

EFFECT OF NAA SPRAYS ON BUNCH YIELD AND FRUIT CHARACTERISTICS OF "ZAGHLOUL" DATE (*Phoenix dactylifera* L.)

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ABSTRACT

This work was carried out during the 2000 and 2001 seasons on "Zaghloul" date cv. to study the effect of NAA concentrations on bunch yield and fruit characteristics. Bunches were sprayed with NAA solutions containing 0, 10, 20, 30 or 40 ppm, 10 days after fruit set.

It was found that NAA treatment reduced both yield/bunch and number of fruits/strand. Moreover, fruit weight and flesh weight were increased in response to this treatment. Results also indicated that SSC% of fruits were increased with the NAA treatments. However, tannin content was decreased in the NAA treated fruits. This was attributed to enhanced maturity due to the achieved thinning.

The NAA treatment of "Zaghloul" date cv. as indicated under the conditions of this experiment could be recommended to improve fruit quality.

INTRODUCTION

Fruit thinning is a known horticultural practice for improving quality of fruits including dates (Al-Bakr, 1972). Many investigators have shown that many advances could be achieved in improving fruit quality by the use of certain plant growth regulators for thinning date palm fruits. Earliest investigators reported that alternate bearing was very pronounced in most cultivars of date palm. Fruit thinning could partly relieve this phenomenon (Al-Bakr, 1972 and Wally *et al.*, 1979). Several different chemicals are being used successfully to thin dates such as ethephon (El-Hamady *et al.*, 1979 & 1992), 2, 4-D (Abd El-Hamid & Agamia, 1983 and Khalifa *et al.*, 1984) and 2, 4, 5 T (Ketchie, 1967 & 1968 and El-Kassas, 1983). No trend was observed for naphthalene acetic acid (Furr and Hewitt, 1964), whereas Abd El-Hamid & Agamia (1983) and Khalifa *et al.* (1984) found that NAA had good effects on date fruit thinning. El-Hamady *et al.* (1992) mentioned that it is not always possible to apply the same results obtained in one country to the situation found in another due to varying environment, varieties, soils and management practices.

Zaghloul date palm is one of the most important cultivars of soft dates in Egypt. The main objective of this work is to investigate the effect of NAA concentrations on thinning and fruit quality of "Zaghloul" dates.

MATERIALS AND METHODS

This study was carried out during 2000 and 2001 seasons on "Zaghloul" date palm cultivar grown at El-Mehala El-Koubra, Gharbia Governorate where the soil is loamy-clay. Six, 25 years old palms in their one-year, planted at 10 meters apart were selected for each season. The selected palm tree were uniform in size, vigor, and number of bunches. No bunches were removed from these palms. Pollination was carried out by placing the strands within female spathe using the same male parent for both seasons.

Each spathe was isolated by placing it in a paper bag which was tied at the base of the spathe to prevent pollen contamination. The bags were shaken gently to insure pollen distribution. The bags were removed two weeks later.

Two spathes on each palm were sprayed with solutions containing 0, 10, 20, 30 or 40 ppm NAA 10 days after fruit set. Tween-20 was used as wetting agent. Each bunch was covered with polyethylene bag and the spraying was carried out inside the bag.

At harvesting, bunches were picked at full color stage and the weight of fruits was determined per bunch, and number of fruits in 20 randomly selected strands were recorded in each bunch. A sample of 30 fruits were taken from each bunch for determination of: fruit weight, fruit length, fruit diameter, fruit length/fruit diameter (L/D) ratio, seed & fruit flesh weight, flesh dry matter percentage, soluble solids content (SSC %), acidity %, tannin %, and vitamin C according to A.O.A.C. (1980).

Each treatment was represented by six replicates arranged in a complete randomized block design. The data were statistically analyzed according to the method of Snedecor and Cochran (1967) as means were compared using Duncan's multiple range test, DMRT, (Duncan, 1955).

RESULTS

Bunch yield:

Data in Table (1) showed that NAA treatments reduced bunch yield when compared with the control in both seasons. Bunch yield decreased as NAA concentrations increased. The reduction in bunch yield as compared to the control was 9.74, 20.09, 24.34 and 32.85% for 10, 20, 30 and 40 ppm treatments, respectively in the first season while it was 20.03, 29.24, 30.28 and 34.03% in the second season. The differences between the control and NAA treatments were significant in both seasons except between 10 ppm treatment and the control in the first season. Regarding the differences within NAA treatments, there was a significant difference between 10 and 40 ppm in both seasons, while the differences within 10, 20, 30 as well as between 20, 30, 40 ppm treatments were not significant during both seasons.

Number of fruits per strand:

Data of both seasons (Table 1) indicated that number of fruits/strand of the thinned fruits were lower than the control. Also the number of fruits/strand decreased as NAA concentration increased. There was significant difference between the control and 20, 30 and 40 ppm treatments during both seasons, while the difference between the control and 10 ppm treatment was not significant. On the other hand, the difference within 10, 20, 30 ppm as well as 20, 30, 40 ppm treatments in the first season were not significant. Also it was not significant within NAA treatments in the second season.

Table (1): Effect of NAA sprays on yield/bunch, number of fruits/strand and some fruit physical characteristics of "Zaghloul" date cv.

NAA concentration (ppm)	Bunch yield (kg)	Number of fruits/strand	Fruit weight (g)	1 st season (2000)					Fruit length/fruit diameter	Flesh weight (g)	Seed weight (g)	Flesh dry matter percentage
				Fruit length (cm)	Fruit diameter (cm)	Fruit length/fruit diameter	Fruit weight (g)	Fruit length (cm)				
0 (control)	17.87 a	11.58 a	20.92 b	5.42 b	2.57	2.11	18.97 b	1.95	30.33			
10	16.13 ab	9.83 ab	23.50 a	5.49 b	2.62	2.12	21.44 a	2.06	30.18			
20	14.28 bc	8.08 bc	24.16 a	5.70 a	2.70	2.11	22.13 a	2.03	31.45			
30	13.52 bc	7.05 bc	24.01 a	5.68 a	2.73	2.08	22.02 a	1.99	31.87			
40	12.00 c	5.90 c	24.24 a	5.70 a	2.72	2.09	22.21 a	2.03	31.81			
Sig.	**	**	**	**	NS	NS	**	NS	NS	NS	NS	
2 nd season (2001)												
0 (control)	19.22 a	11.15 a	21.55 b	5.47 b	2.60 b	2.10	19.65 b	1.90	30.53			
10	15.37 b	8.85 ab	22.34 b	5.50 b	2.68 ab	2.08	20.40 b	1.94	31.17			
20	13.60 bc	7.08 b	24.69 a	5.64 ab	2.74 a	2.05	22.60 a	2.09	30.18			
30	13.40 bc	6.92 b	24.38 a	5.70 a	2.76 a	2.07	22.38 a	2.00	31.31			
40	12.68 c	6.50 b	24.58 a	5.71 a	2.75 a	2.07	22.58 a	2.00	32.04			
Sig.	**	**	**	*	*	NS	**	NS	NS	NS	NS	

In the same cell, means followed by the same letter are not significantly different according to DMRT.

Fruit weight:

Generally, NAA treatments increased fruit weight significantly (Table 1). In the first season, the differences within NAA treatments were not significant. In the second season, the differences within 20, 30, 40 ppm were also not significant, while it was significant between 10 ppm treatment and each of 20, 30 and 40 ppm treatments.

Fruit dimensions:

Generally fruit length and fruit diameter were increased in NAA treatments than the control (Table 1). Regarding fruit length, the differences between 10 ppm treatment and each of 20, 30 and 40 ppm treatments were significant in both seasons, except the 20 ppm treatment in the second one. Moreover, no significant differences were found between 10 ppm treatment and the control. Nearly the same trend was observed for fruit diameter, but the differences were non significant in the first season. Concerning fruit length/diameter (L/D) ratio, the obtained data did not show any significant differences (Table 1) which indicate no change in fruit shape due to the treatment.

Seed & flesh weight, and flesh dry matter percentage:

Data in Table (1) showed that no significant differences were found in seed weight between the control and any of the NAA treatments in both seasons. However, significant differences were found in flesh weight. In the first season, all NAA treatments had significantly higher flesh weight than the control, with no significant differences between the 10, 20, 30 or 40 ppm treatments. The same trend was observed during the second season except that there was no significant difference between the 10 ppm NAA treatment and the control.

Regarding the effect of NAA thinning treatments on flesh dry matter, data showed that the differences were not significant (Table 1).

Soluble solids content and acidity:

The obtained data in Table (2) indicated that NAA thinning treatments increased soluble solids content (SSC%) of the fruits during the both season as compared to the control. The highest SSC % was corresponding with the highest NAA concentration treatment. The difference between 10 ppm NAA treatment and the control was not significant, while it was significant between the control and each of 20, 30 and 40 ppm NAA treatments in both seasons.

However, acidity content was not significantly affected in both seasons.

Tannin and vitamin C content:

Data in Table (2) indicated that NAA treatments significantly decreased tannin content as compared to the control in both seasons, generally the decrement increased as NAA concentration increased, while no significant differences between the 10, 20, 30 or 40 ppm NAA were found in the first season, the 40 ppm was significantly lower than the 10 and 20 ppm treatments in the second season. Concerning vitamin C content, data did not show any significant differences between all treatments in both season (Table 2).

Table (2): Effect of NAA sprays on some fruit chemical characteristics of "Zaghloul" date cv.

NAA concentration (ppm)	SSC %	Acidity %	Tannin %	Vit. C (mg/100 gm)
1st season (2000)				
0 (control)	25.43 c	0.45	0.052 a	34.98
10	25.47 c	0.47	0.044 ab	32.17
20	26.60 b	0.43	0.043 ab	33.55
30	26.93 ab	0.41	0.034 b	32.80
40	27.40 a	0.43	0.031 b	33.35
Sig.	**	Ns	*	NS
2nd season (2001)				
0 (control)	26.10 b	0.47	0.060 a	37.45
10	26.37 b	0.45	0.053 b	36.07
20	27.27 a	0.42	0.054 ab	38.90
30	27.43 a	0.44	0.044 bc	38.03
40	27.80 a	0.44	0.037 c	38.93
Sig.	**	NS	**	NS

In the same cell, means followed by the same letter are not significantly different according to DMRT

DISCUSSION AND CONCLUSION

The use of NAA as chemical thinner in date palm has been investigated. It was found that it was effective in reducing both number of fruits/strand and yield/bunch. No trend was observed for NAA treatment at 25-50 ppm as a fruit thinner of "Medjool" dates (Furr and Hewitt, 1964), which is not in agreement with this report. This might be due to differences in the studied cultivar and/or environmental differences (El-Hamady *et al.*, 1992).

The reduced number of fruits/strand or per bunch resulted in several expected effects on fruit characters. Fruit weight was increased, which is in agreement with the results of Furr and Hewitt (1964), Ketchie (1967), El-Hamady *et al.* (1979), El-Hamady *et al.* (1992), Al-Maghrabi *et al.* (1992) and El-Makhtoun *et al.* (1995). Moreover, fruit thinning was reported to increase flesh weight of several date cultivars (Hussein *et al.*, 1976; El-Kassas, 1983; Al-Maghrabi *et al.*, 1992; El-Hamady *et al.*, 1992 and El-Makhtoun *et al.*, 1995), which is in agreement with the results reported here.

It was also noticed that thinning "Zaghloul" dates using NAA treatment increased SSC and decreased tannin content. Ethephon treatment as a thinner was reported to increase date fruit SSC (El-Hamady *et al.*, 1979 & 1992). Moreover, fruit thinning using different chemicals (Furr & Hewitt, 1964; Ketchie, 1968 and El-Kassas, 1983) or manually (Al-Bakr, 1972; Hussein *et al.*, 1976; El-Kassas, 1983; Al-Maghrabi *et al.*, 1992 and El-Makhtoun *et al.*, 1995) is known to increase date fruit SSC as a result of accelerated ripening, supposedly due to lower fruit load. This effect could also be a factor in reducing the alternate bearing habit.

It could be concluded that under the conditions of this work, NAA treatment was effective as a fruit thinner for "Zaghloul" cultivar, and could be recommended.

REFERENCES

- Abd El-Hamid, N.M.G. and E.H. Agamia (1983). Effect of hand or chemical thinning on fruit quality and tree production of dates (Cv. Hayany). Bull. Fac. Agric., Cairo Univ., 34 pp.

- Al-Bakr, A. (1972). The date palm. Al-Ani Press, Baghdad, Iraq, pp. 265-278 (In Arabic).
- Al-Maghrabi, M.A.; M.M. El-Hamady and M.A. Bacha (1992). Effect of bunch thinning and bunch removal of Seleg and Meneify date palm cvs. *Annals Agric. Sci., Ain Shams Univ., Cairo*, 37(2): 539-546.
- A.O.A.C. (1980). Association of Official Agriculture Chemists. Official Methods of Analysis, 13th Ed. Washington, D.C, USA.
- Duncan, D.B. (1955). Multiple range and multiple F test. *Biometrics*, 11: 1-42.
- El-Hamady, M.M.; M.A. Al-Maghrabi and M.A. Bacha (1992). Effect of ethephon treatment on fruit thinning and quality of Seleg and Meneify date palm cultivars. *Annals Agric. Sci., Ain Shams Univ. Cairo*, 37(2): 5431-538.
- El-Hamady, M.M.; A.S. Khalifa and A.M. El-Hammady (1979). Thinning date palm with ethephon. *Res. Bull. No. 1216, Fac. Agric., Ain Shams Univ.*, 20 p.
- El-Kassas, S.E. (1983). Manual bunch and chemical thinning of Zaghloul date. *Assiut J. Agric. Sci.*, 14(2): 221-233.
- El-Makhtoun, F.M.; A.M. Abd El-Kader and A.A. El-AI (1995). Effect of different fruit thinning methods on yield and fruit characteristics of Zaghloul dates. *Zagazig J. Agric. Res.*, 22(1): 143-149.
- Furr, J.R. and A.A. Hewitt (1964). Thinning trials on "Medjool" dates, pollen dilution and chemicals. *Date Grower's Inst. Rept.*, 41: 17-18.
- Hussein, F.; S. Moustafa and F. El-Samaraea (1976). Size, quality and ripening of "Barhi" dates as affected by fruit thinning. *J. Agric. Sci., Zagazig Univ.*, 3(2): 125-142.
- Ketchie, D.O. (1967). Tests of chemicals for thinning and production seedless Medjool dates. *Date Grower's Inst. Rept.*, 44: 5-6.
- Ketchie, D.O. (1968). Chemical tests for thinning Medjool dates. *Date Grower's Inst. Rept.*, 45: 19-20.
- Khalifa, A.S.; Z.H. Hamdy; H.M. El-Masry; M.R. Tadros and G. Said (1984). Effect of some growth regulators on thinning "Amhat" date palm. *Agric. Res. Rev.*, 62: 755-766.
- Snedecor, G.W. and W.G. Cochran (1967). *Statistical Methods*. 6th ed. Iowa State Univ. Press, Ames. USA.
- Wally, Y.A.; F. Hussein and M.S. El-Kahtany (1979). Date cultivation and production in both Arab and Islamic nations, *Ain Shams Univ., Press*, pp. 152-154 (In Arabic).

تأثير الرش بنفتالين حمض الخليك على المحصول/سباطة والصفات الثمرية لصنف البلح الزغلول

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أجرى هذا البحث خلال موسمي ٢٠٠٠، ٢٠٠١ على صنف البلح الزغلول لدراسة تأثير الرش بتركيزات مختلفة من نفتالين حمض الخليك وبعض الصفات الثمرية، فقد عوملت العزوق بمحاليل نفتالين حمض الخليك تحتوي على صفر، ١٠، ٢٠، ٣٠، ٤٠ جزء في المليون بعد عشرة أيام من عقد الثمار. أظهرت النتائج أن رش العزوق بنفتالين حمض الخليك أدى إلى خفض كل من المحصول/سباطة وعدد الثمار/شمارخ، وقد أدى ذلك إلى زيادة وزن الثمار ووزن اللحم. كما أوضحت النتائج أيضا أن المعاملة بنفتالين حمض الخليك أدت إلى زيادة محتوى الثمار من المواد الصلبة الذائبة، ومن ناحية أخرى انخفض محتوى الثمار من المواد التانينية، ويرجع ذلك إلى سرعة اكتمال نمو الثمار بسبب الخف الذي حدث للثمار. ويمكن التوصية باستخدام نفتالين حمض الخليك على صنف البلح الزغلول كما بينت النتائج تحت ظروف هذه التجربة لتحسين الصفات الثمرية.