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PHYSICO-CHEMICAL CHARACTERIZATION OF THE OIL OF *ZIZIPHUS* KERNELS FROM THE SAVANNAH AREA OF CAMEROON

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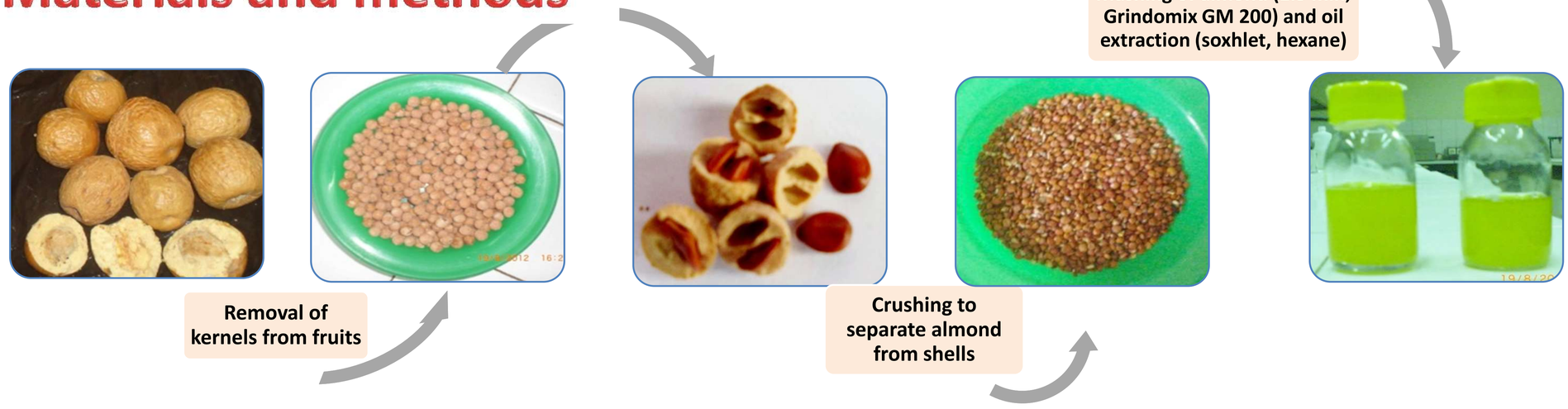
Ziziphus **tree, endemic in the savannah region of Cameroon, is represented by 4 ecotypes belonging to 3 species: *Z mauritiana* (2 consumable ecotypes locally called: *Jaabi Dakamji, Jaabi Lammuji*), *Z. mucronata* (not consumed; local name: *Jaabi Hadinga*) and *Z. spina christi* (not consumed; local name: *Kurnadje*).**

The flesh of the dry fruits is rich in antioxidant components, while the kernel, contains fat. The present study aims to evaluate the fat content and composition of *Jaabi* kernels from the 4 ecotypes.

Materials and methods



Oil analyses:

- **Physical**: **Density** (IUPAC; 1992), **Viscosity** (Oswald capillary viscosimeter)
- **Chemical**: **Saponification Index**, **Iodine Index**, **total unsaponifiable** (IUPAC, 1992), **fatty acids profile** (GCFID, Shimadzu), **total carotenoids** and **chlorophylls** (Miguez & Carrido, 1986), **tocopherols** (IUPAC, 1992), **polyphenols** content and **antioxidant activity** (Ozgen *et al*., 2006).

Results and Discussion

General interest of *Ziziphus oils*:

- ❑ **Interesting oil content, particularly for consumed variety (*Z. mauritiana*)**
- ❑ **Industrial interest:**
  - **High potential for cosmetic industry, regarding the unsaponifiable matter (up to 15% in *Z. mauririana*) provided the quality of components involved**
  - **Potential use in soap industry, for *Z. mauritiana*, regarding the Saponification index**
- ❑ **Nutritional interest: Carotenoids content of *Z. mauritiana* => hypothesis on the presence of pro vitamin A**

Table 1: Physico-chemical characteristics of *Ziziphus* kernel oils

	Z. mauritiana		*Z. spina christi*	*Z. mucronata*
	Jaabi Lamouji	*Jaabi Dakamji*	*Kurnadje*	*Jaabi Hadinga*
Fat content of kernels (%DW)	25.58 ± 1.93	33.23 ± 0.60	12.11 ± 1.41	22.65 ± 3.71
Physical properties of oils				
Density (g/ml)	0.889 ± 0.002	0.891 ± 0.002	0.904 ± 0.001	0.901 ± 0.006
Viscosity (mPa.s)	23.34 ± 0.36	34.18 ± 5.83	17.47 ± 0.18	nd
Chemical properties of oil				
Saponification Index (mg KOH/g)	274.72 ± 4.68	126.55 ± 4.58	54.60 ± 3.79	95.01 ± 3.30
Iodine Index (gI_2/100g)	6.55 ± 0.20	7.93 ± 0.43	7.83 ± 0.56	7.45 ± 0.24
Unsaponifiable (%)	14.65 ± 1.62	11.96 ± 1.76	6.48 ± 0.70	10.71 ± 1.72
Total carotenoids (µg/100ml)	1033.2 ± 48.2	1574.8 ± 25.9	352.9 ± 9.0	911.9 ± 272.9
Total chlorophyll (µg/100ml)	230.33 ± 19.09	225.50 ± 20.16	7.16 ± 2.56	246.67 ± 9.77
Tocopherols (mg/100g)	3.38 ± 0.01	3.27 ± 0.31	4.14 ± 0.30	3.11 ± 0.24
Total phenolic compounds (mg/100g)	6.57 ± 0.06	5.30 ± 0.39	10.57 ± 0.14	6.39 ± 0.24

Table 2: Antioxidant activity of *Ziziphus* kernel oils, expressed as IC_{50} (concentration of extract inhibiting 50% of DPPH)

	Z. mauritiana		*Z. spina christi*	*Z. mucronata*	BHT	Quercetin
	Jaabi Lamouji	*Jaabi Dakamji*	*Kurnadje*	*Jaabi Hadinga*		
IC_{50} (mg/ml)	2.00 ± 0.01	1.79 ± 0.01	2.15 ± 0.07	2.10 ± 0.14	28	28

Ziziphus **kernel oils present apparent antioxidant activity ten times higher than BHT and Quercetin**
Activity comparable to what has been found in the pulp of the dry fruit (Biyanzi *et al*., 2012).
This activity is probably due to polyphenols and tocopherols contents.

Table 3: Fatty acids profile of *Ziziphus* kernel oil

Fatty acids (%)	*Z. mauritiana*		*Z. spina christi*	*Z. mucronata*
	Jaabi Lamouji	*Jaabi Dakamji*	*Kurnadje*	*Jaabi Hadinga*
Hexanoic acid ($C_{6:0}$)	0,96	1,78	nd	nd
Capric acid ($C_{10:0}$)	nd	nd	3,75	nd
Palmitoleic acid ($C_{16:1}$)	nd	nd	6,07	0,43
Palmitic acid ($C_{16:0}$)	9,80	8,25	18,05	14,55
Oleic acid ($C_{18:1}$)	12,58	15,21	8,87	30,49
Linoleic acid ($C_{18:2}$)	63,13	57,41	35,44	22,21
Arachidic acid ($C_{20:0}$)	2,38	2,17	nd	1,17
Gadoleic acid ($C_{20:1}$)	2,01	2,11	12,91	2,28
Behenic acid ($C_{22:0}$)	1,33	1,38	nd	nd

Column ZB-5, 30m x 0.25µm x 0.32mm, carrying gaz: N_2
Injection T°: 250°C; T° gradient: 190°C (1 min) – 220°C, 1°C/min; detector: 250°C

Main fatty acids: $C_{18:1}$ and $C_{18:2}$
But low iodine Index (Tab. 1) due probably to oxidation during soxhlet extraction and storage conditions

Conclusion

Ziziphus **kernel oil presents significant industrial, nutritional and biological interest, justifying the necessity to develop research for the domestication of the plant and its valorization.**

References

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