Effect of Different Time for Spathes Bagging on Fruit Set, Yield and Quality of Barhi and Majdool Date Palm under Sudan Climatic Conditions

Dawoud H.D.*and Fatima A. El-Rauof

Horticultural Research Center, Shambat Agricultural Research Corporation (ARC), Sudan

Abstract

Bagging spathes time is one of the most important factor, which affect fruit set, yield and physicochemical characteristics of date palm cv. Barhi and Majdool date palm under Sudan condition were assessed under agro climatic conditions of Sudan during 2015, 2016 and 2017 growing seasons. Treatments consisted of five varied bagging timings using kraft paper i.e., at spathe bagging 15, 30, 45 and 60 days after pollination compared with control (unbagging). Data were collected for fruit set (%), fruit drop (%), fruit yield (kg/ palm) and some of physicochemical quality parameters. Results revealed that bagging times affected all the parameters significantly. Maximum fruit set and fruit yield and best fruit quality and minimum fruit drop of two cultivars from bagging at spathes 30 days after pollination. Fruit quality improved the overall fruit physicochemical quality characteristics with maximum fruit length, fruit width, fruit volume, fruit weight, total soluble solids, total acidity and total sugars. This study proved that bagging spathes after pollination 30days was more effective for optimum fruit set and economic yield and best fruit quality.

Keywords: Date palm, (*Phoenix dactylifera* L.), Barhi, Majdool, spathes, fruit quality

***Corresponding author:** dawoudhussien@gmail.com

Introduction

Date palm (*Phoenix dactylifera* L.) is one of the oldest known fruit crops and has been cultivated in North Africa and the Middle East for at least 5000 years (Zohary and Hopf, 2000). Berhi variety is one among the most important soft popular date cultivar for export , preferred as a premium product during physiologically mature as hard, crisp, bright yellow in color and have the highest moisture and is commonly harvested and consumed fresh at the khalal stage (Ismail *et al*., 2006). Medjool date is most well-known for its unusually large size and its delicious flavor. it is firmer and more resilient than most other soft dates and it handles much better as well, making it a great choice for commercial production. It is consumed after its color changes from yellow to light brown and suitable for export (FAO, 2019). Under hot arid conditions, date palms are facing environmental stresses that limit tree productivity and negatively affect fruit quality characteristics especially weight and size. Bagging is a physical technique commonly used with many crops to protect the fruits from diseases, pests and to improve the micro-environment in which the fruits develop its ripening (omar *et al*., 2014). Fruit set and low fruit quality are a serious problem facing date palm growers (Ding *et al*., 2003). Fruit drop is genetically, physiologically and environmentally problem (Wu *et al*.,

2009) and Stress factors such as heat, drought, nutrient imbalance or deficiency, and heavy crop load contribute to fruit drop (Gao *et al*., 2007). Bagging fruits is one of the major practices that often help in overcoming some problems, such as fruit set dropping, addition it enhances fruit quality of dates and reduces compactness of bunch yield, besides increase of adequate quality (Omar *et al*., 2014). Bagging spathes of date palm cvs. during flowering and fruit setting periods showed a beneficial effect on fruit set, yield and physical and chemical properties. Bunches bagging two weeks after pollination gave high fruit set percentage and palm yield (Rabeh and Kassem, 2003). In addition, such treatment exhibited the highest fruit weight, flesh weight, fruit dimensions, total soluble solid percentage and lowest tannins percentage (Moustafa, 2007).Bagging either with paper kraft could be recommended to improve fruit set, bunch yield and fruit quality of 'Rothana' fruits (omar *et al*., 2014) and increased fruit weight, TSS "Barhee" date palm (Harhash *et al*., 2020). Bagging bunches of date palm recorded the highest scores dealt with fruiting quality (Mostafa *et al*., 2014). Fruit quality is one of the most limiting factors affecting in fruit marketing because consumers generally prefer high quality of fruits (Al-Qurashi and Awad, 2012). The aim of this research was to investigate effects of different time of bagging craft paper for different periods, 15, 30, 45, or 60 days after pollination on fruit set ,fruit drop, yield and fruit quality of Barhi and Majdoole date palms grown at Taiba El Hassanab South, Khartoum state.

Materials and methods

1. Plant material

Date palm trees (*Phoenix dactylifera* L.) of Barhi and Majdool cultivars, 12 years old palms were grown on heavy clay soil in private orchard Taiba El Hassanab South, Khartoum states in Sudan. The trees were spaced at 7×7 meters apart and irrigated by drip irrigation system and received the same cultural practices applied in the orchard. Moreover, date palm trees were uniform and healthy as possible in vigor and size. Eight bunches on each palm were selected uniformly and nearly in vigor and size.

2. Bagging treatments

Eight female spathes were bagging after pollination using Kraft paper for 15, 30, 45 and 60 days of Barhi and Majdool. The applied treatments during three successive seasons of 2015, 2016 and 2017 were arranged in a randomized complete block design (RCBD) with three replicates (three trees) for each treatment which were organized as follow:

2.1. Control (without covering)
2.2. Kraft Paper after pollination for (15 days)
2.3. Kraft Paper after pollination for (30 days)
2.4. Kraft Paper after pollination for (45 days)
2.5. Kraft Paper after pollination for (60 days)

3. Quality assessments of "Barhi and Majdool" date palm fruits at harvest

3.1. Fruit set (%): It was determined from counts of fruit and flower score and calculated on the basis of total number of female flowers

3.2. Early fruit drop (%): It was calculated as the numbers of fruits were dropped in two months after fruit set and related to the total number of fruits which setting.

3.3. Palm yield: The yield of palm tree was measured at the harvesting time by calculating the number and weight in kg of bunches per each palm.

3.4. Fruit quality: At the time of the fruit ripening (fruit reached full maturity and 100% yellow coloring), a sample of 20 fruit from each bunch was randomly collected from each treatment in order to estimate fruit physical and chemical properties.

3.5. Physical properties

3.5.1. Fruit weight: Each bunch was weighed independently using a weighing balance to calculate at harvest, which was expressed in grams (g).

3.5.2. Fruit dimensions (length & width): Fruit length was measured from the end of the fruit to the top of the shoulder which was expressed in (cm). While, fruit width was measured at the broadest point of the fruit shoulder and stated in (cm).

3.5.3. Fruit weight (g): A digital balance was used to determine the weight of the fruits in (g).

3.5.4. Fruit volume (cm3): Because the volume of 1 g pure water is equivalent to 1 cm3, this study used pure water to determine the real volume of the date fruits.

3.6. Chemical properties:

3.6.1. Total soluble solids (%): At room temperature, total soluble solids were measured with refractometer

3.6.2. Total acidity (%): Titratable acidity was measured using phenol phethalin as an indicator and a reference solution of sodium hydroxide (0.1N) (A.O.A.C., 2000). According to the following equation, the data were reported as percentages of anhydrous malic acid.

$$Total\ acidity = \{(M1\ of\ NaOH \times 0.0067) / M1\ juice\ used\} \times 100$$

3.6.3. Total sugars content (%): The phenol sulfuric acid method was used to determine the total sugar content in the methanol extract, and the concentration was determined as using the method described by (Malik and Singh, 1980).

4. Statistical Analysis:

All data parameters studied were analyzed as a Completely Randomized Design in factorial arrangement with three replications. All data were subjected to statistical analysis as described by (Snedecor and Cochran, 1989). The differences between means were differentiated using test according to (Duncan, 1955).

Results

5. Quality assessments of "Barhi and Majdool" date palm fruits at harvest

5.1. Palm yield and bunch weight

Data in Table (1) summarize the effect of bagging of female spathes of Barhi and Majdool cultivars; compared to unbagged, on yield per tree, during the three seasons of study and all the studied parameters were significantly differences. The highest yield were produced from 30 days bagging treatment followed by 45 days bagging versus the control treatment produced the lowest yield/palm /kg in the two cultivars in the three years. The improvement of physiochemical characters of fruits could be due to appropriate temperature degree in the bagged spathes than unbagged ones also reduced the losses of pollens by the wind or the rain in pollination period.

5.2. Fruit set (%)

Data in Table (1) summarize the effect of bagging of female spathes of Barhi and Majdool cultivars, compared to un bagging, on fruit set .The high fruit set percent were produced from 30 and 45 days bagging respectively, while the lowest fruit set percent were produced from control treatment for the two cultivars in the three seasons.

5.3. Early fruit drop (%)

Data in Table (1) summarize the effect of bagging of female spathes of Barhi and Majdool cultivars, compared to un bagging, on early fruit drop percentage per tree, during the three seasons of study and all the studied parameters were significantly differences. The high amount of early fruit drop percentage, were associated with control and 60 days bagging in the two cultivars in the three years. While the lowest amount of early fruit drop were produced from 30 days bagging, 45 days bagging respectively.

5.4. Physical properties

5.4.1. Average fruit weight (kg)

The data in Table (2) illustrated the effect of the bagging on fruit weight, of the two cultivars for three seasons. The data regarding fruit weight as results of different time treatments of bagging indicated that the heaviest fruit weight produced from 30 days bagging, while the lightest fruit weight produced from control and 60 days bagging treatment for the two cultivars.

5.4.2. Fruit volume, length and width

The data in Table (2) illustrated the effect of the bagging on volume, length, width of the two cultivars for three seasons. The largest fruit volume was produced from 30 days bagging treatment while smallest fruit volume was produced from control treatment for the two

cultivars. Fruit length and width parameters followed the same trend, the longest and the widest fruits produced from 30days and 45 days bagging treatments respectively while the shortest and narrowest fruits produced from the control treatment, for the two cultivar for the three years . Also, the longest and the widest fruits produced from 30days and 45 days bagging treatments respectively while the shortest and narrowest fruits produced from the control treatment, for the two cultivars for the three years.

5.5. Chemical properties

5.5.1. Total soluble solids (TSS) , Acidity and Total sugars

The data in Table (2) illustrated the effect of the bagging on TSS, Total acidity and total sugars (%) of the two cultivars for three seasons. the total acidity and total sugars percent of the fruits were affected by bagging practices of female spathes for 30 days and 45 days. The bagging treatments also affect the total acidity and total sugars percent of the fruits; the more acid fruits and the high TSS, total sugars percent were produced from 30 days and 45 days bagging, although the less acid and low total sugars fruits were produced from control treatment for the two cultivar.

Discussion

The obtained results showed that the best time of bagging spathes by using kraft paper after pollination for 30 days improved fruit set, total yield bunch comparing with control. Besides, physical properties as weight, fresh fruit weight, fruit flesh weight, and chemical characteristics total soluble solids total sugars contents in both cultivars Barhi and Majdool date palm under Sudan condition. The results are in agreement with the findings of (Rabeh and Kassem, 2003) reported that bagging spathes of “Zaghloul” and “Samani” date palm cultivars during fruit setting periods showed the effect on fruit set, yield and physical and chemical properties. Also, Dawoud *et al*. (1997) who reported that, date palm grown at El Geriaf, Khartoum South, had long stalk due to the increases of temperature degree in these locations during the flowering and pollination periods. Our obtained data are in agreement with the findings of (Galib *et al*., 1988), they found that bunch bagging with paper bags during 4 weeks from pollination increased fruit set and yield of ‘Hallawy’ date cultivar. Furthermore, the obtained results were previously explained by Chillet and Jamnoyer (1996) they reported that bagging raised the temperature around bunches and reduced the shooting until harvesting time under temperate conditions and microclimate surrounding the bunch could favorably be changed by bunch covering. AL- Baker (1972), Hussein *et al*. (1979) and Reuther and Crawford (1946) stated that the bagging practice provide a proper environmental conditions to pollination operation, and this reproduced on the high fruit set and high yield, also may be due the etiolating process as a result of using Kraft paper bag which lead to increase cell elongation and results in improvement of fruit weight and volume, these facts in agreement with Al-Baker (1972) who reported that bagging the spathes for 30 days ;increased the number of fruits per bunch , improved fruit weight and volume , and reduced fruit infestation by insects .

Table (1): Effect of different time for spathes bagging on fruit set, fruit drop and yield of Barhi and Majdool date palm during 3 seasons

Barhi CV.															
Bagging period/day	**Control**			**15**			**30**			**45**			**60**		
seasons	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Fruit set (%)	45.7d	44.7d	45.6d	57.7c	54.7c	52.8c	67.3a	66.1a	68.7a	64.3a	65.1a	65.7a	62.1b	63.1b	61.8b
Early fruit drop (%)	22.8a	22.7a	22.6a	20.0b	20.2b	20.3b	14.6d	14.2d	14.9d	18.1c	18.3c	18a	22.1a	21.5a	20.9a
Yield per palm (Kg)	98.0e	95.4e	93.6e	110.2d	109.7d	111.2d	145.0a	144.1a	145.3a	129.1b	31.2b	130.2b	120.1c	119.8c	120.2c
Majdool CV.															
Bagging period/day	**Control**			**15**			**30**			**45**			**60**		
seasons	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Fruit set (%)	48.4d	49.3d	45.8d	58.3c	54.2c	55.3c	74.2a	73.9a	75.1a	71.1a	73.2a	72.9a	65.1b	63.2b	64.3b
Early fruit drop (%)	17.3a	16.8a	17.1a	15.3b	15.8b	15.6b	10.2c	10.0c	9.8c	15.2b	15.4b	15.2b	16.9a	17.1a	17.3a
Yield per palm (Kg)	100.0e	97.4e	96.9e	119.2d	120.7d	127.2d	149.0a	152.1a	151.7a	129.1b	131.2b	130.2b	1209c	118.9c	121.0c

Means in the columns followed by the same letters are not significantly different according to Duncan's Multiple Range test at 5% level

Table (2): Effect of different time for spathes bagging on physiochemical parameters of Barhi and Majdool date palm during 3 seasons

Barhi CV.															
Bagging period /Days	**Control**			**15**			**30**			**45**			**60**		
seasons	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Fruit weight (g)	19.1c	20. 5c	20. 7c	24.1 b	24.6b	24.4b	26.7a	26.5a	26.3a	24.3b	24.5b	24.1b	20.3c	20.1c	20.5c
Fruit volume (cm)	20.7 e	20.5e	20.3e	21.9d	21.8d	21.6d	28.0a	27.8a	27.9a	26.4b	26.2b	26.3b	23.5c	23.2c	23.4c
Seed weight (g)	2.3a	2.2a	2.2a	2.2a	2.3a	2.2a	2.1a	2.0a	2.1a	2.2a	2.0a	2.1a	2.2a	2.1a	2.2a
Fruit length (cm)	5.7c	5.5c	5.6c	6.0b	6.2b	6.1b	8.2a	8.1a	8.0a	6.1b	6.0b	6.3b	5.9c	5.7c	5.5c
Fruit width (cm)	2.4c	2.2c	2.3c	2.7b	2.8 b	2.9b	3.1a	3.0a	3.3a	2.8b	2.7b	2.9b	2.8b	2.7b	2.8b
Total acidity (%)	0.7c	0.6c	0.7c	0.9b	0.8b	0.8b	1.0a	1.0a	1.0a	1.0a	1.0a	1.0a	0.7c	0.6c	0.7c
Total sugars (%)	21.4c	21.5c	21.7c	21.5c	21.4c	21.3c	26.1a	26.0a	26.2a	22.2b	22.1b	22.3b	22.1b	22.1b	22.0b
Majdool CV.															
Bagging period /Days	**Control**			**15**			**30**			**45**			**60**		
season	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Fruit weight (g)	24.0c	24.0c	24.0c	24.5b	24.7b	24.4b	25.8a	25.7a	25.8a	24.3b	24.5b	24.7b	24.3b	24.5b	24.7b
Fruit volume(cm)	23.3c	23.5c	23.2c	27.6b	27.4b	27.6b	28.1a	28.5a	28.3a	27.8b	27.6b	27.5b	27.4b	27.6b	7.5b
Seed weight(g)	2.4 a	2.4a	2.3a	2.3a	2.4a	2.4a	2.4a	2.3a	2.3a	2.3a	2.4a	2.3a	0.24a	2.3a	2.3a
Fruit length (cm)	5.3c	5.3c	5.3c	5.5b	5.6b	5.6b	5.9a	5.8a	5.9a	5.8a	5.8a	5.9a	5. 6b	5.5b	5.6b
Fruit width (cm)	2.7c	2.8c	2.7c	3.2b	3.3b	3.0b	4.1a	4.0a	4.1a	3.9a	4.0a	4.0a	3.2b	3.2b	3.2b
Total acidity (%)	0. 5c	0.6c	0.5c	0.8b	0.8b	0.9b	1.0a	1.0a	1.0a	1.0a	0.93a	0.95a	0.7c	0.6c	0.7c
Total sugars (%)	21.4c	21.2c	21.3c	23.3b	23.4b	24.2b	25.5a	25.3a	25.1a	24.4a	24.3a	24.7a	23.3b	23.1b	23.4b

Means in the columns followed by the same letters are not significantly different according to Duncan's Multiple Range test at 5% level

These results is in agreement with the findings of Dawoud *et al*. (1997) reported that, date grown at El Geriaf, Khartoum South, had long stalk respectively due to the increases of temperature degree in these locations during the flowering and pollination periods. El-Azzouni *et al*. (1975) reported that the length and width of the fruits, also TSS, total acidity and total sugars percent of the fruits were affected by bagging practices of female spathes for 30 days. Besides (Moustafa, 2007) reported that bunch bagging with kraft paper after one month from pollination of 'Helali' dates improved significantly TSS, total and reducing sugars. Harhash and Al-Obeed (2010) noticed that bagging treatments significantly increased the fruit total soluble solids and sugars compared to not bagging. Also, Mostafa *et al*. (2014) they indicated that TSS % and sugar contents were significantly varied according to bagging treatments. In addition, the obtained results are in the same trend with the findings of Omar *et al*. (2014) they performed used paper kraft of bagging after pollination for one month, as compared to control (unbagged) as improved fruit quality of Rothana date palm.

Conclusion

The results presented in this study indicated that bagged spathes after pollination for 30 days of Barhi and Majdool date palm was the most effective for maintain fruit quality as delaying drop fruit and increased fruit set, total yield, fruit weight fruit dimension, fruit volume, total soluble solids total sugars .Treatment is safe and simple which could be employed for export date palm farm.

References

A.O.A.C. (2000). Official Methods of Analysis. Association of Official Analytical Chemists, Inc.Vitamins and other nutrients. (17th ed.), Washington, D.C. 16-20.

Al- Baker, A. (1972). The Date Palm . Al- Ani Press Baghdad . Iraq . (in Arabic). Albert, D.W. and Hilgeman, R.H. (1933): Fruit growth and temperature relationships in the date palm. Amer. Soc. Hort. Sci. Proc. 30: 225 – 228.

Al-Qurashi, A.D.; Awad, M. A. and Elsayed, M. (2012). Pre-harvest fruit drop, bunch weight and fruit quality of "Rothana" and "Ghur" date palm cultivars as affected by some plant growth regulators. Afri. J. Biot., 11: 14644-14651.

Chillet, M. and M. Jamnoyer, (1996). Choice of bagging for the optimisation of banana growth condition. Infomusa 5(1): 25-27.

Ding, Q., Han, M.Y. and Tian, Y.M. (2003). Effect of bagging on nectarine fruit quality and fruit cracking. J. Northwest Sci-Tech Univ. of Agri. and For. Nat. Sci. Ed. 31(2):59-61.

Duncan, D.B., (1955). Multiple range and multiple F. test. Biometrics, 11: 1-42.

El-Azzouni, M.M.; kabeel , M.T.; Bakr , E.I. and Abdel- Rahman (1975). Developmental changes in fruit characters and maturity determination of two Date palm varieties. Annals of Agric. Sci., Moshtohor , Vol. 4: (221 – 234).

FAO (2019). Data for Crop Production in 2017.

G**alib, H.A., Mawlood, E.A. and Hamood, H.H. (1988).** The Influence of bagging on fruit set and fruit characteristics in date palm cv. Hallawi. Date Palm J. 6, 238–254.

Gao, W.S., Lv, D.G., Yu, C., Qin, S.J., Du, G.D. and Zhao, D.Y. (2007). Study on microorganism population structure in microenvironment of bagged apple fruit. Journal of Fruit Science 24(6):830-832.

Harhash, M.M. and Al-Obeed, R.S. (2010). Effect of bunch bagging color on yield and fruit quality of date palm. American Eurasian J. Agric. Environ. Sci., 7(3): 312-319.

Harhash, M.M., Mosa, W.F.A, Safaa, M and Gattas, H.A,H. (2020). Effect of bunch covering on yield and fruit quality of "Barhee" date palm cultivar. Middle East J. Agric. Res., 9(1): 46-51.

Ismail, B., Haffar, I., Baalbaki, R., Mechref, Y. and Henry, J. (2006). Physico-chemical characteristics and total quality of five date varieties grown in the United Arab Emirates. International Journal of Food Science and Technology. 41, 919–926.

Malik, C.P. and Singh, M.B. (1980). Extraction and estimation of amino acids and keto acids. In: Plant enzymology and histoenzymology. (Eds.): CP. Malik, MB. Singh, Kalyani Publishers, New Delhi-Lud Hana, India, 286.

Mostafa, R.A.A.; El-Salhy, A.M; El-Banna, A.A. and Diab, Y.M. (2014). Effect of Bunch Bagging on Yield and Fruit Quality of Seewy Date Palm under New Valley Conditions (Egypt). Middle East Journal of Agriculture Research, 3(3): 517-521.

Moustafa, A.A. (2007). Effect of bagging period of spathes after pollination on fruit set, yield and fruit quality of "Sewey" dates under Fayoum governorate conditions. *Proceeding of the Fourth Symposium on the Date Palm in Saudi Arabia*, Al- Hassa. p:123.

Omar, A. K., Al-Saif, A.M. and Ahmed, M.A. (2014). Bagging of bunches with different materials influences yield and quality of Rothana date palm fruit. J. Food, Agric. Environ., 12 (2): 520 -522.

Rabeh, M.R.M., and Kassem, H.A. (2003). The effect of bagging the spathes after pollination on yield and quality of Zaghloul and Samany dates. *Zagazig J. Agric. Res.,* 21 (3B): 935-944.

Reuther, W. and Crawford, C.L. (1946). The effect of temperature and bagging on fruit set of dates. Date Grower's Inst. Rpt. 23: 3-7.

Snedecor, G.W. and Cochran, W.G. (1989). Statistical Methods. Iowa State University Press, 8th Edition, USA, 491p.

Wu, H.X.; Wang, S.B.; Shi, S.Y.; Ma, W.H.; Zhou, Y.G. and Zhan, R.L. (2009). Effects of bagging on fruit quality in Zill Mango. Journal of Fruit Science 26(5):644-648.

Zohary, D. and Hopf, M. (2000). Domestication of plants in the old world: The origin and spread of cultivated plants in West Asia, Europe, and the Nile Valley (Oxford University Press, Oxon, UK.

تأثير اختلاف التوقيت لتغطية السوباطات على عقد الثمار والمحصول وجودة ثمار نخيل البلح البرحي والمجدول تحت ظروف المناخية للسودان

داود حسين داود[1]- فاطمة عبد الرؤوف أحمد[2]
مركز بحوث المحاصيل البستانية- السودان

الملخص العربي

يعتبر التوقت المناسب لتغطية من أهم العوامل التي تؤثر على تكوين الثمار والمحصول والخصائص الفيزيائية والكيميائية لصنف نخيل التمر. تم تقييم نخيل البلح لصنفي البرحي والمجدول تحت الظروف المناخية الزراعية في السودان خلال مواسم الزراعة 2015، 2016، 2017. تكونت المعاملات من خمسة توقيتات مختلفة للتكميم باستخدام ورق الكرافت، تمت تغطية السوباطات بعد 15 و 30 و 45 و 60 يومًا بعد التلقيح مقارنةً بالكنترول (غير مغطاه). جمعت البيانات عن عقد الثمار (٪)، وقطر الثمرة (٪) المحصول (كجم/ نخلة) وبعض معايير الجودة الفيزيائية والكيميائية. أظهرت النتائج أن توقيت تغطية السوباطات أثر بشكل كبير على معنوية جميع القياسات. أقصى قدر من عقد الثمار والمحصول وأفضل جودة للثمار وأقل تساقط للثمار لصنفي الدراسة المعاملين بالتغطية بعد 30 يومًا من التلقيح. أدت المعاملات إلى تحسين خصائص الجودة الفيزيائية والكيميائية حيث وصلت الثمار للحد الأقصى لطول الثمار وقطر الثمار وحجم الثمار ووزن الثمار والمواد الصلبة الذائبة الكلية والسكريات الكلية وقللت من والحموضة الكلية. أثبتت هذه الدراسة أن تغطية السوباطات بعد التلقيح لمدة 30 يومًا كان أكثر فاعلية في الحصول على عقد الثمار المثالي والعائد الاقتصادي وأفضل جودة للثمار.

الكلمات الدالة: نخيل التمر، البرحي، المجدول، تغطية السوباطات، جودة الثمار