



Study of chemical composition and correlation between the seeds of two date palm cultivars grown in Libya

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Abstract:

The aim of this study was to examine the chemical composition and correlation between two types of date palm seeds (*Phoenix dactylifera* L.) grown in the north (Al-Bakrari) and south (Tafsert) of Libya. The chemical composition of two local date seeds was measured biochemical parameters on commonly used. Results showed that protein and lipid contents (Based on dry matter) ranged between 3.25 and 3.50 g/100 g and between 4.81 and 6.64 g/100 g, respectively. Carbohydrates content was about 80.74 and 82.48 g/100g for both samples. The ash content was ranged (1.85 - 2.30 g/100 g dry matter, while the moisture content did not exceed 7.6 % in any trial samples. The statistical analysis showed that lipid content had a significant positive correlation with moisture, ($R^2 = 0.751$; $p = 0.05$). Further analysis indicated that both moisture and lipid had a highly significant negative correlation with ash ($R^2 = - 0.902$ and $- 0.901$; $p = 0.05$) respectively, while ash having a highly significant positive correlation with carbohydrate ($R^2 = 0.967$; $p = 0.05$). Based on the outcome of the study, it appears that the chemical composition of date seeds, it is recommended to use these residues in animals feed to obtain the highest productivity economically and utilization of the wasted resources on the other hand.

Keywords: date palm seeds- Correlation- Chemical composition

Introduction

Date palm (*Phoenix dactylifera*, L.) is the most important food crops which have been cultivated in North Africa and the Middle East for at least 5000 years (Chao and Krueger , 2007), and also according to the many references telling to date palms which found in olden Egyptian, and Libyan writings (Chao and Krueger, 2007). At nowadays, more than 2000 different cultivars of the date palm are known to exist all over the world (Borchani, et al. 2010). FAO (2011) reported that in 2009, world production of dates was about 7.52 million tones and the top 10 producing countries were Egypt, Saudi Arabia, Iran, United Arab Emirates, Pakistan, Algeria, Sudan, Oman, Libya, and Tunisia. Arab countries have 70% of the world date palms (El-Juhany, 2010). In Libya like other North Africa countries, dates are an important part of the food available for people. Annual production of date in Libya about,

151163.04 tonnes and considered now to be the 5th producing country of valuable dates in the Arab countries (FAO, 2016).

The fruit part of the date palm it is fruity and has one seed, which can vary in size, shape, and quality of flesh, and they have many commercial and medicinal applications. The date seed (also called stone or kernel) is hard-coated, oblong and weighs 0.5 to 4g, about (10 -15%) of date fruit weight (Bouaziz et al, 2013). In some countries such as Libya, date seeds are used as food for domestic farm animals.

Several researchers have reported studies on the chemical components of date seeds. Bouaziz et al, (2013) reported the chemical composition on Tunisian date palm seeds. Al-Hooti et al (1998) studied the chemical composition of seeds date fruit cultivars of United Arab Emirates. However, a few information on the chemical composition of date seeds grown in this country available. Therefore, the objective of this study was to analyze some chemical parameters of two types of seeds grown in the north (Al-Bakrari) and south (Tafsert) of Libya which obtained during 2013. The information about the chemical composition of the two date palm cultivars seeds obtained from this study will be used in later studies in the preparation of value-added date seeds products and nutritional quality and these results have been reported in separate publications

Material and methods

1. Seeds collection

For this study, two types of date palm seed (Al-Bakrari and Tafsert) were used which grown in the north and south of Libya respectively. The date palm seeds were dried in an oven at 60-70°C for 72 hrs, then crushed using a feed grinder, sieved to pass through 0.5 mm diameter, and stored for later use at room temperature.

2. Chemical Analysis

The chemical composition of both local date palm seeds was done in triplicate following the standard methods of the Association of Official Analytical Chemists (AOAC 1990) for dry matter, protein, lipid, and ash. Dry matter: after drying palm seeds at dry oven (105 °c) for 24 h until constant weight. Nitrogen content was measured using Kjeldahl method using Kjeltac TM, 2100 FOSS and crude protein were estimated by multiplying nitrogen content by 6.25. Total lipids content was determined by petroleum extraction using the Soxhlet method. The method depends upon heating the solvent, which is allowed to pass through the

sample to extract the lipid. The extract was collected in a cup and, when the process is completed, the solvent is evaporated and the remaining crude lipid is dried and weighed. Ash was determined by incineration in a muffle furnace at 600°C for 6 hrs. Carbohydrate content was estimated by difference of mean values, that is, 100 - (sum of percentages of moisture, ash, protein and lipids) according to Bouaziz et al, (2013).

Results and Discussion

Table 1 shows the chemical composition of the date palm seeds of two date palm (Al-Bakrari and Tafsert) grown in Libya. The numbers shown are the average measurements of three replicates. The results obtained from this study were compared with the characteristics of some reported values cited in the Literature (Bouaziz et al, 2013, Al-Hooti et al, 1998). The average of protein values were 3.48 and 3.34 g/100 g, lipid values were about 4.81 and 6.64 g/100 g, ash values were about 1.85 and 2.30 g/100 g for both seed samples (Al-Bakrari) and (Tafsert) respectively. In the analyses of carbohydrates content was the largest component is found about 80.74 and 82.48 g/100g for both samples (Al-Bakrari) and (Tafsert) respectively, while the moisture content did not exceed 7.6 % in any trial samples. The date seeds from both trial samples have a low protein content, this result agrees with this range (1.5-4% DM) which reported by Boudechiche et al., (2008), In addition, the lipid content showed a significant difference; it was a higher percentage of lipid in the Al-Bakrari seeds comparing to Tafsert seeds. Because the chemical composition of date seeds can differ depending on soil status and also the variety (Al-Kharusi et al., 2009). Moisture content was ranged between 6.48 and 8.00 % which also depends on the cultivar location grown.

Table (1): Chemical composition of seeds of two date palm Cultivars (Al-Bakrari and Tafsert)

Types of Cultivar	Moisture (%)		Protein (%)		Lipid (%)		Carbohydrate (%)		Ash (%)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Al-Bakrari	7.58	7.12-8.00	3.48	3.47-3.50	6.35	5.96-6.64	80.74	80.11-81.06	1.85	1.79-1.90
	6.59	6.48-6.69	3.34	3.25-3.34	5.29	4.81-5.77	82.48	81.93-82.87	2.30	2.24-2.38

The lipid content had a significant positive correlation with moisture and protein, ($R^2 = 0.751$ and 0.895 ; $p = 0.05$) respectively. Further analysis indicated that moisture, protein and lipid

had a highly significant negative correlated with carbohydrate content ($R^2 = -0.918$, -0.858 , and -0.951 ; $p = 0.05$) respectively. In addition, moisture, protein and lipid had a highly significant negative correlated with ash content ($R^2 = -0.902$, -0.845 , and -0.901 ; $p = 0.05$) respectively, while it is having a highly significant positive correlation with carbohydrate ($R^2 = 0.967$; $p = 0.05$). This correlation indicates the high carbohydrate content of date seeds makes good energy sources for animal feed and left protein for growth.

Table (2) Pearson correlation between chemical compositions of date palm seeds

	Moisture	Protein	Lipid	Carbohydrate
Protein	0.653			
Lipid	0.751	0.895*		
carbohydrate	-0.918**	-0.858*	-0.951**	
Ash	-0.902*	-0.845*	-0.901*	0.967**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Conclusion

Date palm seeds in both types could be a good source of functional foods components in animal feed considering the protein, lipid and carbohydrate contents

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دراسة التركيب الكيميائي والعلاقة بين نوعين من نوى نخيل التمر المزروعة في ليبيا

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الملخص:

تهدف هذه الدراسة إلى معرفة التركيب الكيميائي والعلاقة بين نوعين من نوى نخيل التمر المزروعة بمناطق شمال (بكراري) وجنوب (تافسرت) من ليبيا، تم قياس التركيب الكيميائي لنوى التمر حسب الطرق البيوكيميائية التي يشيع استخدامها، أظهرت النتائج أن محتويات البروتين والدهون تراوحت بين 3.25 و 3.50 جم / 100 جم وبين 4.81 و 6.64 جم / 100 جم على التوالي، تراوحت نسبة الكربوهيدرات 80.74–82.48 جم/100جم، أما نسبة الرماد فكانت (1.85 – 2.30 جم / 100 غرام من المواد الجافة، في حين أن محتوى الرطوبة لم يتجاوز 7.6٪ في جميع العينات المدروسة، وأظهرت نتائج التحليل الإحصائي أن محتوى الدهون كان له علاقة إيجابية كبيرة مع الرطوبة ($R^2 = 0.751$ ، $p = 0.05$)؛ إضافة إلى ذلك كانت كل من الرطوبة والدهون لهما علاقة سلبية مع الرماد ($R^2 = -0.902$ و -0.901 ؛ $p = 0.05$) على التوالي، وبناءً على نتائج الدراسة ومعرفة التركيب الكيميائي لنوى التمر يمكن التوصية باستخدام هذه المخلفات في تغذية الحيوانات وذلك للحصول على أعلى إنتاجية بكفاءة اقتصادية من جهة واستغلال الموارد المهذورة من جهة أخرى.

الكلمات المفتاحية: بذور نخيل التمر، الارتباط، التركيب الكيميائي