

Exploring Date Palm, Desert Date, and Acacia as Promising Sources of Edible Oil in Moroccan Deserts Area

Said El Harkaoui¹, Zoubida Charrouf², Hanae El Monfalouti², Badr Kartah², Said Gharby³, Bertrand Matthäus¹

¹Max Rubner-institut (MRI), Detmold, Germany. ²Mohammed V University of Rabat, Lab. of Plant Chemistry and Organic and Bio- Organic Synthesis, Morocco. ³University Ibn Zohr, Lab. of Biotechnology, Materials and Environment (LBME), Morocco

Introduction

Morocco is a country that is known for its scarcity of rains and successive periods of drought. In the dry season, many rural people rely on plants growing in the deserts such as date palm (*Phoenix dactylifera*), deserts date (*Balanites aegyptiaca*), or acacia (*Acacia Raddiana*). On one side these plants provide people with nutrients from different parts of the plant and on the other side, they can cope with the increasing problems of climate change with less and less rainfall. Therefore, it is crucial to explore each part of these plants seeking nutritional compounds such as edible oil.

Objective:

Solvent extraction of desert date kernel oil, date palm seed oil, and acacia seed oil and their investigation in terms of triglycerides, fatty acids, sterols, and tocopherols.

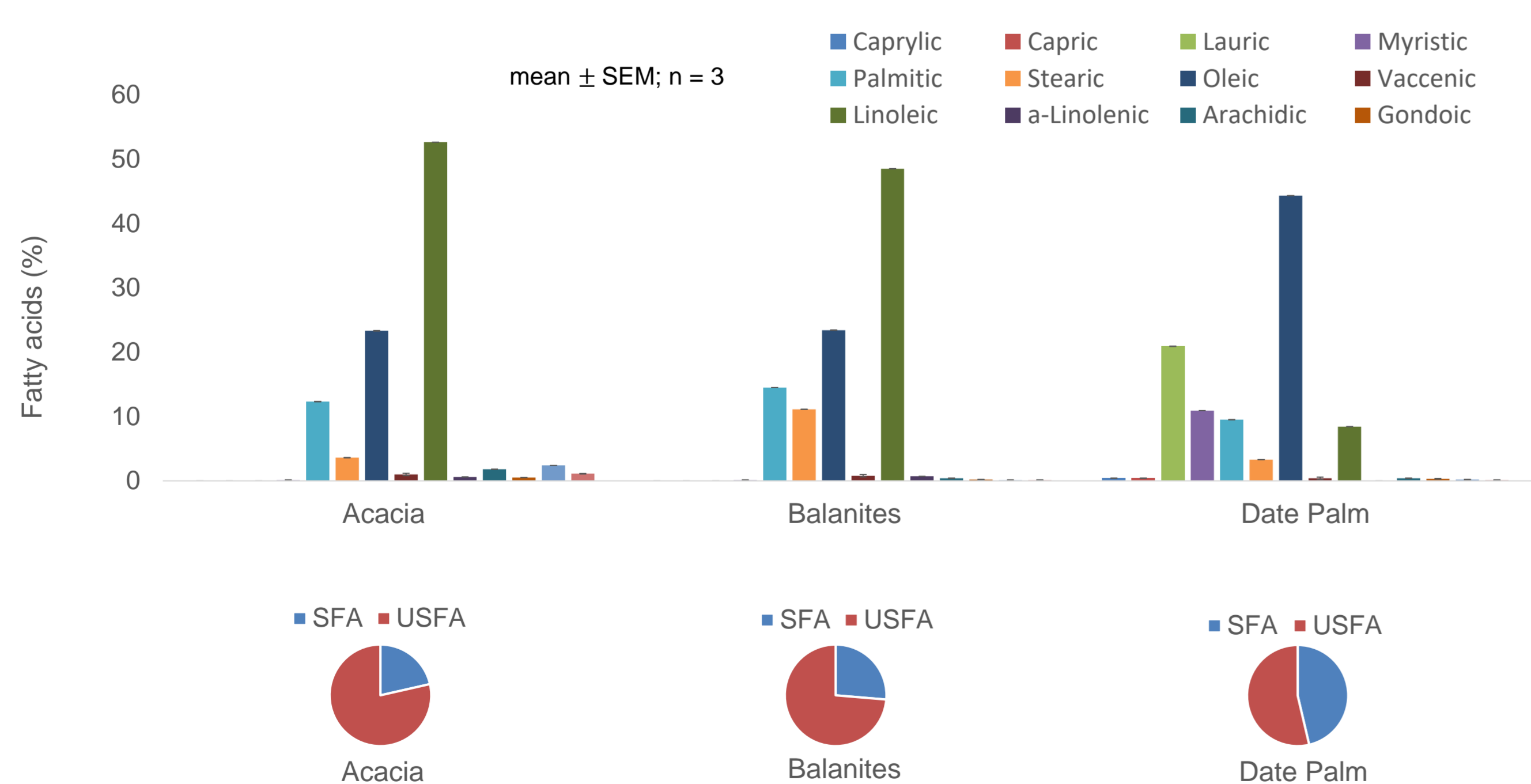
Material and methods

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| Balanites aegyptiaca | Acacia Raddiana | Phoenix dactylifera (Date palm) |
| Origin: Tata-Morocco | Origin: Tata-Morocco | Origin: Errachidia - Morocco Variety: Mejhoul |
| Kernel: edible but bitter, light yellow, 1,5 to 2 cm long | Seed: hard, brown to glossy black, 3 mm long and 1.5 mm thick | Seed: very hard, 2 to 2.5 cm long and 6–8 mm thick |
| Kernel oil content: 44% (solvent extraction) | Seed oil content: 3,6% (solvent extraction) | Seed oil content: 7% (solvent extraction) |

Methods

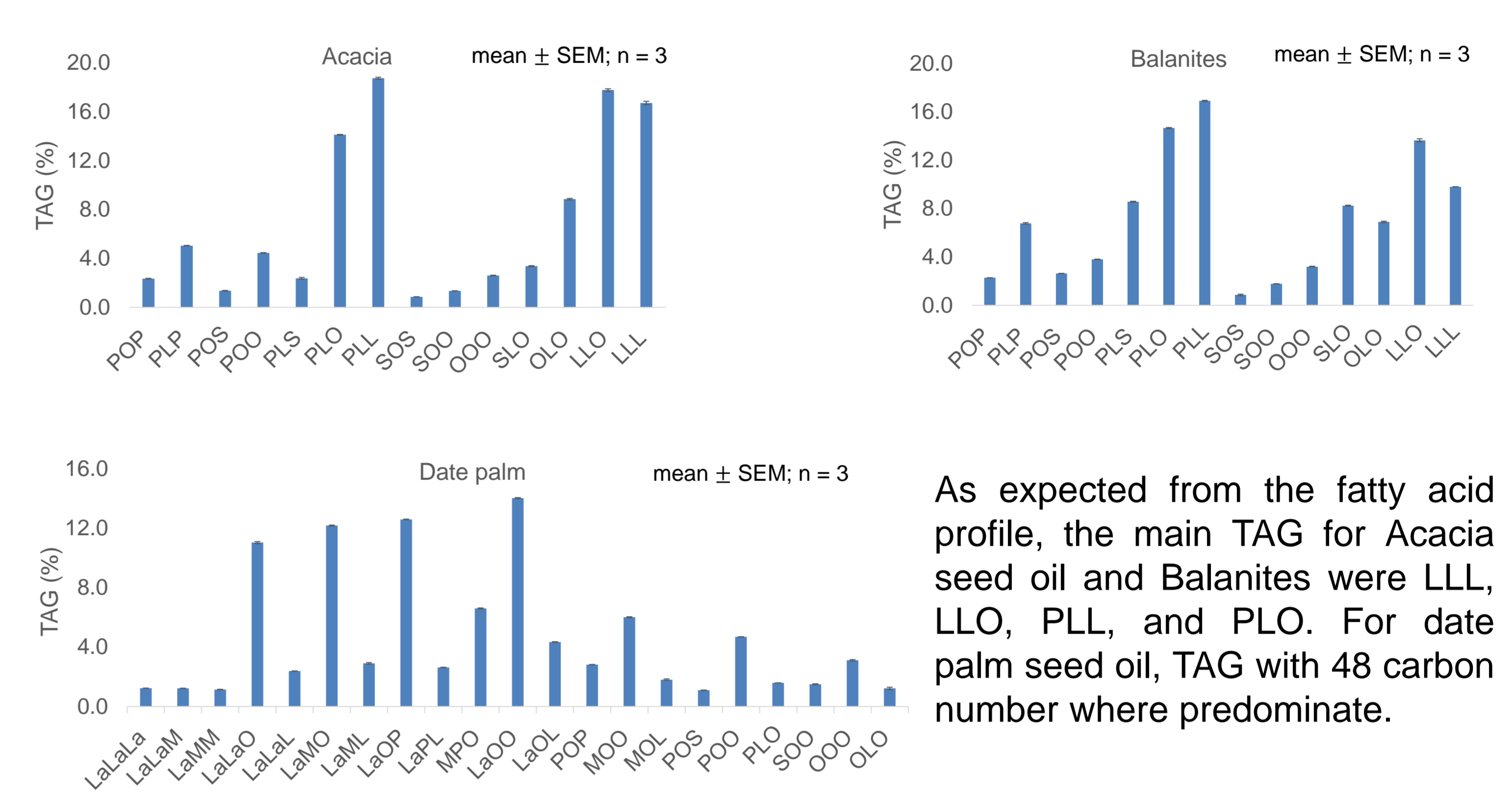
- The oil extraction was done using petroleum ether as a solvent (50°C) in a twisselmann extractor for 6h (DGF B-15 (12)).
- Fatty acid, triglycerides and sterols were analyzed using gas chromatography (GC-FID) according to DGF C-VI 11d (19), DGF F-III 1 (98) and DGF C-VI 14(08) successively.
- Tocochromanols were analyzed on a normal phase HPLC (DGF F-II 4a (00)).

Fatty acid profile



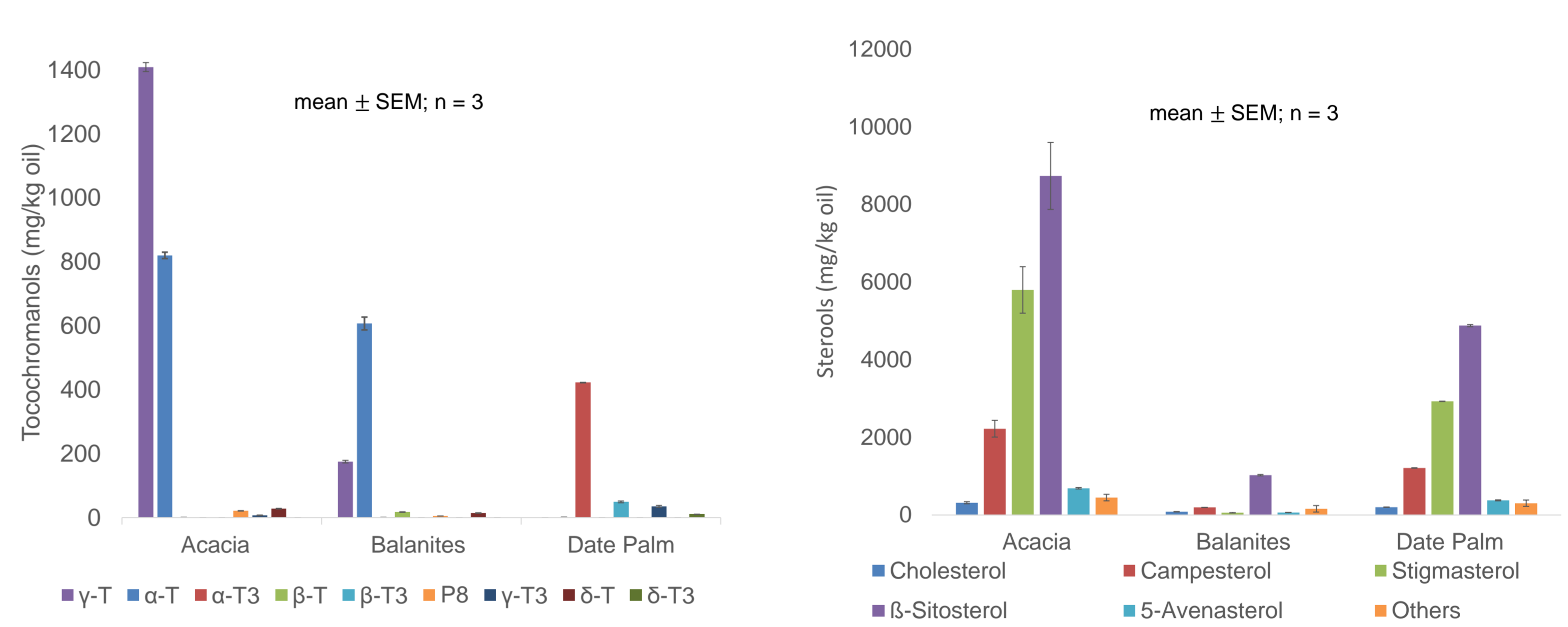
- The major fatty acids in Acacia seed oil and Balanites kernel oil were linoleic followed by oleic and palmitic. A similar results were found for sunflower oil, soybean oil, and corn oil [1].
- The fatty acid composition of date palm seed oil was comparable to coconut oil and palm kernel oil with a predominance of lauric, myristic, palmitic, and oleic fatty acids[2].

Triacylglycerol (TAG) profile of the oils



As expected from the fatty acid profile, the main TAG for Acacia seed oil and Balanites were LLL, LLO, PLL, and PLO. For date palm seed oil, TAG with 48 carbon number where predominate.

Tocochromanol and phytosterol composition



- Acacia seed oil had higher tocochromanol content (2286 mg/kg oil) followed by Balanites kernel oil (819 mg/kg oil) and (516 mg/kg oil) for palm seed oil.
- Acacia seed oil had a very high tocochromanol content than most of the other known oils [3].
- β -sitosterol was the main phytosterol in our samples, Acacia (8737 mg/kg oil), date palm seed oil (4881 mg/kg oil), and Balanites (1025 mg/kg oil). The predominance of β -sitosterol is very common in edible oils [3].

Conclusion

- The fatty acid profile of the selected oils is comparable to the common edible oils such as sunflower, coconut, soybean, and corn oil.
- Balanites kernel is very promising in terms of oil yield, while Acacia seed oil is a rich source of tocochromanol and phytosterols with content exceeding most known oils.
- Acacia seed oil and Balanites kernel oil are rich in Linoleic acid which is an essential fatty acid. On the other hand, date palm seed oil is mainly saturated and monounsaturated suggesting high oxidative stability.
- The different properties of those oils may suggest a blending between them to have a stable oil rich in nutrients.

References

- [1] Li, C. et al. 2011. Comparison and analysis of fatty acids, sterols, and tocopherols in eight vegetable oils. *Journal of agricultural and food chemistry* 59, 23, 12493–12498.
- [2] Komaram, A. C. et al. 2021. Detection and quantification of palmolein and palm kernel oil added as adulterant in coconut oil based on triacylglycerol profile. *J Food Sci Technol* 58, 11, 4420-4428.
- [3] Leonardo Velasco and M. Victoria Ruiz-Méndez. Sunflower Oil Minor Constituents.

Funding

With support from
Federal Ministry of Food and Agriculture
by decision of the German Bundestag