



## Response of Samany Date Palm to Different Methods and Times of Fruit Thinning Under Assiut Conditions



Ahmed Abdelhalim Ahmed

Central laboratory of Organic Agriculture, Agriculture Research Center, Giza, Egypt.

**T**HIS experiment was conducted during 2020 and 2021 on Samany date palms grown in new reclaimed sandy soil at private orchard located at Al Assiuty valley, Assuit, Egypt, to improve yield and some physical and chemical fruit quality by strand thinning (shortening 25% of length of all strands from the terminal tips at pollination and one month after pollination or removing 25% of total strands from the center of the bunch at pollination and one month after pollination. These results indicated that the control gave the highest bunch and total yield than the other treatments but all thinning treatments increased most of physical properties; fruit weight, flesh weight, fruit length, and diameter and thickness. Also improved the chemical properties such as TSS, total sugars, and reducing sugars. Strand thinning by removal 25% of the total number of strands at month after pollination gave the highest physical and chemical properties.

**Keywords :** Date palms, Samany, Thinning strands, Yield, Fruit quality

### Introduction

Date palms (*Phoenix dactylifera* L.) are considered one of the major fruit crops grown in Egypt, and are considered the tree of life in the desert, due to their tolerance to drought, salinity and high temperatures, when compared with many other fruit crops (Lunde, 1978). It is classified to three groups (soft, semi dry and dry) according to the heat unites and fruit moisture content. Dates have higher nutritional value; most of the dry matter in dates are sugars. Samany is the best soft date palm cultivar found to be favored by Egyptian consumers. Thinning fruits is a very significant practice for date palms to improve their fruit quality to help in decreasing bunch breaking, in reducing the compactness of bunch and regulating alternate bearing. There are many methods to carryout thinning, for example, removal total bunch or strands thinning and thinning fruit individually (El-Assar, 2005 and Mostafa & El-Akkad, 2011). (Hussein et al., 1992) found that in Samany date palm, fruit weight, total sugars and TSS were significantly increased by

increasing level of fruit thinning. Also, found that bunch weight was decreased by increasing level of fruit thinning. (El-Assar, 2005) stated that for Zaghoul date palms removing 50% of the total bunches gave the highest bunch weight, thinning 50% of the total strands in each bunch caused the better fruit weight, dimension, fruit flesh, TSS and total sugars %, but soluble tannins were decreased as compared to un thinned ones. Removal 30% of strands from bunch centre after 15days from the pollination improved the total yield and fruit quality of Sultani date palm under upper Egypt conditions (Shamel, et al., 2014). Result indicated that fruit weight, pulp weight percent and reducing and non reducing sugar were increased with thinning treatments but weight of bunch and total yield decreased with thinning treatments compared with control (Mohamed, 2008). The thinning bunch number from 10-30 percent increased bunches weight compared with control (Akl et al., 2004 and Alwasfy & Mostafa, 2008). El-Badawy et al. (2018) illustrated that, the best of measurements studied were attained by

thinning to 8 bunches per palm and removing 30% of strands from the bunch center. Imtiaz Hussain et al. (2016) cleared that strand thinning increased the level of total phenols, flavonoids, antioxidants and sugars at rutab stage of Hillawi and Khadrawi date palms compared with un-thinned fruit clusters. The best thinning treatment was removal of 30% central strands alone and in combination with 30% cutting of terminal tips. Mukhtar and Ali (2019) found that fruit thinning significantly increased fruit properties such as fruit weight, fruit length, diameter, Pulp thickness, while total yield was not affected by thinning treatment in the two seasons. This study aimed to evaluate effects of different methods and times of fruit thinning of Samany date cultivar on yield and fruit quality under Assiut conditions.

### **Materials and Methods**

This study was conducted during 2020 and 2021 seasons on Samany date palm cultivar grown in newly reclaimed land, at private orchard located at Al Assiuty valley, Assiut Governorate, Egypt. Fifteen mature palms of Samany date cultivar (20 years old) were selected randomly to study the effects of different thinning treatments using different methods and times on yield, some physical and chemical fruit properties. The selected palms were healthy and similar in vigor and received the same culture practice and adjusted to same load of 9 bunches and the leaf/bunch ratio of 9:1 was maintained. Pollination of this investigation was carried out using the same pollen source, same method and timing to avoid metaxinial effect.

The palm trees were divided at random into five treatments each treatment was made of three replicates, each replicate was of one palm.

The five treatments were arranged as follows:-

- (T<sub>1</sub>) Without thinning (control)
- (T<sub>2</sub>) Shortening 25% of length of all strands from the terminal tips at pollination
- (T<sub>3</sub>) Removing 25% of total strands from the center of bunch at pollination
- (T<sub>4</sub>) Shortening 25% of length of all strands from the terminal tips one month after pollination
- (T<sub>5</sub>) Removing 25% of total strands from the center of bunch one month after pollination

#### *Experimental measurements*

All bunches were harvested at commercially color stage at second week of September. Bunches weight were recorded then the yield

was estimated as kg per palm. Thirty fruits from each replicate were picked randomly to determine the following physical and chemical properties:

Fruit weight, pulp and seed weight (g) were measured by using electronic balance. Fruit dimension (Length and diameter), size and thickness (cm) measured by Vernier Caliper, TSS% was determined by hand referacotmeter. Total, reducing, non reducing sugars and total acidity % were determined according to A.O.A.C. (1995).

The complete randomized experimental design was adopted. Analysis of variance was carried out according to Means were separated by L.S.D. (0.05) using Statistix 8.1 software (Analytical Software, 2005).

### **Results and Discussion**

#### *Bunch weight and total yield*

According to results in Table (1) it is noticed that the different methods and times of thinning treatments significantly decreased the bunch weight (kg) and total yield (kg/palm) than the control during the two seasons of the study. The highest bunch weight and total yield were recorded with the control (T<sub>1</sub>) (23.52, 24.81 kg) and (216.68, 223.29 kg) respectively, followed by Removing 25% of total strands from the center one month after pollination (T<sub>5</sub>) recorded (22.25, 23.78 kg) and (200.25, 212.02 kg), respectively. Additionally, no significant difference was found between T<sub>3</sub> and T<sub>5</sub> during the two seasons in these respects.

#### *Fruit and flesh weight.*

The results presented in Table (1) clear that the all thinning treatments increased significantly fruit and flesh weight as compared with the control in the two seasons of this study. Thinning treatment by removing 25% of total strands from the center of bunch one month after pollination (T<sub>5</sub>) gave the highest fruit and flesh weights; (24.52, 25.73 g) and (22.91, 24.13g) respectively followed by Removing 25% of total strands from the center of bunch at pollination (T<sub>3</sub>) (23.75, 24.16 g) and (22.10, 22.39) respectively with insignificant differences between them While the lowest values were recorded with the control (without thinning). Moreover, there were no significant differences between T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> with respect to flesh weight in the first season only.

**TABLE 1. Effect of different thinning treatments on bunch weight, total yield fruit and flesh weight of Samany date palm during 2020 and 2021 seasons .**

Treatments	Bunch Weight (kg)		Total Yield (kg)		Fruit weight (g)		Flesh weight (g)	
	2020	2021	2020	2021	2020	2021	2020	2021
T <sub>1</sub>	23.52 <sup>a</sup>	24.81 <sup>a</sup>	211.68 <sup>a</sup>	223.29 <sup>a</sup>	19.52 <sup>c</sup>	20.15 <sup>c</sup>	17.92 <sup>c</sup>	18.45 <sup>c</sup>
T <sub>2</sub>	19.40 <sup>d</sup>	20.08 <sup>d</sup>	174.60 <sup>d</sup>	180.72 <sup>d</sup>	21.95 <sup>b</sup>	22.51 <sup>b</sup>	20.51 <sup>b</sup>	20.86 <sup>b</sup>
T <sub>3</sub>	22.16 <sup>b</sup>	22.90 <sup>bc</sup>	199.44 <sup>b</sup>	206.10 <sup>bc</sup>	23.75 <sup>a</sup>	24.16 <sup>a</sup>	22.10 <sup>a</sup>	22.39 <sup>a</sup>
T <sub>4</sub>	21.01 <sup>c</sup>	22.20 <sup>c</sup>	189.09 <sup>c</sup>	199.80 <sup>c</sup>	22.48 <sup>b</sup>	22.51 <sup>b</sup>	20.76 <sup>ab</sup>	20.80 <sup>b</sup>
T <sub>5</sub>	22.25 <sup>b</sup>	23.78 <sup>b</sup>	200.25 <sup>b</sup>	214.02 <sup>b</sup>	24.52 <sup>a</sup>	25.73 <sup>a</sup>	22.91 <sup>a</sup>	24.13 <sup>a</sup>

(T1) Control without thinning ; (T2) Shortening 25% of length of all strands from the terminal tips at pollination; (T3) 25 Removing 25% of total strands from the center of bunch at pollination; (T4) Shortening 25% of length of all strands from the terminal tips one month after pollination; (T5) Removing 25% of total strands from the center of bunch one month after pollination. Values having the same letter(s) within a column not significantly different.

These result are in agreement with those obtained by Al-Obeed et al., (2005), Al-Wasfy and Mostafa, (2008), Soliman et al. (2011), Moustafa et al.,(2011) and Bashir et al., (2014) they reported that thinning fruits by using different method lead to lowest bunch weight and total yield per palm of many date palm cultivars . On the other hand, these results dissimilar with those obtained by Marashi and Mousavi (2007) who investigated the impact of thinning fruit using different degrees and methods at 6 weeks from pollination on Barhee date cultivar, they observed that no significant difference found on yield/palm between control and cutting 25% or 30% from strand length.

#### Seed weight

Regarding seed weight, result show that no significant differences found between control and all thinning treatments in both seasons.

#### Fruit size

Results in Table (2) revealed that Samany fruit size was significantly increased by thinning treatments; meanwhile where thinning by removing 25% of total strands from the center of bunch one month after pollination (T5) caused a significant increase in fruit size that was highest than other treatments in the first and the second season followed by removing 25% of total strands from the center of bunch at pollination (T3). Thinning treatment T5 gave the largest values (22.44 and 23.29 cm<sup>3</sup>), while control (without

thinning) gave the smallest values (17.83 and 18.08 cm<sup>3</sup>) during the two seasons. Meanwhile, no differences were found between T3 and T5 during second season.

#### Fruit dimension( length and diameter)

The data presented in Table (2) show that treatment of thinning by removal 25% of total strands from the center of bunch one month after pollination(T5) increased significantly the fruit dimension (length and diameters) than the control and the other treatments, it resulted in significantly the longest fruit length and diameter values (5.39 and 5.55cm) and (3.25 and 3.27 cm) However, the shortest fruit length and diameter recorded by control (5.00 and 5.10) and (2.80 and 2.85) in both seasons, respectively.

#### Fruit thickness

Concerning fruit thickness, results clarified that thinning treatments led to increasing fruit thickness than control during both seasons. As illustrated in Table (2), strand thinning by removal 25% of total strands from the center of bunch one month after pollination(T5) recorded the highest value (0.95 and 0.96cm) while the control recoded the lowest value (0.90 and 0.91cm) in both seasons, respectively. Furthermore, no differences were found between T2, T3, and T4 in the two seasons studied. All thinning procedures increased the physical properties of the fruit, such as fruit volume, length, and diameter.

**TABLE 2. Effect of different thinning treatments on seed weight, fruit size, fruit length, diameter and thickness of Samany date palm during 2020 and 2021 seasons.**

Treatments	Seed (weight (g)		Fruit (size (cm <sup>3</sup>		Fruit (length (cm		Fruit (diameter (cm		Fruit thickness (cm)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
T <sub>1</sub>	1.60 <sup>a</sup>	1.70 <sup>a</sup>	17.83 <sup>c</sup>	18.08 <sup>c</sup>	5.00 <sup>c</sup>	5.10 <sup>c</sup>	2.80 <sup>c</sup>	2.85 <sup>c</sup>	0.90 <sup>c</sup>	0.91 <sup>c</sup>
T <sub>2</sub>	1.44 <sup>a</sup>	1.65 <sup>a</sup>	19.65 <sup>b</sup>	19.90 <sup>b</sup>	5.19 <sup>b</sup>	5.17 <sup>c</sup>	2.90 <sup>bc</sup>	2.98 <sup>b</sup>	0.93 <sup>ab</sup>	0.94 <sup>ab</sup>
T <sub>3</sub>	1.65 <sup>a</sup>	1.76 <sup>a</sup>	21.11 <sup>b</sup>	22.78 <sup>a</sup>	5.21 <sup>b</sup>	5.24 <sup>b</sup>	2.86 <sup>bc</sup>	2.90 <sup>c</sup>	0.93 <sup>ab</sup>	0.93 <sup>ab</sup>
T <sub>4</sub>	1.65 <sup>a</sup>	1.70 <sup>a</sup>	20.90 <sup>b</sup>	21.16 <sup>b</sup>	5.18 <sup>b</sup>	5.24 <sup>b</sup>	3.01 <sup>b</sup>	3.15 <sup>a</sup>	0.94 <sup>ab</sup>	0.94 <sup>ab</sup>
T <sub>5</sub>	1.70 <sup>a</sup>	1.60 <sup>a</sup>	22.44 <sup>a</sup>	23.29 <sup>a</sup>	5.39 <sup>a</sup>	5.55 <sup>a</sup>	3.25 <sup>a</sup>	3.27 <sup>a</sup>	0.95 <sup>a</sup>	0.96 <sup>a</sup>

(T1) Control without thinning ; (T2) Shortening 25% of length of all strands from the terminal tips at pollination; (T3) Removing 25% of total strands from the center of bunch at pollination; (T4) Shortening 25% of length of all strands from the terminal tips one month after pollination; (T5) Removing 25% of total strands from the center of bunch one month after pollination. Values having the same letter(s) within a column not significantly different.

These findings are consistent with those of other research reported by Al-Obeed et al., (2005), Marzouk et al., (2007) and Abdel-Galil et al., (2008). Soliman and Harhash (2012) Moustafa et al., (2019) Mukhtar and Ali (2019) who have shown that thinning fruits by different method of many date palm cvs, increased fruit physical properties such as fruit volume, length , diameter and thickness. Bunch thinning by removing 10% to 40% of total strands after pollination enhanced fruit quality than control in Khadrawi date palm cultivar (Nirmaljit et al. 2006).

These results may be attributed to the decrease of fruit number within the bunch to give more space among the fruit and the leaves ratio to fruits number was improved. Thus a better supply of Carbohydrates produced in the leaves which lead to improve fruit quality (Moustafa 1993 and Al-Saikhan 2008).

#### Acidity

Results in Table (3) illustrate that no significant differences found between control and other thinning treatments in the two studied seasons.

#### Total soluble solids (TSS %)

Concerning to results presented in Table (3) it's clear that all thinning treatments increased TSS percentage than control. Strand thinning by removing 25% of total strands from the center one month after pollination(T5) induced the highest TSS percentage (44.62 and 45.36 %) while the control resulted in the lowest TSS

*Egypt. J. Hort.* Vol. 49, No. 1 (2022)

percentage (39.77 and 40.48%) in both seasons, respectively.

#### Reducing sugar

Data presented in Table ( 3) show that all treatments of strand thinning increased reducing sugars than the control in the two studied seasons, although there are no differences were found between the thinning treatments, the highest reducing sugars (29.75 and 30.72%) were recorded by removing 25% of total strands from the center of bunch one month after pollination(T5).

#### Non Reducing sugars

Results in Table (3) show that no significant differences were found between control and all thinning treatments in both seasons.

#### Total sugars

Regarding total sugars, data presented in Table (3) indicate that total sugar increased under all thinning treatments than control during the two studied seasons. Moreover, the highest values (40.25 and 41.18 %) were obtained with thinning treatment T5 compared with control which gave the lowest values (36.42 and 36.91 %) during the two seasons, respectively. The increment in TSS (%), total sugars and reducing sugars could be attributed to the change of the ratio between leaf and fruit and increase the light between fruits.

These results are agreement with those reported by Al-Wasfy and Mostafa (2008), Soliman, et al. (2011), Bashir et al. (2014) Soliman et al. (2015) Moustafa et al. (2019) Mukhtar and Ali (2019).

**TABLE 3. Effect of different thinning treatments on fruit acidity, TSS, total sugars, reducing and Non red-sugars of Samany date palm during 2020 and 2021 seasons.**

Treatments	%Acidity		%TSS		Reducing %sugar		Non reducing %sugar		%Total sugar	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
T <sub>1</sub>	0.32 <sup>a</sup>	0.31 <sup>a</sup>	39.77 <sup>d</sup>	40.48 <sup>d</sup>	25.75 <sup>b</sup>	26.26 <sup>b</sup>	10.67 <sup>a</sup>	10.65 <sup>a</sup>	36.42 <sup>c</sup>	36.91 <sup>d</sup>
T <sub>2</sub>	0.31 <sup>a</sup>	0.30 <sup>a</sup>	41.97 <sup>c</sup>	41.46 <sup>c</sup>	27.82 <sup>ab</sup>	27.54 <sup>a</sup>	9.81 <sup>a</sup>	10.28 <sup>a</sup>	37.63 <sup>b</sup>	37.82 <sup>bc</sup>
T <sub>3</sub>	0.30 <sup>a</sup>	0.29 <sup>a</sup>	42.30 <sup>bc</sup>	43.25 <sup>b</sup>	28.25 <sup>a</sup>	28.04 <sup>a</sup>	9.65 <sup>a</sup>	9.78 <sup>a</sup>	37.90 <sup>b</sup>	37.82 <sup>bc</sup>
T <sub>4</sub>	0.31 <sup>a</sup>	0.29 <sup>a</sup>	42.80 <sup>b</sup>	43.38 <sup>b</sup>	27.90 <sup>ab</sup>	27.90 <sup>a</sup>	10.42 <sup>a</sup>	10.57 <sup>a</sup>	38.23 <sup>b</sup>	38.32 <sup>b</sup>
T <sub>5</sub>	0.29 <sup>a</sup>	0.29 <sup>a</sup>	44.62 <sup>a</sup>	45.36 <sup>a</sup>	29.75 <sup>a</sup>	30.72 <sup>a</sup>	10.50 <sup>a</sup>	10.46 <sup>a</sup>	40.25 <sup>a</sup>	41.18 <sup>a</sup>

(T1) Control without thinning; (T2) Shortening 25% of length of all strands from the terminal tips at pollination; (T3) 25 Removing 25% of total strands from the center of bunch at pollination; (T4) Shortening 25% of length of all strands from the terminal tips one month after pollination; (T5) Removing 25% of total strands from the center of bunch one month after pollination. Values having the same letter(s) within a column not significantly different.

They found that all thinning treatments increased TSS, total and reducing sugars compared to unthinning (control). These results might due to reduction of fruit compactness between fruits within bunch and increase the light around the fruit to improve fruit quality.

#### **Conclusion**

Thinning treatments led to an improvement in the physical and chemical properties of the fruits as a result of increasing the spaces between the fruits inside the bunch and increasing the nutrients for the remaining fruits, which led to an increase in their weight size and chemical properties. Meanwhile, the best treatment in such concern was thinning by removing 25% of total strands from the center of bunch one month after pollination under this study.

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#### *Conflicts of interest*

No conflicts

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## استجابة نخيل البلح السمانى لطرق ومواعيد مختلفة من خف الثمار تحت ظروف اسيوط

أحمد عبدالحليم أحمد

المعمل المركزى للزراعة العضوية - مركز البحوث الزراعية - الجيزة - مصر.

أجريت هذه الدراسة على اشجار نخيل البلح السمانى المنزرع فى اراضى حديثة الاستصلاح بالوادى الاسيوطى لدراسة استجابة البلح السمانى لطرق ومواعيد مختلفة من الخف وكانت المعاملات كالاتى :

- ١- كونترول (بدون خف)
- ٢- تقصير ٢٥٪ من طول الشماريخ اثناء التلقيح
- ٣- ازالة ٢٥٪ من الشماريخ من قلب السوباطة اثناء التلقيح
- ٤- تقصير ٢٥٪ من طول الشماريخ بعد شهر من التلقيح
- ٥- ازالة ٢٥٪ من الشماريخ من قلب السوباطة بعد شهر من التلقيح

واوضحت النتائج ان معاملة الكنترول (بدون خف) اعطت اعلى وزن للسوباطة والمحصول الكلى مقارنة بباقي المعاملات ومن جهة اخرى اعطت كل معاملات الخف زيادة معنوية فى كل الصفات الطبيعية والكيميائية مثل طول وقطر الثمار ووزن اللحم والحجم وكذلك المواد الصلبة الكلية والسكريات الكلية والمختزلة مقارنة بالكنترول.

وكانت المعاملة الخامسة بازالة ٢٥٪ من الشماريخ من قلب السوباطة بعد شهر من التلقيح هى افضل المعاملات حيث تفوقت على جميع المعاملات