

Response of Bent Aisha and Sewy Date Palm to some Fruit Thinning Treatments

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Abstract

Response of yield and fruit quality of Sewy and Bent Aisha date palms to bunches and strands thinning were studied in 2015 and 2016 seasons. Bunches thinning was carried out by adjusting the number of bunches per palm tree to 7, 8 and 10 bunches, where the control was the latter one. The ten bunches/palm, however, were thinned by removing 20 or 30% of strand/bunch as well as 20, 30 or 40% of fruit numbers/strand. The obtained results showed that reducing bunch numbers/palm to either 7 or 8 bunches significantly increased the bunch weight in alliance with 10 bunches/palm. On the other hand, such reducing significantly decreased the yield/palm.

In addition, reducing strand number/bunch to either 70 or 80% of strands/bunch as well as 70 or 60% fruits/strand significantly decreased the bunch weight and yield of Sewy and Bent Aisha palms, respectively comparing to the unthinned ones. A remarkable promotion on fruit quality was observed due to performing fruit thinning in alliance to unthinning. Thinning either bunches or strands as well as fruits significantly increased the fruit weight, size and flesh percentage comparing to the unthinning. Fruit thinning also significantly improved the fruit chemical properties in terms of increasing the total soluble solids and sugar contents compared to the unthinning treatment. It can be concluded that thinning by removing 20-30% of strands/bunch as well as 20-30 of fruits number/strand achieved on good fruit quality of Sewy and Bent Aisha date palms with a relation suitable yield/palm.

Keywords: *Fruit thinning, Yield, Fruit quality, Date palm.*

Introduction

Date palm is a major tree crops in arid regions of Middle East and North Africa, having an important impact in economy of many countries in these regions. Egypt is considered among the top ten date producers (FAO, 2014). Fruit thinning is commonly practiced in most date palm growing regions of the world in order to avoid the alternancy phenomenon, improve the fruit quality, ensure an early ripening and reduce the compactness of the fruit bunches. Thinning process is generally practiced either manually or chemically (Nixon

and Carpenter, 1978; Abdel-Hamid, 2000 and Tavakkoli *et al.*, 2006). There is much concern regarding the use of chemicals on environmental pollution and health aspects. Therefore, the development of a more save and economic thinning methods for date palm is critically required especially under arid and semi arid conditions (Awad, 2006 and Abdel-Galil *et al.*, 2008). Date fruit thinning might be realized by reducing the number of bunches per palm, reducing the number of strands per bunch and reducing the number of fruits per strands. Bunch thinning that is cutting back of

strands had a maximum effect on the size of fruits if applied at the time of pollination (Nixon and Carpenter, 1978). All the fruit thinning methods substantially decreased the total yield, soluble tannins %, crude fibers % and total acidity %. Also, they are responsible for improving weight, size and dimensions of fruits, pulp weight %, total soluble solids TSS %, and sugar contents. The thinning by removing 10-30% of bunches number significantly increased the bunch weight than unthinning (Akl *et al.*, 2004; El-Assar, 2005 and Alwasfy & Mostafa, 2008). Removing 30% of entire spikelets from "Nabetet Ali" and "Shamran" bunch center gave an economical yield, advancing ripening with the best fruit quality (Godara *et al.*, 1990; Al-Ghamdi *et al.*, 1993 and El-Shazly, 1999). Removing 20% of the entire spikelets from bunch center which is accompanied with cutting back of 20% of the tips of spikelets was the best treatment which gave a high yield with good fruit quality of Sewy date palms (Moustafa, 1998; Akl *et al.*, 2004 and Abdel-Galil *et al.*, 2008).

Zaghloul date fruit weight, dimension, TSS and sugar contents were increased due to strands shortening or reducing its number. Optimum yield with good fruits quality were obtained with 15-30% of fruits thinned as early as 2 to 4 weeks after pollination (Khalifa *et al.*, 1987; El-Kassas *et al.*, 1995; Abdel-Hamid, 2000; Hammam *et al.*, 2002; Bassal and El-Deeb, 2002; Marzouk *et al.*, 2007; Al-Wasfy and Mostafa, 2008; Mostafa and El-Akkad, 2011 and Samouni, Mona *et al.*, 2016).

Flower thinning enhanced the fruit quality and regulated the yield of Zaghloul, Haiany, Halawy, Sewy and Amry date palm cultivars. In addition, removing 20-30% of bunch strands by either thinning out or cutting back before pollination were effective treatments (Abdel-Hamid, 2000; Marzouk *et al.*, 2007; Abdel-Galil *et al.*, 2008 and Mostafa and El-Akkad, 2011). The previous studies demonstrated that thinning practices were effective for improving weight, size of fruits, TSS and sugar contents of Shahani and Khadrawy date palm cvs (Tavakkoli *et al.*, 2006 and Nir-maljit *et al.*, 2006).

Reducing fruits number by one third (central and strand-tip), increased the fruit weight, length and fruit quality, however, this treatment significantly decreased the yield compared with control treatment. Although removal of one third of strands reduced yield, but increased fruit quality (Behseresht *et al.*, 2007 and Mostafa and El-Akkad, 2011).

Thinning in Chimiri stage had no significant effects on fruit quality in comprise with pollination stage. Therefore, the main objective of the current study is to investigate the effect of different methods of fruit thinning on yield and fruit quality of Bent Aisha and Sewy date palms; such practices might be very essential and of great importance for palm growers.

Materials and Methods

This investigation was conducted at the Experimental Orchard of the Faculty of Agriculture, Assiut University, Assiut Governorate, Egypt, during two successive growing seasons 2015 and 2016 on Bent

Aisha and Sewy date palms cvs. Bent Aisha and Sewy date palms were represented by nine palms, of uniform vigour and in a good physical condition, free of insect damage and diseases. Bent Aisha and Sewy cvs were more than 20 years old.

The number of inflorescences/palm was adjusted to ten by removing excess earliest, latest and smallest clusters. The retained bunches were thinned to a constant number of strands. Artificial pollination was uniformly performed in respect of source, date and method. The involved palm trees received the regular horticulture practices. All horticultural practices were carried out according to the recommended program of the orchard. Eight fruit thinning treatments were conducted on the selected palms as follows:

- 1- Control, the number of bunches were adjusted to ten bunches/palm, without fruit thinning (T₁).
- 2- Thinning by adjusting the number of bunches to eight bunches/palm (T₂).
- 3- Thinning by adjusting the number of bunches to seven bunches/palm (T₃).

Each treatment carried out on two palms with six replicates, two bunches per each.

Moreover, five fruit thinning were done on the selected bunches of other retained three palms as follows:

- 4- Thinning by removing 20% the strands number/bunch (T₄).
- 5- Thinning by removing 30% of the strands number/bunch (T₅).
- 6- Thinning by removing 20% of fruits strand (T₆).
- 7- Thinning by removing 30% of the fruits/strand (T₇).

8- Thinning by removing 40% of the fruits/strand (T₈).

Each fruit thinning carried out on three palm with six replicates, one bunch per each. Either bunches or strands and fruits thinning were done before pollination and after six weeks of pollination, respectively. The experiment was arranged in a complete randomized block design including eight treatments with six replications. All bunches were harvested when they reached the commercially derived color and weighted then the yield/palm (kg) was estimated. Samples of 50 fruits were picked at random from each bunch for the determination of some physical and chemical fruit properties, according to A.O.A.C. (1985). Data were subjected to statistical analysis according to the procedure reported by Gomez and Gomez (1984) and Snedecor and Cochran (1990). Treatments means were compared by the least significant difference test (L.S.D.) at the 5% level of probability in the two experimental seasons.

Results and Discussion

1 - Yield

Data presented in Table (1) showed the effect of bunches, strands or fruits thinning on bunch weight and yield/palm of Sewy and Bent Aisha date palm cvs during 2015 and 2016 seasons. It is obvious that the results took a similar trend during the two studied seasons. Results indicated a significant negative relationship between the bunch weight and bunches number/palm and a significant positive one between the bunch weight and the strands or fruits number/bunch. Thinning bunches to either 8 or 7 bunches/palm significantly in-

creased the bunch weight compared to 10 bunches/palm. Fruit thinning by removing 20 or 30% of strands/bunch, as well as, removing 30 or 40% of fruits significantly decreased the bunch weight and yield/palm compared with the control treatment (ten bunch/palm without fruit thinning). However, thinning by removing 20% of fruit/strands did not

significantly affect both bunch weight and yield/palm compared to the control. The heaviest bunches were obtained when reducing the bunch number/palm to 7 bunches, whereas, the least one was recorded on palm that thinned by removing 30% of strands/bunch or removing 40% of fruits/strands in both cultivars.

Table 1. Effect of fruit thinning methods on the bunch weight and yield/palm of Sewy and Bent Aisha date palm cultivars during 2015 and 2016 seasons.

Characters Cultivar→ Season→ ↓Treatment		Bunch weight				Yield/tree			
		Sewy		Bent Aisha		Sewy		Bent Aisha	
		2015	2016	2015	2016	2015	2016	2015	2016
10 bunches/palm (cont.)	T ₁	11.28	12.10	10.75	11.83	112.80	121.00	107.50	118.30
8 bunches/palm	T ₂	12.98	13.90	12.37	13.48	103.84	111.20	98.96	107.84
7 bunches/palm	T ₃	13.67	14.38	12.90	14.42	95.69	100.66	90.30	100.94
20% strands no./bunch	T ₄	9.98	10.68	9.46	10.12	99.80	106.80	94.60	101.20
30% strands no./bunch	T ₅	9.46	10.13	9.00	9.83	94.60	101.30	90.00	98.30
20% fruits/strand	T ₆	10.53	11.17	10.12	11.25	105.30	111.70	101.20	112.50
30% fruits/strand	T ₇	9.98	10.76	9.38	10.38	99.40	107.60	93.80	103.80
40% fruits/strand	T ₈	9.60	10.22	8.93	9.85	96.00	102.20	89.30	98.50
L.S.D.		0.85	0.98	0.76	0.88	7.85	8.96	6.84	7.11

The obtained bunch weights of Sewy date palm were (11.28, 12.98, 13.67, 9.98, 9.46, 10.53, 9.98 and 9.60 kg) and (12.10, 13.90, 14.38, 10.68, 10.13, 11.17, 10.76 & 10.22 kg) due to unthinned ones (T₁), thinning to 8, 7 bunches/palm (T₂, T₃), removing 20, 30% of strands/bunches (T₄ & T₅) or removing 20, 30 or 40% of fruits/strands (T₆, T₇ and T₈) during the two studied seasons, respectively. The increment percentage of bunch weight due to thinning bunch over unthinned ones (control) were (15.07 & 21.19%) and (14.88 & 18.84%) for T₂ and T₃ during the two studied seasons, respectively. Furthermore, yield/palm significantly decreased due to reducing

either the bunch/palm to 8 of 7 and strands/bunch to 80 or 70% of strands/ bunch as well as fruit 70 to 60% of total fruits/strands. On the other hand, thinning by leaving 80% of fruit/strands did not affect the yield/palm, also, there were no significant differences of bunch weight and yield/palm between leaving 80% of strands as well as 70 or 60% of fruits/strand. The recorded yield/palm were (112.80, 103.84, 95.69, 99.80, 94.60, 105.30, 99.40 & 96.00 kg/palm) and (100.66, 106.80, 101.30, 111.70, 107.60 & 102.20 kg/palm) due to T₂ to T₈ treatments, against 112.80 and 121.00 kg for unthinned ones, during the two studied seasons, respectively. The decrement

percentages of yield/palm due to T₂ to T₈ treatments over unthinning ones (T₁) were attained (7.94, 15.17, 11.52, 16.12, 6.65, 11.88 and 14.89%) and (8.10, 16.81, 16.28, 7.69, 11.07 and 15.54%) during the two studied seasons, respectively.

However, the recorded bunch weights of Bent Aisha date palm were (10.75, 12.37, 12.90, 9.46, 9.00, 10.12, 9.38 & 8.93 kg) and (11.83, 13.48, 14.42, 10.12, 9.83, 11.26, 10.38 & 9.85 kg) for T₁ to T₈ treatments, during the two studied seasons, respectively. Moreover, the increment percentage of bunch weight due to T₂ and T₃ over T₁ were (15.07 & 20.00%) and (13.45 & 21.89%) during the two studied seasons, respectively. These results could be attributed to the increase of fruit retention on bunch and the increase in fruit weight.

On the other hand, thinning by reducing either the bunch/palm to 8 & 7 or the strands/ bunch to 80 or 70% of total strands/bunch, as well as 70 or 60% of fruit numbers/strands significantly decreased the yield/palm compared with the control. The obtained yield/palms were (107.50, 98.96, 90.30, 94.60, 90.00, 101.20, 93.80 and 89.30 kg) and (118.30, 107.84, 100.94, 101.20, 98.30, 112.50, 103.80 and 98.50 kg/palm) due to T₁ to T₈ during the two studied seasons, respectively. The decrement percentage of yield/palms were (7.94, 16.00, 12.00, 16.28, 5.86, 12.74 & 16.93%) and (8.84, 14.67, 14.45, 16.91, 4.90, 12.26 & 16.74%) due to T₂, T₃, T₄, T₅, T₆, T₇ and T₈ during the two studied seasons, respectively.

Such reduction in the yield might be attributed to the highest re-

duction in number of fruits/ palm or bunch through the removal of some bunches strands or fruits..

These results are in agreement with those of Khalifa *et al.* (1987), Moustafa (1998), El-Shazly (1999), Abdel-Hamid (2000), Hammam *et al.* (2002), Marzouk *et al.* (2007), Behseresht *et al.* (2007), Al-Wasfy and Mostafa (2008), Abdel-Galil *et al.* (2008), Mostafa and El-Akkad (2011), Bashir *et al.* (2014), Al-Saikhan & Sallam (2015) and Samouni, Mona *et al.* (2016) who concluded that the fruit thinning by removing one third (central or strand-tip) or 30 to 45% of fruit decreased the yield compared to the unthinned one.

2- Fruit properties:

A – Physical characteristics

Data presented in Tables (2 & 3) showed the efficiency of different treatments of fruit thinning on some physical fruit properties of Sewy and Bent Aisha date fruits. Generally, it is obvious that fruit dimensions and flesh percentages reacted similarly and took the same trend of fruit weight in response to the effect of fruit thinning treatments for both the studied cultivars. Data showed that the fruit weight significantly increased as a result of any fruit thinning treatment comparable to the unthinned ones (control). The Sewy fruit weights were (13.80, 14.40, 14.35, 15.64, 14.93, 16.37 & 16.75g) and (15.86, 16.35, 16.32, 17.63, 17.22, 18.40 & 18.93 g) due to T₂ to T₈ treatments compared to the values of the control (unthinned one), 12.47 & 14.23 g, during the two studied seasons, respectively. The increment percentage of fruit weights due to the thinning treatments over unthinned ones were (10.66, 15.48, 15.08, 25.42, 19.72, 31.28 & 34.32%) and (11.45, 14.89, 14.69, 23.89, 21.10, 29.30 & 33.03%) due to T₂

to T₈ treatments during the two studied seasons, respectively.

The corresponding values for Bent Aisha fruit weights were (12.75, 13.60, 13.36, 14.65, 13.95, 15.21 & 15.68 g) and (14.43, 15.31, 15.16, 16.28, 15.69, 17.03 & 17.49 g) for T₂ to T₈ treatments compared to the values of the control (11.59 & 13.10 g). Hence, the increment percentage were attained (10.01, 17.34, 15.27, 26.40, 20.36, 31.23 & 35.29%) and (10.15, 16.87, 15.73, 24.27, 19.77, 30.00 & 33.51%) due to T₂ to T₈ during the two studied seasons, respectively. It could be concluded that there is a positive relation between the fruit weight and thinning rate in the same cultivar and within different cultivars. So that, fruit

thinning positively improved the physical fruit traits. Moreover, fruit thinning by removing some strands or fruits significantly improved the physical fruit traits as compared to either the bunch removing or the control treatments. Furthermore, removing 30% of strands/bunch or 30 to 40% of fruits/strand were more effective compared to the other thinning treatments. Such finding might be attributed to the reduction of either the number of bunches per palm or fruits per bunch consequently, the ratio of leaves to fruits number was improved. This in turn might induce a better supply of food materials (Carbohydrates) which produced in the leaves.

Table 2. Effect of fruit thinning methods on the fruit weight and flesh % of Sewy and Bent Aisha date palm cultivars during 2015 and 2016 seasons.

Characters Cultivar→ Season→ ↓Treatment		Fruit weight (g)				Flash (%)			
		Sewy		Bent Aisha		Sewy		Bent Aisha	
		2015	2016	2015	2016	2015	2016	2015	2016
10 bunches/palm (cont.)	T ₁	12.47	14.23	11.59	13.10	85.68	85.93	88.14	89.66
8 bunches/palm	T ₂	13.80	15.86	12.75	14.43	87.11	87.38	89.65	91.33
7 bunches/palm	T ₃	14.40	16.35	13.60	15.31	88.30	88.72	90.72	92.18
20% strands no./bunch	T ₄	14.35	16.32	13.36	15.16	87.46	87.94	90.05	91.62
30% strands no./bunch	T ₅	15.64	17.63	14.65	16.28	89.10	89.35	91.26	92.68
20% fruits/strand	T ₆	14.93	17.22	13.95	15.69	88.45	88.73	90.78	92.41
30% fruits/strand	T ₇	16.37	18.40	15.21	17.03	88.83	89.09	91.39	92.73
40% fruits/strand	T ₈	16.75	18.93	15.68	17.49	89.18	89.43	91.55	93.09
L.S.D.		0.98	1.10	0.90	1.27	1.27	1.18	1.42	1.26

Table 3. Effect of fruit thinning methods on the fruit dimensions of Sewy and Bent Aisha date palm cultivars during 2015 and 2016 seasons.

Characters Cultivar→ Season→ ↓Treatment		Fruit length (cm)				Fruit diameter (cm)			
		Sewy		Bent Aisha		Sewy		Bent Aisha	
		2015	2016	2015	2016	2015	2016	2015	2016
10 bunches/palm (cont.)	T ₁	3.98	4.16	3.81	4.11	2.42	2.48	2.33	2.42
8 bunches/palm	T ₂	4.19	4.41	4.03	4.30	2.53	2.60	2.43	2.53
7 bunches/palm	T ₃	4.29	4.48	4.11	4.38	2.60	2.67	2.56	2.67
20% strands no./bunch	T ₄	4.23	4.41	4.07	4.36	2.56	2.63	2.52	2.63
30% strands no./bunch	T ₅	4.35	4.53	4.18	4.49	2.62	2.68	2.57	2.68
20% fruits/strand	T ₆	4.26	4.48	4.10	4.39	2.56	2.64	2.51	2.62
30% fruits/strand	T ₇	4.40	4.60	4.23	4.51	2.64	2.71	2.59	2.71
40% fruits/strand	T ₈	4.43	4.62	4.28	4.53	2.65	2.72	2.61	2.72
L.S.D.		0.19	0.23	0.20	0.18	0.09	0.10	0.08	0.09

B – Fruit chemical constituents

Data in Tables (4 & 5) clearly showed that all fruit thinning significantly increased the total soluble solids and sugar contents as compared to the unthinned ones. It is, also declared from the obtained data that the total sugar contents have the same trend of change as the total soluble solids in response to the effect of fruit thinning treatments during the two studied seasons for both cultivars.

The improvement in fruit chemical quality was associated with either increasing the number of removal bunches, strands or fruits removal. Furthermore, fruit thinning by removing fruits was more effective in improving the fruit chemical constituents than thinning by some bunches or strands removal. The highest values of the total soluble solids and sugar contents in dates juice were obtained as a result of removing 30 or 40% of fruit numbers/strand.

Table 4. Effect of fruit thinning methods on the TSS and total sugars % of Sewy and Bent Aisha date palm cultivars during 2015 and 2016 seasons.

Characters Cultivar→ Season→ ↓Treatment		Total soluble solids %				Total sugars %			
		Sewy		Bent Aisha		Sewy		Bent Aisha	
		2015	2016	2015	2016	2015	2016	2015	2016
10 bunches/palm (cont.)	T ₁	47.10	49.00	31.20	32.30	36.97	38.30	22.35	23.00
8 bunches/palm	T ₂	48.60	51.83	33.40	35.15	38.55	40.09	23.92	25.00
7 bunches/palm	T ₃	49.37	52.50	33.85	34.63	38.85	40.43	24.34	24.95
20% strands no./bunch	T ₄	49.53	52.97	35.20	36.45	38.63	41.08	25.40	25.91
30% strands no./bunch	T ₅	49.67	51.40	33.00	33.85	38.50	39.65	23.85	24.10
20% fruits/strand	T ₆	52.10	55.20	36.18	36.75	40.17	42.28	25.86	26.13
30% fruits/strand	T ₇	52.43	55.37	36.75	37.25	40.94	42.87	26.16	26.52
40% fruits/strand	T ₈	53.53	55.95	37.00	38.10	41.35	43.00	26.67	26.85
L.S.D.		1.24	0.98	0.73	0.91	1.22	1.56	1.51	1.63

Table 5. Effect of fruit thinning methods on the reducing and non-reducing sugars of Sewy and Bent Aisha date palm cultivars during 2015 and 2016 seasons.

Characters Cultivar→ Season→ ↓Treatment		Reducing sugars				Non-reducing sugars			
		Sewy		Bent Aisha		Sewy		Bent Aisha	
		2015	2016	2015	2016	2015	2016	2015	2016
10 bunches/palm (cont.)	T ₁	27.65	28.11	19.50	19.92	9.32	10.19	2.85	3.08
8 bunches/palm	T ₂	28.81	29.60	20.67	21.42	9.74	10.49	3.25	3.58
7 bunches/palm	T ₃	29.16	29.85	21.25	21.55	9.68	10.58	3.09	3.40
20% strands no./bunch	T ₄	28.90	30.25	22.18	22.27	9.73	10.83	3.22	3.64
30% strands no./bunch	T ₅	28.50	29.18	20.60	20.75	10.00	10.47	3.25	3.35
20% fruits/strand	T ₆	30.25	31.45	22.47	22.51	9.92	10.83	3.39	3.62
30% fruits/strand	T ₇	31.11	31.51	23.00	22.90	9.83	11.36	3.16	3.62
40% fruits/strand	T ₈	30.91	31.40	23.11	23.42	10.44	11.60	3.56	3.43
L.S.D.		0.96	1.08	0.63	0.76	0.31	0.38	0.24	0.21

The highest values of the total soluble solids of Sewy dates juice were (52.10 & 55.20), (52.43 & 55.37%) and (53.53 & 55.95%) due to remove 20, 30 or 40% of fruit numbers/strand, during the two studied seasons, respectively. On other hand, the lowest one (47.10 & 49.0%) were recorded on unthinned fruits during the two studied season, respectively. The increment percentage of the total soluble solids attained (10.61 & 12.65%), (11.32 & 13.00%) and (13.65 & 14.18%) due to remove 20, 30 or 40% of fruits number/strand compared to unthinned treatment during the two studied seasons. The corresponding values of the total sugars were (40.17 & 42.28%), (40.94 & 42.87%) and (41.35 & 43.00%) due to remove 20, 30 or 40% of fruit number/strand during the two studied seasons, respectively. Thus, the increment percentage were (8.65, 10.39%), (10.74 & 11.93%) and (11.85 & 12.27%) during the two studied seasons, respectively. Similarly, the highest values of the total soluble solids of Bent Aisha dates juice were (36.18 & 36.75%), (36.75 & 37.5%) and (37.0 & 38.10%) due

to remove 20, 30 or 40% of fruit number/strand compared to the lowest ones (31.20 & 32.30%), respectively. Hence, the increment percentages were (8.65 & 10.39%), (10.74 & 11.93%) and (11.85 & 12.27%) due to remove 20, 30 or 40% of fruit numbers/strand compared to unthinned ones during the two studied seasons, respectively. The corresponding values of the total sugars were (25.86 & 26.13%), (26.16 & 26.52%) and (26.67 & 26.85%) compared to (22.35 & 23.00%), hence the increment percentages were (15.70 & 13.61%), (17.05 & 15.30%) and (19.33 & 16.74%) due to remove 20, 30 or 40% of fruit numbers/strands relative to the unthinned ones (control) during the two studied seasons, respectively. Clearly, there is a positive relationship between the fruit thinning rate and the total soluble solids and total sugars contents of date fruits pulp.

These results might be attributed to the adequate carbohydrates and other essential foods for the remained fruits, consequently enhanced the fruit maturity and increase its contents of total soluble solids and

sugars. In addition, fruit thinning effectively lowered the competition occurred between fruits and consequently raised the total soluble solids and sugar contents for each fruit.

Thus, there is a positive relationship between fruit thinning treatments and the chemical constituents improvement. The enhancing effect of fruit thinning on date fruit quality are in harmony with those obtained by Hassaballa *et al.* (1983), Khalifa *et al.* (1987), Godara (1990), El-Kassar *et al.* (1995), El-Shazly (1999), Abdel-Hamid (2000), Bassal and El-Deeb (2002), Hammam *et al.* (2002), El-Assar (2005), Nirmaljit *et al.* (2006), Tavakkoli *et al.* (2006), Behseresht *et al.* (2007), Marzouk *et al.* (2007), Al-Wasfy and Mostafa (2008), Abdel-Galil *et al.* (2008), Mostafa and El-Akkad (2011), Bashir *et al.* (2014), Al-Saikhan and Sallam (2015) and Samouni, Mona *et al.* (2016).

From the results of the present study, it could be concluded that leaving 10 bunches/ palm with 70 to 80% of strands bunch or 60 to 70% of fruit numbers/strands would result in producing a considerable yield characterized by high fruit quality of Sewy and Bent Aisha date palms cvs.

References

- A.O.A.C. 1985. Association of Official Agricultural Chemists. Official Methods of Analysis. A.O.A.C. 14th Ed. Published by A.O.A.C. Washington, D.C. (U.S.A.).
- Abdel-Galil, H.A.; A.M. El-Salhy; M.M. El-Akkad and Y.M. Diab. 2008. Effect of different methods and dates of fruit thinning on "Sewy" date yield and quality under New Valley conditions. The 3rd Int. Conf. on Date Palm, 25-27 April, El-Arish, Egypt.
- Abdel-Hamid, N. 2000. Effect of time, rate and patterns of thinning, leaf bunch ratio and male type on "Zaghloul" date yield and quality. Arab, J. Agric. Sci. Ain Shams Univ., Cairo, 8 (1): 305-317.
- Akl, A.M.; M.A. Ragab and A.Y. Mohamed. 2004. Yield and fruit quality of Sewy date palms in response to some fruit thinning treatments. The Second Inter. Conf. on Date Palm Faculty of Envir. Agric. Sci., El-Arish, Suez Canal Univ. Egypt. 6-8 Oct.
- Al-Ghamdi, A.S.; O.A. Al-Tahir and A.A. Al-Khateeb. 1993. Thinning stage effects on fruit size, yield and fruit quality of date palm (*Phoenix dactylifera* L.) cv. Khalas. Third Symposium on date palm, Saudi Arabia, Book of Abstracts, p. 88.
- Al-Saikhan, M.S. and A.A. Sallam. 2015. Impact of chemical and non-chemical thinning treatment on yield and fruit quality of date palm. J. of Food and Research, 4 (4): 18-24.
- Al-Wasfy, M.M. and R.A.A. Mostafa. 2008. Effect of different methods of fruit thinning on Zaghloul date palm production and fruit quality. Assiut J. Agric. Sci., 39 (1): 97-106.
- Awad, A.M. 2006. Water spray as a potential thinning agent for date palm flowers (*Phoenix dactylifera* L.) c.v. "Lulu" Abstract J. Int. Conf. on Date Palm Production and Processing Technology, May 9-11, Muscat Oman, p. 12.
- Bashir, M.A.; M. Ahmad; F. Altaf and K. Shabir. 2014. Fruit quality and yield of date palm (*Phoenix dactylifera* L.) as affected by strand thinning. J. Anim. Plant Sci., 24 (3): 951-954.

- Bassal, M.A. and M.D. El-Deeb. 2002. Effect of thinning and some growth regulators on yield and fruit quality of Zaghoul date palm. *Zagazig J. Agric. Res.* 29 (6): 1815-1837.
- Behseresht, R.; R. Khademi and P. Bayat. 2007. The effects of bunch thinning methods on quality and quantity of date palm cv. Kabakab. The fourth symposium on date palm in Saudi Arabia, King Faisal University, Al-Hassa, 5-8 May, Book of Abstracts, p. 117.
- El-Assar, A.M. 2005. Response of "Zaghoul" date yield and fruit characteristics to various organic and inorganic fertilization types as well as fruit thinning models in a rich carbonate soil. *J. Agric. Sci. Mansoura Univ.*, 30 (5): 2795-2814.
- El-Kassas, Sh.E.; T.K. El-Mahdy; A.A. El-Khawaga and Zynab Hamdy, 1995. Response of Zaghoul date palms to certain treatments of pollination, flower thinning and bagging. *J. of Agric. Sci.* 26 (4): 167-178.
- El-Shazly, S.M. 1999. Effect of fruit thinning on yield and fruit quality of "Nabtet Ali" Saudi date palm. The International Conference on date palm Nov. 9-11, Assiut Univ., Egypt, pp.17-33.
- FAO. 2014. Food and Agriculture Organization Statistical Year Book. FAO. Rome Italy.
- Godara, R.K.; N.R. Godara and N.S. Nehra. 1990. Effect of level of thinning on ripening of date palm fruit (*Phoenix dactylifera*) cv. Shamran. *Res. Dev. Rep.*, 7(1-2): 21-25.
- Gomez, K.A. and A.A. Gomez, 1984. *Statistical Procedures for Agriculture Research*. 2nd Ed. Wiley, New York.
- Hammam, M.S.; Sabour-Asma and Ebeed-Sanaa. 2002. Effect of some fruit thinning treatments on yield and fruit quality of Zaghoul date palm. *Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo*, 10 (1), 261-271.
- Hassaballa, L.A.; M.M. Ibrahim; M.M. Sharaf; A.Z. Abdel-Aziz and N.A. Hagagy. 1983. Fruit physical and chemical characteristics of "Zaghoul" date cultivar in response to some fruit thinning treatments. *Annals Agric. Sci. Moshtohor, Egpt*, 20 (3): 3-14.
- Khalifa, A.S.; A.I. El-Kady; K.M. Abdalla and A.M. El-Hamdy. 1987. Influence of thinning patterns and leaf/bunch ratio on "Zaghoul" dates. *Ann. Agric. Sci., Fac. Agric., Ain Shams Univ., Cairo, Egypt*. 32(1): 637-647.
- Marzouk, H.M.; A.M. El-Salhy; H.A. Abdel-Galil and A.E. Mahmoud. 2007. Yield and fruit quality of some date palm cultivars in response to some flower thinning rates. The 4th Symposium on date palm in Saudi Arabia. King Faisal Univ., Al-Hassa, 5-7 May, p. 110.
- Moustafa, A.A. 1998. Studies on fruit thinning of date palm. The First International Conference on date palm Al-Ain United Arab Emirates. March 8-10, 1998, pp.354-363.
- Mostafa, R.A.A. and M.M. El-Akkad. 2011. Effect of fruit thinning rate on yield and fruit quality of Zaghoul and Haiany date palms. *Australian J. of Basic and Applied Sciences*, 5 (12): 3233-3239.
- Nirmaljit, K.; J.S. Josan and P.K. Monga. 2006. Fruit thinning of dates in relation to fruit size and quality. Abstract of the Third International Date Palm Conf. Feb. 19th-21th, Abu Dhabi, United Arab Emirates.

- Nixon, R.W. and J.B. Carpenter. 1978. Growing dates in the United States U.S. Dep. Agric. Inform. Bull. No. 207, 56 p.
- Samouni, Mona, T.M.; A.M. El-Salhy; Ibtesam F.M. Badawy and E.F. Ahmed. 2016. Effect of pollination and thinning methods on yield and fruit quality of Saily date palms. *Assiut J. Agric. Sci.*, 47 (3): 92-103.
- Snedecor, G.W. and W.G. Cochran, 1990. *Statistical Methods* 7th ed. Iowa State Univ. Press. Ames.
- Tavakkoli, A.; E. Tafazoli and M. Rahem. 2006. Comparison of hand versus chemical thinning on quality and quantity of fruits and alternate bearing of "Shahani" date (*Phoenix dactylifera* L.). Abstract of the Third International Date Palm Conf. Feb. 19th-21st, Abu Dhabi, United Arab Emirates.

استجابة نخيل البلح بنت عيشة والسيوى لبعض معاملات خف الثمار

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الملخص

أجرى هذا البحث على نخيل البلح السيوي وبنت عيشة بمزرعة كلية الزراعة - جامعة أسيوط - جمهورية مصر العربية خلال موسمي ٢٠١٥ ، ٢٠١٦ بهدف دراسة تأثير بعض معاملات خف الثمار على المحصول وصفات الثمار. حيث أجرى خف السوبات إلى ٧ ، ٨ ، ١٠ سوبات (حيث ان المعاملة الاخيرة هي معاملة المقارنة) / نخلة. وعلاوة على ذلك فإن معاملة ١٠ سوبات / نخلة تم خفها بإزالة ٢٠ أو ٣٠% من عدد الشماريخ/سوبات أو إزالة ٢٠ ، ٣٠ أو ٤٠% من عدد الثمار / شمراخ. ويمكن تلخيص أهم النتائج كالتالى:

- أدى خف عدد السوبات إلى ٧ ، ٨ سوبات / نخلة إلى زيادة معنوية فى وزن السوبات بينما حدث نقصاً معنوياً فى وزن المحصول / نخلة مقارنة بترك ١٠ سوبات / نخلة (معاملة المقارنة).

- سبب إزالة ٢٠ أو ٣٠% من عدد الشماريخ أو خف عدد الثمار بنسبة ٣٠ أو ٤٠% لكل شمراخ نقصاً معنوياً فى وزن كل من السوباتة والمحصول / نخلة من نخيل السيوى وبنت عيشة مقارنة بعدم الخف. بينما لم يظهر تأثير لمعاملة خف ٢٠% من عدد الثمار / شمراخ.

- أدى الخف سواء من عدد الثمار/شمراخ أو عدد الشماريخ/سوبات إلى زيادة مؤكدة فى وزن وحجم الثمار ونسبة اللحم وكذلك محتوى الثمار من المواد الصلبة الذائبة الكلية والسكريات مقارنة بثمار المقارنة (١٠ سوباتة / نخلة).

- أوضحت النتائج أن إزالة ٢٠-٣٠% من الشماريخ/سوباتة وكذلك إزالة ٢٠-٣٠% من ثمار كل شمراخ تعطى أحسن خصائص ثمرية مع نقص قليل بمحصول نخيل البلح السيوى أو بنت عيشة.

لذا يمكن التوصية بخف عدد السوبات إلى ١٠ سوباتة / نخلة مع إزالة ٢٠-٣٠% من الشمراخ أو إزالة ٢٠-٣٠% من عدد الثمار / شمراخ لإنتاج محصول مناسب ذو خصائص ثمرية جيدة لنخيل البلح السيوى ، بنت عيشة.