



Evaluation of Some Fruit Quality of Date Palm Cv. “Medjoul” Grown Under El Wahat Al Bahria and El-Wadi El-Gadid Oases Conditions

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ABSTRACT

This study was carried out to evaluate the performance fruit quality of date palm (*Phoenix dactylifera* L.) cv. “Medjoul” trees grown under two different climate conditions i.e., El-Wahat Al Bahria and El-Wadi El-Gadid (New valley) Oases during 2021 and 2022 seasons. The climate play an important role in fruit quality and physical characteristics, where is found the greatest value of fruit weight, flesh weight, fruit length and appearance of homogeneous dark brown color in El-Wahat Al-Baharia region but appearance two color light brown at the funnel of fruits and dark brown color at the rest of fruits in El-Wadi El-Gadid region that may be due to the humid climate which improved physical characteristics in El-Wahat Al-Baharia region than the dry climate in El-Wadi El-Gadid region. Fruit quality was affected by climate region whereas the highest values were achieved with humid climate. The fruit chemicals properties were not differed according to climate conditions in the region.

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INTRODUCTION

Date Palm (*Phoenix dactylifera* L.) Cv. “Medjoul” is one of the most important date palm varieties in the world. It merits a more detailed account than some other varieties; it has become a very important variety to the date industry in recent years and its history is somewhat unusual. “Medjoul” is the most desirable because of its large size, soft flesh, excellent taste, and attractive appearance. The Mejhoul date palm originated from the Tafilalet Valley in the Kingdom of Morocco. Mejhoul variety is called The Jewel of Dates. Zaid, (2002).

A fundamental goal of commercial growers in modern date palm cultivation is to produce a large crop of high-quality fruit free from pesticide residues with the least amount of irrigation water (Ismail et al., 2014). Egypt is now aiming to expand its cultivation of the Mejhoul variety, by working on the development of the date industry, and the establishment of new sorting and manufacturing stations. This expansion is taking place in new areas looking to start cultivating this date variety, in places such as Aswan, New Vally, El-Wahat Al-Bahariya and

Al Minya, in addition to the southern Red Sea and Sinai provinces, with the aim of increasing the added value of the Mejhoul date industry. This propose aim to evaluate of some fruit quality of date palm “Medjoul” Cv. grown under El-Wahat Al-Baharia Oasis and El-Wadi El-Gadid (New Valley) Oases

MATERIALS and METHODS

This study was done in 2021 and 2022 seasons on date palm (*Phoenix dactylifera* L.) Cv. “Medjoul” trees under two different climate conditions i.e. El-Wahat Al-Baharia Oasis, Giza Governorate and El-Wadi El-Gadid (New Vally) Governorate to observe the effect of some different climate conditions on yield and fruit quality (physically and chemically). The observed trees were 10-year-old at beginning of study, planted at 7x7 in sandy soil and irrigated with drip irrigation system. Average maximum temperatures as well as relative humidity percentage for both El-Wahat Al-Baharia Oasis (Giza Governorate) and El-Wadi El-Gadid Oasis, New Vally Governorate at the beginning of the experiment are shown in (Table, 1). For this investigation nine trees were chosen in each region divided into three replicates and the following parameters were done:

Table (1): Average temperature, relative humidity and possible sunshine duration for El-Wahat Al-Baharia Oasis and El-Wadi El-Gadid Oases in the beginning of experiment. According to the Meteorological Authority in agriculture.

Regions	El- Wahat Al- Baharia				El-Wadi El-Gadid			
	Mean Temp. °C	Max Temp. °C	Mini Temp. °C	Humidity %	Mean Temp. °C	Max Temp. °C	Mini Temp. °C	Humidity %
May	27.2	35.6	18.70	34	29.7	38.6	20.1	25.0
June	29.7	37.20	22.10	23	33.3	42.9	24.0	26.8
July	30.5	38.10	22.90	42	32.4	40.7	23.6	31.4
Aug	30.0	37.50	22.50	46	32.0	40.0	23.6	33.4
Sep	27.2	34.30	20.00	46	29.1	36.8	21.5	37.2
Oct	25.0	31.90	18.10	47	26.4	33.4	19.4	42.3

[Data were obtained from the agrometeorological Unit at SWERI, ARC]

The following indices were studied and recorded in each region:

Spathe emergence and bursting: Dates of commencement and ending of spathes emergence and bursting.

Yield and bunch characteristics: the harvest took place when the fruits reached to first tamar stage, the following data were recorded: date of

harvest, weight of bunches (kg) and yield per palm (kg).

Physical and chemical properties of fruits: representative fruit sample 50 fruits collected at harvesting time of each replicate (from each palm).

Fruit evaluation included fruit length, dimensions (axial and equatorial diameter), flesh weight and fruit volume.

Color: The color of date samples was evaluated using a modified method. Pictures of the date samples were taken in a fully closed white cardboard box using a digital camera. During photography the option flash was kept off. The gap from camera to box bottom was 30 cm. For all samples the relative location of the camera and the sample is kept the same. Color was calculated inside the software's "Lab" mode. The color measurement tests were performed in triplicate (Farahnaky, et al. 2010). Total soluble solids (T.S.S) content were determined according to the method described in the A.O.A.C. (1995). Total and reducing sugars content were determined according to the method of Lane and Eynon as described in the A.O.A.C. (1995). Total Indoles (mg/100 gm d.wt)

The total indoles were determined in the methanolic tissue extract using p-dimethyl amino benzaldehyde (PDAB, 1 g was dissolved in 50 ml HCl conc. and 50 ml ethanol 95%) test according to Larsen et al. (1962). A stable pink color would be formed. Pure indole acetic acid was used as standard. Total Indoles were expressed on fruit dry weight basis as mg/100 gm d. wt. Tannins content (gm tannins/100 gm f.wt) A sample of five fruits was taken to determine tannins content according to the official method described by Winton and Winton (1958). The fruit tannins content was determined as gm tannins / 100 gm fresh weight of the flesh according to the following equation: 1 ml. Oxalic acid (0.1 N.) = 0.0416 gm. tannins.

Statistical analysis:

Statistical analysis of different collected data to variable significant differences were counted according to Steel and Torrie (1985). Individual comparisons were compared by using the least significant differences (LSD_{0.05}) according to Waller and Duncan, (1969).

RESULTS AND DISCUSSION

Flowering and harvest date: The obtained results in (Table 2), showed enormous variation

between tested regions in dates of Spathe Opening in Medjoul date palm which female palms opened early at El-Wahat Al-Baharia region (30th and 28th of December) for both seasons, respectively, while palms grown at El-Wadi El-Gadid region began Opening of spathe later (15th and 10th of January) for both seasons, respectively. Regarding flowering period extended from 24 to 30 days for trees under the different studied conditions, in both studied seasons, respectively. As for harvesting date, data in Table (2) also showed that, Medjoul fruits required 267-272 days to reach tamar stage. The harvest date begins earlier (9/10 and 10/10) at El-Wadi El-Gadid region and required 289 -291 days under El-Wahat Al-Baharia region conditions. Harvest dates begin (15/10 and 15/10) in the first and second season, respectively.

Bunch weight and yield: Data in Table (2) show significant differences in bunch weight between the tested regions the average of the two years show that Medjoul date palms grown in El-Wahat Al-Baharia produced the heaviest bunches (7.4 and 7.4 kg) compared with ones in El-Wadi El-Gadid (5.5&5.3 Kg).

Yield per palm reached (74.0 and 74.0 kg) under El-Wahat Al-Baharia condition and (55.0 and 55.5 kg) under El-Wadi El-Gadid condition. These results are harmony with Abdalla et al., (1996) who stated that climatic conditions temperature and relative humidity were the most important factors affecting fruiting of date palms. Moreover, Hasnaoui et al., 2010; Mahawar et al., 2017; Salomón-Torres et al., 2019 who told that the Medjoul date palm prefers doses of cold in winter and heat is important from fruit set to harvesting, for around five to six months per year. The flowering of the Medjoul date palms starts in general when the air temperature goes above 18°C. In most date-producing areas this occurs around the end of January/February in the Northern hemisphere and June/July in the southern hemisphere, respectively. During the fruit maturation period, the climate in Medjoul producing areas is hot, particularly July to

August, in the Northern hemisphere, varying between 36°C at El-Wahat Al-Baharia in Egypt.

Table (2): Spathe Opening, Fruit Set, Harvesting Date, Bunch Weight (kg) and Yield/palm (kg) of Medjoul date palm grown in El-Wahat Al-Baharia Oasis and New Valley Oases through 2021 and 2022 seasons

Region	Chara.	Spathe Opening	Harvesting Date	Harvesting period (days)	Bunch Weight (kg)	Yield/palm (kg)
First season						
El-Baharia		30 th Dec.	15 th Oct.	289a	7.4a	74a
El-Wadi El-Gadid		15 th Jan.	9 th Oct.	267b	5.5b	55b
Second season						
El-Baharia		28 th Dec.	15 th Oct.	291a	7.4a	74a
El-Wadi El-Gadid		10 th Jan.	10 th Oct.	272b	5.3b	55b

Fruit characteristics:

The effect of climate condition on some physical and chemical properties of Medjoul date palm fruit under two studied regions during 2021 and 2022 seasons were tabulated in Table (3). The obtained data clearly showed that, the heaviest fruit (22.7 and 23.5 g) were produced from Medjoul palm grown under El-Wahat Al-Baharia condition followed by fruit obtained from palm grown under El-Wadi El-Gadid (New Valley) climate condition (13.8 and 14.1 g), while the highest flesh fruits (20.8 and 21.5 g) were produced from Medjoul palm grown under El-Wahat Al-Baharia climate condition with significant differences during the two studied seasons, respectively.

Meanwhile, fruit length and fruit diameter statistically differed between the two studied regions to longer fruits (6 and 6 cm) intermediate diameter (3 and 3 cm) was attained under El-Wahat Al-Baharia climate condition followed by values obtained from ones fruit produced from palms grown under El-Wadi El-Gadid climate condition (4.4 and 4.43 cm) for fruit length and (2.5 and 2.5 cm) for fruit diameter. Fruit volume ranged between 14.5 to 13.5 cm for fruits under the different climatic conditions. The highest volumes (14.5 and 14.5 cm) were recorded with fruit grown under El-Wahat Al-Baharia climate while the lowest

ones (13.5 and 14 cm) were found in fruit grown under El-Wadi El-Gadid condition.

The Medjoul producing areas around the globe present a diversity of the combinations of:

a) Soil characteristics, including the physico-chemical factors; b) The cumulative heat units during the period from fruit set to fruit maturation; c) The average air relative humidity mainly during the fruit development and maturation. Therefore, the Mejhoul fruits produced in these areas present different fruit characteristics as a result of the above combinations. This includes fruit color (high rate of relative humidity combined with high temperature provides dark fruits), fruit sugar content, total phenols, vitamins and antioxidants (Hasnaoui et al., 2010; Mahawar et al., 2017; Salomón-Torres et al., 2019). These results are due to the different climatic conditions of the agricultural areas, where El-Wahat Al-Baharia Oasis characterized by an increase in relative humidity and low heat compared to New Vally region were high temperature and low relative humidity. (Ahmed, et al.,2018).

Fruit chemical properties:

Fruit color

Colors are as follows in **Fig. (1)** and **Fig. (2)**: Khalal stage begin yellow orange with clear dark red strips, Rutab stage amber, Tamar stage

(ripe) transparent dark brown to black. The mature fruit color is related to the climate and growing conditions. The skin is irregularly wrinkled, shiny at the peak and dull at the lower part. Skin is medium thick and tender, tied to the flesh, but at Tamar stage the fruit shrinks and the thickness of the flesh with little fiber. Flesh is firm, meaty and thick, brownish amber, translucent with practically no fiber around the seed. Taste is excellent and sweet. Fruit color appearance of homogeneous dark brown color in El-Wahat Al-Baharia region but appearance

two color light brown at the funnel of fruits and dark brown color at the rest of fruits in New Valley region that may be due to the humid climate which improved physical characteristics in El-Wahat Al-Baharia region than the dry climate in New Valley region. Fruit darkening (beyond that normally desired) can be due to both enzymatic and non-enzymatic browning, which increases with higher moisture content and higher temperatures (Rygg 1975, Yahia 2004)

Table 3: Physical fruit characteristics fruit (weight (g), length (cm), diameter (cm), volume (cm³) and flesh weight (g) of Medjoul date palm grown in El-Wahat Al-Baharia Oasis and El-Wadi El-Gadid Oases through 2021 and 2022 seasons

Chara. Region	Fruit weight (g)	Flesh weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit volume (cm ³)
First season					
El-Baharia	22.7a	20.8a	6.0a	3.0a	14.5a
El-Wadi El-Gadid	13.8b	12.8b	4.4b	2.5b	13.5b
Second season					
El-Baharia	23.5a	21.5a	6.0a	3.0a	14.5a
El-Wadi El-Gadid	14.1b	12.7b	4.43b	2.5b	14.0b



Figure (1): Colors of fruits begin in Tamar stage (ripe) dark brown in El-Wahat El-Baharia region.



Figure (2): Colors of fruits appearance two color light brown at the funnel of fruits and dark brown color at the rest in El-Wadi El-Gadid region.

Total soluble solids (T.S.S):

Results shown in Table (4), Fig. (1) and Fig. (2), percentage of total soluble solids (T.S.S.) in the fruits significantly varied in the tested regions. Medjoul fruits produced at El-Wadi El-Gadid attained the uppermost T.S.S.% (68.35 % as average of the two years) against ones in New Valley which produced values 66.1 % of T.S.S.

As for total sugars, data in Table (4) reveal the same trends as observed on T.S.S., i.e., fruits at El-Wahat Al-Baharia region have the highest content of total sugars (84.5% as average of the two seasons), against fruits at El-Wadi El-Gadid region which showed low total sugars content (80.2 & 82.3%, respectively). Results show also that most of these sugars were found as reducing sugars. "Medjoul" fruits were highest in reducing sugars content (62.2%), while fruits, at New Valley recorded low value in this respect (60.1 %). Data show also that fruits produced at El-Wahat Al-Baharia region came in the first rank between the two tested regions in non-reducing sugars content (22.3%), and "Medjoul" fruits in El-Wadi El-Gadid had the lowest non-reducing

sugars content (21.1 %). Tannins and Indoles content:

The average of the two years showed that there were no significant differences in fruit tannins and indoles content between the tested regions. In general fruits tannins and indoles content were recorded in El-Wahat Al-Baharia region (0.075 % & 0.10) and El-Wadi El-Gadid region (0.080 & 0.10).

The results are in harmony with those obtained by Sourial et al. (1983) and Sayed (1999) reported that fruits tannins content ranged from 0.100 % to 0.366 % in some Saudi and Iraqi cvs

Iqbal et al., (2011) they reported that physio-chemical properties of fruits affected by cultivar and surrounding conditions. On the other hand, Ahmed, et al., (2018) reported that no significant differences were observed in chemical fruits quality that produced under El-Kharga and Al-Dakhla locations. It is evident from the foregoing results that the climatic conditions of Al-Dakhla and El-Kharga are ideal climatic conditions for the cultivation and production of Sewy date palm.

Table (4): Chemical fruit characteristics of Medjoul date palm grown in El-Wahat Al-Baharia Oasis and New Valley Oases through 2021 and 2022 seasons

Chara. Region	Total sugar%	Reducing sugar%	Non-reducing sugar%	T.S.S%	Tannins%	Indoles%
First season						
El-Baharia	83.5a	63.1a	20.4a	68.5a	0.075a	0.099a
New valley	80.2b	60.1b	20.1a	62.2b	0.079a	0.099a
Second season						
El-Baharia	85.6a	61.3a	24.3a	68.2a	0.076a	0.102a
New valley	82.3b	60.2b	22.1b	64.1b	0.081a	0.103a

Thus, one can conclude that physical fruit quality and fruit color of date palm (*Phoenix dactylifera* L.) Cv. "Medjoul" was affected by climate region (temperature and relative humidity) whereas the highest values were achieved with humid climate in El-Wahat Al Bahria Oasis region compared with El-Wadi El-

Gadid Oasis. On the other hand, fruit chemicals properties were not differed according to the region. As is evident from the foregoing results, the climatic conditions of El-Wahat Al-Baharia Oasis are an ideal climatic condition for the cultivation and productions of Medjoul date palm.

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