



## Effect of Some Treatments such as Wrapping with Polyethylene, Aluminum Foil, and Cold Storage Temperature on Keeping Quality and Storability of Sewey Date palm Fruits.

Farouk H. Abdelaziz<sup>1</sup>; Foad A. Emad<sup>2</sup> and Shaimaa G. Mahraan

<sup>1</sup>Hort Dept. Fac. of Agric. Minai Univ. Egypt

<sup>2</sup> Date Plam Center Lab, ARC, Giza, Egypt  
[faroukabelaziz2001@yahoo.com](mailto:faroukabelaziz2001@yahoo.com)

**Abstract:** This study was done during two successive seasons 2017 and 2018 to discover the effect of wrapping polypolymer bags and aluminum foil sheets on the shelf life and keeping quality of Sewey date palm fruits under cold storage temperature at 5°C and 90% RH using different layers from both materials polypolymer bags and aluminum foil sheets, results in both seasons revealed that storing date palm fruits upto eleven months with fairly good quality including: fruit weight, volume. Fruit dimensions, bulb weight, TSS and total acidity in both seasons, this results were assured significantly in both the experimental seasons, under the condition of this experiment we recommend using one layer from both materials.

[Farouk H. Abdelaziz; Foad A. Emad and Shaimaa G. Mahraan. **Effect of Some Treatments such as Wrapping with Polyethylene, Aluminum Foil, and Cold Storage Temperature on Keeping Quality and Storability of Sewey Date palm Fruits.** *N Y Sci J* 2019;12(11):13-17]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 3. doi:[10.7537/marsnys121119.03](https://doi.org/10.7537/marsnys121119.03).

**Keywords:** Polypolymer, aluminum sheets, cold storage and Sewey date palm fruits

### 1. Introduction

Date palm (*Phoenix dactylifera* L.) Is grown extensively in arid and semiarid region of the world such as North Africa and south Asia counties, it is one of the oldest plants in cultivated by human beings and has been used as food for around 6000 years. Storing ate fruits for long time need special treatments of wrapping and cold storage. Date fruit can be considered as a complete diet since they contain all the necessary ingredient required for human body, (Ibrahim and Haggag 1993 and Al-Shahib and Marshall, 2003).

Stretch wrap film is highly stretchable plastic film that is wrapped around items. the elastic recovery keeps the item tightly bound. in contrast shrink wrap is applied loosely around the item and shrinks tightly with exposed to high temperature. Therefore must be find new date products (quality, packaging, and organic products) to increase the value of our exports (FAO 2003).

The most common stretch wrap material linear low-density polyethylene, which is produced by copolymerization of ethylene with alpha-olefins, the most common of which are butane and octane.

This study was made to prolong the shelf life of sewey date palm fruits by using different wrapping layers of polyethylene and Aluminum bags under cold storage temperature 5°C and 90% RH.

### 2. Materials And Methods

The present investigation was carried out during two successive seasons of 2017 and 2018 on "sewey" date palm fruits. The studied Datepalm fruits were harvested from an orchard of Elkaarga, New Valley, Egypt. Twenty four Kg. of "Sewey" date palm fruits were collected in both the experimental seasons. fruits were immediately transferred to the laboratory of Elbarrey factory, Elkarga, New valley, Egypt. Only at a uniform fruit size, color and free from any visible blemishes, while separate fruits which had no capsule, unusual value of pulp, small or large and over ripe were rejected.

Fruits were washed in running tap water then air dried and subjected to fumigation for a period of 21 days by using Fumaxin 75% at the dose of 3 tablets per cubic meter to control fruit decay caused by weave land fungus, then fruits were exposed to cold air for three days as precooling, then fruits were selected at a uniform fruit size and divided to eight groups, every group had three replicates " 1 kg of fruits / replicate "in both the experimental seasons 2017 and 2018.

Experiment was started in 21, November every year while ended at the end of October each season of our experiment (i.e. nearly eleven months).

Treatments were done as follows:

A- Wrapping fruits in polyethylene bags under cold room temperature 5°C and 90% RH. Fruits were placed in low density polyethylene bags (20 x 25 cm. dimensions, 30 ± 2 µ m. thickness under 5°C and 90%

B- RH. room temperature and relative humidity, every bag contained 1 kg of fruits as follows:

1: Control treatment (without wrapping)

2: Polyethylene bags with one layer of Polyethylene.

3: Polyethylene bags with two layers of Polyethylene.

4: Polyethylene bags with three layers of Polyethylene.

C- Wrapping fruits in aluminum bags under cold room temperature 5°C and 90% RH. every bag contained 1 kg of fruits as follows:

1: Control treatment (without wrapping)

2: Polyethylene bags with one layer of Polyethylene.

3: Polyethylene bags with two layers of Polyethylene.

4: Polyethylene bags with three layers of Polyethylene.

Fruit so of all treatments were subjected to determine physical & chemical properties of fruits in both seasons 2017 and 2018 as follow:

**A-Fruit physical properties for every season include the following:**

1: Weight of fruits was estimated by using digital balance.

2- Weight of the fruit bulb in grams by using digital balance.

3- Weight of the fruit seed in grams by using digital balance .

4-Fruit dimensions include long and width of fruits by using hand capparilar.

**B-Fruit chemical properties for every season include the following:**

1- Total soluble solids percentage (T.S.S. %): TSS of the edible pulp was estimated by hand refractometer. Three different readings for each replic at were recorded and the average was calculated (A.O.A.C., 1990).

2- Total acidity percentage (T.A.): T.A. of the flesh extract was determined as malic acid by titration with a solution of 0.1 N. (NaOH), using phenolphthalein as an indicator. The average amount of sodium hydroxide used in each titration was recorded and total acidity was calculated as gm / 100 gm of fresh weight (A.O.A.C., 1990).

**Statistical analysis:**

All data for all fruit parameters studied were analyzed by using Completely Randomized Design (CRD) with three replicates. Then average treatment means were compared using Least Significant Difference Test (L.S.D.) at 5% in the two experimental seasons. All data were subjected to statistical analysis by using MSTAT programe in both seasons 2017 and 2018.

### 3. Results and Discussion

**Effect of storage Sewy date palm fruits under cold room temperature (5°C and 90% RH) wrapped in poly polymer bags and in aluminum foil:**

**1- Fruits and seed Weight losses in gr.:**

Results presented in Tables (1 and 2) showed the effect of polypolymer bags (plastic seeling bags) and aluminum foil (aluminum seeling bags) on fruits and seeds weight losses of Sewy date palm fruits at cold room storage during 2017 and 2018 seasons.

Data in the previous tables indicated that Increasing number of layers from one to twice or thrice layers from both used material bags in the two experimental seasons on fruits weight, resulted in significant decreasing in fruit weight losses either with using polypolymer bags (plastic sealing bags) or aluminum foil bags in comparing with that of the control treatment, since it has the highest fruit weight losses (6.9 and 6.0) for polypolymer sheets in the first experimental seasons while it was (6.3 and 6.1) for foraluminium foil in the second season. Storing in polypolymer bags using two layers (8.5 & 8.4) while using aluminum foil was (8.0 & 9.4) in the two seasons respectively in the two seasons. These results assured significantly in both the experimental seasons 2017 and 2018, defenses between two and three layers were significantly in both season between the two materials.

Concerning seeds weight, it is clear that storing seeds without wrapping resulted in the largest decreased of seed weight in both seasons (1.0 & 1.0) for polypolymer bags while it were (1.00 & 1.00) for storing in aluminum foil in the two seasons. Differences between two layers and three layers were significant in both seasons either for polypolymer bags (plastic sealing bags) or aluminum foil bags in both the experimental seasons 2017 and 2018 as indicated in the previous tables.

On the other hand, It is clear that all treatments decreased weight loss of seeds in both polypolymer bags (plastic sealing bags) and aluminum foil while in comparing with seed losses in the control (storing seeds without wrapping) in both seasons.

These results could be attributed to the increase in water losses by evaporation during storage in both season With regard to polyethylene effect, the results clearly indicated that wrapping fruits with polyethylene reduced weight losses, this may be due to the modified atmosphere resulting from wrapping in polyethylene film which decreased respiration in both fruit and seeds.

Consequently, wrapped fruits in polyethylene film reduced fruit weight loss by evaporatranspiration and slowed down fruit respiration.

These results confirmed the findings obtained by **Fernandez et al., (1998)** who found that modified

atmosphere bags was associated with lower weight loss. **Mohamed *et al.*, (2005)** indicated that no ventilation or micro ventilation rate significantly reduced weight loss incidence in lime fruits during

storage compared with normal ventilation rate. In addition, weight loss percentage increased gradually, and significantly with the increasing ventilation rate.

**Table (1): effect of polypolymer bags (plastic sealing bags) on fruits and seeds weight (gr) of Sewy date palm at cold room storage at 5°C and 90% RH on Fruit Weight, Bulb Weight and Seed Weight during 2017 and 2018 seasons.**

Treatments	Fruit weight (gr)		Bulb weight (gr)		Seeds weight (gr)	
	2017	2018	2017	2018	2017	2018
WITHOUT WRAPPING	6.9	6.3	5.9	5.3	1.0	1.0
ONE LAYER	7.8	7.4	6.6	6.1	1.2	1.3
Two layers	8.3	8.1	7.0	6.7	1.3	1.4
Three layers	8.5	8.4	7.1	7.0	1.5	1.7
LSD at 5%	0.1	0.2	0.11	0.12	0.14	0.22

**Table (2): effect of Aluminum foil on fruits and seeds weight (gr) storage of Sewy date palm at cold room temperature at 5°C and 90% RH on Fruit Weight, Bulb Weight and Seed Weight during 2017 and 2018 seasons.**

Treatments	Fruit weight (gr)		Bulb weight (gr)		Seeds weight (gr)	
	2017	2018	2017	2018	2017	2018
WITHOUT WRAPPING	6.0	6.1	5.0	5.1	1.0	1.0
ONE LAYER	7.9	9.1	6.8	7.9	1.1	1.2
Two layers	8.0	9.4	6.8	8.2	1.2	1.3
Three layers	8.2	9.5	7.9	8.4	1.4	1.4
LSD at 5%	0.07	0.30	0.03	0.02	0.13	0.10

**Table (3): effect of polypolymer bags (plastic sealing bags) on fruits and seeds weight (gr) of Sewy date palm at cold room storage at 5°C and 90% RH on Fruit Volume, Fruit Long and Fruit Diameter during 2017 and 2018 seasons.**

Treatments	Fruit volume (ml)		Fruit long (cm)		Fruit diameter (cm)	
	2017	2018	2017	2018	2017	2018
WITHOUT WRAPPING	7.87	7.00	2.60	2.90	1.50	1.60
ONE LAYER	8.16	8.20	2.83	3.50	1.60	2.50
Two layers	8.30	8.41	2.97	3.61	1.85	2.65
Three layers	8.67	8.90	3.00	3.70	1.90	2.88
LSD at 5%	0.10	0.30	0.02	0.04	0.02	0.11

**Table (4): effect of Aluminum foil on fruits and seeds weight (gr) storage of Sewy date palm at cold room temperature at 5°C and 90% RH on Fruit Volume, Fruit Long and Fruit Diameter during 2017 and 2018 seasons.**

Treatments	Fruit volume (ml)		Fruit long (cm)		Fruit diameter (cm)	
	2017	2018	2017	2018	2017	2018
WITHOUT WRAPPING	8.20	8.00	2.50	2.60	1.63	1.62
ONE LAYER	8.41	8.41	2.60	3.40	1.80	2.00
Two layers	8.62	8.64	2.80	3.50	1.90	2.20
Three layers	8.80	8.99	2.90	3.00	1.93	2.50
LSD at 5%	0.16	0.20	0.08	0.30	0.01	0.12

In this regard, **Ben-Yehoshua, *et al.*, (1981 a)** found that seal packaging of Valencia & Shamouti oranges, “Marsh” grapefruit and “Eureka” lemon in high - density polyethylene (HDPE) film (0.01 mm. in

thickness) inhibited weight loss more than the control. **Miller and Risse (1988)** also stated that film wrapping of fresh produce in Florida including mangoes,

grapefruits, lemons and oranges reduced moisture loss during extended periods of storage and marketing.

These results were in line with those obtained by **Attia et al. (1997)**, who noted that sealing Zaghoul fruits stored at room temperature increased weight loss significantly compared with control fruits. **Miller and Risse (1988)** also stated that film wrapping of fresh produce in Florida including broccoli, cucumbers, lettuce, sweet potatoes, tomatoes, blueberries, mangoes, grapefruits, lemons and oranges reduced moisture loss, retarded softening and maintained characteristic freshness.

#### 2-Fruit volume and fruit bulb weight losses:

It is clear from tables (3 and 4) that wrapping Sewey fruits either using polypolymer bags or aluminum foil resulted in decreasing volume losses for all treatments in both seasons, these results were assured significantly in both seasons 2017 and 2018.

Differences between using two or three layers concerning polypolymer bags and between two or three layers using aluminum foil, were significant in both seasons 2017 and 2018.

#### -Fruit long and fruit diameter in mm:

Data in tables (3 and 4) showed the effect of polypolymer bags (plastic sealing bags) and aluminum foil wrapping on fruit long and fruit diameter in millimeter of Sewey date palm fruits at cold room storage temperature (5°C and 90% RH) in both 2017 and 2018 seasons.

It is clear from these data presented in the last previous tables of both polypolymer bags (plastic sealing bags) and aluminum foil resulted in decreasing fruit long and diameter significantly by wrapping fruits using the last materials for Sewey date palm fruits at cold room- storage temperature (in comparing with that of the control in 2017 and 2018 seasons).

Storing Sewey fruits without wrapping using both the last materials under cold room- temperature resulted in (1.5 & 1.6) for polypolymer bags and (1.63 & 1.62) mm in diameter respectively in both the experimental seasons respectively, these results were assured significantly in both seasons 2017 and 2018.

#### Fruit Chemical properties:

##### Total soluble solids percentage (T.S.S. %):

Results of Sewey fruit date palm fruits presented in Table (5 and 6) concerning Total soluble solids percentage (T.S.S. %) revealed that the effect of polypolymer bags (plastic sealing bags) and aluminum foil wrapping decreased total soluble solids percentage (T.S.S %) of Sewey date palm fruits during cold room-storage temperature in both 2017 and 2018 seasons significantly.

It is clear from these data that there was a gradual decrease in T.S.S percentage towards the increasing number of layers from both materials during storage. There were significant differences between all treatments in both seasons, control treatment were (10.0 and 10.0) in the first season while it was (10.0 & 9.80) in the second season for polypolymer bags (plastic sealing bags) and aluminum foil respectively, Increasing in TSS during cold room temperature storage in comparing with that of the control could be attributed to increasing water losses from fruits resulted from evaporation during storage.

In this respect, **Allam et al., (1992)** reported that seal packaging of "Washington" Navel orange fruits in polyethylene shrinkable film had a positive effect on T.S.S. also, **Hassan et al., (1970)** found that tomato fruits packed in perforated polyethylene had higher content of T.S.S. compared with control fruits.

##### 2: Total acidity percentage:

Results in Tables (5 and 6) showed the effect of modified atmosphere (sealing bags) on total acidity percentage (T.A %) of Sewey date fruits during cold room- storage temperature in 2017 and 2018 seasons.

The highest value of total acidity was recorded by, wrapping fruits in three layers treatment in comparing with the other wrapping treatments this effect was significantly in both seasons 2017 and 2018.

This effect might be attributed to the increasing of layers number from both materials which affect fruit respiration inside bags.

**Table (5): effect of polypolymer bags (plastic sealing bags) on fruits and seeds weight (gr) of Sewey date palm at cold room storage at 5°C and 90% RH on TSS and Total acidity perc. during 2017 and 2018 seasons.**

Treatments	TSS %		Total Acidity as malic acid	
	2017	2018	2017	2018
WITHOUT WRAPPING	10.0	10.0	0.64	0.60
ONE LAYER	12.8	13.0	.06	0.81
Two layers	12.5	12.6	0.71	0.85
Three layers	12.1	12.2	0.85	0.90
LSD at 5%	0.20	0.10	.02	0.01

**Table (6): effect of Aluminum foil on fruits and seeds weight (gr) storage of Sewy date palm at cold room temperature at 5°C and 90% RH on TSS and Total acidity perc. during 2017 and 2018 seasons.**

Treatments	TSS %		Total Acidity as malic acid	
	2017	2018	2017	2018
WITHOUT WRAPPING	10.0	9.80	0.60	0.64
ONE LAYER	12.8	13.0	0.61	0.81
Two layers	12.3	12.8	0.71	0.85
Three layers	12.0	12.5	0.85	0.90
LSD at 5%	0.02	0.10	0.05	0.02

#### 4. Discussion

These results could be attributed to the increase in water losses by evaporation during storage in both season With regard to polyethylene effect, the results clearly indicated that wrapping fruits with polyethylene reduced weight losses, this may be due to the modified atmosphere resulting from wrapping in polyethylene film which decreased respiration in both fruit and seeds. Consequently, wrapped fruits in polyethylene film reduced fruit weight loss by evaporate transpiration and slowed down fruit respiration. The same results obtained by using aluminum foil bags in both seasons, under the condition of this experiment we recommend using one layer from both materials.

These findings are in agreement with those of (Sabry, 1998), Fernandez *et al.*, (1998); Mohamed *et al.*, (2005); Ben-Yehoshua, *et al.*, (1981 a); Miller and Risse (1988); Miller and Risse (1988) and Attia *et al.* (1997), Allam *et al.*, (1992) Hassan *et al.*, (1970).

#### References

1. Attia, M. M.; A. A. Etman; A. M. Hussein and N. El-Nagar, (1997): Effect of wrapping with two polyethylene types on postharvest behavior and Shelf life of three soft dates cvs. Zagazig J. Agric. Res., 24 (6).
2. Allam, A. M.; Nawar, A. A. and Hassan, A. E. (1992): Use of shrinkable film wrapping versus waxing to prolong the storage life of "Washington" Navel orange fruit. Menofiya J. Agric. Res., Egypt; 17 (2): 701-710.
3. Association of Official Agricultural Chemists (A.O.A.C.). 1990: Official methods of analysis. Benjamin Franklin Station, Washington, 4. D. C. USA.
4. Ben-Yehoshua, S.; Kobilier, L and Shapiro, B. (1981 a): Effect of cooling versus seal-packaging with high-density polyethylene on keeping qualities of various citrus cultivars. J. Amer. Soc. Hort. Sci.; 106 (5): 536-540.
5. Fernandez Trujillo, J. P; Martinez, J. A; Artes, F. (1998): Modified atmosphere packaging affects the incidence of cold storage disorders and keeps 'flat' peach quality. Food Research International. 1998; 31(8): 571-579.
6. Hassan, F. M.; Khalil, M. H.; Said, W. I. and Salama, B. S. (1970): A study on the effects of several wrapping materials on the keeping quality of tomatoes at different storage temperatures. Agric. Res. Rev., Egypt; 48: 151-170.
7. Ibrahim, A. M. F. and Haggag, M. N., 1993: Tamer palms, its cultivation, care and productivity in the Arab world. El-Maaref publisher, Alexandria, Egypt, PP. 693 (In Arabic).
8. Mohamed, M. A. A; Abd El-Hafeez, A. A. and El-Bassiouny, R. (2005): Physiological studies on Egyptian Lime fruits, II – Effect of micro ventilation rate on Lime fruit quality and storability. Annals of Agric. Sc. Moshtohor, Vol. 43 (3): 1203 – 1220.
9. Miller, W. and Risse, L.A. (1988): Recent research of film wrapping of fresh produce in Florida. In sixth international citrus congress, Middle East, Tel. Aviv, Israel 6-11 March 1988 Volume 3 Rehovot, Israel; balaban Publishers. (c.f Hort. Abst. 1993 Vol. 63 No. 1).
10. Sabry, M.A.F. (1998): Effect of some biological treatments on fungal infection, quality and storage ability of apple fruits. M. Sc. Thesis, Fac. Agric. Cairo Univ.
11. Shaybany, B.; Rouhani, L. and Azarakhsh, H. (1978): Effect of storage temperature and container type on storage and shelf life of persimmon fruits. Iranian Journal of Agric. Res.; 6 (2): 123-127.