

EVALUATION OF BIOCHEMICAL AND SENSORY CHARACTERISTICS OF DIBIS (DATE SYRUP) WHICH IS PRODUCED FROM SOME IRRADIATED KINDS OF DATE DURING STORAGE

Nassef, Ashga E. * and Monera O. AL- Jobair**

* National Center for Radiation Research and Technology, (NCRRT)
P.O. Box 29 Nasr City, Egypt

** College of Home Economic and Art Education, Riyadh, Kingdom of Saudi Arabia

ABSTRACT

Khalas and Sukkary dates varieties were treated with two doses of gamma irradiation (0.5 and 1.0 kGy) in addition to control (untreated dates) were stored under relative moisture of (70-80%) and temperature ranged from (20-25 °C) for 36 weeks. They were used in this study to produce and evaluate its dibis (date syrup).

The results revealed that the date, which treated with 1.0 kGy for the two cultivars, produced the best quality of dibis. The highest reduction of moisture content was observed in untreated samples in each cultivar. The treated samples with (1.0 kGy) are succeeded in preserving total sugars of fruits during storage of both Khalas and Sukkary cultivars. The total soluble solids percentage was increased in fruits by prolonging the storage period in all treatments of date cultivars under study. Also, the high irradiation treatment (1.0 kGy) succeeded to increase viscosity within to limited permission in fruit of all date cultivars under study. It also keeps the best flavor of dates dibis during storage of both Khalas and Sukkary. At last, the irradiation treatments succeeded to keep the best flavor, texture and color of date dibis during storage of both Khalas and Sukkary.

INTRODUCTION

Arab countries (Saudi Arabia, Egypt, Iraq, Libya, Tunisia, Sudan and Algeria) are considered the main source of date fruit in the world. Some of these products are exported as fresh fruit and the remainder is processed to different products (Hasheem, 1979 and Mikki *et al.*, 1980).

Khalas and Sukkary cultivars of date are the main varieties in Saudi Arabia. Brunetii (1980) and Merritt (1989) found that gamma irradiation at (0.25, 0.75 and 1.0 kGy) decreased moisture content in some date fruits. Diehl (1990) reported that, when he treated some varieties of date fruits with doses of gamma rays (0.0, 15, 20 40 and 100 Krad) and stored then under normal condition for 6 months then produced dibis (concentrated date extract) at 2, 4 and 6 months from storage, resulted that irradiation dosage within the range of (40 and 100 Krad) had a significant reduction in moisture content and non-significant in total soluble sugars for its dibis during storage.

Diehl (1995) found that, irradiation of date fruits at (0.25, 0.5, 0.75 and 1.0 kGy) and stored with normal conditions for 12 months resulted in production of dibis. The irradiated samples showed reduction in moisture content, while the total soluble sugars were kept without significant change.

El-Salhy (1998) showed that, irradiation with dosage within range of (0.25, 0.5, 0.75 and 1.0 kGy) of some kinds of date fruits which were stored

for 12 months to produce dibis; only the irradiation doses of (0.75 and 1.0 kGy) had significant effects on total soluble solids and viscosity values.

Alhamdan (2002) found that, viscosity value of cow milk after addition of 3 kinds of date fruits dibis (Khalas, Sefenopot and Sukkary) with concentration (2.5 to 15%) and rang of temperature (5-15 °C), the viscosity values ranged between (0.2-1.6 mL/pascal/sec). The viscosity values were increased by decreasing the degree of temperature and increasing of sugars percentage in the sample.

Diehl (1995), Abd El-Mohsen (1995) and Aussous (1999) treated some kinds of date fruits with gamma rays (0.0, 0.5 and 1.0 kGy) and stored for (12 months) in (60-70%) relative humidity and temperature (20-30 °C) and then extracted its dibis from the beginning of storage to the end. They found that, the treatment of (1.0 kGy) succeeded to keep the best flavor, texture and color.

Egyptian Standard (1996) and FAO (1996) reported that, using gamma rays up till (10 kGy) or (one mega rad) on date fruits extend its shelf-life with keeping its nutritional value such as its flavor and color. The produced dibis was examined for organoleptic evaluation (color, texture and flavour). The irradiation samples of dibis (1-1.5 kGy) showed higher degree than control sample.

The aim of this study was to prepare and evaluate date syrup (dibis) from this two varieties after treating them by gamma irradiation (0.5 and 1.0 kGy) in addition to control.

MATERIALS AND METHODS

Samples:

Two date palm varieties named Khalas and Sukkary were obtained from the Ministry of Agriculture and Water, Riyadh, Saudi Arabia produce its dibis.

Irradiation process:

Date fruits samples (Khalas and Sukkary) were irradiated with 0.0, 0.5 and 1.0 kGy at Gamma Cell-220 in king Abdul Aziz City For Science and Technology (KACST).

Methods:

Date fruits (Khalas and Sukkary) were taken after harvest, to sort out and cleaned, then divided into three groups. The first group was irradiated with 0.5 kGy, the second group was irradiated with 1.0 kGy and the third group was untreated (control). Treatments were carried out with their replications for measuring physical, insects infestations characters and chemical analysis of treated date fruits and untreated (control). All treatments were stored under relative moisture of (70-80%) and temperature ranged from (20-25 °C).

Date fruits was extracted by water (100 gm date + 300 cm³ water) at 25±1 °C after removing the seeds for 2 min, then filtration (residues and extract). The residues was refiltrated, the water extracts were collected and concentrated under vacuum to produce the dibis and then was stored (according to Benjamin and Abbas, (1985)).

Moisture content was measured according to A.O.A.C. (1990).

Total soluble sugars were measured according to A.O.A.C. (1990).

Total soluble solids (T.S.S.) were measured according to A.O.A.C. (1995). The viscosity of all dibis samples was measured at $25 \pm 1^{\circ}\text{C}$ with a Brook field DV. III programmable rheomete. Brook field Engineering Laboratories. Inc. Stough, MA. USA connected with (Brook field Refrigerated Bath/Circulator Model T C-500, Brook field Engineering Laboratories, MA-USA), (mL/pascal/second) according to Howard (1991). Sensory evaluation of colour, texture and flavour for dibis treatments was performed by 10 panetests using a scale from 1 to 10 and evaluation form Fig. (1). The collected data were subjected to an analysis of variance (completely, Randomized Design) according to Abdel Magied (1991).

RESULTS AND DISCUSSION

The moisture content percentage for treatments of dibis are present in Table (1). The data showed that, in all treatments moisture content were decreased with increasing storage period. Moreover, irradiation treatments were superior in decreasing moisture content than control. Comparing different doses of irradiation it is quite evident that the highest dose (1.0 kGy) was lowest in this respect in comparison with the control, which showed significant differences between them as explained by Hasheem (1979) and Mikki *et al.* (1980). Also, these results agreed with those found by Diehl (1990).

Table (1): Percentage of moisture in dibis treatments during storage

Variety	Treatment	Periods after harvest (in weeks)					L.S.D.* (0.05)
		4	12	20	28	36	
Khalas	1.0 kGy	28.14	26.16	25.51	25.15	24.84	1.47
	0.5 kGy	28.44	26.05	25.49	25.02	24.68	2.09
	Control	28.96	26.07	25.21	24.88	24.52	2.34
Sukkary	1.0 kGy	29.61	27.49	26.91	26.57	26.37	1.57
	0.5 kGy	29.79	27.35	26.73	26.37	26.10	2.41
	Control	29.92	27.14	26.44	26.00	25.67	2.87

* The value is equal the means of three replicate

Table (2) showed the effect of irradiation treatments on total sugars percentage of dibis, it is clear that irradiation treatment indicated significant increase in total sugars percentage as compared with control. Comparing different doses of irradiation it is obvious that no significant difference was noticed between different doses of irradiation. These results agreed with those found by Diehl (1990 and 1995).

Table (3) illustrated the effect of irradiation treatment on total soluble solids percentage of dibis, clarify that storage duration is directly proportional with the increase in total soluble solid percentage in all irradiation and control treatment. However, the highest irradiation dose (1.0 kGy) induced the lowest significant increase in the total soluble solids percentage during the storage period as compared with the control treatment. These results are in agreement with those found by El-Saihy (1998).

Table (2): Percentage of total soluble sugars in dibis treatments during storage

Variety	Treatment	Periods after harvest (in weeks)					L.S.D.* (0.05)
		4	12	20	28	36	
Khalas	1.0 kGy	62.10	62.26	62.58	62.70	62.90	0.46
	0.5 kGy	61.92	62.17	62.47	62.62	62.78	0.27
	Control	61.74	62.02	62.32	62.53	62.62	0.22
Sukkary	1.0 kGy	63.18	63.56	63.73	63.90	62.09	0.65
	0.5 kGy	62.91	63.33	63.42	63.60	63.82	0.42
	Control	62.73	63.14	63.31	63.45	63.69	0.37

* The value is equal the mean of three replicate

Table (3): Percentage of total soluble solids of dibis treatments during storage

Variety	Treatment	Periods after harvest (in weeks)					L.S.D.* (0.05)
		4	12	20	28	36	
Khalas	1.0 kGy	68.6	68.8	69.0	69.2	69.4	0.21
	0.5 kGy	68.8	69.0	69.2	69.5	69.6	0.24
	Control	68.9	69.2	69.4	69.7	70.1	0.28
Sukkary	1.0 kGy	69.7	69.9	70.1	70.3	70.5	0.15
	0.5 kGy	69.9	70.1	70.3	70.5	70.7	0.16
	Control	70.2	70.4	70.7	70.9	71.2	0.19

The value is equal the means of three replicate

Regarding the effect of irradiation treatments on viscosity value of dibis, Table (4) showed that the highest viscosity was found in control treatment. This was related to the total soluble solids, since by decreasing the total soluble solids in (treatment 1.0 kGy) the viscosity was the lowest. However, the highest significant increase in viscosity during the storage period was the 1 kGy as compared with other treatment (0.5 kGy and control). This results agreed with those found by El-Salhy (1998) and Alhamdan (2002).

Table (4): The viscosity of value (mL/paskal/sec.) of dibis treatments during storage

Variety	Treatment	Periods after harvest (in weeks)					L.S.D.* (0.05)
		4	12	20	28	36	
Khalas	1.0 kGy	349.8	352.1	378.2	389.3	399.0	6.35
	0.5 kGy	345.9	356.8	368.2	379.5	386.3	7.72
	Control	452.6	455.9	462.1	472.2	486.7	7.91
Sukkary	1.0 kGy	461.4	475.9	482.1	499.4	511.1	7.38
	0.5 kGy	459.2	470.1	479.6	490.5	501.9	8.06
	Control	473.5	487.2	495.0	499.9	520.1	8.24

* The value is equal the means of three replicate

Organoleptic evaluation of irradiated treatments and control are showed in Table (5) and Fig. (1). The data shows that the lowest score is recorded in

non-irradiated sample (control), but the highest irradiation dose (1.0 kGy) still has an excellent score grade during the storage period as compared with other treatment (0.5 kGy and control). These results are in agreement with those found by Diehl (1995), Abd El-Mohsen and Nezam El-Din (1995) and Aussous (1999). Also, it agreed with Egyptian Standard (1996) and FAO (1996) for they reported that the irradiated samples of dibis from (1-1.5 kGy) have higher degree when it e xamined for organoleptic e valuation for color, texture and flavour than control sample.

In conclusion, the dibis which was produced from irradiated dates fruit with dose 1.0 kGy had the best quality than other treatments (0.5 kGy) and control. Also, using irradiation of (1.0 kGy) dose could be recommended as a food preservation technology

Table (5): Flavour, colour and texture evaluation by panelists of dibis treatments during Storage

Variety	Treatment	Periods after harvest (in weeks)												Overall Accept.			
		4			12			20			28				100%		
		A	B	C	A	B	C	A	B	C	A	B	C				
	1.0 kGy	8	3.5	4.5	7.5	4.0	4.5	9.0	4.5	4.5	10	5	0	10	5.0	5.0	90
Khalas	0.5 kGy	7.0	3.0	4.0	7.5	4.0	4.0	8.5	4.0	4.5	9.0	4.5	5	9.5	5.0	4.5	83
	Control	7.0	3.0	4.0	7.0	3.0	3.5	8.0	4.0	4.5	9.0	4.5	5	9.0	4.5	4.5	80
	1.0 kGy	9.0	4.5	5.0	9.5	5.0	5	9.5	5.0	5.0	9.5	5.0	0	10	5.0	5.0	97.0
Sukkary	0.5 kGy	9.0	4.5	4.5	9.5	5.0	4.5	9.5	5.0	5.0	9.5	5.0	0	9.5	5.0	5.0	95.5
	Control	9.0	4.5	4.0	9.5	4.5	4.5	9.5	5.0	4.5	9.5	5.0	5	9.5	4.5	4.5	92.5

A Flavour 90-100 **Excellen** **69-60 : Accepted**
B Colour 89-80 **Very good** **Less than 59 Not accepted**
C Texture 79-70 **Good**

Fig. (1): Sensory evaluation form of dibis treatments

Measurements	Treatments						
	A1	A2	A3	B1	B2	B3	Notes
Flavour							
Colour							
Texture							
Overall acceptability							

Level of Arbitration	The degree				
	Excellent	Very good	Good	Accepted	No accepted
Flavour	10	8	6	4	2
Colour	5	4	3	2	1
Texture	5	4	3	2	1
Overall acceptability %					
90-100	80-89	70-79	60-69	Less than 59	
Excellent	Very good	Good	Accepted	No accepted	

REFERENCES

- Abdel Magied, Mona, M. (1991). Effect of dietary fiber of potato peels on the physiological and organoleptic characteristics of biscuits. *Egypt J. of Food Sci.*, 19(3): 293.
- Abdel Mohsen, M.M. and Nezam El-Din (1995). Technological study on dibis production fro, the Siwi date. *Egypt. J. Food Sci.*, 23 (3): 229-239.
- Alhamdan, A. (2002). Rheological properties of newly nutritions diary drink and date exctract concentrate. *International J. Food Properties*. 5(1): 113-126.
- A.O.A.C. (1990). "Official Methods of Analysis". Association of Official Analytical Chemistry. 15th Ed, Washington, USA.
- A.O.A.C. (1995). "Official Methods of Analysis". Association of Official Analytical Chemistry. 16th Ed, Washington, USA.
- Aussous, M.T.M. (1999). Production and Evaluation of Siwi date syrup (dibis). M.Sc. Thesis Fac. Of Agric., Cairo Univ.
- Benjamin, N.D. and M. F. Abbas (1985) Clarification of date juice by chemical and enzymatic processes. *J.Agric. Water Reso. Res.*, 4(3): 153-168.
- Brunetii, A.P. (1980). Recommendations for evaluating the safty of irradiated foods. Final report prepared for the Director, Bureau of Foods. Use Food and Drug Administration, Washington DC.
- Diehl, J.F. (1990). Safety of Irradiated Food. Marcel Dekker, Inc., New York. Pp 9-11.
- Diehl, J.F. (1995). Safety of Irradiated Food 2nd. Marcel Dekker, Inc., New York. Pp 25-29.
- El-Salhy, T.A.F. (1998) . Effect of gamma rays on fruit storage of some date palm cultivars. M.Sc. Thesis, Fac. Of Agric., Zagazig Univ. Egypt.
- Egyptian Standard For Date Syrup (Dibis) (1996). Date Syrup No. 3074 Egyptian Organization for Standardization and Quality Control.
- F.A.O. (1996). Food and Agriculture Organization of United Nation. Production Year Book. Vol. 50.
- Hasheem, D.G. (1979). Dibis Production from dates. Training course on date processing, 6-29 October (1979) Part 2 palm and Date Research Center, Bagdad, Iraq.
- Howard, D.W. (1991). A Look at viscosity. *Food Technology*. 7: 82-84.
- Mikki, M.S.; Bukhaev, V. and Zaki, F.S. (1980): Production of caramel color from date juice. *Tech., Bull. No. 2/80*, Palm Date Research Center. Bagdad, Iraq.
- Merritt, C. (1989). Radiolytic products. Are they safe ? Safety Factors Influencing the Acceptance of Food Irradiation Technology, IAEA TECDOC -490, Vienna.

التقييم البيوكيميائي والحسي للدبس (مستخلص التمور) المنتج من بعض أصناف التمور
المعاملة بأشعة الجاما أثناء التخزين
أشجا العدوى ناصف* منيرة عثمان الحبير
* المركز القومي لبحوث وتكنولوجيا الإشعاع-هيئة الطاقة الذرية - القاهرة - جمهورية مصر
العربية
** كلية التربية للاقتصاد المنزلى والتربية الفنية - الرياض - المملكة العربية السعودية

أجريت هذه الدراسة بهدف إنتاج الدبس (عسل التمر) من ثمار التمور للصنفين الخلاص
والسكري وهما من أكثر الأصناف إنتاجا وإستهلاكها بالمملكة العربية السعودية حيث يتم إنتاجهما
للاستهلاك المحلى المباشر وللتصنيع ، وقد تم تعريض ثمار التمور للصنفين لجرتين من أشعة
جاما (٠,٥ ، ١,٠ كيلوجراى) وهى طريقة من طرق الحفظ ثم حفظ التمور المعاملة والغير معاملة
لمدة ستة وثلاثون اسبوعا وتم أستخراج الدبس من ثمار التمور المعاملة والغير معاملة (المقارنة)
على مدى (٤ ، ١٢ ، ٢٠ ، ٢٨ ، ٣٦ أسبوعا) من التخزين .

ولقد أظهرت النتائج أن الرطوبة النسبية للدبس المستخلص من ثمار التمور تقل بزيادة الفترة
التخزينية فى كل المعاملات وفى كل الاصناف. وأيضا السكريات الكلية الذائبة للدبس تزداد بنسبة
قليلة بطول الفترة التخزينية . ومن الملاحظ أن نسبة المواد الصلبة الذائبة قد تزداد أيضا بزيادة
الفترة التخزينية . كما كان من الواضح عند تقدير صفة اللزوجة لمعاملات الدبس المختلفة أن
درجة اللزوجة للمعاملة (١,٠ كيلوجراى) تفوقت على المعاملة الاشعاعية الاخرى (٠,٥ جراى)
وأيضا على الدبس للمقارنة .

ولقد أوضحت النتائج بالنسبة للتقييم الحسى للدبس المستخلص من ثمار التمور المعاملة أشعاعيا
والغير معاملة أن المعاملة (١,٠ كيلوجراى) قد حصلت على أعلى الدرجات من البدء حتى نهاية
الفترة التخزينية وذلك بالنسبة لصفات الطعم واللون والقوام عن المعاملات الاخرى .