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**EFFECT OF MALE VIGOUR AS WELL AS DATE AND DAY
TIME OF POLLINATION ON YIELD AND FRUIT QUALITY
OF SEWY DATE PALMS GROWN UNDER EL- FARAFRAH
OASIS CONDITIONS**

II- SOME CHEMICAL CHARACTERS OF THE FRUITS

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ABSTRACT

This investigation was carried out during 2006 and 2007 seasons to examine various effects of male vigour, date and day time of hand pollination on some chemical characters of the fruits of Sewy date palms. The experiment included three factors; the first factor consisted of three treatments of male vigour namely high vigour, medium, and low vigour males; the second factor involved five treatments from dates of pollination after spathe cracking namely two, four, six, eight and ten days after spathe cracking and the third factor consisted of three treatments from day time of pollination i.e. early morning (6.30-7.30 am); afternoon (12- 1.0 pm) and before sunset (4.30 – 5.30 pm).

Male vigour failed to show noticeable effects on percentages of total soluble solids, total acidity, total and reducing sugars, soluble tannins and percentages of P and K in the fruits.

Delaying date of pollination after spathe cracking from the second to the tenth day was followed by a gradual promotion on fruit chemical quality in terms of increasing total soluble solids, total and reducing sugars, and fruit content of P and K and in decreasing total acidity and soluble tannins. All chemical characters of Sewy date fruits were similar if pollination took

place either at the second or the fourth day of female spathe cracking. Delaying pollination from the fourth to the tenth day of spathe splitting resulted in considerable promotion on fruit quality.

Pollination at ten days after spathe cracking gave the best results with regard to chemical characters of the fruits. Hand pollination at the time of early morning resulted in significant promotion on fruit quality.

Pollinating female Sewy date palms with pollins from the same cv at ten days after spathe cracking early morning gave the best results with regard to chemical quality of the fruits.

INTRODUCTION

Selecting the suitable date at which the female flowers of different date palm cvs remain receptive to fertilization is very important to date growers. Early pollination after flowers opening is very beneficial for obtaining female flowers very receptive to fertilization. Pollinating the palms after five days of spathe cracking is considered the maximum length of receptivity to obtain appropriate yield of good fruit quality (Soliman, 1999; Marzouk *et al.*, 2002c and Abdalla *et al.*, 2002).

It is generally known that pollen grains from different male date palms possibly affect the chemical quality of fruits in different date palm cvs.(El- Salhy *et al.*, 1997 ; Rahemi 1998 ; Khalifa , 1999; Helail and El- Kholey 2000 ; Abd El-Hamid, 2000; Marzouk *et al.*, 2002a and 2002b; Soliman and El- Kosary 2002; El- Kosary and Soliman 2003; Ashour *et al.*, 2004 and Al- Hamoudi *et al.*, 2006).

Selecting the suitable day time for pollination was very effective in enhancing the efficiency of pollination and fertilization, yield and chemical quality of fruits in different date palm cvs. Germination of pollen grains was depended on temperature and relative humidity during day time. Delaying day time from early morning to afternoon was accompanied with improving the germination of pollen grains (Brown *et al.*, 1969; Soliman *et al.*, 1976; Khosh- Khui *et al.*, 1979 and Moustafa *et al.*, 1986).

The second part of the study aimed to examine the period of time (date of pollination) at which the female flowers of Sewy date

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palm remain receptive to fertilization and suggesting the best time for pollination of Sewy date palms. Also, selecting the suitable pollinator or the male from vigour, view stand point, and the proper day time of pollination after female spathe cracking which may result in improving chemical quality of the fruits.

MATERIALS AND METHODS

This investigations was conducted in an orchard of date palm located at El- Farafrah Oasis, New Valley Governorate during the two consecutive seasons of 2006 and 2007 on Sewy date palm cv. The selected palms were uniform in vigour, healthy, good physical conditions, free of insects, damage and diseases and grown in sandy soil. They were planted at 7x 7 meters apart. The number of female spathes per each palm was adjusted to ten spathes by removing excess earliest, latest and small bunches and the leaf bunch ratio was maintained at 7 :1 according to Sayed ,(2002).

Generally, hand pollination of all selected palms was achieved by inserting ten male strands into the centre of female bunch, using different sources of pollen grains (from vigour, intermediate vigour and weak males) throughout different dates after spathe cracking during various times of one day.

All selected Sewy date palms received the same and common horticultural practices that are usually applied in the orchard.

The experiment included three factors (A & B & C). The first factor (A) consisted of three treatments of male vigour namely a₁) high vigour, a₂) medium vigour and a₃) low vigour males.

The second factor (B) involved five treatments from dates of pollination after spathe cracking namely b₁) two, b₂) four, b₃) six, b₄) eight and b₅) ten days after spathe cracking. The third factor (C) consisted of three treatments from day time pollination i.e., c₁) early morning (6.3- 7.30 am); c₂), afternoon (12-1.0 pm) and c₃) before sunset (4.30-5.30 pm).

Therefore, the experiment included 45 different pollination treatments (3 male vigor treatments X 5 dates of pollination after spathe cracking X 3 day time pollination treatments). Each treatment was represented by three Sewy date palms (each one as replicate).

The experiment was set up in split split plot arrangement of completely randomized block design. Male vigour, dates of pollination and day time of pollination stood up for main, sub- plot and sub- sub – plots, respectively.

At harvesting date, twenty- five fruits from each bunch were picked at random (i.e. 250 fruits/palm) for the determination of total soluble solids %, total and reducing sugars and percentage of total acidity (as g citric acid per 100 g / pulp) according to A.O.A.C. (1985) methods. Tannins content was determined using the Indigo Carmen indicator described by Balbaa (1981). Date content of P and K was determined in the digested samples by atomic absorption following the methods of Davis and Ferites, (1970).

All obtained data were tabulated and statistically analyzed. The differences between treatment means were compared using New L.S.D. test at 5% according to Mead *et al.*, (1993).

RESULTS AND DISCUSSION

Total soluble solids, total and reducing sugars, total acidity and total soluble tannins:

It is clear from the obtained data in Tables 1 ,2 , 3 ,4 , 5 , 6 , 7 and 8 that varying male vigour had meaningless effect was observed on all the previous studied chemical quality characters of the fruits. These results are in harmony with those obtained by Marzouk *et al.*, (2002a) on Zaghloul and Samany dates ; Ashour *et al.*, (2004) on the fruits of the same two previous date palm cvs and Al- Hamoudi *et al.*, (2006) on Barhi dates. Delaying date of pollination after spathe cracking was accompanied with improving in the chemical quality of the fruits. Delaying date of hand pollination from the second to the fourth day of spathe splitting had insignificant promotion on these chemical characters. Pollination at the second day of spathe splitting resulted in unfavourable (low sugars and high tanninis) effects on fruits quality. The best fruit quality was recorded on bunches of Sewy date palms pollinated at the tenth day of spathe cracking. Date of pollination had no effect on reducing sugars. These results were true in both seasons.

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Table 1: Effect of male vigour as well as date and day time of hand pollination on total soluble solids percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	56.0	56.4	56.6	56.3			
b ₂ Four days	56.4	56.6	56.8	56.6			
b ₃ Six days	57.5	57.7	57.9	57.7			
b ₄ Eight days	58.3	58.7	58.8	58.6			
b ₅ Ten days	60.8	61.5	61.7	61.3			
Day time of pollination (C)							
C ₁ Early morning	58.9	59.2	59.4	59.2			
C ₂ Afternoon	57.8	58.1	58.3	58.1			
C ₃ Before sunset	56.7	57.3	57.4	57.1			
b ₁ C ₁	57.0	57.5	57.8	57.3			
b ₁ C ₂	56.0	56.3	56.5	56.3			
b ₁ C ₃	55.0	55.4	55.6	55.3			
b ₂ C ₁	57.5	57.7	58.0	57.7			
b ₂ C ₂	56.4	56.6	56.8	56.6			
b ₂ C ₃	55.3	55.5	55.6	55.5			
b ₃ C ₁	58.5	58.8	58.9	58.7			
b ₃ C ₂	57.5	57.7	57.9	57.7			
b ₃ C ₃	56.4	56.7	56.9	56.7			
b ₄ C ₁	60.0	60.3	60.5	60.3			
b ₄ C ₂	58.0	58.3	58.4	58.2			
b ₄ C ₃	57.0	57.4	57.5	57.3			
b ₅ C ₁	61.5	61.8	62.0	61.8*			
b ₅ C ₂	61.0	61.5	61.7	61.4			
b ₅ C ₃	60.0	61.3	61.5	60.9			
Mean (A)	57.8	58.2	58.4				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.4	0.8	1.4	1.4	1.8	3.1

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Table 2: Effect of male vigour as well as date and day time of hand pollination on total soluble solids percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	56.70	56.90	57.06	56.87			
b ₂ Four days	56.77	57.06	57.2	57.01			
b ₃ Six days	58.53	58.67	58.87	58.69			
b ₄ Eight days	59.5	59.77	59.97	59.75			
b ₅ Ten days	61.73	61.93	62.13	61.93			
Day time of pollination (C)							
C ₁ Early morning	59.68	59.9	60.08	59.87			
C ₂ Afternoon	58.58	58.86	59.04	58.83			
C ₃ Before sunset	57.57	57.84	58.02	57.81			
b ₁ C ₁	57.8	58.0	58.2	58.0			
b ₁ C ₂	56.7	56.9	57.0	56.87			
b ₁ C ₃	55.6	55.8	56.0	55.80			
b ₂ C ₁	57.3	57.5	57.6	57.5			
b ₂ C ₂	57.0	57.5	57.7	57.4			
b ₂ C ₃	56.0	56.2	56.3	56.17			
b ₃ C ₁	59.5	59.7	59.9	59.70			
b ₃ C ₂	58.6	58.8	59.0	58.80			
b ₃ C ₃	57.5	57.5	57.7	57.57			
b ₄ C ₁	61.0	61.3	61.5	61.27			
b ₄ C ₂	59.0	59.3	59.5	59.4			
b ₄ C ₃	58.5	58.7	58.9	58.70			
b ₅ C ₁	62.8	63.0	63.2	63.0*			
b ₅ C ₂	61.6	61.8	62.0	61.8			
b ₅ C ₃	60.8	61.0	61.2	61.0			
Mean (A)	58.65	58.87	59.05				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.25	0.25	0.43	0.43	0.56	0.97

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Table 3: Effect of male vigour as well as date and day time of hand pollination on total sugars percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	50.9	51.1	51.4	51.1			
b ₂ Four days	51.4	51.6	51.8	51.6			
b ₃ Six days	52.3	52.6	52.7	52.5			
b ₄ Eight days	53.3	53.6	53.7	53.5			
b ₅ Ten days	54.7	54.8	55.0	54.8			
Day time of pollination (C)							
C ₁ Early morning	53.2	53.4	53.6	53.4			
C ₂ Afternoon	52.6	52.9	53.1	52.9			
C ₃ Before sunset	51.8	52.0	52.1	52.0			
b ₁ C ₁	51.5	51.8	52.0	51.8			
b ₁ C ₂	51.0	51.2	51.5	51.2			
b ₁ C ₃	50.3	50.4	50.6	50.4			
b ₂ C ₁	51.9	52.0	52.3	52.1			
b ₂ C ₂	51.5	51.8	52.0	51.8			
b ₂ C ₃	50.7	50.9	51.0	50.9			
b ₃ C ₁	53.0	53.3	53.3	53.2			
b ₃ C ₂	52.5	52.8	53.0	52.8			
b ₃ C ₃	51.5	51.7	51.8	51.7			
b ₄ C ₁	54.0	54.3	54.5	54.3			
b ₄ C ₂	53.5	53.7	53.8	53.7			
b ₄ C ₃	52.5	52.8	52.9	52.7			
b ₅ C ₁	55.5	55.6	55.7	55.6*			
b ₅ C ₂	54.7	54.8	55.0	54.8			
b ₅ C ₃	54.0	54.1	54.2	54.1			
Mean (A)	52.4	52.8	52.9				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.7	0.4	1.2	0.7	0.9	1.6

Table 4: Effect of male vigour as well as date and day time of hand pollination on total sugars percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	51.63	51.90	52.07	51.87			
b ₂ Four days	52.27	52.40	52.60	52.42			
b ₃ Six days	53.13	53.33	53.50	53.32			
b ₄ Eight days	54.10	54.30	54.47	54.29			
b ₅ Ten days	55.67	55.93	56.13	55.91			
Day time of pollination (C)							
C ₁ Early morning	53.88	54.12	54.30	54.10			
C ₂ Afternoon	53.26	53.44	53.64	53.45			
C ₃ Before sunset	52.94	53.16	53.32	53.13			
b ₁ C ₁	52.2	52.5	52.6	52.43			
b ₁ C ₂	51.6	51.80	52.0	51.8			
b ₁ C ₃	51.1	51.40	51.6	51.37			
b ₂ C ₁	52.6	52.80	53.0	52.8			
b ₂ C ₂	52.2	52.20	52.5	52.30			
b ₂ C ₃	52.0	52.2	52.3	52.17			
b ₃ C ₁	53.5	53.8	54.0	53.77			
b ₃ C ₂	53.0	53.2	53.3	53.17			
b ₃ C ₃	52.9	53.0	53.2	53.03			
b ₄ C ₁	54.6	54.8	55.0	54.80			
b ₄ C ₂	54.0	54.2	54.4	54.20			
b ₄ C ₃	53.7	53.9	54.0	53.87			
b ₅ C ₁	56.5	56.7	56.9	56.70*			
b ₅ C ₂	55.5	55.8	56.0	55.77			
b ₅ C ₃	55.0	55.3	55.5	55.27			
Mean (A)	53.36	53.57	53.75				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.56	0.31	0.97	0.54	0.69	1.19

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Table 5: Effect of male vigour as well as date and day time of hand pollination on reducing sugars percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour		a ₂ Medium vigour		a ₃ Low vigour		Mean B, C & BC
Pollination date (B) (after spathes cracking)							
b ₁ Two days	20.1		20.3		20.4		20.3
b ₂ Four days	20.3		20.4		20.5		20.4
b ₃ Six days	21.2		21.5		21.7		21.5
b ₄ Eight days	22.0		22.1		2.2		22.1
b ₅ Ten days	22.4		22.5		22.6		22.5
Day time of pollination (C)							
C ₁ Early morning	22.1		22.3		22.4		22.3
C ₂ Afternoon	21.4		21.6		21.7		21.6
C ₃ Before sunset	20.1		20.2		20.3		20.2
b ₁ C ₁	20.6		20.8		20.9		20.8
b ₁ C ₂	20.0		20.3		20.4		20.2
b ₁ C ₃	19.7		19.9		20.0		19.9
b ₂ C ₁	20.8		20.9		21.0		20.9
b ₂ C ₂	20.2		20.3		20.4		20.3
b ₂ C ₃	20.0		20.1		20.2		20.1
b ₃ C ₁	22.0		22.2		22.5		22.2
b ₃ C ₂	21.0		21.4		21.6		21.3
b ₃ C ₃	20.6		20.8		20.9		20.8
b ₄ C ₁	23.3		23.4		23.5		23.4
b ₄ C ₂	22.8		22.9		23.0		22.9
b ₄ C ₃	20.0		20.0		20.1		20.0
b ₅ C ₁	24.0		24.1		24.2		24.1*
b ₅ C ₂	23.0		23.0		23.1		23.0
b ₅ C ₃	20.3		20.4		20.5		20.4
Mean (A)	21.2		21.4		21.5		
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.4	0.5	0.7	0.9	1.1	1.9

Table 6: Effect of male vigour as well as date and day time of hand pollination on reducing sugars percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	20.5	20.7	21.0	20.7			
b ₂ Four days	21.2	21.4	21.7	21.4			
b ₃ Six days	22.2	22.5	22.7	22.5			
b ₄ Eight days	23.4	23.6	23.8	23.6			
b ₅ Ten days	23.9	24.3	24.5	24.2			
Day time of pollination (C)							
C ₁ Early morning	23.1	23.4	23.6	23.4			
C ₂ Afternoon	22.3	22.6	22.8	22.6			
C ₃ Before sunset	21.3	21.6	21.8	21.6			
b ₁ C ₁	21.1	21.4	21.6	21.4			
b ₁ C ₂	20.4	20.6	20.8	20.6			
b ₁ C ₃	19.9	20.2	20.5	20.3			
b ₂ C ₁	21.8	22.0	22.5	22.1			
b ₂ C ₂	21.2	21.5	21.7	21.5			
b ₂ C ₃	20.6	20.8	21.0	20.8			
b ₃ C ₁	23.0	23.3	23.6	23.3			
b ₃ C ₂	22.0	22.3	22.6	22.3			
b ₃ C ₃	21.6	21.8	22.0	21.8			
b ₄ C ₁	24.4	24.6	24.8	24.6			
b ₄ C ₂	23.8	24.0	24.2	24.0			
b ₄ C ₃	22.0	22.2	22.5	22.2			
b ₅ C ₁	25.0	25.5	25.7	25.4*			
b ₅ C ₂	24.2	24.5	24.7	24.5			
b ₅ C ₃	22.5	22.8	23.0	22.8			
Mean (A)	22.2	22.5	22.7				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.7	0.4	1.2	0.7	0.9	1.6

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Table 7: Effect of male vigour as well as date and day time of hand pollination on total soluble tannins percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	0.59	0.58	0.57	0.58			
b ₂ Four days	0.55	0.54	0.54	0.54			
b ₃ Six days	0.53	0.52	0.52	0.52			
b ₄ Eight days	0.47	0.46	0.46	0.46			
b ₅ Ten days	0.43	0.42	0.42	0.42			
Day time of pollination (C)							
C ₁ Early morning	0.48	0.47	0.47	0.47			
C ₂ Afternoon	0.52	0.51	0.50	0.51			
C ₃ Before sunset	0.54	0.54	0.53	0.54			
b ₁ C ₁	0.55	0.54	0.54	0.54			
b ₁ C ₂	0.59	0.57	0.56	0.57			
b ₁ C ₃	0.63	0.63	0.62	0.63			
b ₂ C ₁	0.52	0.52	0.51	0.52			
b ₂ C ₂	0.55	0.55	0.55	0.55			
b ₂ C ₃	0.57	0.56	0.55	0.56			
b ₃ C ₁	0.48	0.48	0.48	0.48			
b ₃ C ₂	0.54	0.53	0.52	0.53			
b ₃ C ₃	0.56	0.56	0.55	0.56			
b ₄ C ₁	0.44	0.43	0.43	0.43			
b ₄ C ₂	0.47	0.46	0.46	0.46			
b ₄ C ₃	0.50	0.49	0.48	0.49			
b ₅ C ₁	0.40	0.40	0.40	0.40*			
b ₅ C ₂	0.43	0.42	0.41	0.42			
b ₅ C ₃	0.46	0.45	0.44	0.45			
Mean (A)	0.51	0.51	0.50				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.02	0.02	0.03	0.03	0.07	0.12

Table 8: Effect of male vigour as well as date and day time of hand pollination on total soluble tannins percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	0.56	0.55	0.55	0.55			
b ₂ Four days	0.47	0.46	0.46	0.46			
b ₃ Six days	0.44	0.43	0.42	0.43			
b ₄ Eight days	0.38	0.37	0.37	0.37			
b ₅ Ten days	0.33	0.33	0.32	0.33			
Day time of pollination (C)							
C ₁ Early morning	0.45	0.44	0.43	0.44			
C ₂ Afternoon	0.43	0.42	0.41	0.42			
C ₃ Before sunset	0.43	0.43	0.42	0.43			
b ₁ C ₁	0.52	0.51	0.50	0.51			
b ₁ C ₂	0.55	0.54	0.54	0.54			
b ₁ C ₃	0.62	0.61	0.60	0.61			
b ₂ C ₁	0.50	0.48	0.48	0.49			
b ₂ C ₂	0.47	0.45	0.44	0.45			
b ₂ C ₃	0.45	0.45	0.45	0.45			
b ₃ C ₁	0.46	0.45	0.45	0.45			
b ₃ C ₂	0.44	0.43	0.42	0.43			
b ₃ C ₃	0.42	0.41	0.40	0.41			
b ₄ C ₁	0.40	0.40	0.40	0.40			
b ₄ C ₂	0.38	0.36	0.35	0.36			
b ₄ C ₃	0.36	0.36	0.35	0.36			
b ₅ C ₁	0.36	0.35	0.34	0.35*			
b ₅ C ₂	0.33	0.32	0.31	0.32			
b ₅ C ₃	0.31	0.31	0.31	0.31			
Mean (A)	0.44	0.43	0.42				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.2	0.2	0.3	0.3	0.4	0.7

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These results could be explained on the light of the reduction on fruit setting with delaying date pollination, thus reducing the depletion of nutrients and increasing the availability of nutrients especially sugars to the other fruits.

The present results are in accordance with those obtained by Soliman (1999) on Samany dates; Marzouk *et al.*, (2002c) on Zaghloul and Samany dates and Abdalla *et al.*, (2002) on Sewy dates.

The obtained data also clearly show that advancing day time of pollination from sunset to early morning was followed by a gradual and significant promotion on chemical quality parameters of the fruits. Hand pollination at the time of early morning gave the best results. The unfavourable effects on chemical quality were recorded when pollination was conducted before sunset.

Using pollens from weak males and pollination at ten days after spathe cracking in early morning gave the best results. Unfavourable effects on fruit quality were recorded when the pollens were taken from high vigour males and pollinated at the second day of spathe opening before sunset. All the studied combinations had no significant effect on non - reducing sugars. The same trend was detected in both seasons of the study. These findings are in accordance with those obtained by Moustafa *et al.*, (1986) on Sewy dates.

Fruit content of P and K :

Data in Tables 9 , 10, 11 and 12 reveal that varying vigour of Sewy date palm males had meaningless effect on percentages of P and K in the fruits during both seasons.

It is clear from the obtained data that varying dates of pollination after spathe cracking had an announced effect on percentages of P and K in the fruit pulp. There was a remarkable and significant promotion on both P and K with delaying date of pollination from the second to the tenth day of spathe splitting. The maximum values were recorded when pollination was conducted at the tenth day of spathe cracking. Early pollination at the second day of spathe cracking gave the minimum values. These results were true in both seasons.

Table 9: Effect of male vigour as well as date and day time of hand pollination on phosphorus percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathe cracking)							
b ₁ Two days	0.42	0.43	0.43	0.43			
b ₂ Four days	0.45	0.46	0.46	0.46			
b ₃ Six days	0.48	0.49	0.49	0.49			
b ₄ Eight days	0.55	0.56	0.56	0.56			
b ₅ Ten days	0.60	0.61	0.61	0.61			
Day time of pollination (C)							
C ₁ Early morning	0.52	0.53	0.53	0.53			
C ₂ Afternoon	0.50	0.50	0.50	0.50			
C ₃ Before sunset	0.49	0.49	0.49	0.49			
b ₁ C ₁	0.44	0.45	0.45	0.45			
b ₁ C ₂	0.42	0.43	0.43	0.43			
b ₁ C ₃	0.41	0.41	0.41	0.41			
b ₂ C ₁	0.47	0.48	0.48	0.48			
b ₂ C ₂	0.45	0.45	0.45	0.45			
b ₂ C ₃	0.44	0.45	0.45	0.45			
b ₃ C ₁	0.51	0.51	0.51	0.51			
b ₃ C ₂	0.48	0.48	0.48	0.48			
b ₃ C ₃	0.46	0.47	0.47	0.47			
b ₄ C ₁	0.57	0.58	0.58	0.58			
b ₄ C ₂	0.55	0.55	0.55	0.55			
b ₄ C ₃	0.54	0.55	0.55	0.55			
b ₅ C ₁	0.62	0.63	0.63	0.63*			
b ₅ C ₂	0.60	0.61	0.61	0.61			
b ₅ C ₃	0.85	0.59	0.59	0.59			
Mean (A)	0.50	0.51	0.51				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.03	0.02	0.05	0.03	0.04	0.07

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Table 10: Effect of male vigour as well as date and day time of hand pollination on phosphorus percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	0.47	0.47	0.48	0.47			
b ₂ Four days	0.52	0.53	0.54	0.53			
b ₃ Six days	0.60	0.61	0.61	0.61			
b ₄ Eight days	0.63	0.64	0.65	0.64			
b ₅ Ten days	0.70	0.71	0.71	0.71			
Day time of pollination (C)							
C ₁ Early morning	0.61	0.62	0.63	0.62			
C ₂ Afternoon	0.58	0.59	0.60	0.59			
C ₃ Before sunset	0.56	0.57	0.57	0.57			
b ₁ C ₁	0.51	0.51	0.51	0.51			
b ₁ C ₂	0.47	0.48	0.49	0.48			
b ₁ C ₃	0.43	0.43	0.44	0.44			
b ₂ C ₁	0.55	0.56	0.57	0.56			
b ₂ C ₂	0.51	0.52	0.53	0.52			
b ₂ C ₃	0.50	0.51	0.51	0.51			
b ₃ C ₁	0.62	0.63	0.63	0.63			
b ₃ C ₂	0.60	0.61	0.62	0.61			
b ₃ C ₃	0.57	0.58	0.58	0.58			
b ₄ C ₁	0.67	0.69	0.70	0.69			
b ₄ C ₂	0.63	0.64	0.64	0.64			
b ₄ C ₃	0.60	0.60	0.61	0.60			
b ₅ C ₁	0.71	0.71	0.72	0.71*			
b ₅ C ₂	0.70	0.70	0.70	0.70			
b ₅ C ₃	0.68	0.71	0.71	0.70			
Mean (A)	0.58	0.59	0.60				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.03	0.02	0.05	0.03	0.04	0.07

Table 11: Effect of male vigour as well as date and day time of hand pollination on potassium percentage of Sewy date palm fruits during 2006 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	0.87	0.88	0.89	0.88			
b ₂ Four days	0.92	0.93	0.93	0.93			
b ₃ Six days	0.95	0.96	0.97	0.96			
b ₄ Eight days	1.00	1.00	1.00	1.00			
b ₅ Ten days	1.06	1.06	1.06	1.06			
Day time of pollination (C)							
C ₁ Early morning	0.98	0.99	1.00	0.99			
C ₂ Afternoon	0.96	0.97	0.99	0.97			
C ₃ Before sunset	0.94	0.94	0.94	0.94			
b ₁ C ₁	0.89	0.91	0.92	0.91			
b ₁ C ₂	0.87	0.87	0.88	0.87			
b ₁ C ₃	0.85	0.86	0.86	0.86			
b ₂ C ₁	0.94	0.95	0.95	0.95			
b ₂ C ₂	0.92	0.93	0.93	0.93			
b ₂ C ₃	0.90	0.90	0.90	0.90			
b ₃ C ₁	0.98	0.99	0.99	0.99			
b ₃ C ₂	0.95	0.96	0.97	0.96			
b ₃ C ₃	0.93	0.94	0.94	0.94			
b ₄ C ₁	1.02	1.02	1.02	1.02			
b ₄ C ₂	1.00	1.01	1.01	1.01			
b ₄ C ₃	0.98	0.98	0.98	0.98			
b ₅ C ₁	1.09	1.10	1.10	1.10*			
b ₅ C ₂	1.06	1.06	1.06	1.06			
b ₅ C ₃	1.02	1.02	1.02	1.02			
Mean (A)	0.96	0.97	0.97				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.03	0.02	0.05	0.03	0.04	0.08

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Table 12: Effect of male vigour as well as date and day time of hand pollination on potassium percentage of Sewy date palm fruits during 2007 season.

Date (B) and day time of pollination (C) treatment	Male vigour (A)						
	a ₁ High vigour	a ₂ Medium vigour	a ₃ Low vigour	Mean B, C & BC			
Pollination date (B) (after spathes cracking)							
b ₁ Two days	0.90	0.91	0.92	0.91			
b ₂ Four days	0.96	0.97	0.98	0.97			
b ₃ Six days	1.01	1.02	1.02	1.02			
b ₄ Eight days	1.07	1.09	1.10	1.09			
b ₅ Ten days	1.15	1.16	1.16	1.16			
Day time of pollination (C)							
C ₁ Early morning	1.04	1.05	1.05	1.05			
C ₂ Afternoon	1.01	1.03	1.04	1.03			
C ₃ Before sunset	1.00	1.01	1.02	1.01			
b ₁ C ₁	0.92	0.94	0.94	0.93			
b ₁ C ₂	0.90	0.91	0.92	0.91			
b ₁ C ₃	0.88	0.89	0.90	0.89			
b ₂ C ₁	0.98	1.00	1.00	0.99			
b ₂ C ₂	0.95	0.97	0.98	0.97			
b ₂ C ₃	0.94	0.95	0.95	0.95			
b ₃ C ₁	1.04	1.05	1.05	1.05			
b ₃ C ₂	1.00	1.01	1.02	1.01			
b ₃ C ₃	0.98	0.99	1.00	0.99			
b ₄ C ₁	1.10	1.11	1.11	1.11			
b ₄ C ₂	1.07	1.10	1.11	1.09			
b ₄ C ₃	1.04	1.06	1.07	1.08			
b ₅ C ₁	1.16	1.17	1.17	1.17*			
b ₅ C ₂	1.15	1.15	1.15	1.15			
b ₅ C ₃	1.14	1.16	1.16	1.15			
Mean (A)	1.02	1.03	1.04				
New L.S.D. at 5 %	A	B	C	AB	AC	BC	ABC
	NS	0.04	0.02	0.07	0.03	0.04	0.07

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The increase in nutrients of the pulp with delaying pollination date could be attributed to the decline in fruit setting and the reduction on the depletion of nutrients which moved to the fruits.

These results are in agreement with those obtained by Nasr *et al.*, (1997) on Aseal dates and Abdalla *et al.*, (2002) on Sewy dates.

It is clear from the obtained data that advancing day time of pollination was accompanied with increasing percentages of P and K. Pollination at early morning produced fruits with the highest content of P and K. The minimum values were recorded when pollination was carried out before sunset. These results were true in both seasons.

The maximum values were recorded when pollen grains were taken from males regardless vigour males and pollination was carried out at the tenth day of spathe cracking at the time of early morning.

As a conclusion pollinating Sewy date palms with pollen grains obtained from Sewy males at the tenth day of spathe splitting at the day time of early morning was very beneficial for improving chemical quality of the fruits and nutritional value of the fruits.

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تأثير قوة ذكر النخيل وموعد التلقيح وفترةه خلال اليوم الواحد المناسبة على كمية المحصول وجودة الثمار في نخيل البلح السيوى النامى تحت ظروف واحدة الفرازة III- بعض الخصائص الكيميائية للثمار

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مركز البحوث الزراعية - الجيزة- المنيا مصر

أجريت هذه التجربة خلال موسمى ٢٠٠٦ ، ٢٠٠٧ للتعرف على التأثيرات المختلفة لقوة ذكر النخيل وموعد التلقيح وفترة النهار المناسبة على بعض الخصائص الكيميائية للثمار. ولقد اشتملت التجربة على ثلاث عوامل ، تكون العامل الأول من ثلاث معاملات من قوة ذكر النخيل هي (نكور نخيل قوية، نكور نخيل متوسط القوة، نكور نخيل ضعيفة) أما العامل الثانى فقد تكون من خمس معاملات من مواعيد التلقيح بعد انشقاق الاغريض المؤنثة هي (يومان ، أربعة ، ستة ، ثمانية ثم عشرة ايام)أما العامل الثالث فقد تكون من ثلاثة معاملات من موعد التلقيح خلال اليوم الواحد هي التلقيح فى الصباح الباكر(من ٦,٣٠ الى ٧,٣٠ صباحا) ، بعد الظهر (من ١٢ الى ١ ظهرا) وقبل غروب الشمس من (٤,٣٠ الى ٥,٣٠ مساء).
أوضحت النتائج أن قوة ذكر النخيل ليس لها تأثيرات واضحة على النسبة المئوية للمواد الصلبة الذائبة الكلية والحموضة الكلية والسكريات الكلية والمختزلة والتانين الذائب ومحتوى

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الثمار من الفوسفور والبوتاسيوم . أدى تأخير موعد لجراء التلقيح بعد انشقاق الاغاريض المؤنثة من اليوم الثانى الى اليوم العاشر الى حدوث تحسن تدريجي فى خصائص الثمار الكيميائية متمثلا فى زيادة المواد الصلبة الذاتية الكلية والسكريات الكلية والمختزلة ومحتوى الثمار من الفوسفور والبوتاسيوم وفى تقليل الحموضة الكلية والتانين الذائب وكانت قيم جميع هذه الصفات الكيميائية للثمرة متقاربة إذا تم التلقيح فى اليوم الثانى او الرابع لانشقاق الاغاريض المؤنثة وأمكن الحصول على أفضل نتائج بخصوص خصائص الجودة الكيميائية للثمار عند تلقيح الثمار فى اليوم العاشر لانشقاق الاغاريض المؤنثة كذلك عند التلقيح فى الصباح الباكر أدى ذلك الى حدوث تحسن واضح فى هذه الصفات.

إن تلقيح إناث نخيل البلح السيوى بحبوب لقاح من نفس الصنف بعد عشرة أيام من انشقاق الاغاريض المؤنثة فى فترة الصباح الباكر يعطى أفضل النتائج بخصوص خصائص الجودة الكيميائية للثمار.