EVALUTION OF DATE PALM MALES USED IN POLLINATION IN RASHEED REGION, EGYPT

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ABSTRACT

This investigation was conducted during 2005 and 2006 seasons to evaluate some date palm males used in pollination of date palms in Rasheed and Idko which are concedered one of the main regions in date palm cultivation in Egypt. The evalution involved ten male palms numbered from 1 to 10. This investigation included two main studies, in the first one, to the physical properties of spathe, pollen grains, inflorescence and strands of the ten males were determined, However, in the second study, the effect of pollen grains of five date palm males chosen from the ten above mentioned to evaluate the effect of pollens on yield and some physical and chemical properties of Zaghloul and Samany fruits. The results, generally, indicated that the physical properties of males tree differed from one male tree to another, in this sense, the first five males were the best. It was also found that the males (1) and (2) were the best as pollinizers for Zaghloul and Samany cvs. wherease, they induced the highest fruit set percentages. They also induced the highest bunch weight and yield per palm of Zaghloul cv. However, males (5) and (3) as pollinators enhanced fruit ripening of Zaghloul and Samany cvs., respectively. The results indicated also that fruit physical properties (fruit weight, dimenstions, and flesh thickness) were improved when Zaghloul and Samany trees were pollinated with pollen grains of males (1), (2) and (4) or with pollen grains of males (5), (4) and (1), respectively. However, fruit chemical constituents (fruit TSS and total sugars percentages) were increased when Zaghloul and Samany trees were pollinated with pollen grains of males (1) and (3) or with pollen grains of males (1) and (5), respectively. So, these five males should receive more studies, then propagated vegetatively and distributed as certified date palm pollinators in these regions to guaranty the good quality of fruits from year to another.

Key words : *Males, Pollin grains, Zaghloul, Samany.*

INTRODUCTION

Date palm, *Phoenix dactylifera* L. is an important fruit crop in Egypt. The number of fruitful female palms in Egypt is about 10.3 millions produced 1090004 tons of detes (according to Annals of Agricultural Statics, 2003).

Rasheed and Idko regions have most of date palm cultivation in El-Behaira governorate which ranked second in number and production of date palm trees among Egyptian districts. Date palm trees are dioecious plant and need to artificial hand pollination to produce economic yield. Little attention has been given to selection of male palms as pollen sources. The growers use any pollens that are available of seedling males.

These seedling males are differ greatly in their growth, vigour, spathe characteristics and pollen quality (Nixon, 1959 and Naser *et al*., 1986). Some reports in the literature suggested that there is a direct effect of pollens on fruit quality of date palm (Nixon, 1926 & 1927; Nixon and Carpenter, 1978; Abo-Hassan *et al*., 1983; El-Ghayaty, 1983; Boughediri and Bounaga, 1987 and Desouky *et al*., 1993). As a result, yield and fruit quality of the female palms differed greatly from one year to another according to the pollens quality (Osman *et al*., 1974; Higazy *et al*., 1983; Al-Ghamdi *et al*., 1988; Gasim, 1993; El-Salhy *et al*., 1997; Rahemi, 1998; Osman and Soliman, 2003 and Al-Saikhan, 2006). The growers now in urgent business for selection of date palm males.

Therefore, the main aim of this investigation is to evaluate some unidentifiable date palm males grown in the main center of date palm cultivation of El-Behaira governorate (Rasheed), the evalution involved the following osbservations :

1) Physical characteristics of male spathe.
2) Fruit quality and yield produced by pollens of the studied pollinizers.

MATERIALS AND METHODS

The investigation was commenced in two successive seasons of 2005 and 2006 season under two studies. The first was to evaluate the physical characteristics of unidentifiable male date palm's spathe, and the second was to evaluate the physical and chemical properties of Zaghloul and Samany dates produced by the pollen grains of the studied male date palms.

First study :

This study was carried out on unidentifiable date palm males of thirty years old, grown in sandy soil of El-Boseely orchard, Agric. Research Center at Rasheed region. Ten male palms were selected having off-shoots, to allow further propogation.

At the flowering time, five cracked spathes were collected from each male palm to study pollen viability and some physical characteristics of spathe and inflorescence; i.e. weight, length and width, as will as number of strands per inflorescence, length of strand, number of flowers per strand and weight of spathe pollen grains.

For pollen extraction, the strands were cut off and spread in on paper sheets to dry. The strands were rotated each day to the other side for 7 days to ensure

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sufficient dryness. Then pollen grain were separated from the strands by using fine sieve and weighed.

Pollen viability was determined by stainability of the pollen grains with 1% acetocarmine (Moreira and Gurgel, 1941). Pollen grains that stained red were considered viable, wherease, the colourless grains or those undersized were recorded as non-viable.

On the basis of viability and pollen grains weight in the first season. Five date palm males from the ten studied males were selected to use in the second study according to Nixon (1959) who suggested that in selecting male palms, the flowers should be contain abundant pollens. In addition, Al-Tahir and Asif (1980) who reported that variability existed in pollen quality including viability and germination.

Second study :

In this study twenty female date palms as uniform as possible were chosen from both Zaghloul and Samany cultivars. These trees were 10 years old, spaced at 10 × 10 meters in sandy soil (Table 1) of El-Mammoura Experimental Station of Agricultural Research Center, Alexandria Governorate. They were subjected to the same horticultural practices, then, at flowering stage their spathes were thinned to the same number and bagged before craking. Each selected palm was pollinated just after spathe craking by the same number of male strands which collected from the five male palms previously mentioned in the first study. Wherease, each selected male palm was used to pollinate four female palms (replicates) from each cultivar. Number of flowers of 10 tagged strands from each pollinated inflorescence were recorded. Then, the pollinated inflorescences were rebagged for two weeks to prevent contamination from other surrounding pollen sources.

The pollinating treatments were arranged in Randomized Complete Blocks Designs (RCBD), in which each treatment was replicated four times with one tree for each replicate i.e., 5 pollinating treatments (male palms) × 4 replicates (female palms) = 20 female palms from each cultivar.

At the end of June, fruit set percentage was calculated. At harvest time, in kahlol stage, ripening date, bunch weight and yield per palm was determined. A sample of 80 fruits was taken at random from each palm (replicate) for fruit quality determination of the two studied cultivars.

For each sample, average fruit diameter, length, weight and flesh thickness were recorded. Likewise, total soluble solids (T.S.S.) of fruit were determined by a hand refractometer, fruit juce acidity was determined according to A.O.A.C. (1998) by titration with 0.1 N sodium hydroxide. Total sugars were determined according to Malik and Singh (1980). The tannins content were determined according to Swain and Hillis (1959).

The data obtained throughout this investigation were statistically analyzed using the analysis of variance as described by SAS (2001). The difference among treatment means were compared by least significant difference test (Senedcor and Cochron, 1982).

RESULTS AND DISCUSSION

First study :

Physical characteristics of the studied males.

1- Spathe and pollen grains :

Data concerning the physical characteristics of male spathes and their pollen grains are presented in Table (2) and Figure (1).

a – Spathe :

a-1- Spathe weight :

It was found that male (1) and male (5) had significantly higher spathe weight than those of other males in 2004 and 2005 seasons. However, male (6) and male (10) had significantly least spathe weight than those of other males in both seasons. Other males had intermediate spathe weight without significant differences between each other in most cases.

a-2- Spathe length :

In both experimental seasons male (1) and male (5) produced the highest significant spathe length, except the insignificant difference between male (5) and male (9) in the first season. However, male (6), male (3) and male (10) produced the lowest spathe length in both seasons and differed significantly than most other males.

a-3- Spathe width :

The obtained results showed that, in both experimental seasons, male (5) and male (3) significantly exhibited higher spathe width than those of other males, and male (9) significantly exhibited the lowest spathe width. In the meantime, other males exhibited intermediate spathe width.

These results of spathe physical characteristics are in line with those of El-Sabrout (1979) and Naser *et al.* (1986). The second, for example, found that spathes of date palm males were ranged from 105 to 3683 gm, 25 to 119 cm and 3.5 to 22.5 cm for weight, length and width, respectively.

b – Pollen grains :

It is clear from Table (2) that in two experimental seasons, both of male (1) and male (2) had significantly higher pollen weight per spathe and pollen viability percentage than those of all or most other males. However, both of male (6) and male (10) had the lowest values of pollen weight and viability percentage respectively. It is also noticed that the first five males had higher values of viability percentage than those of other males.

Table (1): Physical and chemical analysis of the experimental soil achived in 2005 season.

Depth (cm)	EC ds/m	pH	$CaCO_3$ %	O.M. %	Cations mq/L Ca	Mg	Na	K	ppm Fe	Mn	Zn	Cu	Anions mq/L HCO_3	Cl	SO_4	Sand	Silt	Caly	Textural class
0 - 30	2.01	7.67	2.86	1.97	3.29	2.30	1.35	2.90	3.80	4.26	2.15	1.45	3.61	2.82	3.39	93.16	2.21	4.63	
30-60	2.33	7.82	3.75	0.98	3.01	2.17	1.30	3.10	3.62	4.71	2.08	1.31	3.05	2.66	3.86	92.73	3.25	4.02	Sandy
60-90	2.51	7.90	3.98	0.90	2.14	2.11	1.25	3.00	3.92	4.81	2.11	1.00	2.53	2.73	3.21	91.84	3.78	4.38	

Table (2): Spathe and its pollen grains physical characteristics of different date palm males under evalution.

Date palm males	Spathe						Pollen grains			
	Weight (kg)		Length (cm)		Width (cm)		Pollen weight / spathe (gm)		Pollen viability (%)	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	1.412^{a}	1.407^{a}	69.00^{a}	69.33^{b}	13.500^{e}	13.920^{e}	21.48^{a}	20.91^{a}	83.03^{a}	85.06^{a}
Male (2)	1.154^{bc}	1.175^{c}	53.46^{e}	54.50^{de}	13.166^{e}	13.700^{e}	20.38^{ab}	20.44^{a}	80.93^{ab}	81.53^{b}
Male (3)	1.178^{bc}	1.131^{c}	47.00^{f}	51.16^{ef}	15.590^{b}	15.900^{b}	17.75^{cd}	18.03^{c}	79.60^{b}	81.26^{b}
Male (4)	1.168^{bc}	1.165^{c}	58.83^{cd}	58.33^{cd}	13.633^{de}	15.033^{c}	13.55^{e}	19.04^{b}	78.86^{b}	80.43^{bc}
Male (5)	1.419^{a}	1.445^{a}	65.46^{ab}	75.46^{a}	18.666^{a}	17.666^{a}	19.34^{bc}	16.24^{d}	75.56^{c}	79.13^{c}
Male (6)	0.899^{e}	0.884^{d}	44.66^{f}	50.50^{ef}	13.233^{e}	13.501^{e}	11.67^{e}	11.32^{g}	74.56^{bc}	73.20^{e}
Male (7)	1.243^{b}	1.291^{b}	53.83^{e}	54.00^{de}	14.500^{c}	14.549^{cd}	16.25^{d}	16.07^{d}	72.16^{de}	76.33^{d}
Male (8)	1.228^{b}	1.141^{c}	54.33^{de}	56.00^{d}	13.341^{e}	14.200^{de}	12.48^{e}	13.85^{e}	72.13^{de}	68.83^{f}
Male (9)	1.055^{cd}	1.090^{c}	62.00^{bc}	62.66^{c}	11.266^{f}	11.810^{f}	16.62^{d}	11.71^{fg}	71.80^{e}	69.36^{f}
Male (10)	0.921^{cd}	0.859^{d}	47.16^{f}	48.16^{f}	14.333^{cd}	14.833^{cd}	12.82^{e}	12.47^{f}	70.50^{e}	68.36^{f}
L.S.D. (0.05)	0.143	0.108	4.95	4.57	0.753	0.800	2.60	0.84	2.73	1.56

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

These foregoing results are in agreement with those found by many investigators such as Wertheimer (1957) and Hussein (1983) who showed that different males yielded different amounts of pollen grains. Additionally, Ibrahim and Kholif (1993) reported that pollen grains viability differed according to the genetic variations of different pollen sources.

2- Inflorescence and strand :

Data regarding the physical properties of inflorescence and strand are presented in Table (3) and Figure (1).

a – Inflorescence :

a-1- Inflorescence weight :

In both experimental seasons, it appears that males (1), (3) and (7) had significantly higher inflorescence weight than those of other males. Males (4), (8) and (10) in 2005 season or and male (6) in 2006 season significantly had the lowest inflorescence weight. In the meantime, the other remained males produced intermediate inflorescence weight values.

a-2- Inflorescence length :

The results showed that males (1) and (2), in 2005 season and male (1) only, in 2006 season had significantly higher inflorescence length than those of other males. However, males (6) and (8) in 2005 season and males (6), (8), (10) and (2) in 2006 season had significantly lower inflorescence length than those of other males.

a-3- Inflorescence width :

It was appeared that, males (5) and (1) significantly recorded higher inflorescence width in 2005 season, however in 2006 season, males (5), (1) and (9) significantly recorded higher inflorescence width than those of other males. Meanwhile, in the two seasons, both males (2) and (4) significantly recorded lower inflorescence width than those of other studied males. On the other hand, the remained males recorded the intermediate inflorescence width.

These findings relating inflorescences are seemed to be confirmed with the results obtained by Naser *et al.* (1986), El-Salhy *et al.* (1997) and Al-Saikhan (2006) on different males of date palm.

b – Strand :

b-1- Strand length :

The obtained results indicated that males (9), (3) and (1) in 2005 season and males (3) and (1) only in 2006 season gained the highest strand length. But, the differences between the mentioned males and other males were insignificant in most cases. However, both males (4) and (6) in 2005 season and male (4) only in 2006 season gained the lowest strand length and significantly differed than those of most other males.

b-2- Number of strands per inflorescence :

It was clear that, in both experimental seasons, male (2) had significantly the highest number of strands per inflorescence. While males (10), (6) and (8) in 2005 season and males (6) and (8) only in 2006 season had significantly lower number of strands per inflorescence than those of other males. In addition, the other studied males had intermediate number of strands per inflorescence.

b-3- Number of flowers per strand :

The obtained data revealed that in both seasons, male (7) significantly exhibited higher number of flowers per strand than those of other males, except (3) in the first season. In the other side, male (6) exhibited the lowest number of flowers per strand which significantly differed than those of most males in the second season only. The values of the remained males were intermediary and to be near one another.

These results relating strands of different males are in harmony with those obtained by El-Sabrout (1979) and Naser *et al.* (1986) who found that physical characteristics differed from date palm male to another.

Generally, the above mentioned results showed that the studied males varied in their physical characteristics of spathe, pollens, inflorescence and strands. Such results were in line with many investigators. For examples, Nixon (1959) cited that no two seedling palms are alike, Naser *et al.* (1986) reported that the seedling males differ greatly in their morphological characteristics of the spathes. Moreover, Iqbal *et al.* (2004) detected that nine male palms found markedly differed in their floral characteristics.

Consequently, it could be summarized from this first study that the first five males were found the best in the most studied morphological characteristics and pollen viability.

Table (3): Inflorescence and strand physical characteristics of different date palm males under evalution.

Date palm males	Inflorescence						Strand					
	Weight (gm)		Length (cm)		Width (cm)		Length (cm)		No. of strands / inflorescence		No. of flowers / strand	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	931.33^{a}	868.00^{b}	50.56^{a}	50.60^{a}	17.600^{b}	17.900^{b}	27.33^{a}	26.00^{a}	153.12^{b}	145.43^{c}	53.42^{cd}	51.00^{e}
Male (2)	724.74^{d}	713.50^{d}	41.70^{e}	41.50^{c}	9.166^{l}	9.950^{g}	23.06^{abc}	23.13^{abcd}	181.66^{a}	179.33^{a}	54.26^{cd}	60.61^{bcd}
Male (3)	894.25^{b}	908.13^{a}	43.83^{c}	44.68^{b}	15.233^{de}	14.566^{cd}	26.36^{a}	26.00^{a}	132.00^{c}	129.00^{d}	66.00^{ab}	67.33^{b}
Male (4)	559.39^{e}	531.67^{f}	45.00^{b}	45.70^{b}	11.233^{h}	11.366^{f}	18.33^{c}	16.86^{e}	109.24^{e}	106.66^{f}	50.18^{cd}	63.70^{bc}
Male (5)	847.67^{c}	796.67^{c}	44.46^{bc}	44.30^{b}	18.833^{a}	19.200^{a}	24.33^{ab}	25.10^{ab}	158.91^{b}	161.00^{b}	54.33^{cd}	55.00^{de}
Male (6)	465.00^{g}	487.80^{g}	34.00^{g}	37.26^{d}	13.400^{g}	13.500^{e}	18.66^{c}	18.50^{de}	97.10^{f}	93.56^{g}	43.00^{d}	42.71^{f}
Male (7)	912.00^{ab}	933.33^{a}	45.03^{b}	44.46^{b}	15.600^{d}	14.733^{c}	24.66^{ab}	23.00^{abcd}	134.00^{c}	130.33^{d}	70.66^{a}	90.00^{a}
Male (8)	523.37^{f}	508.53^{fg}	39.06^{f}	40.00^{c}	14.100^{fg}	13.633^{de}	23.00^{abc}	20.00^{bcde}	97.58^{f}	91.46^{g}	57.73^{bc}	54.66^{de}
Male (9)	736.00^{d}	711.73^{d}	49.80^{a}	45.70^{b}	16.433^{c}	17.00^{b}	25.50^{a}	24.00^{abc}	121.73^{d}	118.25^{e}	57.00^{bc}	57.33^{cde}
Male (10)	547.41^{ef}	604.00^{e}	40.73^{e}	40.70^{c}	14.666^{ef}	14.466^{cde}	20.00^{bc}	20.16^{cde}	97.00^{f}	117.00^{e}	48.38^{cd}	50.38^{ef}
L.S.D. (0.05)	31.06	37.48	0.93	1.89	0.709	0.997	5.31	4.75	6.83	5.37	11.57	7.79

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

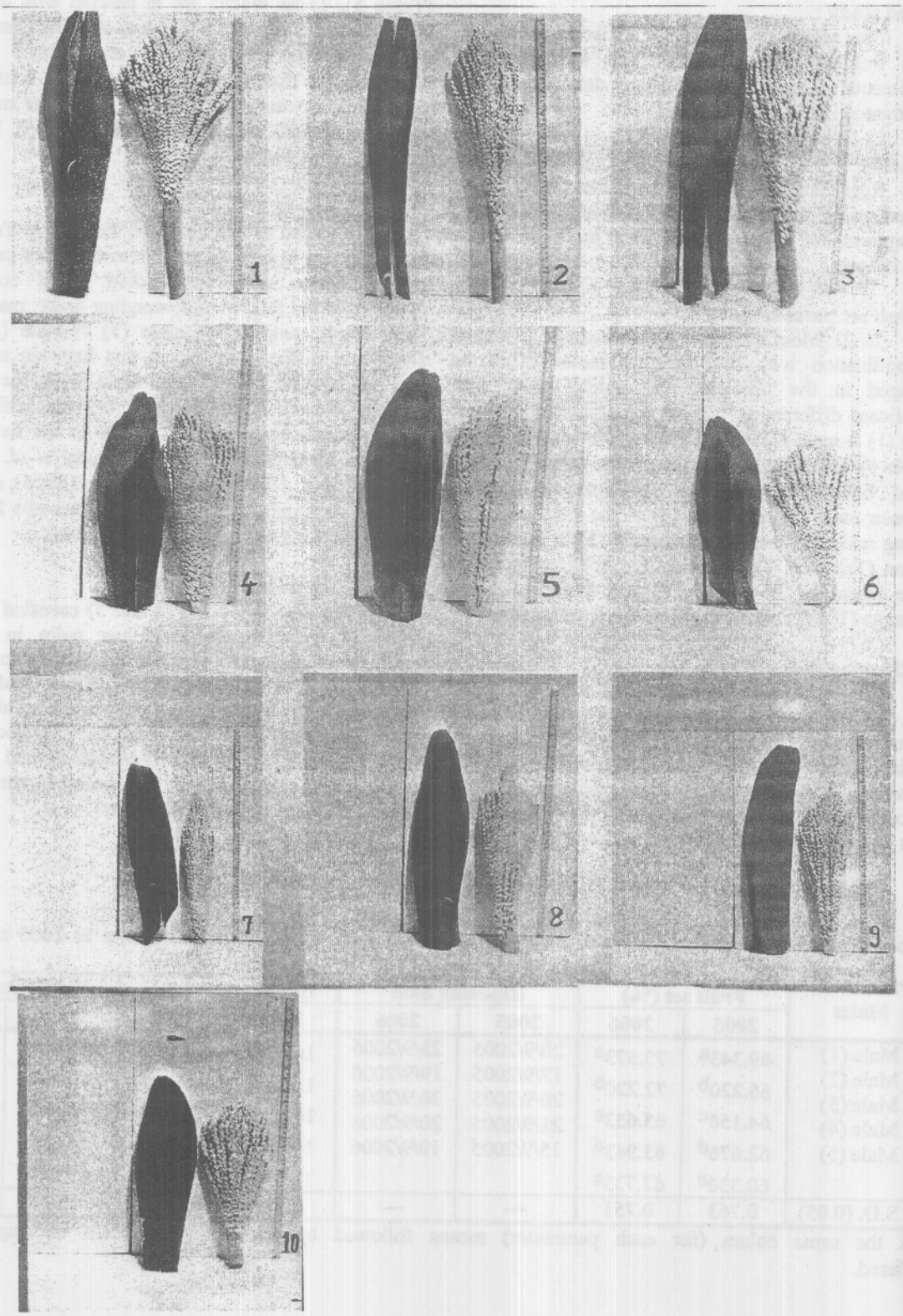

Figure (1)

Second study :

The effect of pollens of different males on yield, fruit physical properties and fruit chemical constituents of Zaghloul and Samany date palms were investigated in this study.

I - Yield :

Regarding the effect of the pollen grains of the studied males on yield of Zaghloul and Samany cvs., the experimental data are summarized in Tables (4 and 5) as follows :

a) Fruit set percentage :

In Zaghloul cv., fruit set percentage produced by pollination with the different males could be arranged in the following descending order with significant differences, in both experimental seasons: male (1) > male (2) > male (3) > male (4) > male (5) (Table 4). Likewise, in Samany cv. the same trend was found but there were no significant differences between male (3) and male (4) in the first season or among male (3), male (4) and male (5) in the second season (Table 5). These results are in agreement with those found by El-Ghayaty (1983), Boughediri and Bounaga (1987) and Rahemi (1998) on date palms.

b) Ripening date :

In Zaghloul cv., the data in Table (4) showed that, in both seasons, pollen grains of male (5) were more effective in enhancing the ripening time of Zaghloul fruits than other males, followed by male (2). However, in Samany cv., pollen grains of male (3) followed by male (2) were more effective in enhancing fruit ripening than other studied males in both seasons (Table 5). These results are in parallel with those of Nixon and Carpenter (1978) and Abo-Hassan *et al.* (1983). Additionally, Ibrahim and Kholif (1993) recommended that date palm growers can enhance or delay fruit ripening by selection of proper males to avoid unsuitable climatic conditions which lead to hard quality of fruits.

c) Bunch weight :

In regard to Zaghloul cv., the data in Table (4) indicated that in both seasons, bunch weight produced by pollination with the studied males could be arranged in the following descending order: male (1) > male (2) > male (4) > male (3) > male (5) with significant differences, except that between male (2) and male (4) or male (3) and male (5) in the second season. However, in Samany cv. the differences among bunch weight values as due to the five males were not significant (Table 5). Higazy *et al.* (1983), El-Salhy *et al.* (1997) and Al-Saikhan (2006), detected that bunch weight of female date palms was found to differ according male used in pollination.

d) Yield per palm :

The data in Tables (4 and 5) revealed that the trend of variations in yield per palm in various pollination treatments was almost similar to that of bunch weight in the two cultivars. These results are in agreement with some investigators working along this branch of research in date palm such as Abo-Hassan (1983), Gasim (1993) and El-Makhtoun and Abd-El-Kader (1993), they found that pollen grains source greatly affected yield of date palms.

Table (4): Effect of pollen grains of different males on yield of Zaghloul date palm in 2005 and 2006 seasons.

Males	Fruit set (%)		Ripening date		Bunch weight (kg)		Yield / palm (kg)	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	69.343^{a}	75.573^{a}	20/9/2005	23/9/2006	16.426^{a}	16.196^{a}	81.33^{a}	72.81^{a}
Male (2)	66.220^{b}	72.220^{b}	17/9/2005	19/9/2006	15.583^{b}	15.433^{b}	75.55^{c}	65.15^{c}
Male (3)	64.156^{c}	65.633^{c}	26/9/2005	30/9/2006	14.066^{d}	13.373^{c}	71.19^{d}	58.25^{d}
Male (4)	62.676^{d}	63.943^{d}	21/9/2005	20/9/2006	14.953^{c}	14.796^{b}	78.67^{b}	68.85^{b}
Male (5)	60.330^{e}	62.733^{e}	15/9/2005	19/9/2006	13.340^{e}	13.260^{c}	67.24^{e}	57.20^{d}
L.S.D. (0.05)	0.763	0.751	---	---	0.219	0.739	1.50	3.27

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

Table (5): Effect of pollen grains of different males on yield of Samany date palm in 2005 and 2006 seasons.

Males	Fruit set (%)		Ripening date		Bunch weight (kg)		Yield / palm (kg)	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	64.206[a]	67.533[a]	15/10/2005	19/10/2006	22.647	23.917	116.59	125.33
Male (2)	50.826[b]	63.330[b]	9/10/2005	10/10/2006	22.380	23.687	110.43	120.34
Male (3)	47.966[c]	53.503[c]	7/10/2005	9/10/2006	20.357	23.680	120.68	128.86
Male (4)	46.766[c]	53.363[c]	12/10/2005	15/10/2006	20.263	21.790	109.28	130.72
Male (5)	43.123[d]	51.853[c]	10/10/2005	12/10/2006	19.740	21.373	123.83	130.00
L.S.D. (0.05)	2.042	2.090	---	---	N.S.	N.S.	N.S.	N.S.

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

II – Fruit physical properties :

Concerning the effect of pollen grains of the five studied males on fruit physical properties, the obtained data are listed in Tables (6 and 7). It appears that, in Zaghloul cultivar, both fruit weight and length were significantly higher when pollen grains of males (1) and (2) were used in pollination than those of other males. While both of fruit diameter and flesh thickness were significantly higher when pollen of males (1) and (4) were used in pollination than those of other males.

In Samany cultivar, the trees pollinated with pollen grains of male (5) and male (4) significantly raised fruit weight and length than those of others (Table 6). However, trees pollinated with pollen grains of male (5) and male (1) increased significantly fruit diameter and flesh thickness than those of most males (Table 7). Similar views have been expressed by Khalifa *et al.* (1980) and Al-Ghamdi *et al.* (1988), who reported that both of fruit length, diameter, size and flesh weight significantly affected by different pollen grain types. Additionally, El-Ghayaty (1983), El-Makhtoun and Abd-El-Kader (1993) and Desouky *et al.* (1993) conclouded that pollen grains of selected male palms significantly raised fresh weight of fruits.

Table (6): Effect of pollen grains of different males on fruit physical properties of Zaghloul date palm in 2005 and 2006 seasons.

Males	Fruit weight (gm)		Fruit length (cm)		Fruit diameter (cm)		Flesh thickness (cm)	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	27.52[a]	28.28[a]	5.600[a]	5.326[a]	2.570[a]	2.593[a]	0.992[a]	1.099[a]
Male (2)	25.92[b]	28.08[a]	5.143[b]	5.235[b]	2.520[c]	2.496[c]	0.960[c]	1.064[bc]
Male (3)	24.71[d]	21.15[c]	4.766[d]	4.836[e]	2.480[d]	2.380[d]	0.949[d]	0.999[d]
Male (4)	25.65[c]	24.87[b]	4.733[e]	5.226[c]	2.546[b]	2.536[b]	0.968[b]	1.082[ab]
Male (5)	25.72[bc]	24.93[b]	5.046[c]	5.136[d]	2.463[e]	2.363[d]	0.908[e]	1.059[c]
L.S.D. (0.05)	0.26	1.45	0.022	0.008	0.011	0.020	0.001	0.020

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

Table (7): Effect of pollen grains of different males on fruit physical properties of Samany date palm in 2005 and 2006 seasons.

Males	Fruit weight (gm)		Fruit length (cm)		Fruit diameter (cm)		Flesh thickness (cm)	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	33.78[c]	36.78[ab]	5.183[c]	5.076	3.085[a]	3.360[b]	1.125[b]	1.142[b]
Male (2)	33.50[c]	32.60[c]	5.046[d]	4.713	3.053[ab]	3.226[c]	1.110[b]	1.114[c]
Male (3)	30.70[d]	31.89[c]	4.973[e]	4.923	3.030[b]	3.166[e]	1.018[c]	1.072[d]
Male (4)	35.45[b]	35.56[b]	5.240[b]	5.133	3.076[ab]	3.186[d]	1.052[c]	1.105[c]
Male (5)	36.93[a]	37.72[a]	5.266[a]	5.233	3.096[a]	3.940[a]	1.229[a]	1.196[a]
L.S.D. (0.05)	0.37	1.58	0.010	N.S.	0.047	0.006	0.055	0.025

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

III – Fruit chemical constituents :

Regarding the effect of pollen grains of the studied males on fruit chemical constituents of Zaghloul and Samany cultivars, the experimental data are represented in Tables (8 and 9), respectively.

It was abvious that in Zaghloul cultivar, both of fruit total soluble solids (TSS) and total sugars percentages were significantly higher when pollen grains of male (1) and (3) used in pollination than those of others. On the other hand, both of fruit acidity and tannins percentages almost were significantly higher when pollen grains of males (5) and (2) used in pollination than those of others (Table 8).

As regard to Samany cultivars, it was found that fruits of the palms pollinated with pollen grains of males (1) and (2) significantly had higher fruit total soluble solids (TSS) and total sugars percentages than those of other males. However, fruits of the palms which pollinated with pollen grains of males (3) and (2) had significantly higher fruit acidity and tannins percentages than those of other palms (Table 9). These findings were confermed with Abo-Hassan *et al.* (1983), Higazy *et al.* (1983), Shaheen *et al.* (1989) and Al-Saikhan (2006), who emphasized that fruit total soluble solids and total sugars contents were positively improved by pollen grains from some male date palms, however, fruit tannins content was found to differ from date palm male used in pollination to another.

It could be concluded from the present study that both of males (1) and (2) were the most convenience as pollinizers for Zaghloul and Samany female palms, wherease the pollen grains of the two mentioned males recorded the highest fruit set percentages for the two cultivars. Also, the same males (1 and 2) increased bunch weight and yield of palm in Zaghloul cv.. On the other hand, both of males (5) and (3) were more effective in enhancing ripening time of Zaghloul and Samany fruits, respectively.

In addition, pollen grains of males (1), (2) and (3) were the most effective in improving fruit quality of Zaghloul cultivar, while, pollen grains of males (5), (4) and (1) were the most effective in improving fruit quality of Samany cultivar.

Table (8): Effect of pollen grains of different males on fruit chemical constituents of Zaghloul date palm in 2005 and 2006 seasons.

Males	T.S.S. %		Acidity %		Total sugars %		Tannins %	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	24.09^{a}	24.31^{a}	0.172^{c}	0.153	78.22^{a}	72.72^{a}	0.231^{d}	0.242^{d}
Male (2)	22.75^{b}	22.00^{c}	0.188^{b}	0.160	72.18^{b}	69.98^{c}	0.317^{b}	0.331^{b}
Male (3)	24.01^{a}	23.11^{b}	0.147^{e}	0.159	72.55^{b}	70.52^{b}	0.278^{c}	0.252^{d}
Male (4)	20.76^{c}	22.05^{c}	0.162^{d}	0.155	62.24^{d}	60.81^{d}	0.263^{c}	0.284^{c}
Male (5)	23.00^{b}	20.16^{d}	0.192^{a}	0.160	68.98^{c}	67.18^{a}	0.344^{a}	0.369^{a}
L.S.D. (0.05)	0.48	0.35	0.003	N.S.	0.45	0.12	0.026	0.016

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

Table (9): Effect of pollen grains of different males on fruit chemical constituents of Samany date palm in 2005 and 2006 seasons.

Males	T.S.S. %		Acidity %		Total sugars %		Tannins %	
	2005	2006	2005	2006	2005	2006	2005	2006
Male (1)	25.16^{a}	25.95^{a}	0.123^{e}	0.164^{e}	67.53^{a}	67.99^{a}	0.177^{d}	0.328^{d}
Male (2)	22.27^{d}	22.65^{e}	0.134^{b}	0.182^{b}	59.28^{d}	61.27^{d}	0.234^{b}	0.455^{b}
Male (3)	23.48^{c}	23.92^{d}	0.151^{a}	0.193^{a}	60.36^{c}	61.97^{c}	0.286^{a}	0.491^{a}
Male (4)	24.19^{b}	24.46^{c}	0.132^{c}	0.170^{c}	56.12^{e}	56.58^{e}	0.215^{c}	0.324^{d}
Male (5)	24.56^{b}	24.82^{b}	0.130^{d}	0.169^{d}	62.05^{b}	62.25^{b}	0.186^{d}	0.436^{c}
L.S.D. (0.05)	0.37	0.32	0.002	0.001	0.19	0.17	0.015	0.009

In the same colum (for each parameter) means followed by the same letter are not significantly differed.

Therefore the above mentioned males must receive more attention, propagated and studied their compatibility with other cultivars such as Hayany, Bent Esha ... etec. to use them as certified and constant pollen grains source. The growers can use them in any other regions.

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الملخص العربى

تقييم ذكور نخيل البلح المستخدمة فى التلقيح بمنطقة رشيد – بمصر

ربيع إبراهيم سعد

قسم الفاكهة الإستوائية وتحت الإستوائية – معهد بحوث البساتين

مركز البحوث الزراعية – الجيزة – مصر

هذا البحث تم إجراءه خلال عامىّ ٢٠٠٥ و ٢٠٠٦ لتقييم بعض ذكور نخيل البلح المستخدمة فى تلقيح النخيل بمنطقة تمركز زراعة النخيل بمصر (رشيد) .

وقد شمل هذا التقييم عشرة ذكور رقمت من ١ إلى ١٠ ، وأنقسم هذا البحث إلى دراستين : الدراسة الأولى كان الهدف منها تقييم تلك الذكور من حيث الصفات الطبيعية لكل من الأغريض وحبوب اللقاح والنورة والشماريخ الزهرى . أما الدراسة الثانية فقد كان الهدف منها دراسة كل من المحصول والصفات الطبيعية والكيميائية لثمار نخيل البلح صنفىّ الزغلول والسمانى الناتجة من إستخدام حبوب لقاح بعض هذه الذكور . وقد أوضحت نتائج البحث إختلاف الذكور فيما بينها بالنسبة للصفات الطبيعية ، وأن أفضلها كان الخمسة ذكور الأولى من العشرة ذكور التى تم دراستها . كما وجد أيضاً أن الذكور (١) و (٢) كانا الأفضل كملقحات لصنفىّ الزغلول والسمانى حيث أعطيا أعلى نسبة لعقد الثمار ، وكذا أعلى وزن للسباطة وأعلى محصول للنخلة بالنسبة لصنف الزغلول . بينما الذكور (٥) و (٣) كملقحات قد أديا إلى تبكير نضج ثمار صنفىّ الزغلول والسمانى على الترتيب.

كما أشارت النتائج إلى أن الصفات الطبيعية للثمار (وزن وأبعاد الثمرة وسمك اللحم) تحسنت عندما أستخدمت حبوب لقاح كل من الذكور (١) ، (٢) و (٥) أو عندما أستخدمت حبوب لقاح كل من الذكور (٥) ، (٤) و (١) لتلقيح أشجار صنفىّ الزغلول والسمانى على الترتيب .

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لذلك فإن هذه الذكور الخمسة يجب الإهتمام بها بمزيد من الدراسة ثم إكثارها خضرياً ونشرها كملقحات معتمدة لأشجار نخيل البلح فى هذه المناطق لضمان ثبات جودة الثمار من عام لآخر .