

Characteristics of Milk Thistle Seed Oil Extracted by Folch's Extraction Procedure

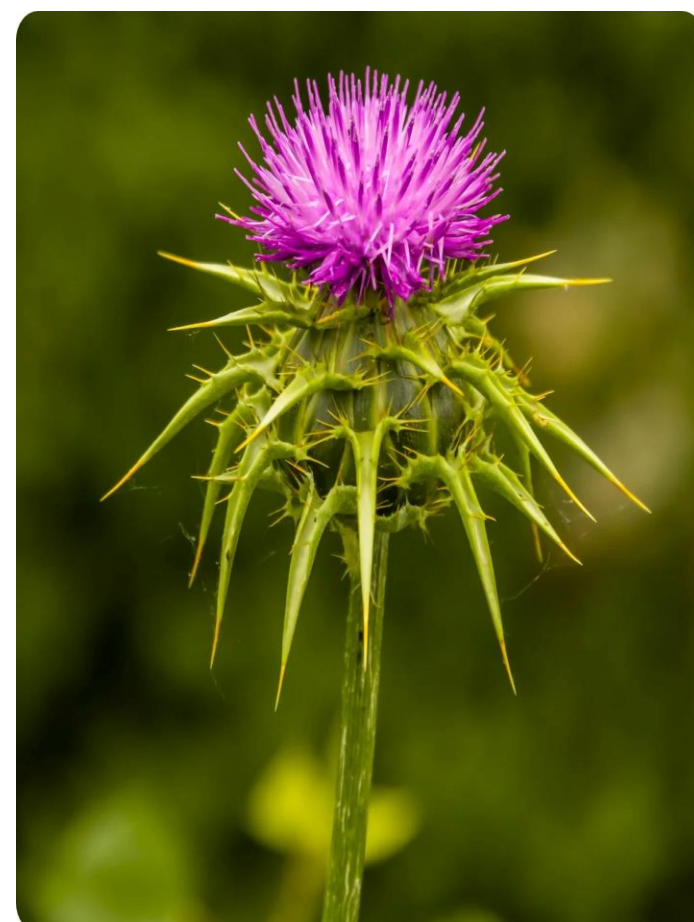
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INTRODUCTION & AIM

- Milk thistle, an annual or biennial plant, belonging to *Astraceae* family [1].
- Found in the Mediterranean region, currently widespread all over the world [2].
- Poland is one of predominant European countries – cultivation of 2000 ha.
- Source of unsaturated fatty acids, protein, fiber, vitamin E, and minerals (calcium, potassium, and copper) [3].
- Aimed to investigate the effect of extraction methods on the physicochemical properties of milk thistle seed oil.



METHOD

- Folch Extraction Method: Ground seeds homogenized in a chloroform: methanol (2:1 v/v) mixture. Then, the mixture was vortexed before centrifugation. The solvent evaporated under vacuum using a rotary evaporator [4].
- Fatty Acids' Composition: Gas chromatography (GC), equipped with a capillary column and a flame ionization detector, was applied [5].
- Distribution of Fatty Acids in TAG Structure: Determined by their position (internal or external) within triacylglycerols using enzymatic hydrolysis [5].
- Oxidative Stability: Pressure Differential Scanning Calorimetry (PDSC) was used [6].
- Acid Value & Peroxide Value: Measured according to : ISO 660:2009 method and ISO 3960:2007 method respectively [7, 8].
- Antioxidant Activity and Total Phenolic Content: The antioxidant activity was estimated by the DPPH test [9].

Analyses performed in triplicate and results expressed as mean ± std. The data were statistically analyzed by Statistica Inc.

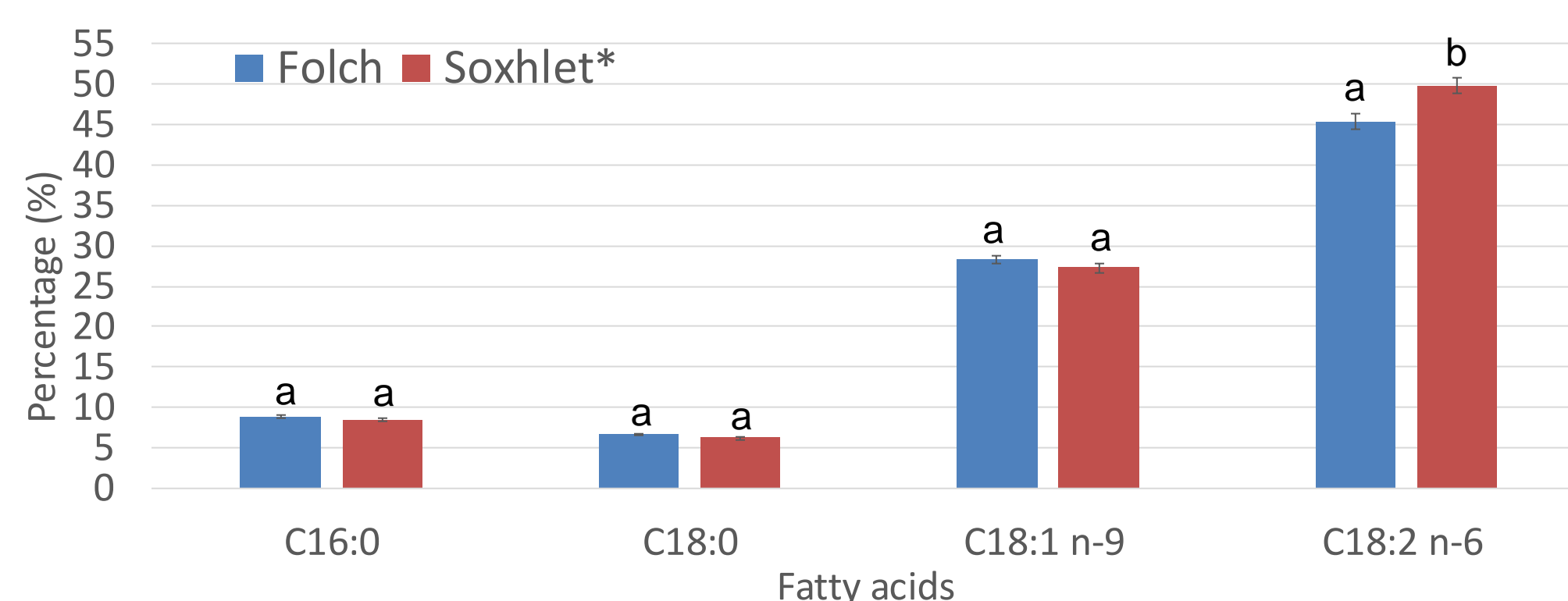
RESULTS & DISCUSSION

- Acid Value & Peroxide Value:
 - According to Alimentarius Codes: Limit of 5mg KOH/g, 15 meq O₂/kg, respectively.
 - Both were in permissible level for Folch method but not for Soxhlet.

	Acid value (mgKOH/g)	Peroxide value (meq O ₂ /kg)
Folch	2.43	8.57
Soxhlet*	7.28	19.34

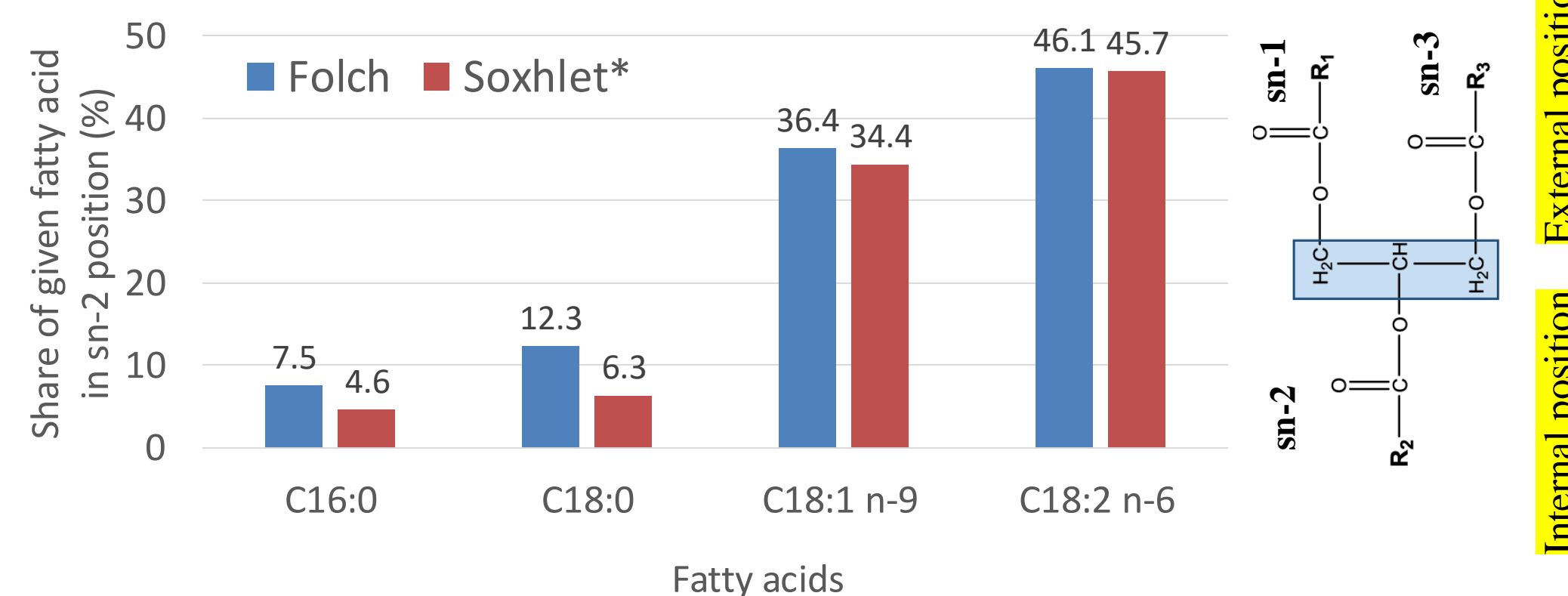
- Composition of Fatty Acids:

- Saturated fatty acids: Palmitic (C16:0), Stearic (C18:0).
- Unsaturated fatty acids: Linoleic (C18:2), Oleic (C18:1)
- No significant difference observed except for linoleic acid.



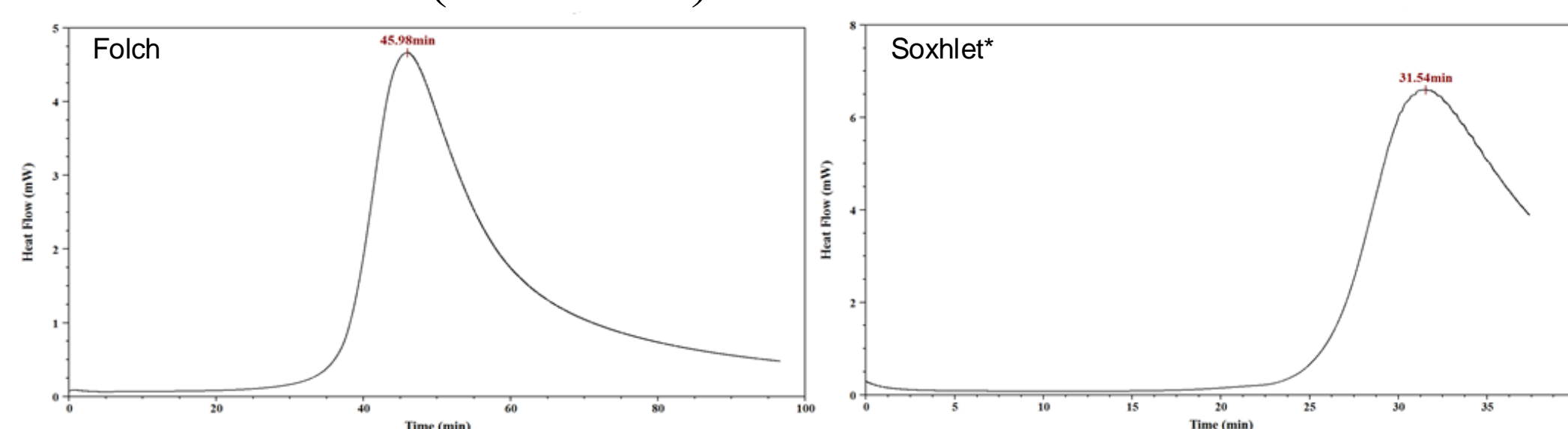
- Distribution of Fatty Acids:

- Saturated fatty acids → external TAG position (sn-1,3).
- Unsaturated fatty acids → internal TAG position (sn-2).



- Oxidation Stability:

- Longer oxidation induction time (45.98 min) compared to Soxhlet method (31.54 min) → non-thermal treatment.



- Total Phenolic Content and Antioxidant Activity:

- The amount of phenolic compounds were negligible in both methods.

* The Soxhlet method results were presented in 11th Intercollegiate Biotechnology Symposium "Symbioza" Conference, 10-12.05.2024.

CONCLUSION

- Non-thermal extraction methods like Folch's can effectively preserve the quality of the oil.
- Soxhlet extracted oil was susceptible to rancidity due to the high content of UFA and low phenolic compounds.

FUTURE WORK / REFERENCES

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