USE OF DATE PITS AS A NOVEL ADDITIVE FOR THE MEAT INDUSTRY

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Abstract – This study aimed to evaluate the safety of using date pits, an antioxidant-rich agroindustrial by-product, in the meat industry. The chemical composition of date pits was determined, and extracts were obtained from raw material using different solvents (water, acetone-water, methanol-water, and ethanol-water) and extraction methods (maceration and ultrasound assisted extraction [UAE]). Antioxidant activity (ABTS and reducing power) and phytochemical content (total phenols, TPC; flavonoids, TFlvC) were determined for lyophilised extracts. The results for chemical composition, considering moisture (7.66 ± 0.05), protein (5.28 ± 0.15), fat (6.56 ± 0.08), ash (1.14 ± 0.01) and carbohydrates (79.36 ± 0.07), were similar to other studies. Solvent and extraction method affected ($p<0.05$) TPC (165.12-193.79 mg of GAE/g), TFlvC (64.64–247.9 mg of RE/100 g), ABTS (35.87–94.68%) and RP (0.48–0.93, Abs: 700 nm). The results suggest that date pit extract from raw material has a high antioxidant content and could potentially be used in meat products to improve the health of consumers.

Key Words – Date pit, antioxidant-rich extract, natural ingredients, meat product

I. INTRODUCTION

Currently, the meat industry is facing a challenge because different meat components have been associated with the development of chronic degenerative diseases. To mitigate this problem, alternative methods for reducing these risks, such as adding phytochemicals to meat products, have been proposed. These compounds may help to protect cells against the oxidative damage caused by free radicals, thereby reducing the risk of disease. Fruits and their by-products, such as skin and seeds, are a good source of bio-active molecules that positively impact food quality and consumer health [1]. Such is the case for date pits, which are an abundant by-product of date processing. Presently, date pits have received increasing interest because they have several potential uses. One major use can be as a food additive, as date pits have high nutritional value, among other properties (antimicrobial; antioxidant; source of dietary fibre, organic acids and β-glucans). Date pit extracts have been distinguished for their ability to delay oxidative damage to functional molecules such as lipids and proteins [2-3]. However, no studies exist on their application in food matrices. The objective of this study was to investigate the potential use of date pits as a unique antioxidant additive in meat and meat products.

II. MATERIALS AND METHODS

Seeds of the Medjool cultivar were directly isolated from 50 kg of date fruit cultivated in Sonora, Mexico, and collected at the "Tamar stage" (full ripeness). The seeds were cleaned to eliminate any adhering date flesh and were then dried at 50 °C during 48 h. Next, the date pits were ground to make powder and sieved with 1–2 mm mesh [4]. The chemical composition of date pit powder was determined at following. The results were reported as means ± standard deviation for all determinations and expressed as g/100 g. Different seed extracts were prepared from seed powder using two methods: constant stirring at a rate of 300 rpm for 48 h using a magnetic stirring plate and ultrasound assisted extraction (UAE) during 60 min. Water in addition to acetone-water [70:30 v/v], methanol-water [50:50, v/v] and ethanol-water [50:50 v/v] solutions were used as solvents for extracting compounds at a sample-solvent ratio of 1:10. The extract was lyophilised and stored at -20 ºC without light. The total phenolic content (TPC) of date pit extracts was

quantified using Folin-Ciocalteu´s reagent. The total flavonoid content (TFlvC) was measured using an aluminium chloride colorimetric assay. An inhibition assay was also performed based on the discolouration of radical $ABTS^{\cdot+}$ according to spectrophotometric methods. The reducing power was determinate based on the reduction of the Fe^{3+}/ferricyanide complex to its ferrous form, and absorbance was measured at 700 nm.

Data analysis was performed using a two-way linear model (GLM-ANOVA) in NCSS (version, 2011). All tests were considered statistically significant at $p<0.05$. The significant differences between the mean values were identified with a Tukey-Kramer multiple range test.

III. RESULTS AND DISCUSSION

The results show that date seeds are a good source of chemical components (Table 1), as reported by other authors [5].

Table 1 Chemical proximate composition of date pits.

Component	Composition of date pit (g/100 g)	
	Average ± SD	Reference
Moisture	7.66 ± 0.05	9.76 ± 0.26
Protein	5.28 ± 0.15	5.55 ± 0.01
Fat	6.56 ± 0.08	6.52 ± 0.01
Ash	1.14 ± 0.01	1.14 ± 0.01
Carbohydrate	79.36 ± 0.07	77.032*

* Dietary fibre addition (73.36 ± 0.96) and carbohydrates (3.66 ± 0.70).

The solvents and extraction methods showed significant differences ($p<0.05$) in phytochemical content and antioxidant activity. UAE was the most efficient extraction method, which agrees with another study where UAE was used to extract natural bioactive compounds [6]. The highest values of TPC (193.79 mg EAG/100g) and TFlvC (247.9 mg ER/100g) were presented in aqueous and acetone extracts, respectively (Figure 1). The TPC of date pits has even been shown to surpass that of date flesh [7]. TflvC was the most abundant identified molecule, and, importantly, these compounds have multiple bioactive functions [8]. Regarding antioxidant activity, the acetone extract demonstrated the highest percentage of $ABTS^{+}$ radical inhibition (95.85%) as well as the greatest reducing power (Abs_{700}=0.8–0.98) (Figure 2); the relation between these activities can be attributed to the richness of phytochemicals in this material.

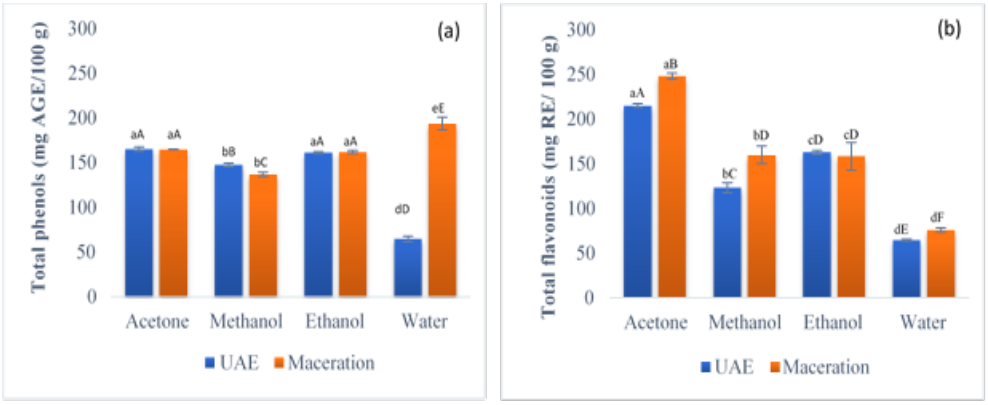

Figure 1. Total phenol (a) and flavonoid (b) content in lyophilised date pit extract (small letters indicate differences between solvents, and capital letters indicate differences between extraction methods).

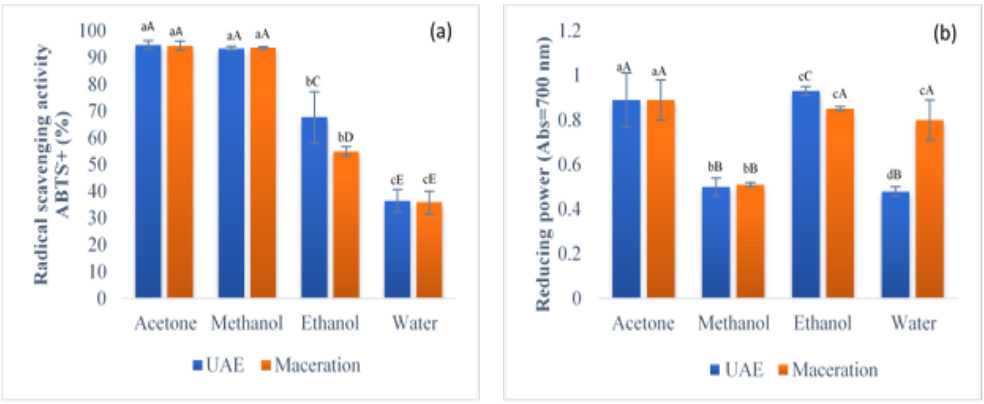

Figure 2. Radical scavenging activity $ABTS^{\cdot+}$ (a) and reducing power (b) of lyophilised date pit extract (small letters indicate difference between solvents, and capital letters indicate differences between methods).

IV. CONCLUSION

To our knowledge, this is the first report on the phytochemical compounds in Mexican date pits. This study opens the way for further experiments to consider date pits as a raw material with potential functional compounds, especially flavonoid compounds, which can be included as additives in meat and meats products.

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