

## **EFFECT OF DEGREE AND TIME OF BUNCH THINNING ON YIELD AND FRUIT QUALITY OF TAMR (C.V.) DATE PALM**

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**ABSTRACT:** *This investigation was carried out during the two successive seasons (2005 and 2006) on "Tamr" date palms (dry cultivar) grown in commercial orchard at saad family in Dakhla Oasis, El-Wady El-Gadid Governorate to study the effect of both time and degrees of fruit thinning on yield and fruit quality. Five degrees of fruit thinning; control (no thinning), removing 5%, 10%, 15% and 20% of entire strands from the bunch center. The four thinning treatments were done at the time of pollination or 4 weeks after pollination. The obtained results showed that, all thinning treatments caused a decreased in yield per palm and average bunch weight, whereas it, increase significantly fruit weight and dimensions. Thinning treatments also improved chemical properties of "Tamr" fruits i.e. T.S.S, total and reduced sugars while acidity and tannins were not significantly affected. Removing 20% of entire strands from the bunch center, four weeks after pollination was most suitable for "Tamr" dates, which gave a reasonable yield per palm and fruit quality and could be consider as recommended treatment under conditions of this experiment.*

**Key words:** *Thinning, date palm, yield, Fruit quality and Tamr.*

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### **INTRODUCTION**

The successful orchard management practices are directed towards obtaining a suitable yield with high fruit quality. Fruit thinning is one of the most important culture practices in date palm orchard to obtain large size and improve quality of fruits (Nixon 1940, 1951, Hussein *et. al.*, 1970; Hussein *et al* 1976, 1992; El-Kassas *et. al.*, 1983; Moustafa *et. al.*, 1984; Moustafa 1990, El Shazly 1999 and El Hammady *et. al.*, 2002). Date palm cultivars differed greatly in their thinning i.e. the procedure that gave successful results in the certain cultivar might be deleterious in other. Thus the method of thinning recommended was dependent on the date palm cultivar (Nixon, 1951; El Fawal 1962; Khalifa *et. al.*, 1987; El Makhtoun *et. al.*, 1995) Miremadi (1970) noticed that in small-fruited cultivars removing strands from the bunch center or individual fruits might be more desirable. Moreover, El Kassas 1983) and Hassaballa *et. al.*, (1983) found that fruit thinning by strands shortening was more effective as it improved fruit physical properties of "Zaghloul" dates than the strands removal. "Tamr" dates cultivar is one of most important cultivars of dry dates in El-Wady El-Gadid Governorate, Egypt and demanded in local and foreign markets for its good quality for

these reasons it is very important to try different degrees and times of bunch thinning aiming to improve its fruit quality without remarkable reduction in fruit yield.

## **MATERIALS AND METHODS**

This study was carried out in the two successive seasons (2005 and 2006) on “Tamr” date palms (dry cultivar) grown on sandy soil at a privet orchard at saad family in El- Dakhla Oasis, El-Wady El-Gadid Governorate, Egypt. Forty palms in full production stage were chosen and subjected to the normal cultural practices. Only ten bunches of nearly equal size were left on each palm. These bunches were pollinated by using pollen grains from the same parent in both seasons. The ten bunches on each palm were treated with one of the following treatments.

Treat ments:

Treatment No.	Strands removal %
1	-
2	5
3	10
4	15
5	20

The thinning treatments were done at time of pollination and 4 weeks after pollination in both seasons.

Each treatment was replicated four times with one palm for each replicate. At picking time (at Tamr stage) all fruit bunches were harvested. Total yield per palm and average bunch weight were recorded. A sampling of 50 date fruits was taken from each replicate for used to study different fruit properties included weight of fruit and pulp and fruit dimension, total soluble solids (T.SS) and acidity of the fruit juice were determined according to the method described in the A.O.A.C. (1985). Total and reducing sugars content were carried out according to the method of Lane and Eynon as outlined in A.O.A.C.(1985). Tannins content was determined according to the method described by Balbaa (1981). Results were subjected to analysis of variance using factorial experiment in a completely randomized design and L.S.D (0.05) was used for comparison (Snedecor and Cochran, 1972).

## **RESULTS AND DISCUSSION**

### **1. Total yield and Bunch Weight:**

Data in Tables (1 and 2) revealed that, all thinning treatments significantly decreased yield /palm than that of the control except treatment 2 (removing 5% of entire strands) which gave similar yield as the control in the first season. Palm yield was decreased as thinning degree increased. According

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**Table 1**

**Table 2**

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to this relationship, palms thinned by removing 20% of entire strands produced the most inferior yield as compared with other treatments. Generally, the reduction in total yield / palm was expected since, all thinning treatments reduced number of strands / bunch which finally reduced the number of total fruits and yield / palm. These results are harmony with those mentioned by Nixon (1951) on “Barhi” and “Medjool” dates; El-Fawal (1962) on some Egyptian dates; Khalifa *et. al.* (1987) and El-Makhtoun *et. al.* (1995) on “Zaghloul” who stated that the method of thinning recommended depends on the date palm cultivars.

The obtained data also show that there are significant differences between thinning dates. Palms received fruit thinning, 4 weeks after pollination produced the highest yield as compared with other tested date regardless of degree of thinning. This was true in both seasons. These results are agreement with those obtained by Khalifa *et. al.*, (1987) and Moustafa, (1990). They found that the optimum favorable yield could be obtained when fruit thinning was done at four weeks after pollination.

As for the average of bunch weight, data of Tables (1 and 2) reveal the same trends as observed on yield / palm, i.e. all thinning treatments significantly decreased the average of bunch weight as compared with the control. Nevertheless, the average of bunch weight was gradually decreased as thinning degree increased. Palms subjected to treatment 5 (removing 20% of entire strands produced significantly smaller bunch weight as compared with the other treatments in the two seasons. These results are generally in line with those reported by Hussein, *et. al.* (1970); Hussein (1976) and (1992) ; El-Kassas *et. al.* (1983) ; Mostafa, *et. al.* (1984) ; Mostafa (1990) ; El Shazly 1999 and El-Hammady *et. al.* (2002). They found that increasing thinning severity reduced bunch weight.

## **2. Fruit Physical Characteristics:**

Data in Tables (3 and 4) revealed that, the studied treatments of bunch thinning significantly increased the average fruit weight of “Tamr” dates as compared with the control in both seasons. Generally, increasing fruit thinning degree increased the average fruit weight, hence, the greatest fruit weight was obtained by removing 20% of strands number (treatment 5), such increment was statistically significant as compared with other thinning degrees in the two seasons regardless of time of thinning. On the other hand, fruit thinning at 4 weeks after pollination gave heavier fruits than the other date, regardless of degree of thinning in the two seasons. This was true in the two seasons of study. This increment in fruit weight, which occurred by thinning, may be due to the reduction in fruit number, which prevents their accumulation within bunch. Consequently, it permits the fruits to take sufficient amount of carbohydrates, water and nutrients, which finally, caused the increase in fruit weight as compared with the control palms which had the highest yield and smallest fruit weight. Similar results were obtained

by El-Makhtoun *et. al.* (1995) on “Zaghloul” , Moustafa (1990) on “Sewy” and Shazly (1999) on “Nabtet-Al” cvs. Who mentioned that fruit thinning by removing of entire strands from bunch increased fruit weight.

In regard to seed weight the obtained data in Tables (3 and 4) show that there are no significant differences in seed weight between different thinning treatments including the control. This was true in both seasons. In other words, the increase in fruit weight by thinning treatments could be mainly attributed to the increase in flesh weight without regard to the changes of seed weight.

Regarding pulp weight% the data of Tables (3 and 4) reveal the same trends as observed in fruit weight, i.e. the tested treatments significantly increased the pulp weight% as compared with the control in both seasons. The highest values were obtained by treatment 5 with no significant differences between treatment 4 in both seasons. No significant differences were detected in flesh weight % between treatment 4 and 3 and between treatment 3 and 2 in the first season. No Significant differences were also found in this respect between the thinning dates, except treatment 4 (removing 15% of entire strands) in both studied seasons. Similar results were obtained by Hussein (1970); Hussein *et. al.*(1976); Hassaballa *et. al.* (1983); Khalifa *et. al.* (1987) and Moustafa (1990) who found that bunch thinning treatments had no appreciable effect on seed weight. on the other hand, El-Kassas (1983) found that bunch thinning of “Zaghloul” decreased seed weight.

As for fruit length and diameter, data in Table (3 and 4) also showed a nearly similar trend as discussed for fruit weight. All thinning treatments significantly increased both fruit length and diameter as compared with the control in both seasons. Fruit length and diameter increased when degree of thinning out of strands increased. Clear differences were detected between various thinning treatments in this respect. Treatment 5 was the most effective in increasing fruit dimensions as compared with other thinning treatments with no significant differences between treatment 4 in the two seasons of study. Significant differences were also found in fruit dimensions between the thinning times. Fruit thinning by treatments, 4 weeks after pollination gave considerable increase in fruit length as compared with other tested times except treatment 3 which the differences between tested dates did not reach the level of significance in both seasons. Generally, it can be noticed that the effect of bunch thinning on fruit length was more pronounced than the effect on fruit diameter. This was true in both seasons. In this respect, El-Kassas (1983); Hassaballa *et. al.* (1983); Khalifa *et. al.* (1987); El-Kassas *et. al.* (1995) and El-Makhtoun *et. al.* (1995) on “Zaghloul”; Moustafa *et. al.* (1984) on “Hayany” obtained similar findings.

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**Table 3**

**Table 4**



### **3. Fruit Chemical Characteristics:**

Data in Table (5 and 6) showed the effect of different degrees and time of thinning on some chemical characteristics of "Tamr" fruit. The obtained data in both seasons show that thinning treatments caused a significant increase in total soluble solids % (TSS) content in fruits as compared with the control. Significant differences were also found between different treatments and the increase in TSS. Increasing the thinning intensity caused an increase in TSS, fruits produced from bunches received treatment 4,5 (removing 15,20% of strands, respectively ) contained significantly higher TSS than those produced from other treatments. This was true in the two seasons. Increment in TSS with thinning treatments may be due to the pronounced effect of bunch thinning on supplying carbohydrates and other nutrients from leaves towards the less number of fruits / bunch. The findings of Hussein (1970); Hussein *et. al.* (1976); Hassaballa *et. al.* (1983); Moustafa (1990) and El-Kassas *et. al.* (1995) confirm these results. Clear differences were also found between the tested times of thinning and increasing TSS. Bunches thinned, 4 weeks after pollination gave fruits with highest content of TSS. However, Moustafa (1990) on "Sewy" dates found that thinning 30% of the total strands after 2 weeks of pollination were the most effective in this respect.

Concerning total sugars content, the values of total sugars take the same trend of TSS the treatment5 of (removing 20% of strands) gave the highest values while the lowest values were obtained from (control) regardless of time of thinning. This was true in the two seasons.

As for the effect of different levels and time of thinning on reduced sugars. The obtained data in both seasons show that thinning treatments caused a significant increase in reduced sugars % content in fruits as compared with the control. Generally, the percentage of reduced sugars increased with increasing thinning degree. No significant differences were found between the treatments 4 and 5 in both studied seasons, in both time of thinning.

Concerning total acidify and Tannins content, the obtained data in Tables (5 and 6) show that there are no significant differences in this respect between different thinning treatments including the control. This was true in both seasons. No significant differences were also found between the two tested dates of pollination. These results were coinciding the findings of (El-Kassas 1983, Khalifa *et al* 1987; El-Makhtoun *et al* 1999; El-Shazly 1999 and El-Hammady *et al.* 2002). It can be concluded that, thinning treatments reduced yield and weight of bunch as compared with the control. However, fruit quality of "Tamr" (physical and chemical properties) were improved with thinning treatments. Bunch thinning by removing 20% of entire strands from the bunch center, four weeks after pollination was most suitable for " Tamr" dates , which gave a reasonable yield per palm and fruit quality and could be consider as recommended treatment under conditions of this experiment.

**Table 5**

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**Table 6**

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## تأثير مستوى الخف وميعاد الخف على المحصول وجودة الثمار لنخيل البلح صنف التمر

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### الملخص العربي

أجريت هذه التجربة خلال موسمي ٢٠٠٥ و ٢٠٠٦ على نخيل البلح (صنف التمر) بواحة  
الداخلة - الوادي الجديد بهدف دراسة تأثير مستوى وميعاد الخف على المحصول وجودة الثمار.  
وتم إجراء الخف كالاتي:

دون معاملة (الكنترول) وإزالة ٥ ، ١٠ ، ١٥ ، ٢٠ % من السويطة وتم الخف بعد التلقيح  
مباشرة أو بعد ٤ أسابيع من التلقيح. وقد أوضحت النتائج المتحصل عليها أن جميع معاملات  
الخف أدت إلى نقص وزن السويطة. وبالتالي نقص محصول النخلة مقارنة بالنخيل الغير معاملة  
بالخف (الكنترول). ومن ناحية أخرى فإن معاملات الخف أدت إلى زيادة وزن وطول وقطر الثمرة  
ولم يتأثر معنويا وزن البذرة. كما أدت معاملات الخف إلى تحسين الصفات الكيماوية للثمرة كالمواد  
الصلبة الذائبة الكلية والسكريات الكلية والمختزلة. ولم تتأثر النسبة المئوية للحموضة والمحتوى  
من التانينات معنويا بالمعاملات المختلفة للخف. وكانت أكثر المعاملات تأثيرا هي مستوى إزالة  
٢٠ % من السويطة علاوة على ذلك فإن إجراء الخف بعد التلقيح بـ ٤ أسابيع كان أفضل من  
إجراء الخف بعد التلقيح مباشرة.

Table (1): Effect of fruit thinning on bunch weight and yield per palm of Tamr date 2005 season .

<i>Treatments</i>	<i>Av. Of bunch weight (kg)</i>			<i>Yield per palm (kg)</i>		
	<i>Weeks after pollination</i>			<i>Weeks after pollination</i>		
	0	4	Av.	0	4	Av.
<i>Control</i>	8.20	8.45	8.32	82.00	84.33	83.17
<i>5%</i>	8.17	8.30	8.23	81.67	83.00	82.33
<i>10%</i>	8.03	8.20	8.12	80.33	82.00	81.17
<i>15%</i>	7.85	8.00	7.95	78.50	80.50	79.50
<i>20%</i>	7.70	7.90	7.80	77.00	79.00	78.00
<i>Average</i>	7.99	8.17		79.90	81.77	

*L.S.D at 0.05 treatment (T)*

*Date (D)*

*TxD*

0.10

0.06

0.14

0.76

0.48

1.07

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**Table (2): Effect of fruit thinning on bunch weight and yield per palm of Tamr date 2006 season .**

<i>Treatments</i>	<i>Av. Of bunch weight (kg)</i>			<i>Yield per palm (kg)</i>		
	<i>Weeks after pollination</i>			<i>Weeks after pollination</i>		
	<b>0</b>	<b>4</b>	<b>Av.</b>	<b>0</b>	<b>4</b>	<b>Av.</b>
<b>Control</b>	7.35	7.55	7.45	73.50	75.33	74.42
<b>5%</b>	7.25	7.43	7.34	72.50	74.33	73.42
<b>10%</b>	7.13	7.33	7.23	71.33	73.32	72.33
<b>15%</b>	7.00	7.13	7.14	70.00	71.33	70.67
<b>20%</b>	6.80	7.08	6.97	68.50	70.83	69.67
<b>Average</b>	7.15	7.31		71.17	73.03	

*L.S.D at 0.05 treatment (T)*

*Date (D)*

*TxD*

*0.12*

*0.07*

*0.16*

*0.54*

*0.34*

*0.76*



**Table (3): Effect of fruit thinning on fruit weight, seed weight and Pulp % of Tamr date fruits (2005 season)**

<i>tratment</i>	<i>Fruit weight (g)</i>			<i>Seed weight(g)</i>			<i>Pulp weight%</i>			<i>Fruit length(cm)</i>			<i>Fruit diameter(cm)</i>		
<i>Strands removal%</i>	<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>		
	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>
<i>Control</i>	7.50	7.75	7.63	1.55	1.56	1.56	79.33	79.87	79.60	3.80	3.87	3.83	2.30	2.33	2.32
<i>5%</i>	8.25	8.25	8.25	1.55	1.55	1.55	81.21	81.21	81.21	3.87	4.00	3.93	2.40	2.37	2.38
<i>10%</i>	8.55	8.77	8.66	1.57	1.56	1.57	81.63	82.12	81.87	4.20	4.20	4.20	2.43	2.40	2.42
<i>15%</i>	8.75	9.25	9.00	1.56	1.57	1.57	82.71	83.02	82.86	4.27	4.33	4.30	2.47	2.43	2.45
<i>20%</i>	9.25	9.58	9.42	1.57	1.55	1.56	83.02	83.82	83.42	4.30	4.40	4.35	2.50	2.47	2.48
<i>Average</i>	8.46	8.72		1.56	1.56		81.56	82.11		4.09	4.16		2.42	2.40	

*L.S.D. (0.05) treatment (T)*

*Date (D)*

*T×D*

*0.35*

*0.22*

*0.50*

*N.S*

*N.S*

*N.S*

*0.35*

*0.22*

*0.50*

*0.09*

*0.06*

*0.13*

*0.08*

*0.05*

*0.11*

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Table (4): Effect of fruit thinning on fruit weight, seed weight and Pulp % of Tamr date fruits (2006 season) 2006 season.

treatment	Fruit weight (g)			Seed weight(g)			Pulp weight%			Fruit length(cm)			Fruit diameter(cm)		
	Weeks after pollination			Weeks after pollination			Weeks after pollination			Weeks after pollination			Weeks after pollination		
	0	4	Av.	0	4	Av.	0	4	Av.	0	4	Av.	0	4	Av.
<b>Control</b>	7.92	8.10	8.01	1.55	1.57	1.56	80.42	80.62	80.52	3.80	3.78	3.83	2.33	2.33	2.33
<b>5%</b>	8.45	8.45	8.45	1.56	1.55	1.55	81.54	81.66	81.60	3.97	4.13	4.05	2.37	2.37	2.37
<b>10%</b>	9.15	9.28	9.22	1.55	1.56	1.55	83.06	83.19	83.08	4.20	4.23	4.22	2.40	2.43	2.42
<b>15%</b>	9.48	9.55	9.52	1.55	1.57	1.56	83.65	83.56	83.61	4.37	4.43	4.40	2.43	2.53	2.48
<b>20%</b>	9.80	10.05	9.93	1.57	1.55	1.56	83.98	84.58	84.28	4.43	4.50	4.47	2.47	2.57	2.52
<b>Average</b>	8.96	9.09		1.56	1.56		82.53	82.72		4.15	4.23		2.40	2.45	

L.S.D. (0.05) treatment (T) 0.16 N.S 0.16 0.07 0.07  
 Date (D) 0.10 N.S 0.10 0.04 0.04  
 TxD 0.22 N.S 0.22 0.10 0.10

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**Table (5): Effect of fruit thinning on some chemical properties of Tamr date fruits (2005 season).**

<i>tratment</i>	<i>T.S.S</i>			<i>Total sugars%</i>			<i>reducing sugars%</i>			<i>acidity</i>			<i>Tannins%</i>		
<i>Strands removal%</i>	<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>		
	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av.</i>	<i>0</i>	<i>4</i>	<i>Av,</i>
<i>Control</i>	71.55	72.18	71.86	60.63	61.42	61.03	30.86	32.44	31.65	0.39	0.39	0.39	1.32	1.29	1.31
<i>5%</i>	73.45	73.91	73.68	61.85	62.75	62.30	31.92	33.64	32.78	0.39	0.40	0.39	1.25	1.30	1.28
<i>10%</i>	74.58	74.63	74.61	62.95	63.55	63.25	32.97	33.94	33.46	0.40	0.41	0.41	1.33	1.35	1.34
<i>15%</i>	75.21	75.78	75.50	63.64	64.41	64.02	33.97	34.45	34.21	0.41	0.42	0.42	1.34	1.38	1.36
<i>20%</i>	75.19	75.98	75.58	63.81	64.49	64.15	33.78	34.51	34.15	0.42	0.43	0.42	1.39	1.42	1.41
<i>Average</i>	74.00	74.49		62.58	63.33		32.70	33.80		0.40	0.41		1.33	1.35	

<i>L.S.D. (0.05)</i>	<i>treatment (T)</i>	0.45	0.45	0.37	NS	NS
	<i>Date (D)</i>	0.28	0.28	0.23	NS	NS
	<i>TxD</i>	0.63	0.63	0.52	NS	NS

**Table (6): Effect of fruit thinning on some chemical properties of Tamr date fruits (2006 season).**

<i>tratment</i>	<i>T.S.S</i>			<i>Total sugars%</i>			<i>reducing sugars%</i>			<i>acidity</i>			<i>Tannins%</i>		
<i>Strands removal%</i>	<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>			<i>Weeks after pollination</i>		
	0	4	Av.	0	4	Av.	0	4	Av.	0	4	Av.	0	4	Av.
<b>Control</b>	73.06	73.52	73.29	62.17	62.31	62.24	32.05	32.51	32.28	0.39	0.40	0.40	1.33	1.33	1.33
<b>5%</b>	75.09	75.17	75.13	63.73	63.83	63.78	33.38	33.55	33.47	0.41	0.41	0.41	1.31	1.35	1.33
<b>10%</b>	75.91	76.09	76.00	64.39	64.89	64.64	34.25	34.47	34.56	0.41	0.42	0.42	1.33	1.35	1.34
<b>15%</b>	77.24	77.71	77.47	65.73	65.88	65.81	35.59	35.36	35.47	0.42	0.43	0.42	1.36	1.39	1.38
<b>20%</b>	77.40	77.71	77.55	65.33	65.69	65.51	35.23	35.33	35.28	0.42	0.43	0.43	1.37	1.39	1.38
<b>Average</b>	75.74	76.04		64.27	64.52		34.10	34.24		0.41	0.42		1.34	1.36	

<i>L.S.D. (0.05) treatment (T)</i>	0.27	0.38	0.35	NS	NS
<i>Date (D)</i>	0.17	0.24	0.22	NS	NS
<i>TxD</i>	0.39	0.53	0.49	NS	NS

**Effect of degree and time of bunch thinning on yield and fruit.....**

