

THE POTENTIAL OF DATE PALM KERNEL OIL

Mohamed E. S. Mirghani^{1*}, Nasereldin A. Kabbashi¹, Ismail H. H²., A. A. A. Yassin², Y. B. Che Man³ and N. Ellyana B. M. Noor¹

¹Bioenvironmental research unit, Department of Biotechnology Engineering, Kuliyah of Engineering, IIUM, Gombak, P.O. Box 10, Selangor 50728, Malaysia; ²National Oilseed Processing Researh Institue (NOPRI), University of Gezira, Medani P. O. Box 20, Sudan. ³Halal Products Institute (HPI), UPM, Selangor, Malaysia.

*Corresponding author: elwathig@iiu.edu.my

ABSTRACT

Date palm (*Phoenix dactylifera*) is considered to be one of the oldest cultivatable crops. The date palm kernels (DPK) considered a waste product of many date processing plants producing pitted dates, date syrup and date confectionery. Direct consumption of dates is also considered as a source of DPK. This study was carried out on DPK to clarify their proximate characteristics of the extracted oil. A laboratory scale for extraction of DPK oil was conducted using two types of DPK which were Deglect Noor oil (DPKDNO) and Moshkan (DPKMO). The extracted oil was then analyzed for color, refractive index, iodine value (IV), Saponification value (SV), unsaponifiable matters and total phenolic content as well as some other quality parameters such as acid value (AV) & free fatty acid (FFA) content, and peroxide value (PV). Generally the DPK of Deglect Noor found to have high oil content (9.67%) compared to Moshkan which has 7.30% oil. The color of crude oil was found to be 5.6R, 25Y and 0.2 blue (Brownish) for DPKDNO while 2.3R and 36Y (Yellowish) for DPKMO using Lovibond tentometer. IV and SV for DPKDNO & DPKMO were found to be 51.6 & 54.8 and 216.3 & 207.8, respectively. The unsapoinfiable matter in both oils are almost same which ranged between 0.8 - 1.4%. Total phenolic content in both oils was also in the same range of 0.96 - 0.98 mg/ml Gallic acid equivalent. The fatty acid composition using GC-MS showed that oleic acid is the main unsaturated fatty acid in both varieties (38.5 & 41.6%) while the main saturated fatty acid is lauric acid which was found to be 23.2 and 18.5% for DPKDNO and DPKMO, respectively. Other types of fatty acids such as palmitic, myristic, stearic and linoleic were also found in both varieties. Thus, the initiation study of this project may generate a new source of special oil which could be able to support the global demands of Halal source of specialty oil as cosmetic ingredient since it had been proven that it has anti-wrinkle effect and is therefore of interest in antiaging skin care products.

BACKGROUND

Date palm (*Phoenix dactylifera*) is considered to be one of the oldest food and chief source of wealth in the irrigable desert from ancient times.

Three main cultivar groups of date exist: soft (e.g. 'Halawy', 'Khadrawy', 'Medjool'), semi-dry (e.g. 'Deglet Noor', 'Zahidi'), and dry (e.g. 'Thoory'). The type of fruit depends on the glucose, fructose and sucrose content.

Dates contain a single seed (kernel) about 2–2.5 cm long and 6–8 mm thick. The kernel is a major by-product of the date palm-processing industry.

The seeds are mainly used as animal feed.

Was used to prepare such coffee-like drink

Dry dates kernel contains 7 – 9% edible oil. Liquid to semi solid, cream to yellow colored depending on cultivar.

The carbohydrate and protein contents of kernel are 76% and 7% respectively; the defatted cake (meal) constituting ~ 90% edible starch and protein.

OBJECTIVES

- To extract oil from date palm kernel.
- To determine physicochemical properties of date palm kernel oil (DPKO).
- To analyze the extracted DPKO for physicochemical properties and fatty acid composition.
- To determine the content of antioxidant in DPKO as total phenolic compounds.

MATERIALS AND METHODS

Samples preparation:

The kernels (pits and/or pips) of date palm fruits of the two varieties Deglect Noor (DPKDN) and Moshkan (DPKM) were subjected to tests for physical analysis and then grounded for oil extraction. The extracted oils subjected to various tests for physical and chemical analysis according to standard methods.

Seed Characteristics and Composition:

- Seed description
- Hundred seeds weight
- Whole seeds: Kernels with shells: Fruits Ratio
- Moisture and volatile matter
- Oil, Protein and Carbohydrate Content

DPKO Characteristics and Composition:

- Colour, Viscosity, Specific Gravity, Refractive index (RI), Melting Point (MP).
- Acidity (free fatty acid and acid value), Saponification Value (SV), Iodine Value (IV), Peroxide Value (PV), Unsaponifiable matter, Fatty Acids Composition by Gas Liquid Chromatography (GLC), Trace Metals by Atomic Absorption Spectrometer (AAS), Infrared (IR) analysis, and Processing.

RESULTS AND DISCUSSION

Table 1: Shows characteristics seed (kernel) of the two varieties of date palm in this study

Variety	Moisture	Oil	Protein	Carbohydrates	Fiber
	%				
DPKDNO	7.34	09.17	06.58	76.38	16.06
DPKMO	8.52	07.30	07.25	74.92	15.48

Table 2: Shows some parameters of date palm kernel oils (DPKO) of the two cultivars date palm in this study*

Variety	Melting Point °C	FFA %	SV	IV	Unsab. %	TPC mg/ml
DPKDNO	37.5	2.4	216.3	51.6	0.837	0.964
DPKMO	38.0	1.4	207.8	54.8	1.355	0.982

*FFA = Free fatty acids, SV = Sapoinification value, IV = Iodine value, Unsab. = Unsaponifiable matter, TPC = Total phenolic compounds

Table 3: Fatty acid composition of date palm kernel oil (DPKO), palm olein (PO), palm kernel oil (PKO) and coco butter

Sample*	Fatty acids %					
	C12:0	C16:0	C18:0	C18:1	C18:2	Others
DPKDNO	23.2	10.70	4.72	38.50	07.24	1 – 4
DPKMO	18.5	09.68	6.75	41.60	08.11	2 – 5
PO	-	35.80	04.20	44.80	15.00	Trace
PKO	52.0	08.00	10.00	15.00	03.00	4 – 9
Coco butter	7 – 13	25.20	35.50	35.20	00.10	01.00

*Abbreviations: PO = Palm olein, PKO = Palm kernel oil.

CONCLUSION

- The study had fulfilled the objective of this project through the utilization of date palm kernel as a new source of special oil
- The DPKO from the two cultivars studied have melting points of ~37° C, in average, indicated the ability for cosmetic uses.
- The defatted cake has high (> 80%) carbohydrates and ~7% as average protein content which is suitable for cattle and poultry feed.