Free fatty acids and β-carotene of artisanal red palm oil in Cameroon

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Introduction: Cameroon, amongst African countries of the Guinean gulf is a traditional red palm oil (RPO) producers and eaters [1]. Nowadays oils and fats consumption per capita is regularly increasing in these countries. In parallel, health problems associated to obesity, type 2 diabetes and vitamin A deficiency are booming [2]. In the southern Cameroon, people are using both industrial and artisanal RPO. The production of the latter, sold on the informal market out of any quality control, is rising due to the development of small-scale mills. In such a context, it seemed necessary to assess the chemical and physical quality of artisanal RPO and to relate the recorded quality differences to producing conditions.

Material

Ripe bunch of oil palm

Red palm oil

Oils samples

32 artisanal producers from 4 different production regions were interviewed, tracked and 32 samples collected. Oil sample was also collected from a local industrial.

Methods

1. Survey in palm oil production areas (June to July 2015) : information on the plant material and the detailed process of oil extraction.

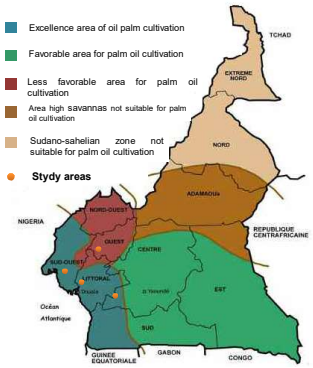
2. Physicochemical properties

Nutritional composition: β-carotene content

Lipolysis and oxidation levels:

- Free fatty acid content (NF T60-204, 1985)
- Peroxide value (NF T60-220, 1968)
- MDA: malondialdehyde (HPLC-fluo of MDA(TBA)2)

Impurity: aflatoxins content (ELISA test)



Results 1. Identification of RPO samples and processes

Table: planting material and production processes.

Factors	Regions	CENTER	LITTORAL	SOUTH-WEST	WEST
Plant material	Tenera (Pamol, IRAD)	X	X	X	
	Tout-Venant	X	X	X	X
	Savage			X	X
Press system	Motorized Caltech (a)	X	X	X	
	Manual Caltech (b)	X	X	X	
	Hydraulic cage press (c)			X	
	Motorized water extractors (d)				X
Method of storage	Bunch/fruits	Shed	open air, shed and bags	open air, shed and bags	Bags and bags in the rain

For all producers, the storage time between harvesting and treatment of palm fruits can range from **2** to **14** days; depending their availability or demand on the market.

Results 2. Effect of production processes on :

a. β-carotene content

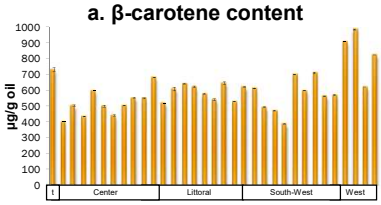


Figure 1: Carotene content of artisanal RPO.

- The **Western region** has the highest β-carotene content; this is due to the presence of savage plant material.
- **ANCOVA**: 69% of the variability of these data are explained by time and method of storage of bunches/fruits before oil extraction. Each day during storage significantly reduces 14 points of carotene content.

b. Free fatty acid (FFA) content

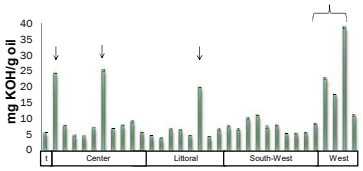


Figure 2: acidity of artisanal RPO.

- **Center and Littoral**: sample with high FFA were stored for more than 12 days [3].
- **West**: the high levels are related to the mode of storage of fruits in bags because the storage time is less than 6 days.
- **ANCOVA**: Each day during storage significantly increase 1,5 point of FFA content.

c. Oxidation markers and aflatoxins content

- **Peroxide value**: 0 - 8,62 meq. active O_2/kg oil.
- **MDA** : 0 - 11 nmol/g oil.
- **Aflatoxins** were always below the detection threshold.

In the light of these results and Codex Alimentarius norm [4], the artisanal palm oils are not oxidized.

Conclusion : Artisanal RPO produced in Cameroon are characterized by high variations in β-carotene content, linked to the type of planting material. The artisanal RPOs are very acid with FFA content far superior to edible oil standards. The results evidence that β-carotene and FFA contents in RPO from small-scale process is closely related to the time and method of storage of bunches/fruits before the oil extraction.

References

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