunch weight and fruit quality of Halawy and Hayany date palm cultivars.

MATERIALS AND METHODS

This experiment was carried out throughout two successive seasons of 2006-2007 on the two date palm cultivars; Halawy and Hayany grown at the Experimental Orchard of Assiut University, Faculty of Agriculture. They were grown in a clay soil. The earlier, later as well as weaked bunches were removed. The leaf bunch ratio was maintained at 7:1 on each palm. One male palm was specified for each cultivar to avoid Metaxinia phenomenon.

Eight palms of 17 years old from each cultivar were chosen. Palms were subjected to standard horticultural practices as defined for the particular orchard except of those related to pollination process which was subjected to the study plan.

Preparing of Pollen Grains

One year before the start of study, 8 fully ripening male spathes were detached and the male strands were excised from them. The male strands were divided into parcels each one consisted of 5 strands and then, they were dried for some days avoiding from direct sunlight and

current of air and turned over each day.

The strand parcels were stored in bored cardboard boxes under normal room temperature for one year to use them for pollinating the female palms in the following year. During the first year of study, same procedures were repeated but the dried strands were divided into two groups, one group was stored to use them in the pollination process during the following year (the second year of study) and the other group (the fresh pollen grains) were used for pollinating the female palms.

The pollen grains were extracted by shaking the strands on a white paper sheet. Then, the pollen grains were separated from other floral parts by using thin silk bolters (Mesh 80). The extracted pollen grains were put in paper sacks till the time of pollination.

Pollen viability was tested using the aceto-carmin stain. One drop of 1% aceto-carmin was placed on glass slide and then, a small amount of pollen was dispersed. A cover slip was placed on the slide and allowed to stand for few seconds. Finally, the slides were examined under the microscope for pollen viability. Colorless or

unstained pollen grains were considered non viable. Several such counts at different fields under the microscope were examined and reading was record to determine the percentage of viability.

Treatments

The study consisted of three concentrations either from stored or fresh pollen grains. The concentrations were 5, 10 and 20% and the rest by using carrier material of wheat flour. The traditional pollination was executed by inserting 5 male strands into each of the female spathe either from stored or fresh strands. The later was used to compare the treatments effect. Thus, there were 8 treatments randomly distributed on the spathes of each female palm. The 8 treatments were repeated on 8 female palms from each cultivar. The experimental design was a completely randomized block. The female spathes before cracking were covered by white paper sacks to avoid any mixed pollinations from strange pollens.

The female spathe was pollinated after 48-72 hours since its cracking. The white paper sacks were marked and the time of

spathe cracking and pollination was registered on it. Four grams from the pollination mixture were used for each treatment. They put in small paper sacks and recorded out the treatment category. Thus, each quantity of pollen grains required to pollinate a single female spathe ranged between 0.2 g (for 5% concentration) to 0.8 g (for 20% concentration).

The pollination was exercised by inserting a piece of white cotton in the sacks containing the pollen mixture and then, it shacked on the female spathes and put it in the centre of the spathe. The bunch was then tied to the nearest leaf and covered with a marked paper sack. The paper sacks were removed after four weeks of pollination and the bunch was marked with the treatment number.

The Measurements

The following measurements were taken on each bunch:

Initial fruit set (IFS)

It was determined 6 weeks after the pollination time. Five fruit strands were randomly marked on each bunch and then, the IFS was calculated according to the following equation:

$$\text{IFS \%} = \frac{\text{No. Fruits}}{\text{No. total flowers}} \times 100$$

(No. total flowers = No. of fruit + all scars on the strand consisted of scars of the tri fruit).

Fruit Retention (FR)

One week before harvesting, the 5 marked strands were collected from each bunch. Then the number of fruits was counted and the percentage of retention fruits was calculated.

Bunch weight (BW)

Bunch weight was estimated by weighing the fruits after detached from the bunch.

Physical and chemical determinations

At ripening; when 3-4 fruits on each bunch were reached softening stage; 30 fruits from each bunch were randomly selected to determine the average fruit weight, average flesh weight, then the percentage of flesh weight was calculated, total soluble solids (TSS %) using hand refractometer, Total and reducing sugars were also determined according to A.O.A.C. (1985).

The experiment was set up as a complete randomized block design. The analysis of variance (ANOVA) was applied according to Snedecor and Cochran (1972). Means were compared using the LSD values at 5% level.

RESULTS AND DISCUSSION

Yield Components (IFS%, FR% and BW (kg))

Data presented in Tables 1, 2 and 3 show the effect of different concentrations of fresh and stored pollen used in pollination process on initial fruit set % (IFS), fruit retention (FR) and bunch weight (BW) of Halawy and Hayany date palms during 2006 and 2007 seasons.

Table 1 showed that the concentration of 5% pollens in the mixture recorded the lowest IFS% where it reached 20.76 and 26.68 for Halawy cultivar and 19.70 and 27.42 in Hayany cv. during the first and second season, respectively. As the concentration of pollens increased more than 5%, the IFS% significantly increased towards maximum percentage (control). The IFS% of control reached 39.37 and 45.42 for Halawy and 39.80 and 43.46 for Hayany in the first and second season, respectively. The differences between traditional pollination and each pollen concentration (except of 20% for Halawy cultivar) were significant. The decreasing percentage of IFS when used 5% pollen

concentration was due to the lower amount of pollen grains in the mixture. However, using 20% pollen grains in the mixture led to a slight decrement of IFS (9.2 and 10.2%). The later may be desired where it considers as an early fruit thinning and reflects on the fruit quality. These results are in accordance with those reported by Hussein *et al.* (1985), Hamood *et al.* (1986), Mostafa (1994), Moustafa (1998), El-Sese *et al.* (2000 a), Hammam *et al.* (2002) and Abdel-Galil *et al.* (2008). They found that fruit setting correlated better with the concentration of pollen grains in the pollination mixture.

Data also revealed that IFS% was higher in the second season of study than the first one in all treatments. The later could be attributed to the differences in weather status from season to another one during the pollination process. This is in accordant with those reported by El-Agamy *et al.* (2008), Ashour *et al.* (2004), El-Sese *et al.* (2000 a), Mostafa (1994), Hussein *et al.* (1985) and Brown (1983). They stated that the fruit set of date palm differed between seasons and cultivars and that greatly affects by the weather status during the season.

Table 1. Effect of pollination using fresh and stored pollen grains at different concentrations on initial fruit set percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	40.11	21.77	29.52	36.90	32.08	40.40	20.20	28.40	35.20	31.05
Stored pollen	38.62	19.75	30.50	35.00	30.97	39.20	19.20	30.00	33.40	30.45
Mean (B)	39.37	20.76	30.01	35.95		39.80	19.70	29.20	34.30	
L.S.D. 0.05										
A			N.S.					N.S.		
B			4.36					3.89		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	45.02	27.82	37.30	41.62	37.94	44.14	28.48	34.50	42.64	37.44
Stored pollen	45.82	25.54	36.00	40.50	36.97	42.78	26.36	32.60	38.48	35.07
Mean (B)	45.42	26.68	36.65	41.06		43.46	27.42	33.58	40.56	
L.S.D. 0.05										
A			N.S.					N.S.		
B			4.92					2.89		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

Data of the present study show that there were no significant differences between fresh and stored pollen grains on IFS%. This observation was mainly due to the slight depression of stored pollen viability where the pollen viability was 96.4 and 98.3% for fresh pollen taken from the first and second male palm, respectively. However, the pollen viability was 93.4 and 93.9% for the stored pollen of the same male palms, respectively. The interaction effect revealed that, the traditional pollination method by using fresh pollen recorded the highest percentage of IFS while, the least percentage was obtained when used a concentration of 5% stored pollens.

The ultimate fruit retention considers a good evidence for bunch weight and yield quantity where it determined before harvesting by a few days. Data presented in Table 2 show that this attribute took the same trend of IFS of the two studied seasons and cultivars. Also the bunch weight (Table 3) took also the same trend of IFS and FR% during the two seasons and cultivars. This study indicated that there was a positive

correlation between IFS and/or FR and BW. This correlation was illustrated in Figures 1 and 2.

These results were accordance with those reported by Ghalib *et al.* (1987) and El-Sese *et al.* (2000a). They mentioned that there was a positive correlation between IFS and/or FR% and bunch weight. Also, with that reported by Hussein *et al.* (1985) where they found that the highest yield was obtained from the palms pollinated by the traditional method. While, El-Kassas and Mahmoud (1986) suggested that using pollen grains of 20 to 40% concentration in the mixture to obtain an economic yield with good quality. Hamood *et al.* (1986) found that the highest yield of date palm was obtained from the manual pollination compared to mechanical one.

Fruit Physical Characteristics

Fruit weight

Data presented in Table 4 show the effect of different concentrations of either stored or fresh pollen grains on fruit weight (g) of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons.

Table 2. Effect of pollination using fresh and stored pollen grains at different concentrations on fruit retention percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	20.12	12.00	15.41	17.21	16.19	23.20	16.10	19.22	21.10	19.91
Stored pollen	19.44	11.70	14.00	16.50	15.41	21.34	14.60	17.50	19.60	18.26
Mean (B)	19.78	11.85	14.70	16.86		22.27	15.35	18.36	20.35	
L.S.D. 0.05										
A			N.S.					N.S.		
B			3.23					1.79		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	28.90	17.90	20.70	23.24	22.69	29.64	17.04	20.84	23.70	22.81
Stored pollen	27.46	15.80	19.42	22.70	21.35	28.92	16.68	19.04	24.88	22.38
Mean (B)	28.18	16.85	20.06	22.97		29.28	16.86	19.94	24.29	
L.S.D. 0.05										
A			N.S.					N.S.		
B			3.91					2.44		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

Table 3. Effect of pollination using fresh and stored pollen grains at different concentrations on bunch weight (kg) of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	11.60	7.70	9.60	10.60	9.88	13.80	10.60	12.00	12.50	12.23
Stored pollen	11.50	7.10	8.40	9.40	9.10	13.20	9.40	10.80	11.60	11.25
Mean (B)	11.55	7.40	9.00	10.00		13.50	10.00	11.40	12.05	
L.S.D. 0.05										
A			N.S.					N.S.		
B			2.47					0.98		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	14.80	9.80	11.71	12.40	12.18	16.80	11.20	13.20	15.40	14.15
Stored pollen	14.20	8.40	11.00	11.80	11.35	15.60	10.40	11.42	14.20	12.91
Mean (B)	14.50	9.10	11.36	12.10		16.20	10.80	12.31	14.80	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.42					1.69		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

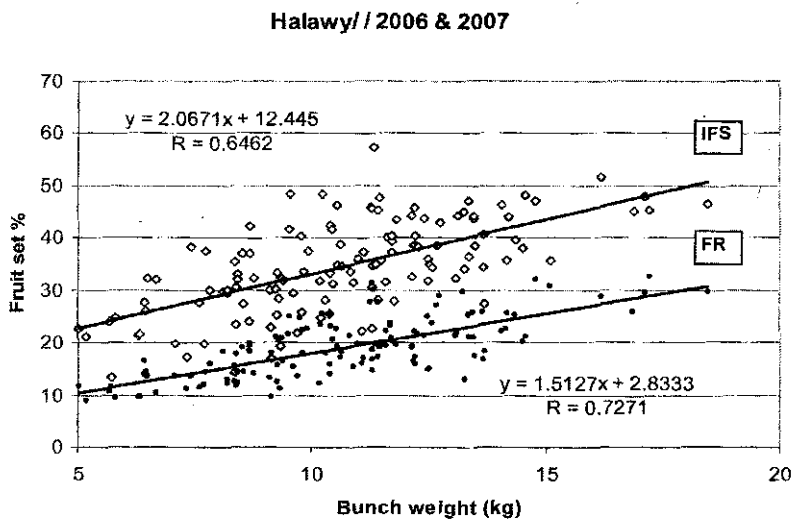


Fig. 1. The correlation between IFS & FR and bunch weight of Halawy date palm cultivars during 2006 and 2007 seasons

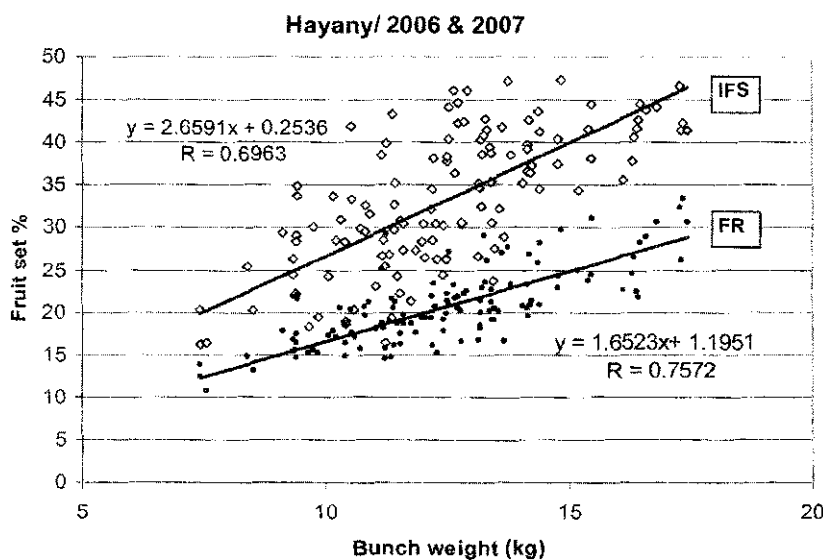


Fig. 2. The correlation between IFS & FR and bunch weight of Hayany date palm cultivars during 2006 and 2007 seasons

Table 4. Effect of pollination using fresh and stored pollen grains at different concentrations on fruit weight (gm) of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	22.34	25.38	24.11	23.94	23.94	21.80	24.17	23.04	22.53	22.89
Stored pollen	22.45	25.65	24.29	24.90	24.32	22.20	24.04	23.40	22.15	22.95
Mean (B)	22.40	25.51	24.20	24.42		22.00	24.11	23.22	22.34	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.79					1.45		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	19.86	23.44	21.65	21.75	21.68	19.20	23.41	22.60	20.87	21.52
Stored pollen	20.25	23.07	22.08	21.41	21.70	19.45	22.93	22.15	21.00	21.38
Mean (B)	20.06	23.26	21.87	21.58		19.33	23.17	22.38	20.94	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.53					1.43		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

Generally, the results took an opposite trend of fruit set or bunch weight of both cultivars and seasons. The least value of fruit weight was produced from the traditional pollination method where it reached 22.40 and 20.06 (g) in Halawy cv. and 22.0 and 19.33 (g) in Hayany cultivar during the first and second season, respectively. As the pollen grains concentration decreased the average fruit weight increased where it reached 25.51 and 23.26 (g) in Halawy and 24.11 and 23.17 for Hayany with using pollens at 5% concentration during the first and second seasons, respectively. The differences between the stored and fresh pollens were not significant in this respect. Additionally, the interaction effect was not significant.

The increment percentage of fruit weight (two season's average) reached 14.92, 8.53 and 8.29% for Halawy cultivar while it was 14.73, 10.66 and 4.94% in Hayany cultivar for the treatments 5, 10 and 20% of pollen concentration, respectively. The increment percentage in fruit weight with low pollen concentration is due to the pollen effect on the fruit set subsequently on punch weight. On

other meaning, decreasing the pollen concentration caused an early fruit thinning and that was reflected on increasing the fruit weight. These results are accordance with those reported by Mostafa (1994), El-Kassas and Mahmoud (1986), and El-Sese *et al.* (2000 b). They found that decreasing the pollen concentration led to an increase of fruit weight due to yield decreasing comparing to the higher pollen concentration or traditional pollination method. Additionally, Hassaballa *et al.* (1984), Sayed (1991), El-Khawaga (1995), and El-Sese *et al.* (2001) found that the increasing fruit thinning rate caused a significant increase of fruit weight of some date cultivars.

Flesh weight percentage

The results of Table 5 reveal that the flesh weight reached the highest percentage with using lower pollen concentration (5%) and then tended to decrease by increasing the pollen concentration. Data also revealed that there were no significant differences between stored or fresh pollen on the flesh weight percentage in both cultivars and seasons. Additionally, the interaction between the freshness of pollen and its concentrations were also insignificant.

Table 5. Effect of pollination using fresh and stored pollen grains at different concentrations on flesh weight percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	88.77	89.53	89.06	89.08	89.11	87.55	88.00	87.91	87.82	87.82
Stored pollen	88.80	89.42	88.97	91.40	89.64	87.23	88.05	88.12	87.45	87.71
Mean (B)	88.78	89.47	89.02	90.24		87.39	88.02	88.01	87.64	
L.S.D. 0.05										
A				N.S.					N.S.	
B				0.74					N.S.	
A x B				1.04					N.S.	
2007 season										
Fresh pollen	87.72	89.08	88.09	88.29	88.29	86.69	87.97	87.70	86.66	87.25
Stored pollen	87.49	88.73	88.62	88.20	88.26	86.33	87.72	87.39	86.85	87.07
Mean (B)	87.60	88.90	88.36	88.25		86.51	87.84	87.55	86.75	
L.S.D. 0.05										
A				N.S.					N.S.	
B				N.S.					1.03	
A x B				N.S.					N.S.	

* T.P. = Traditional pollination.

These results are accordance with those reported by Hassaballa *et al.* (1984); El-Kassas and Mahmoud (1986); Sayed (1991); Mostafa (1994); El-Kassas *et al.* (1995); El-Shazly (1999) and El-Sese *et al.* (2001). They stated that the fruit thinning had a great positive effect on fruit weight and this increase of fruit weight can be attributed to the increase of flesh weight while the increase of seed weight was slight and such increase of fruit weight was reflected on flesh weight percentage.

Fruit Chemical Characteristics

Total soluble solids (T.S.S. %)

The results presented in Table 6 show that the highest T.S.S.% was recorded when using pollen grains at 5% concentration and then, the percentages of T.S.S. were gradually decreased with increasing the pollen concentration where it reached the lowest percentage when using traditional pollination method. There was a negative relation between the percentage of T.S.S. and the fruit set; the higher fruit set gave the lower T.S.S.%. Data revealed that the decrease of fruit set resulted from lower concentration of pollen grains

caused an increase of T.S.S.% in both cultivars. The results also showed that there were insignificant differences between fresh or stored pollen at any concentration of pollen grains in both cultivars and seasons.

The results of the present study accordance with those reported by El-Kassas and Mahmoud (1986); Mostafa (1994) and El-Sese *et al.* (2000 b). They reported that the use of lower concentration of pollens leads to depression of fruit set subsequently distinguishes decrease of bunch weight and that reflects on an increase of T.S.S.% in the fruits. Other investigators, e.g. Hassaballa *et al.* (1984); Sayed (1991); El-Kawaga (1995) and El-Sese *et al.* (2001) stated that the decreasing of bunch weight resulting from fruit thinning led to an increase of T.S.S. %.

Total and reducing sugars

The effect of pollination by different concentration of fresh or stored pollens on total sugars and reducing sugars of Halawy and Hayany date palm cultivars was presented in Tables 7 and 8.

Generally, the results of total sugars Table 7 took the same trend of the T.S.S.% where the lowest

Table 6. Effect of pollination using fresh and stored pollen grains at different concentrations on total soluble solids percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	34.28	36.04	36.28	34.44	35.26	32.60	35.44	34.48	33.88	34.10
Stored pollen	34.46	36.68	35.12	34.96	35.31	32.80	34.68	35.36	34.68	34.38
Mean (B)	34.37	36.36	35.70	34.70		32.70	35.06	34.92	34.28	
L.S.D. 0.05										
A			N.S.					N.S.		
B			N.S.					N.S.		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	32.52	34.40	33.16	33.40	33.37	31.96	33.48	33.51	32.72	32.92
Stored pollen	32.60	34.96	34.46	33.84	33.97	31.34	34.16	33.80	33.12	33.11
Mean (B)	32.56	34.68	33.81	33.62		31.65	33.82	33.66	32.92	
L.S.D. 0.05										
A			N.S.					N.S.		
B			N.S.					N.S.		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

Table 7. Effect of pollination using fresh and stored pollen grains at different concentrations on total sugars percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	30.47	32.24	32.14	30.87	31.43	27.19	29.36	28.75	28.46	28.44
Stored pollen	30.19	32.28	31.94	30.62	31.26	27.88	28.89	29.16	28.39	28.58
Mean (B)	30.33	32.26	32.04	30.74		27.53	29.13	28.96	28.43	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.32					N.S.		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	28.77	30.18	30.12	29.28	29.59	25.72	27.49	27.12	26.15	26.62
Stored pollen	28.49	30.45	30.64	29.16	29.69	25.68	27.94	27.48	26.22	26.83
Mean (B)	28.63	30.32	30.38	29.22		25.70	27.71	27.30	26.19	
L.S.D. 0.05										
A			N.S.					N.S.		
B			N.S.					1.03		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

Table 8. Effect of pollination using fresh and stored pollen grains at different concentrations on reducing sugars percentage of Halawy and Hayany date palm cultivars during 2006 and 2007 seasons

Treatment	Pollen concentration %									
	Halawy					Hayany				
	T.P.*	5%	10%	20%	Mean (A)	T.P.	5%	10%	20%	Mean (A)
2006 season										
Fresh pollen	18.58	21.85	21.64	19.46	20.38	15.76	16.88	16.32	15.74	16.17
Stored pollen	18.66	21.66	21.12	19.29	20.18	15.95	16.71	16.27	15.58	16.13
Mean (B)	18.62	21.75	21.38	19.38		15.86	16.79	16.30	15.66	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.18					0.86		
A x B			N.S.					N.S.		
2007 season										
Fresh pollen	17.55	19.89	19.42	19.59	19.11	13.64	14.73	14.35	13.59	14.08
Stored pollen	17.66	20.34	20.18	18.36	19.14	14.12	14.68	14.19	13.98	14.24
Mean (B)	17.61	20.11	19.80	18.97		13.88	14.71	14.27	13.75	
L.S.D. 0.05										
A			N.S.					N.S.		
B			1.47					N.S.		
A x B			N.S.					N.S.		

* T.P. = Traditional pollination.

value was obtained from the traditional pollination method where it reached 30.33 and 28.63% in Halawy cv. and 27.53 and 25.70% in Hayany cv. during the first and second season, respectively and then, it gradually increased with decreasing the pollen concentration. The differences were significant in the first season for Halawy and in the second season for Hayany. Total sugars % reached the highest value when using 5% pollen concentration where it reached 32.26 and 30.32 in Halawy and 29.13 and 27.71 in Hayany during the first and second season, respectively.

The effect of fresh or stored pollen in this respect was not distinguish where the total sugars reached 30.51 and 30.48 in Halawy and 27.35 and 27.71 in Hayany cv. when using fresh and stored pollens, respectively.

It could be from Table 8 observed that the reducing sugars took the same trend of the total sugars % in both cultivars and seasons.

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تأثير تركيز حبوب اللقاح على وزن العنق وجودة الثمار في صنفى نخيل البلح الحلاوى والحياتى

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أجريت هذه الدراسة في مزرعة أبحاث الفاكهة بكلية الزراعة جامعة أسيوط خلال موسمي النمو ٢٠٠٦ و ٢٠٠٧م على صنفى نخيل البلح الحياتى والحلاوى، حيث تم انتخاب ٨ أشجار مؤنثة متجانسة من كل صنف، وقد تم ضبط عدد الأوراق إلى الأغريض بحيث كانت ٧ : ١ فى كلا الصنفين، تم استخدام لقاح مخزن تحت درجة حرارة الغرفة لمدة عام، تم استخلاص حبوب اللقاح سواء من الشماريخ المخزنة أو الطازجة ثم أستخدم ثلاث تركيزات من حبوب اللقاح سواء المخزنة أو الطازجة مع استخدام دقيق القمح كمادة حاملة وكانت التركيزات ٥ ، ١٠ ، ٢٠% (بالوزن والباقي دقيق القمح) وذلك بالإضافة إلى معاملة التلقيح التقليدية بخمس شماريخ مذكرة من اللقاح المخزن والطاقز كمقارنة وهذا يعنى وجود ثمانى معاملات وزعت بطريقة عشوائية على أغريض النخلة المؤنثة الواحدة، وكان تصميم التجربة قطاعات كاملة العشوائية.

نتج عن معاملة التلقيح التقليدية أعلى نسبة عقد للثمار سواء عقد ابتدائي أو نهائي، ثم حدث نقص في نسبة عقد الثمار كلما نقص تركيز حبوب اللقاح في مخلوط التلقيح سواء اللقاح الطازج أو المخزن حيث كانت الفروق بينهما طفيفة، إنعكس ذلك بطبيعة الحال على وزن العنق، حيث أعطت معاملة التلقيح التقليدية أكبر وزن للعنق ثم حدث إنخفاض تدريجي مع نقص تركيز حبوب اللقاح في مخلوط التلقيح، وكان هناك ارتباط كبير جداً بين العقد الابتدائي والنهائي ووزن العنق. نتج أقل وزن للثمرة واللحم من معاملة التلقيح التقليدية، ثم حدثت زيادة تدريجية كلما نقص تركيز حبوب اللقاح في مخلوط التلقيح. بلغت نسبة المواد الصلبة الذائبة الكلية والسكريات أعلى قيمة لهما عند استخدام تركيز ٥% من حبوب اللقاح في مخلوط التلقيح ثم حدث بها إنخفاض تدريجي مع زيادة تركيز حبوب اللقاح وبلغت أقل قيمة لها تحت معاملة التلقيح التقليدية.

مما سبق يمكن التوصية باستخدام لقاح مخفف بتركيز ١٠% في تلقيح صنف نخيل البلح الحلوي والحباتي حيث أن ذلك أعطى نقصاً معتدلاً في نسبة العقد أو بمعنى آخر خف مبكر للثمار كان من نتيجته حدوث نقص معتدل في وزن العنق (المحصول) انعكس تأثيره على تحسن صفات الثمار الطبيعية والكيميائية، كذلك يمكن تخزين الشماريخ الزهرية المذكورة (حبوب اللقاح) المجففة جيداً تحت درجة حرارة الغرفة العادية بنجاح لمدة عام في كراتين من الورق المقوى في طبقات متبادلة مع ورق الجرائد حيث أن الانخفاض في حيوية حبوب اللقاح كان طفيفاً وأعطت نفس التأثيرات تقريباً للقاح الطازج.