

# Impact Of Storage Period On Some Physicochemical Properties Of Home-Made Date Syrup (Rub-Altamr)

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**Abstract:** This study evaluates the effect of storage period on some physicochemical properties of date syrup (Rub-Altamr). The sample was produced from a selection of dates gathered from different Libyan cities. The examined properties include pH, acidity percentage, and density. The data obtained was analyzed and interpreted using the SPSS statistical package program. Results showed that the storage time (45 day at room temperature) had an impact on every examined property. The pH values after storage were higher than those prior to storage, with a highly significant difference ( $t$ -test = 6.908) and a large correlation coefficient ( $r = 0.70$ ). As for the acidity percentage, it was also found that the samples before and after storage differ significantly ( $t$ -test = 7.506), and the correlation coefficient was 0.696. In addition, a comparison of the storage period before and after storage revealed a decrease in density ( $t$ -test = 5.148) and a significant correlation coefficient ( $r = 0.829$ ). Based on these findings, date syrup should be stored with extra care.

**Keywords:** Rub-altamr, storage period, acidity percentage, density, date syrup.

## 1. INTRODUCTION

The date palm tree (*Phoenix dactylifera* L.) is considered one of the oldest and most important trees that produces an essential food substance for humans. It produces dates, which are one of the staple crops in Australia, Mexico, South America, South Africa, and the United States, as well as in North Africa and southwest Asia. The date fruit has a high nutritional value. According to Aljaloud et al (1), it is abundant in carbohydrates (fructose and glucose), dietary fibres, proteins, and the vitamin B complex (B1, B2, B3, B5, B6, and B9). In addition, minerals such as calcium, iron, magnesium, selenium, copper, phosphorus, potassium, zinc, sulphur, cobalt, fluorine, and manganese are present in date fruit. Furthermore, it is a good source of antioxidants, antimicrobial, anti-cancer, and phenolic substances, in addition to carotenoids and flavonoids (2).

Dates are consumed either in their fresh or dried state. However, processing the fruit adds value and produces a variety of high-end products like date juice concentrates (spread, syrup, and liquid sugar), fermented date products (wine, alcohol, vinegar, and organic acids), and date pastes for specific and varied applications in sectors such as the bakery and confectionery industries (3).

After citrus fruits, mangoes, bananas, and pineapples, dates rank fifth among tropical and sub-tropical fruits. In addition, they are listed among the dried fruits that are exported (4). Over 4 million palm trees with 400 different varieties yield roughly 87,000 tonnes of dates annually (4). According to FOW statistics, Libya produced 150,000 million, placing it in ninth place in 2015 and tenth in the Arab world (5). Libya is considered one of the date-producing nations. According to the Libyan Ministry of Agriculture, the country has the ideal climate resources needed for palm trees to thrive and yield more.

The most popular derived date is date syrup, which is also known as dibs (known as Rub Altamar in Libya) (6). It is the primary ingredient in meals including jams, marmalades, concentrated drinks, chocolates, ice cream, confections, honey, and baked goods (4). Rub Altamar is a dark-colored and a heavy-consistency liquid that is derived from dried or semi-dried dates (7).

In Libya, Bakrari dates are mainly used in the production of dibs or Rub Altamar (Mohamed and Ahmed, 1981), which are an essential ingredient in a popular dish known as "Al-issidath" (8). It is also regarded as a traditional product that can be preserved for extended periods of time without the need for preservatives (9). When the dibs was extracted using both conventional and novel

extraction procedures, it was discovered that it was a good source of naturally occurring phenolic and flavonoid compounds, which gave it good antioxidant activity and biological health benefits.

Date syrup should be stored with extra caution. To maintain the freshness and flavour of date syrup, it should be stored in a cool and dry location after buying it in airtight containers. If date syrup is exposed to heat, light, or moisture, it may deteriorate or lose its quality. The purpose of this study, therefore, is to evaluate some physical and chemical characteristics of homemade date syrup samples and investigate how storage time affects these characteristics.

## 2. MATERIALS AND METHODS

### 2.1 Sources of Samples:

Forty samples of Bakrari dates were collected from seven Libyan cities. These cities include Sabratha, Sorman, Al-Zawiya Al-Gharb (Sabriya), Tripoli, Ubari, Sirte, and Sabha. The date syrup was extracted using the traditional method.

### 2.2 Study Testing:

Conformance tests according to the approved Libyan Standard by National Centre for Standardization were conducted. During the first week of sample collection, the following physicochemical analyses were carried out:  $P^H$ , density, and acidity determination. During a period of 45 days following manufacture, the tests were conducted again on a different batch of samples. All samples were kept at room temperature and were performed in triplicates for each tested parameter.

### 2.3 $P^H$ :

After being calibrated with a standard solutions, the  $P^H$  was measured using a Lovibond SensoDirect 150 portable meter at the Food and Drug Control Centre / Tripoli - Zuwara Branch. The reading was taken at a laboratory temperature of 20°C based on the AOAC methodology (10).

### 2.4 Acidity:

Acidity was determined in the Chemistry Department Lab of the Faculty of Science, Sabratha University, in accordance with AOAC, 2007 (10). Briefly, 10 g of the sample was dissolved in 100 ml of distilled water. Then, the mixture was well stirred. A pipette was used to transfer 10 ml of the mixture into a conical flask, where it was titrated against NaOH (0.1N) in the presence of phenolphthalein as an indicator (with shaking). The appearance of a violet color was an indication of the end point.

### 2.5 Density:

The density was determined according to AOAC (10) in the lab of the Chemistry Department, Faculty of Science, Sabratha University. A pycnometer with a 25 ml capacity was used to measure the samples' density, which was then expressed in g/ml.

### 2.6 Statistical Analysis:

The statistical analysis was carried out using the SPSS. To manage the variations among the examined samples, averages and standard deviations were employed. The results of the averages and standard deviations were confirmed using a t-test.

The matrix of correlation coefficients, whose values are positive for positive interactions and negative for otherwise, was utilized to assess the relationship and the type of its presence in the studied samples (correlation analysis and simple regression models, 2004).

## 3. RESULTS AND DISCUSSION

### 3.1 pH

Table 1 presents the  $P^H$  values of Rub-Altamr before and after storage, together with the t-test value. Results showed that the  $P^H$  value of the fresh samples was 4.26, which falls within the permissible range suggested by Libyan standard specifications for date syrup (7). Our result is consistent with those of previous research reported by Farhan et al (11), who indicated that the dates syrup's  $P^H$  values ranged from 4.5 to 5 and from 3.20 to 4.21, as shown by Mlitan et al (12).

After storage, the average value of  $P^H$  decreased to 3.85. According to the t-test value (6.908) and the p-value ( $0.000 < 0.05$ ), these results indicate a significant difference between the samples before and after storage. Additionally, there was a considerable association between the fresh and stored samples, as indicated by the high correlation coefficient value ( $r = 0.70$ ) and the highly significant p-value (0.000).

The higher  $P^H$  value of the date syrup after storage for our samples is in line with findings from earlier studies (13, 14). It is worth mentioning that samples are considered compatible with GSO 1813/2013 (15) for date syrup quality criteria when their  $P^H$  levels reach 4.

**Table 1:**  $P^H$ , t-test and p-value of some fresh and stored samples of Rub- Altamr.

Samples	N	$P^H$ (Mean $\pm$ SD)	(Mean Difference)	t-test	P-value
Before storage	40	$4.262 \pm 0.473$			
After storage	40	$3.852 \pm 0.495$			
Mean Difference	40		0.410	6.908	0.000
Correlation	40	$r = 0.70$		p-value = 0.000	

### Percentage of Acidity

The estimated acidity percentage of the fresh and preserved date syrup samples is displayed in Table 2. As can be observed, there is a difference between the fresh and stored samples. The acidity increased from 0.722 to 1.060. The t-test value (7.506) and the p-value (0.001) both support the significance of this variation in favor of the stored samples. In addition, there is a strong correlation ( $r = 0.696$ ) between the stored and fresh samples, with a p-value of 0.000. The higher acidity values after storage are due to the conversion of complex chemicals into sugars and the ongoing breakdown processes resulting from enzymatic activity (16).

**Table 2:** Acidity, t-test and p-value of some fresh and stored samples of Rub-Altamr.

Samples	N	Acidity (Mean $\pm$ SD)	(Mean Difference)	t-test	P-value
Before storage	40	$0.722 \pm 0.270$			
After storage	40	$1.060 \pm 0.397$			
Mean Difference	40		0.338	7.506	0.001
Correlation	40		$r = 0.696$	p-value = 0.000	

### 3.3 Density

The results of density measurements are displayed in Table 3. As can be seen, the difference in density between the fresh and stored samples indicates a significant difference in favor of the fresh samples, as confirmed by the t-test value (5.148) and the p-value of 0.001. Also, there is a significant correlation between the stored and fresh Rub-Altamr samples ( $r = 0.829$ ), with a highly significant p-value of 0.000. Our density value before storage corroborates the results reported earlier (17, 18).

**Table 3:** Density, t-test and p-value of some fresh and stored samples of Rub-Altamr.

Samples	N	density (Mean $\pm$ SD)	(Mean Difference)	t-test	P-value
Before storage	40	$1.349 \pm 0.096$			
After storage	40	$1.304 \pm 0.090$			
Mean Difference	40		0.045	5.148	0.001
Correlation	40		$r = 0.829$	p-value = 0.000	

## 4. CONCLUSION AND RECOMMENDATIONS

According to the results of this study, the  $P^H$ , percentage of acidity, and density of 40 samples of Rub-Altamr, prepared using a traditional method from various dates collected from different Libyan cities, show that most of the samples meet the requirements of the Libyan National Center for Standardization and Metrology. However, we found that over a storage period of 45 days, these measurements vary considerably. Therefore, we suggest monitoring all local manufacturing sources for this food product. We also recommend continuing scientific studies in food manufacturing to provide safe products with high nutritional value.

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