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Physicochemical Analysis and Microbial Quality of Three Date Cultuvars Grown in Aoulef Oasis of Adrar Region

A.Makhloufi[1.2], M.Belhadef [2], K.Cherouili [2],M.Fethi [2]

[1]Laboratory of valorization of vegetal Resource and Food Security in Semi Arid Areas, South West of Algeria, BP 417, Tahri Mohamed University. Bechar, Algeria
[2]Department of Biology, Faculty of Life Sciences and Nature .Tahri Mohamed University . Bechar . Algeria.

*Corresponding author : makhloufi_75@yahoo.fr.

Abstract – The fruit of date palm (*Phoenix dactylifera* L.) is an important product in the south of Algeria. Dates played an important role in the economic and social lives of the people. Three Common dates varieties(Tgazza,Tazarzite and Tinnasser) were investigated for biochemical and microbiological composition .
Date flesh of all varieties showed high level of total sugars (45 - 65 %) and a small amounts of protein (1.3-2.4%), ash (2.05-2.46%) and fat (0.18-0.31%) on dry matter basis. The mositure content ranged between 8.34 and 12.28
microbiological testing dates show the existence of a total aerobic mesophilic flora and fungi (mold and yeast) and the absence of all fecal coliform bacteria and *staphylococcus.*

Keywords : Adrar, dates, physico-chemical analysis, Microbiological quality.

1. Introduction

Date fruits (*Phoenix dactylifera* L.) are the products of date palm tree, belonging to the family of *Arecaceae*. It is one of the oldest cultivated plants in the world (Parvin, 2015). In the date-productoin countries (middle east , South-Asian and northern Africa)it is a principal component of the diet.
In Algeria, the production of dates has increased extensively during the last 20 years. In fact, the production has doubled from 600.000 tones in 2012 to 1.100.000 tones in 2017(FAO, 2013).
Nearly 800 cultivars of date palm (*Phoenix dactylifera* L.) are known in Algeria(2015) , but only some are evaluated for their performance and their fruit quality .

Date fruit is a main source of food in the south of Algeria. It is a very nutritious, rich in carbohydrates, minerals, dietary fibers and proteins . Physical and Chemical composition of date palm fruit has been reported by various researchers(Borchani et *al.*,2010 ;Hasnaoui et *al* .,2011 ; Makhloufi et *al.*,2013), but only a few reports are available on the dates varieties growing in south west of Algeria.For this reason, , the aim of this study was to determine phycico-chemecal and microbiological quality of some varieties growing in Adrar oasis of Algeria.

2. Materials And Methods

2.1 Samples

Tree varieties of date palm fruits grown in Aoulef oasis of Adrar were harvested at edible maturation stage in September 2013 for Tgazza,Tazarzite and Tinnasser. The harvesting was carried according to Acourene et Tama ,1997. Each of the fruits are taken randomly from several plans at various heights and orientations(Makhloufi et *al.*, 2013). Two kilogram of date fruits from Three homgenous varieties (for each cultivar) ho were collected and stored at 4°C±2 prior to chemical analysis. Microbial analyses are conducted immediately after harvesting.

2.2 Physico-Chemical Quality of Dates

The fruits were cut, deseeded and the pulp portion was homogenized in blender for analysis. Samples were chemically analyzed for Moisture according to official Analytical methods (Makhloufi,2012). These methods rely on measuring the mass of water in a known mass of sample before and after the water is removed by evaporation.

Moisture (%) =(W1-W2)/W1 .100.

Where; W1 = Weight (g) of sample before drying

W2 = Weight (g) of sample after drying.

Ash content was determined by difference after heating samples of date flesh in a muffle oven (Nintherband) for 8 h at 600°C .Total Nitrogen was determined by the Kjeldahl technique, protein was expressed using the general factor 6.25(AOAC, 1990) .The lipids were estimated after extraction with Soxhlet apparatus using hexane as a solvent(AFNOR,2002).The rate of sugar is obtained by the phenol/sulfuric acid method quoted by Dubois (Adrian et *al.*, 1998).

The pH is a measure of the potential difference between two glass electrodes immersed in an aqueous solution of crushed pulp of dates. For Titratable Acidity This operation consists in titrating the acidity of an aqueous solution of dates with sodium hydroxide solution using phenolphthalein as color indicator (Makhloufi,2012).

2.3 Microbiological Quality of Dates

Samples (10 g) of dates flesh were aseptically weighed into sterile stomacher bags and 90 mL sterile Ringer solution was added. Samples were then homogenized for 10 min.

Mesophilic total aerobic flora (MTAF) counting is done on standard count agar PCA (Plate Count Agar) by seeding depth of 1 ml of the dilutions in the mass of agar counting (Lightfoot and Maier,2002). The detection of coliforms was done by inoculating 1 ml of product, or its dilutions in 15 ml of bile agar with crystal violet and neutral red (VRBL) after solidification, plates are then incubated for 24 h at 30°C (Guairaud, 2003).

For isolation and enumeration of *Streptococci* and *Staphylococcus aureus*, a surface inoculation on selective mediums: Esculine azid Agar and Baird Parker Agar, are respectively achieved. After incubating plates for 24-48 h at 37°C, the number of bacteria was calculated as colony forming units (CFU) (Bourgeois *et al.*, 1996).

Yeasts and molds were isolated and enumerated on acidified media (dextrose agar potato, agar malt extract). From 0.1 ml, dilution is taken and spread on the surface of PDA, and incubated at 25°C for 7 days (Guiraud and Rosec, 2004).

3. Results and Discussion

3.1 Morphological and Physicochemical Characteristic of the Studied Dates

In spite of socio-economic changes in Algeria, date fruits are considered a good source of energy and significant amount of fiber. The chemical properties of date are considered important in grading, preservation, storage and processing of dates. The average proximate of morphological and physicochemical characteristics of the studied cultivars is summarized in Table 1 and Table 2.

Table 1. Morphological characteristics of studied cultivars.

Caracters	TINNASSER	TGAZZA	TAZARZAIET
Color	Amber	Amber brown	Amber brown
consistency	Séché	Semi soft	Semi soft
Average lenght cm)	4,2	4,2	4,3
Average width (cm)	2,5	3,4	3
Average weight of dates (g)	5,89	5,04	6,13
Average weight of the pulp(g)	4,48	4,34	5,34

Table 2. Physicochemical characteristics of studied cultivars.

cultivars / Parameters	Tinnasser	Tgazza	Tazarzaiet
Water content (%)	8.34	11.6	12.28
Ashes (%)	1.22	1.31	1.30
pH	4.55	5.32	5.35
Acidity (g citric acid)	4.64	3.22	3.08
Fats (%)	0.18	0.31	0.27
Total sugars (%)	45	60	65
Proteins (%)	2.05	2.15	2.35

The results show that they have a dry quality and substantial weight and size. Since moisture is a good parameter for food spoilage and acceptability, we investigated the moisture content of the three varieties of dates varied between 8.34 and 12.28%. There is a significant difference in moisture content in these three varieties. During the development of dates, the rate of moisture decreases from 85% at Kimri stage to 24% at the Tamar stage (full ripeness) (Hasnaoui et *al* .,2011) . This rate is closely related to relative humidity of the atmosphere. The values obtained for these dates is lower than those obtained for the Bechar region cultivars which have moisture varying between 21% and 25.24% for Fegouss

,Cherka Taquerboucht, Deglet Talmine and Hmira cultivar (Makhloufi et *al.*,2013, Boulanouar et *al.*,2017) .

The pH is slightly acidic for both cultivars and ranges between pH 4.55 to 5.35. Acidity ranged from 3.08 to 4.64%. Our data is supported by the study of Henchiri et al .(2013) in which authors have shown the similar pH values in some varieties.

For all cultivars, the rate of total sugars varied between 45 and 65% and the proteins exceeds 2%. The ash level exceeds 1.22%. Concerning fat, dates are poor in lipids. Tinnasser variety contains 0.18% 'Tgazza' 0.31% and Tazarzaiet 0.27% . The values were very close to the value was reported (Belitz et al., 2009) , and less important comparatively with 'Taquerboucht6.01%, Deglet Talmine3.69%(Makhloufi *et al.*,2013)

Microbiological analysis (Table 3) showed the presence of total aerobic mesophilic flora (MTAF), fungal flora including *Penicillium* and *Aspergillus* genus, which are the most dominant and the absence bacterial strains, except coliforms in Tinnasser (10^2 CFU) and Tgazza(20 CFU). The pH is quite acid. This pH is detrimental to bacteria but appropriate for the development of fungic flora.

Table 3. Counting of microorganisms sought for the three cultivars expressed CFU/g.

dates	MTAF	FF	CT	CF	*Streptococci sp*	*S.aureus*
Tinnasser	7.10^3	5.10^3	10^2	**00**	**00**	**00**
Tgazza	10^4	4.10^3	20	**00**	**00**	**00**
Tazarzaiet	$1.4.10^4$	3.10^3	**00**	**00**	**00**	**00**

4. Conclusion

This study aimed to valorize three cultivars of dates in the region of Adrar (southwest of Algeria). The morphological and biochemical properties of the fruits studied shows that they are dry dates. However, significant differences between varieties are found on their Physicochemical and microbial composition. All investigated dates were rich in sugars,prot, and ash. Dates are also considered as an almost ideal food that provides a wide range of essential nutrients with many potential health .

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