



Estimate and Identify Different Types of Fruit Losses During Harvesting Time in Saily Date Palm (*Phoenix Dactylifera* L.) Cultivar Grown in New Valley, Egypt

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Abstract

This study was conducted during two successive seasons (2018 and 2019) to estimate and determined the most important loss types of fruits at harvesting time of Saily cultivar (Semi- dray date) grown at El-Dakhla oasis, New Valley, Egypt. Our results indicated that the Mut area is considered the best region it has the highest percentage of sound fruits (79.52 and 81.51 %) and the lowest percentage of defective fruits (20.48 and 18.49 %) of Saily cv. Data also indicated that the highest type of defected fruits was fruit wilting (34.56 and 35.04 %) for El- Gededa region in both seasons followed by mice damage (28.87%) for El-Sheikh Waly region in the first season and fruit wilting (33.55%) for El-Moshya region in the second season., Moreover the largest of loss cropping land and irrigation water were obtained from El-Qasr region . On the other side, the lowest loss of cropping land and irrigation water were obtained from El-Sheikh Waly region in two seasons, respectively. The main objective of this study estimates and determined the most important loss types of fruits at harvesting time as well as the loss of cropping land and irrigation water of Saily date palm cultivar grown in New Valley, Egypt.

Keywords: date palm, fruit, saily, estimate loss, defected

Introduction

Date palm (*Phoenix dactylifera* L.) is an important fruit crop in the palm family (Alliaceae) cultivated in the arid regions, furthermore, it is considered one of the ancient domestic fruit trees in the Middle East countries and their fruits play a vital role in the nutrition pattern of many people as well as a strategic crops in food and biochemical industries (Khayyat *et al.*, 2007). It plays a great role in socioeconomic and many other commercial purposes. Egypt is considered the top ten date palm producers, 'Zaghloul,' 'Samany,' 'Hayany' and 'Sewi' are the most economically important date palm cultivars grown in Egypt (El-Badawy *et al.*, 2018). The climatic conditions of Al-Dakhla and El-Kharga Oasis are ideal climatic conditions for the cultivation and productions of Sewi date palm. (Ahmed *et al.*, 2018). Saily date palm cultivar (semi-dry date) is considered a major cultivar in New Valley and El-Dakhla oasis. Post-harvest Loss (PHL) is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (Hodges & Bennett, 2011). In addition, post-harvest losses represent a waste of resources used in production such as land, water, energy and inputs. In cooperation with FAO and other international agencies, Egypt has developed, in September 2016, a strategy for the development of the date palm and dates sector. One of its main pillars is to enhance dates export through high-quality fruits (strategy for the development of date palm and dates sector, 2016). A crucial step to produce and maintain high-quality date fruits and reduce loss and waste, is to know the volume and types of defects (El-Habbab *et al.*, 2017). The interest for all date palm agricultural practices such as irrigation, fertilization, pollination, pruning, thinning, pest control - and suitable time of harvesting-guarantee high quality and reduce fruit loss at harvesting. The main objective of this study estimates and determined the most

important loss types of fruits at harvesting time as well as the loss of cropping land and irrigation water of Saily date palm cultivar grown in New Valley, Egypt.

Material and Methods

The present study was carried out during two successive seasons of 2018 and 2019 in five production areas namely El-Gededa, El-Moshya, El-Qasr, Mut and El-Sheik Waly grown at El-Dakhla oasis, New Valley, Egypt on Saily date palm cultivars fruits (*Phoenix dactylifera* L.) semi-dry date. Three random samples were randomly taken from each cultivar area, 25 kg for each sample at harvesting time. Saily cultivar (Semi-dry date) are harvest from mid-September and extended to late October. Each sample was examined and estimated the loss percentage of fruits during the harvesting period as well as loss of cropping land (fed) and irrigation water (m³/fed). The defective fruits were calculated as a percentage of their total weight, furthermore defected fruits were divided into the following types: 1) Insect damage, fruits damaged by insects or mites or contaminated by the presence of insects or mites, 2) Wounds, dates resulting from mechanical damage such as movement fruits between fronds during wind, bunches are not pulling down, 3) Unripe dates, fruits reached maturation only (Khalal or Routab stage, 4) Shriveling dates, fruits lose the moisture content causing wrinkling in fruit surface, 5) White end (Al-Touq), stiffness and dryness of nearby area around perianth of fruits due to stopping the cell division in this area especially during Khalal and Routab stage, 6) Un-pollinated fruits, dates not pollinated and characterized parthenocarpy fruits, thin, small in size and sometimes not reached to ripening, 7) Skin separation, skin fruits are swelling and separating fruit flesh as a result of the microclimate condition in the vicinity to fruit bunches while connecting to the tree, 8) Mice damage, dates damage by feeding the mice on the fruits and 9) Fruit wilting, soft tissues shrinkage because of the water loss during

ripening development of date fruit. Concerning the loss in cropping land (fed) were calculated as follows: Total **production area (fed) X % of loss at harvesting**. While losing of irrigation water (m³) used to produce the lost amount of date fruits cultivar as follows: **Loss in Results and Discussion**

1- Percentage of sound and defective fruits of Saily date palm cultivar

Data in Tables (1 and 2) and Fig (1) showed the percentage of the sound (non-defected) and defected fruits at harvesting time for the different cultivated areas. Mut area is considered the best region, .It has the highest percentage of sound fruits (79.52 and 81.51 %) and the lowest percentage of defective fruits (20.48 and 18.49 %) in both seasons. On the other hand, the worst result was for the El-Gededa region it has the lowest percentage (62.63 and 62.32 %) of sound fruits and the highest percentage for defective fruits (37.43 and 37.68%) in two seasons. Also, data indicated that the highest type of defective fruits was fruit wilting (34.56 and 35.04 %) for El-Gededa region in both seasons followed by mice damage (28.87%) for El-Sheik Waly region in the first season and fruit wilting (33.55%) for El-Moshya region in the second season. On the other side, Mut- and El-Moshya region recorded (0%) for shriveling and unpollinated fruits in two successive seasons, respectively. In this concern, it was observed similar results were obtained by **El-Ansary et al. (2019)** noticed that sound date palm fruits percentage ranged from 73.23% to 84.32 for Bent Aisha, 'Oreebi' 'Samani' and 'Hayani' cultivars and the defected fruits ranged from 15.68% to 26.77% for some cultivars, .Also, **El-Habbab et al. (2017)** reported that Ruzaze cultivar gave the highest percentage of good fruits (92.36%) with the lowest shees and best percentage (2.20%).

2- Loss of cropping land and irrigation water of Saily date palm cultivar

Regarding loss of cropping land and irrigation water, data obtained from Table (3)

cropping-land (fed) X Water requirements per fed (m³).

Statistical analysis

The statistical analysis (ANOVA) of the obtained results were performed using SAS program (**SAS Institute, 2006**). indicated that the largest of loss cropping land (288.50 and 195.69 feds) and irrigation water (838958 and 569066.521m³/fed) were obtained from El- Qasr region in 2018 and 2019 seasons, respectively. Followed by Mut region were (124.92 and 112.78 feds) loss in cropping land and (363267.36 and 327964.24 m³/fed) loss of irrigation water. On the other side, the lowest loss of cropping land and irrigation water were (34.92 and 40.58 fed) and (101547.36 and 118006.64 m³/fed) for El – sheik waly region in both seasons, respectively. The differences between loss percentage for each harvesting, loss in cropping land, and irrigation water is due to the differences in the cultivated area. These results agreed with **El-Ansary et al. (2019)**, they found The average water loss ranged from 11,222,087 to 12,285,744 m³/ha for Samani', 'Oreebi', 'Hayani', 'Zaghloul' and 'Bent Aisha' cultivars. Also, they are noticed that water requirements for date palm vary from region to another according to climate conditions as well as the irrigation method, .Where, it is 15,000–35,000 m³/ha in Algeria, 23,600 in Tunisia, 13,000–20,000 in Morocco, 15,000–20,000 in Iraq,8000 m³/ha in Saudi Arabia and 10,280-14,880 m³/ha in Egypt (**Zaid & Arias-Jimenez, 2002; Kassem, 2007; Bekheet & El-Sharabasy, 2015 and AL- Omran et al, 2019**).

Table (1): Production area, sound fruits%, defected fruits% and causes of defected for Saidy date palm cultivar at harvesting time in El-Dakhla oasis, New Valley, Egypt during 2018 season.

Defect %	Area				
	El-Gededa	El-Moshya	El-Qasr	Mut	El-Sheikh Waly
Sound fruits%	62.63 ^d	72.84 ^b	68.79 ^c	79.52 ^a	68.53 ^c
Defected fruits%	37.43 ^a	27.16 ^c	31.21 ^b	20.48 ^d	31.47 ^b
	Causes of defects				
Insect damage	6.93 ^c	18.34 ^c	22.64 ^a	22.74 ^b	23.42 ^b
Wounds	12.21 ^c	3.40 ^f	8.70 ^d	7.45 ^e	9.51 ^c
Unripe dates	9.90 ^d	16.32 ^d	1.29 ^f	0.00 ^g	0.00 ^e
Shriveling	1.18 ⁱ	0.00 ^g	4.35 ^e	0.00 ^g	0.00 ^e
White end	23.52 ^b	23.03 ^b	13.60 ^{bc}	21.67 ^c	9.44 ^c
Unpollinated	1.72 ^h	0.00 ^g	0.45 ^f	0.78 ^g	0.00 ^e
Skin separation	5.91 ^f	7.20 ^e	21.66 ^a	27.92 ^a	24.25 ^b
Mice damage	3.96 ^g	0.00 ^g	12.41 ^c	1.65 ^f	28.87 ^a
Fruit wilting	34.56 ^a	31.70 ^a	14.85 ^b	18.02 ^d	4.48 ^d

Values with the same letter in the same raw are not significant at ($P \geq 0.05$)

Table (2): Production area, sound fruits%, defected fruits% and causes of defected for Saidy date palm cultivar at harvesting time in El-Dakhla oasis, New Valley, Egypt during 2019 season.

Defect %	Area				
	El-Gededa	El-Moshya	El-Qasr	Mut	El-Sheikh Waly
Sound fruits%	62.32 ^d	71.29 ^c	78.83 ^b	81.51 ^a	63.44 ^c
Defected fruits%	37.68 ^a	28.71 ^b	21.17 ^c	18.49 ^d	36.56 ^a
	Causes of defects				
Insect damage	7.05 ^c	19.75 ^c	27.22 ^a	25.79 ^b	23.89 ^a
Wounds	12.06 ^c	4.93 ^e	11.96 ^c	13.59 ^d	10.05 ^c
Unripe dates	9.84 ^d	14.86 ^d	3.96 ^d	2.54 ^f	1.80 ^e
Shriveling	1.35 ^g	0.49 ^g	0.00 ^e	0.00 ^g	4.00 ^d
White end	24.16 ^b	23.75 ^b	22.12 ^b	16.16 ^c	8.53 ^c
Unpollinated	1.42 ^g	0.00 ^g	0.00 ^c	0.00 ^g	0.00 ^f
Skin separation	5.60 ^c	0.00 ^g	27.3 ^a	33.17 ^a	20.73 ^b
Mice damage	3.43 ^f	2.64 ^f	2.99 ^d	1.01 ^g	21.64 ^b
Fruit wilting	35.04 ^a	33.55 ^a	4.41 ^d	7.70 ^c	9.32 ^c

Values with the same letter in the same raw are not significant at ($P \geq 0.05$)

Table (3): Loss in cropping land (fed) and irrigation water (m³ /area) of Saidy date palm cultivar at harvesting time in El-Dakhla oasis, New Valley, Egypt during 2018 and 2019 seasons

Area	Total cultivated area (fed)	Loss %		Loss in cropping land (fed)		Loss of irrigation water (m ³ /area)	
		2018	2019	2018	2019	2018	2019
El-Gededa	288	37.43	37.68	107.79	109.51	313453.32	315547.08
El-Moshya	197	27.16	28.71	53.50	56.55	155578	164447.4
El-Qasr	924.4	31.21	21.17	288.50	195.69	838958	569066.52
Mut	610	20.48	18.49	124.92	112.78	363267.36	327964.24
El-Sheikh Waly	111	31.47	36.56	34.92	40.58	101547.36	118006.64

Conflict of interest statement

This manuscript has no conflicts of interest

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Fig (1): Types of fruit loss for Saidy date palm cultivar at harvesting time, where, 1) White end, 2) Skin separation, 3) Fruit wilting, 4) Shriveling, 5) Unripe dates, 6) Mice damage, 7) Unpollinated, 8) Insect damage and wounds, 9).

