

YIELD AND FRUIT QUALITY OF ZAGHLOUL AND SAMANI DATE PALM (*Phoenix dactylifera*, L.) AS AFFECTED BY POLLINATION METHODS

[44]

Ashour¹, N.E.; H.S.A. Hassan¹ and E.A.M. Mostafa¹

ABSTRACT

This study was carried out during two successive seasons (2002 and 2003) on Zaghloul and Samani date palm cultivars grown at El-Mansoria Giza Governorate Egypt. A spraying trail method was conducted using pollen grains at 2 g/L were mixed with boric acid at 100, 200 and 300 ppm or with Egyptian treacle at 5, 10, 20% as activating media as well as traditional pollination (control). All spraying treatments improved yield, retained fruits and both fruit physical and chemical characteristics i.e. fruit weight, volume, dimensions, TSS%, total sugars, reducing sugars and non-reducing sugars contents than the control treatment. Whereas, total acidity% was not affected by different treatments. The best results were obtained from pollen grains at 2 g/L + boric acid (H_3BO_3) at 200 or 300 ppm. In addition, Pollen grains at 2 g/L+ Egyptian treacle at 10 or 20 % gained also good results.

Key words: Date palm, Pollination, Boric Acid, Egyptian treacle, Fruit Quality

INTRODUCTION

Date palm (*Phoenix dactylifera*, L.) is one of the leading fruit crops all over Egypt. The date palms can grow under different conditions, where many other fruit species fail to grow. For this reason, it is most suitable for cultivation in the newly reclaimed desert area, especially in sandy soils.

It is well recognized that date palm is a dioecious plant i.e. male and female flowers are borne on separate palms. Natural pollination may occur by wind and insects. If the pollination process is

dependent on these two agents, the palm cropping will be shy and the fruits may be of inferior quality due to inadequate pollination. Therefore, artificial hand pollination becomes a necessity as a mean to ensure good yield. The concept of artificial date pollination is not new, and manual pollination has been used for long time, Swingle, (1928).

In addition to the simple method of placing the whole or part of a male inflorescence in female spath. Several methods of manual pollination have been developed. Among of these methods, applying pollen grain suspended in sucrose,

1- Pomology Department, National Research Center, El-Tahrir Street, Dokki, Egypt

(Received September 3, 2004)

(Accepted September 18, 2004)

mineral and some growth regulators as activating media (spraying method) were more efficient when pollen are in small quantities than ordinary pollination with date palm pollen only.

Several investigators studied the effect of boron on fruit-set, productivity and fruit quality, Chanturiya (1972) on mandarin, Hussain *et al* (1985) on date palm, Dabas and Jindal (1987) on grapevines, Saleh and Eman (2003) on mango, Osman (1999) and Hassan (2000). Abd El-Migeed *et al* (2002) on olive.

Other workers studied the effect of sucrose on the same previous parameter, Khalil and Al-Shawaan (1983) and Mostafa (1994) on date palm, Mostafa *et al* (2001) on Le-conte pear, Salah and Eman (2003) on mango.

Therefore, this investigation was carried out to study the effect of spraying pollen grains suspended on boric acid or Egyptian treacle as activating media on fruit retained percentage, yield and fruit quality of Zaghloul and Samani date palm cultivars grown under sandy soil conditions at Mansauria, Giza governorate. Egypt.

MATERIAL AND METHODS

This study was carried out during two successive seasons (2002 and 2003) on 15 years old Zaghloul and Samani date palm cultivars spaced at 10 meters apart, grown in a sandy soil at private orchard located in "El-Mansoria" Giza Governorate. Egypt. Twenty one trees were selected for each cultivar and divided into 7 treatments in three replicates (each of one tree) and arranged in a randomized complete block design as the following:

- 1- (Control) hand pollination (using the traditional method).
- 2- Pollen grains at 2 g/L + Boric acid (H_3BO_3) at 100 ppm.
- 3- Pollen grains at 2 g/L + Boric acid (H_3BO_3) at 200 ppm.
- 4- Pollen grains at 2 g/L+ Boric acid (H_3BO_3) at 300 ppm.
- 5- Pollen grains at 2 g/L + Egyptian treacle at 5 %.
- 6- Pollen grains at 2 g/L + Egyptian treacle at 10 %.
- 7- Pollen grains at 2 g/L + Egyptian treacle at 20 %.

Table 1. Chemical analysis of the used Egyptian treacle

Contents	%
Moisture	22.50
Total soluble solids	77.50
Sucrose	42.50
Reducing sugars	35.00
Ash	2.41
Volatile acidity (acetic acid)	0.32

The concentrations of pollen grains for each treatment was 2 gram per one litter for both Zaghloul and Samani cultivars.

Sprays of pollen suspension were thoroughly applied by small hand sprayer (two liter capacity) at the amount of 200 ml/inflorescence. Suspension was shaken for few minutes, then used immediately (Hussain *et al* 1985). Hand pollination was done by inserting 3 strands of the same selected male inflorescence into the female spath.

Both traditional and spray pollination were carried out twice. The first one just after the female spathe opening. The used pollen grain were collected from the same selected male palm tree to avoid the effect of metaxinia. The second spray was carried 3 days later.

After pollination with the first and second sprays, the inflorescences were wrapped with newspaper bags to prevent natural contamination by wind-borne pollen, bee pollination or by unwanted pollen from surrounding males. Thereafter, the bags were removed out after three weeks from pollination. The palms were subjected to the same horticultural practices and pruning was performed to maintain bunch/mature leaves ratio to (1:8). The number of spathes per palm was adjusted to 8 bunches by removing excess earliest, latest and smallest inflorescences for each female palm of each cv.

All bunches were harvested at the peak of colour development and the following determinations were carried out:

- 1- Fruit retained percentage was calculated at harvest date using this equation:

$$\text{Fruit retained \%} = \frac{\text{Total number retained fruits per bunch}}{\text{Total fruits number per bunch}} \times 100$$

- 2- The average bunch weight was estimated by kg.
- 3- Yield (kg/tree).

$$\text{Yield (kg/tree)} = \text{Number of bunches/tree} \times \text{bunch weight (kg)}$$

- 4- Fruit physical properties:

Samples of three replicates, each of 10 fruits were taken randomly from

each bunch to determine fruit dimension (length & diameter in cm), fruit shape (L/D ratio), fruit weight (g) and volume (cm³).

- 5- Fruit chemical properties:

- Total soluble solids (%) using hand refractmeter (A.O.A.C. 1985).
- Acidity (%) was determined as malic acid according A.O.A.C (1985).
- Total soluble sugars: It was determined according to Smith *et al* (1956), in the methanolic extract using the phenol sulphoric acid method and the percentage was calculated on dry weight basis.
- Reducing sugars content: It was determined in the methanolic extract according to Nelson & Somogy (1944) and A.O.A.C (1995).
- Non-reducing sugars content: It was determined by the difference between total and reducing sugars.

All obtained data were subjected to the analysis of variance. as the usual technique of analysis of variance. The treatment means were presented and compared using the least significant difference (LSD) as mentioned by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1- Fruit retained percentage

Data presented in Table (2) clearly indicated that percentage of retained fruits was significantly affected by different hand pollination methods for the two cultivars in both seasons. While traditional hand pollination method (control) gave the lowest percentage. It is also noticed that boric acid spray treatments significantly increased fruit retained % compared with the control. Moreover, there

Table 2. Percentage retained Fruits, bunch weight and yield of Zaghoul and Samani dates as affected by pollination methods

Treatments	Zaghoul cv.				Samani cv.			
	Fruit retained %	Bunch weight (kg)	Yield/tree (kg)	Increasing % over control	Fruit retained %	Bunch weight (kg)	Yield/tree (kg)	Increasing % over control
First season, 2002								
Control (Traditional method)	30.53	14.6	116.8	---	29.03	15.7	125.6	---
Pollen grains + H ₃ BO ₃ at 100 ppm	42.33	15.7	125.6	7.53	43.13	16.9	135.2	7.64
Pollen grains + H ₃ BO ₃ at 200 ppm	45.83	16.4	131.2	12.33	40.70	17.8	142.4	13.38
Pollen grains + H ₃ BO ₃ at 300 ppm	48.57	16.0	128.0	9.59	45.83	17.5	140.0	11.46
Pollen grains + Egyptian treacle at 5%	31.00	16.0	128.0	9.59	30.03	17.1	136.8	8.92
Pollen grains + Egyptian treacle at 10%	39.20	17.4	139.2	19.18	34.97	18.0	144.0	14.65
Pollen grains + Egyptian treacle at 20%	41.80	17.1	136.8	17.12	37.30	18.3	146.3	16.48
LSD at 5%	3.56	0.4	3.3	---	2.94	0.6	5.0	---
Second season, 2003								
Control (Traditional method)	30.47	14.1	112.8	---	29.13	15.6	124.8	---
Pollen grains + H ₃ BO ₃ at 100 ppm	42.63	15.9	127.2	12.77	43.87	17.9	143.2	14.74
Pollen grains + H ₃ BO ₃ at 200 ppm	47.17	16.6	132.8	17.73	41.57	18.0	144.0	15.38
Pollen grains + H ₃ BO ₃ at 300 ppm	48.57	16.3	130.4	15.60	46.10	17.9	143.2	14.74
Pollen grains + Egyptian treacle at 5%	31.10	16.0	129.0	14.36	30.77	17.5	140.0	12.18
Pollen grains + Egyptian treacle at 10%	39.93	18.0	144.0	27.66	34.97	18.53	152.0	21.79
Pollen grains + Egyptian treacle at 20%	42.63	17.0	136.0	20.57	36.50	18.4	147.2	17.95
LSD at 5%	2.37	0.2	1.884	---	3.06	0.365	2.598	---

was a positive relationship between boric acid concentration and retained fruits % in the two cultivars under study in both seasons. In this respect, it seems that, the improvement in fruit percentage of retained fruits could be explained as a result of increase in pollen grains germination and pollen tube elongation due to boric acid treatments. The above mentioned results are in agreement with those obtained by Osman (1999) on olive who found that boron treatments either as foliar or soil applications increased % of retained fruits. Also, Hassan (2000) reported that boric acid treatments at 250 or 500 ppm increased pollen germination than control and increased % retained fruits in Picual olive.

As for Egyptian treacle spray treatments, the results presented in the previous Table indicate that the treatments significantly increased % retained fruits for the two cultivars in both seasons. Also, there was a positive relationship between Egyptian treacle concentration and fruit retained percentage for the two cultivars in both seasons of study. The previous results are in harmony with those obtained by Khalil and Al-Shawaan (1983). They pointed out that % of retained fruit was higher with spraying treatment than with hand pollination. Mostafa (1994) found that sucrose and sugar cane syrup spray significantly increased the fruit retained percentage than the control for Zaghloul and Samani dates.

2-Bunch weight

It is clear from the table that all applied treatments significantly increased bunch weight in the two cultivars during

the two seasons of study as compared with control.

Treatment pollen grains + boric acid at 200 ppm gave heavier bunch weight than other concentrations for two cultivars under study in both seasons. As for Egyptian treacle sprays, treatment pollen grains + 10 % Egyptian treacle gave the best results in this respect, for the two cultivars in both seasons. The obtained results are in agreement with those obtained by Mostafa (1994).

3- Yield

Concerning the average yield/tree, Table (2) indicated that different hand pollination methods significantly affected the yield in both seasons for the two cultivars under study compared with the control. As for boric acid treatments, the best results were obtained from pollen grains + boric acid at 200 ppm, followed by 300 ppm and 100 ppm. The average increment percentage was 12.33%, 9.59% and 7.53 % and 17.73 %, 15.60 % and 12.77 % in the first and second season, respectively for Zaghloul cultivar. While the average increment percentage was 13.38 %, 11.46 % and 7.64 % and 15.38 %, 14.74 % and 14.74 % than control for Samani cultivar in the first and second seasons, respectively.

As for the Egyptian treacle treatments, best results were obtained from treatment pollen grains + 10 % Egyptian treacle followed by 20 % and 5 %. The average increment percentage was 19.18 %, 17.12 % and 9.59 % and 27.66 %, 20.57 % and 14.36 % for Zaghloul cultivar in the first and second season, respectively. While in Samani cultivar the results differed from season to season. The best results were obtained from treatment pollen grains

+20% Egyptian treacle followed by 10 % and 5 % in the first season. While in the second season, the best results were obtained from treatment pollen grains +10% Egyptian treacle followed by 20 % and 5%. The average increment percentage was 16.48%, 14.65 and 8.92% and 21.79%, 17.95 % and 12.18 % in the first and second season, respectively.

The obtained results are in line with those reported by Singh *et al* (2003) that both boron at 100 or 200 ppm and sucrose at 2.5 % or 5 % increased the yield of Le-conte pear.

PHYSICAL PROPERTIES

Fruit length

Data in Table (3) indicated that fruit length was significantly affected by pollination methods for Zaghoul and Samani cultivars in both seasons of study. In this respect, the best results were obtained from spraying boric acid at 300 ppm followed by Egyptian treacle spray at 20 % suspended with 2 g pollen grain/L treatments. The traditional pollination method gave the shortest fruits. The above results are agree with those of Mostafa (1994) who found that average fruit length of Zaghoul and Samani was increased as a result of sugar cane syrup applications mixed with pollen grain. Abd El-Migeed *et al* (2002) on Picual olive reported that boric acid spray at 300 ppm increased fruit length.

- Fruit diameter

Data in Table (3) indicated that all the studied pollination methods significantly affected the average fruit diameter for Zaghoul and Samani cultivars during

both seasons of study. The best results were obtained from treatment pollen grains + Egyptian treacle at 20 % followed by treatment pollen grain + boric acid at 300 ppm in two seasons of study for two cultivars.

Fruit shape

Data in Table (3) indicated that fruit shape (length/diameter ratio) was not significantly affected with different pollination methods in both Zaghoul and Samani cultivars during both seasons of study. This result may be due to that the increase or decrease in fruit length was parallel to the increment or decrement in fruit diameter in both cultivars during both the experimental seasons. These data coincide with Abd-Alaal *et al.* (1983). Who mentioned that fruit shape was not changed because the increase in length was parallel to the increase in fruit diameter.

Fruit weight and volume

Data in Table (3) clearly indicated that fruit weight of Zaghoul and Samani cultivars were significantly affected by different hand pollination methods in both seasons of study. It was clearly noticed that there is a positive relationship between both boric acid and Egyptian treacle concentrations and fruit weight. In another words, the treatment of both pollen grains + boric acid at 300 ppm and treatment of pollen grains + Egyptian treacle at 20 % gave the highest fruit weight during both seasons of study for the two cultivars. Meanwhile, traditional pollination method gave the least fruit weight for the cultivars.

Table 3. Physical properties of Zaghloul and Samani dates as affected by pollination methods

Treatments	Zaghloul cv.					Samani cv.				
	Fruit length (cm)	Fruit diameter (cm)	Fruit shape (L/D)	Fruit weight (g)	Fruit volume (cm ³)	Fruit length (cm)	Fruit diameter (cm)	Fruit shape (L/D)	Fruit weight (g)	Fruit volume (cm ³)
First season, 2002										
Control (Traditional method)	4.76	2.68	1.78	14.90	15.53	4.53	2.87	1.59	15.50	15.77
Pollen grains + H ₃ BO ₃ at 100 ppm	4.80	2.67	1.80	19.20	19.00	4.63	2.87	1.62	19.60	19.17
Pollen grains + H ₃ BO ₃ at 200 ppm	4.80	2.60	1.85	19.27	19.60	4.87	3.07	1.59	22.97	24.60
Pollen grains + H ₃ BO ₃ at 300 ppm	5.70	3.00	1.90	24.43	24.80	5.67	3.37	1.69	30.07	30.53
Pollen grains + Egyptian treacle at 5%	5.07	2.63	1.92	16.63	16.30	4.43	2.73	1.62	16.90	15.87
Pollen grains + Egyptian treacle at 10%	4.83	2.73	1.77	17.10	18.33	5.37	3.07	1.75	22.90	23.43
Pollen grains + Egyptian treacle at 20%	5.63	3.13	1.57	19.70	21.77	5.07	3.50	1.79	30.53	32.37
LSD at 5%	0.22	0.13	NS	3.81	1.68	0.72	0.11	NS	1.04	2.99
Second season, 2003										
Control (Traditional method)	4.75	2.68	1.79	15.67	15.13	4.50	2.99	1.51	16.27	17.00
Pollen grains + H ₃ BO ₃ at 100 ppm	4.77	2.63	1.81	19.87	19.13	4.57	2.87	1.60	20.13	19.53
Pollen grains + H ₃ BO ₃ at 200 ppm	4.67	2.70	1.74	20.93	19.93	4.93	3.00	1.54	23.00	24.53
Pollen grains + H ₃ BO ₃ at 300 ppm	5.07	2.87	1.77	24.47	24.30	5.27	3.23	1.64	30.27	30.40
Pollen grains + Egyptian treacle at 5%	4.90	2.73	1.81	17.23	17.20	4.37	2.83	1.55	17.77	16.43
Pollen grains + Egyptian treacle at 10%	4.83	2.77	1.75	16.67	17.87	5.07	3.10	1.64	23.00	23.73
Pollen grains + Egyptian treacle at 20%	5.63	3.03	1.86	20.80	21.83	5.17	3.63	1.33	30.00	30.67
LSD at 5%	NS	0.31	NS	2.36	1.57	NS	0.19	NS	1.47	2.36

Regarding fruit volume, the results in the same Table show that fruit volume took a similar trend as fruit weight and was significantly increased as boric acid and Egyptian treacle concentrations increased in both cultivars during both seasons of study.

These results are in agreement with those reported by Mostafa (1994) who found that the traditional pollination method gave the lowest fruit weight and smallest fruit size comparing with all investigated methods in Zaghloul and Samani cultivars. An increment in fruit weight and volume under different treatments as compared with control may be due to improving pollen grain germination ability and accelerated pollen tube growth through style and easily fertilization of ovaules.

CHEMICAL PROPERTIES

Total soluble solids (TSS) percentage

Data presented in Table (4) showed that Zaghloul dates had higher values of total soluble solids than Samani dates. Moreover, pollen grain spraying treatments increased total soluble solids percentage in dates of both Zaghloul and Samani cultivars in comparison with the traditional method in both seasons of study. In this respect, the best results were obtained from treatment of pollen grains + boric acid at 300 ppm and the treatment of pollen grains + Egyptian treacle at 20 % in both seasons of study for the two cultivars. These results are in line with Mostafa (1994) who reported that the traditional pollination method gave the lowest value of TSS percentage than all pollination methods in Zaghloul and Samani cultivars.

Total acidity

Data in Table (4) indicated that total fruit acidity % was not significantly affected by different pollination method in both seasons for the two cultivars under study. Generally, no constants trend was detected among the treatments in both seasons. It is obvious that spraying treatments individually gave more or less similar values to those obtained by traditional pollination method (control).

Sugar contents

Data presented in Table (4) indicated that reducing sugar was significantly affected by different pollination methods for the two cultivars in both seasons of study. Moreover, the spraying treatments increased reducing sugars percentage in the two cultivars compared with the traditional method.

Regarding non-reducing sugars, data in table (4) showed that spraying treatments in the two seasons of study for Zaghloul cultivar enhanced fruit content of non-reducing sugars. While in Samani cultivar non-reducing sugars also enhanced by all treatments but the values varied from treatment to another and from season to season. Thus it seems that there was no constant trend due to different pollination treatments in the two seasons for reducing sugars content.

As for total sugar contents, results in Table (4) indicated that fruit content of total sugars was significantly affected by different pollination methods, spraying treatments increased total sugars percentage in both seasons of study or the two cultivars. The lowest sugars percentage was obtained in the traditional method (control). These results are in line with

Table 4. Chemical properties of Zaghloul and Samani dates as affected by pollination methods

Treatments	Zaghloul cv.						Samani cv.					
	TSS (%)	Acidity (%)	TSS / acid ratio	Reducing sugars	Non-reducing sugars	Total sugar	TSS (%)	Acidity (%)	TSS/ acid ratio	Reducing sugars	Non-reducing sugars	Total sugar
First season, 2002												
Control (Traditional method)	20.17	0.323	62.53	59.00	6.44	65.40	19.30	0.297	65.32	66.00	7.12	73.12
Pollen grains + H ₂ BO ₃ at 100 ppm	22.00	0.310	71.68	60.80	8.20	69.00	20.30	0.297	68.66	72.00	7.95	79.95
Pollen grains + H ₂ BO ₃ at 200 ppm	24.83	0.307	81.57	66.80	7.96	74.76	24.70	0.290	85.14	73.00	6.98	79.98
Pollen grains + H ₂ BO ₃ at 300 ppm	24.63	0.283	87.45	59.50	7.33	66.83	26.47	0.320	82.73	69.80	6.88	76.68
Pollen grains + Egyptian treacle at 5%	23.20	0.293	83.24	67.50	7.85	75.35	22.93	0.283	81.43	72.00	7.65	79.65
Pollen grains + Egyptian treacle at 10%	23.13	0.287	80.71	69.00	6.88	75.88	22.03	0.303	72.82	71.30	7.42	78.72
Pollen grains + Egyptian treacle at 20%	24.501	0.300	81.95	67.80	7.30	75.10	22.50	0.287	78.65	70.20	7.32	77.52
LSD at 5%	2.08	NS	13.14	1.47	0.37	1.46	3.14	NS	NS	2.21	0.37	2.48
Second season, 2003												
Control (Traditional method)	20.50	0.290	70.74	58.60	6.25	64.85	19.83	0.337	62.06	64.80	7.30	72.10
Pollen grains + H ₂ BO ₃ at 100 ppm	22.83	0.300	76.09	62.90	8.50	71.40	23.00	0.273	84.40	70.10	7.95	78.05
Pollen grains + H ₂ BO ₃ at 200 ppm	25.53	0.287	89.26	64.70	6.65	71.35	23.50	0.307	76.74	72.00	7.83	79.83
Pollen grains + H ₂ BO ₃ at 300 ppm	23.10	0.297	77.97	66.80	6.48	73.28	23.97	0.290	82.82	69.50	7.22	76.72
Pollen grains + Egyptian treacle at 5%	23.80	0.300	80.13	66.40	8.20	74.60	23.83	0.283	86.78	73.00	7.92	80.92
Pollen grains + Egyptian treacle at 10%	24.17	0.290	83.81	68.80	6.95	75.75	23.60	0.293	80.53	70.60	7.13	77.73
Pollen grains + Egyptian treacle at 20%	23.60	0.280	84.53	67.00	7.75	74.75	24.47	0.297	82.55	69.00	7.03	76.03
LSD at 5%	1.81	NS	NS	2.86	0.53	3.17	2.3	0.032	9.61	1.99	0.18	1.99

Total sugars, reducing and non-reducing sugars were estimated asg/100g dry wt. of fruit sample.

those obtained by Mostafa (1994) who reported that spraying treatments increased sugars percentage in both seasons for Zaghoul and Samani cultivars.

From the abovementioned results it could be concluded that, combining pollen grains with boric acid or Egyptian treacle using the suspension as sprays is the recommended treatment. Where it increased yield by 7.53 to 27.66 and 7.64 to 21.79% for Zaghoul and Samani cvs. during the first and second seasons, respectively, and improved some fruit physical and chemical properties.

REFERENCES

- Abd El-Migeed, M.M.M.; M.M.S. Salah, E.A.M. Mostafa and M.S. Abou-Raya (2002). Influence of soil and foliar applications of boron on growth, fruit set, mineral status, yield and fruit quality of Picual olive trees. *Egypt J. Appl. Sci.*, 17(1): 261-272.
- Abd-Alaal, A.F.; H.M. Mahmoud and S.Z. El-Agamy (1983). The effect of pollen source on fruit characteristics of Zaghoul dates (*Phoenix dactylifera*, L.). *Assiut J. Agric. Sci.*, 14(3): 347-355. *Egypt.*
- A.O.A.C. Association of Official Agricultural Chemists (1995). Official Methods of Analysis 15th Ed. Published by A.O.A.C. Washington, D.C. (USA).
- Chanturiya, I.A. (1972). Trials with different boron rates in mandarin plantation. *Suptropicheshie Kul Tury. (1): 78-81. (Hort. Abst. 43. 6344).*
- Dabas, A.S. and P.C. Jindal (1987). Effect of boron and magnesium sprays on bud formation, berry set and berry drop of grapes. *J. Agric. Res.*, 19: 40-44 (C.F. *Hort Abst.*, 57: 280).
- Gomez, K.A. and A.A. Gomez (1984). *Statistical Procedures for Agricultural Research*. 680 pp. John Wiley and Sons, Inc. New York.
- Hassan, S.A. (2000). *Morphological and Physiological Studies on Flowering, Pollination and Fruiting of Picual Olive Trees*. p. 49. Ph.D. Thesis, Fac. Of Agric., Cairo Univ., Egypt.
- Hussain, F.A.; S.M. Bader and S.S. Al-Atear (1985). Effect of Different Pollination Methods on Quality and Quantity of Date Palm (*Phoenix dactylifera*, L.) fruits. *J. Agric. Water Resources Res.*, 4(1): 265-282.
- Khalil, A.R. and A.M. Al-Shawaan (1983). Wheatflour and Sugar solution media as carriers for date palm pollen grains. *Proceeding of The First Symposium on The Date Palme in Saudi Arabia*. pp. 68-71. Al-Hassa, Saudi Arabia, Kming Faisal University.
- Mostafa, E.A.M.; M.M.S. Salah and M.M.M. Abd El-Migeed (2001). Improving leCont pear trees productivity by spraying GA₃ and sucrose. *Arab Univ. J. Sci. Ain Shams Univ. Cairo*, 9(1): 373-385.
- Mostafa, R.A.A. (1994). *Effect of Different Pollination Methods on Improving Productivity of Certain Date Palm (Phoenix dactylifera, L.) Cultivars under Assiut Conditions*. p. 109. Ph. D. Thesis, Fac. of Agric., Assiut Univ., Assiut, Egypt.
- Nelson, N. and I. Somogy (1944). Colourimetric methods for determination of reducing sugars related substances. *J. Bio. Chem.*, 153: 375.
- Osman, L.H. (1999). Response of picual olive trees to soil fertilization with borax and magnesium sulphate. *Minufiya, J. Agric. Res.*, 24(1): 277-287. *Egypt.*

Saleh, M.M.S. and A.A. Eman, Abd El-Monem (2003). Improving productivity of "Fagriklan" mango trees grown under sandy soil conditions using potassium, boron and sucrose as foliar spray. *Annals Agric. Sci., Ain Shams Univ. Cairo*, 48(2): 747-756.

Singh, A.K.; R. Singh and S.S. Mann (2003). Effect of plants bio-regulators and nutrients on fruit set, yield and qual-

ity of pear cv. Le conte. *Indian J. Hort.*, 60(1): 34-39.

Smith, F.; M.A. Gilles; J.K. Haniltun and P.A. Godees (1956). Colorimetric methods for determination of sugars related substances. *Anal. Chem.*, 28-350.

Swingle, W.T. (1928). Metaxinia in the date palm possibly a hormone action by the embryo or endosperm. *J. Heredity* 19: 257-268.

مجلة حوليات العلوم الزراعية ، كلية الزراعة ، جامعة عين شمس ، القاهرة ، ٤٩م ، ع(٢) ، ٦٣١ - ٦٤٢ ، ٢٠٠٤

المحصول وجودة ثمار البلح الزغلول والسمانى تحت تأثير بعض طرق التلقيح

[٤٤]

نجاح النعمانى عاشور^١ - حسن سيد أحمد حسن^١ - عصام أحمد محمد مصطفى^١
١ - قسم بحوث الفاكهة - المركز القومى للبحوث - النقى - القاهرة

(١٠٠، ٢٠٠، ٣٠٠ جزء فى المليون) أو العسل الأسود (٥، ١٠، ٢٠%) وذلك بغرض تنشيط انبات حبوب اللقاح على مياسم الأزهار الموثثة بالإضافة إلى معاملة التلقيح العادية. وقد أظهرت النتائج ما يلى:

أن النسبة المئوية للثمار المتبقية فى السباطة عند الجمع وكذلك وزن السباطة والمحصول قد زادت معنوياً بالمعاملات السابقة مقارنة بمعاملة الكنتترول (التلقيح العادى). كما كان هناك علاقة إيجابية بين

أجريت هذه الدراسة خلال موسمى ٢٠٠٢، ٢٠٠٣ على أشجار نخيل البلح (زغلول - سمانى) عمرها ١٥ سنة والمنزرعة فى منطقة المنصورة بمحافظة الجيزة بجمهورية مصر العربية وذلك بغرض دراسة تأثير بعض طرق التلقيح اليدوى على نسبة الثمار المتبقية عند الجمع وكمية المحصول والصفات الطبيعية والكيمائية لثمار هذه الأصناف. حيث تم خلط حبوب اللقاح بتركيز ٢ جم/لتر مع تركيزات مختلفة من حامض البوريك

المليون أو استخدام العسل الأسود بتركيز ١٠ أو ٢٠% للحصول على أعلى محصول وصفات جودة لصنفى البلح الزغلول والسمانى تحت ظروف منطقة المنصورية بالجيزة.

تركيز كل من حامض البوريك أو العسل الأسود وتحسين المحصول وصفات الجودة. وتوصى نتائج هذه الدراسة باستخدام حبوب اللقاح بمعدل ٢ جرام /لتر + حمض البوريك بتركيز ٢٠٠ أو ٣٠٠ جزء فى

تحكيم: أ.د محمد على أبو رواش
أ.د عبد العال حجازى حسن