

The Fate of **Phytosterols, Tocopherols, Polyphenols, and α -Linolenic Acid** after Screw Pressing of Oilseeds under **Argon Atmosphere**

Monika Mikolášková with K. Alishevich, J. Kyselka , E. Pešek, M. Berčíková, V. Filip

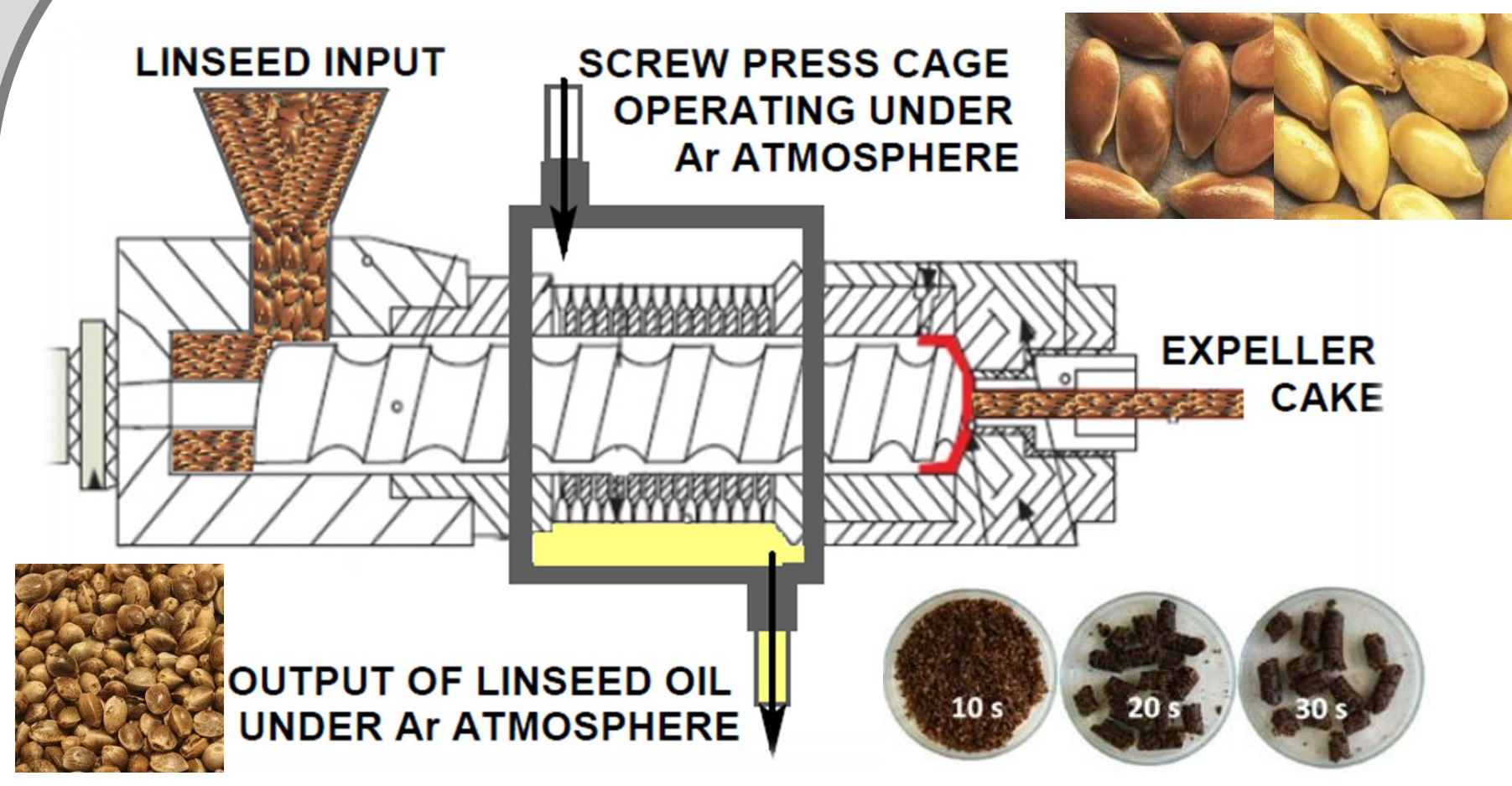
Department of Dairy, Fat and Cosmetics, UCT Prague, Czech Republic

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 17th Euro Fed Lipid Congress
20-23 October 2019 · Sevilla · Spain

The design of Screw Pressing of **Flaxseeds and Hemp Seeds** under **Argon Atmosphere**

Screw press operating under Ar atmosphere



Modification of Komet CA59G



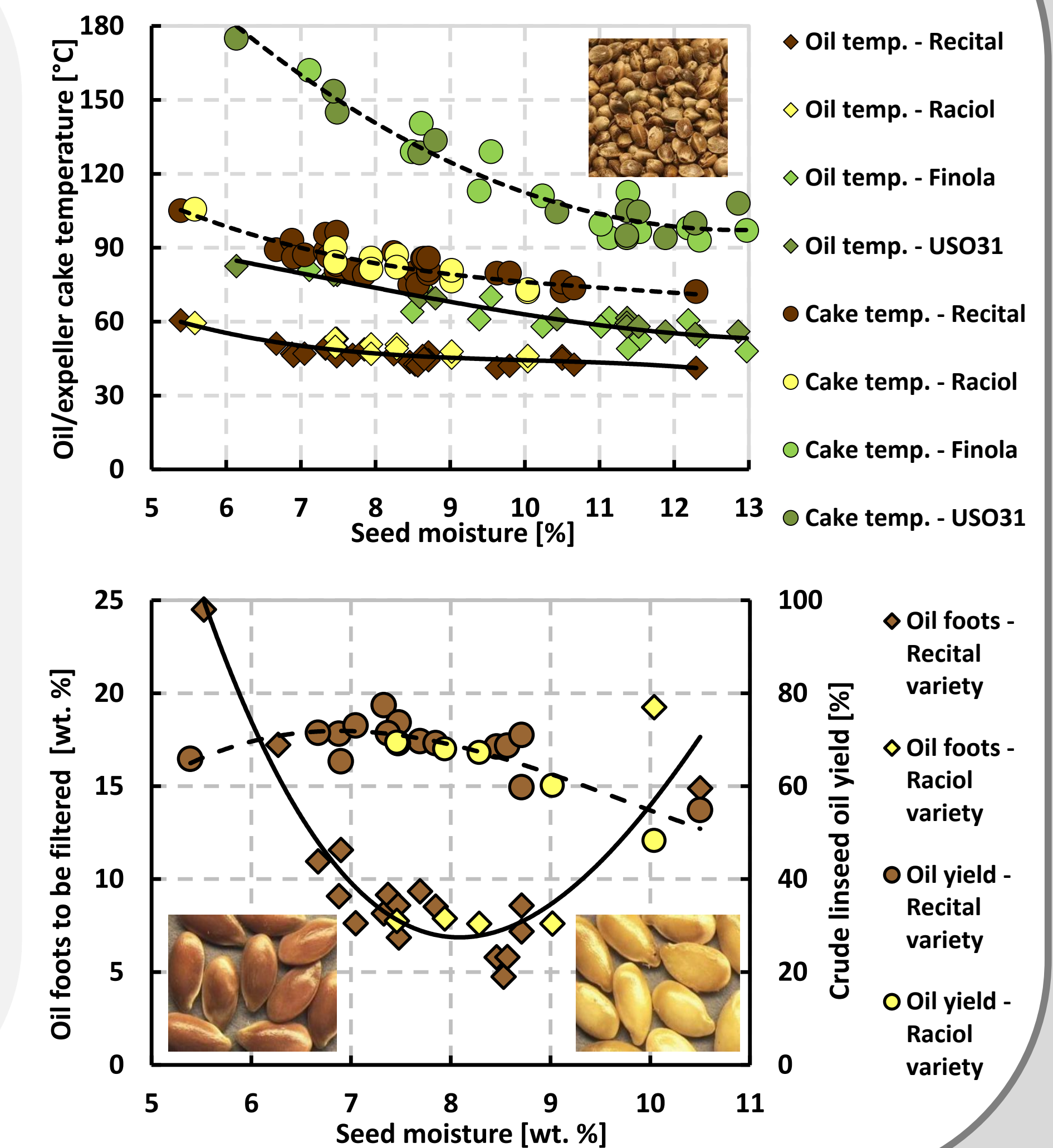
Current state of knowledge:

- Current growing demand for minor oilseed processing is related to the consumption of functional foods and nutraceuticals.
- Linseeds and hemp seeds are **excellent sources** of essential fatty acid, lignans, phenolic acids, fiber and various minerals.
- Lignans and their metabolites have (anti)estrogenic properties.

Importance to the field:

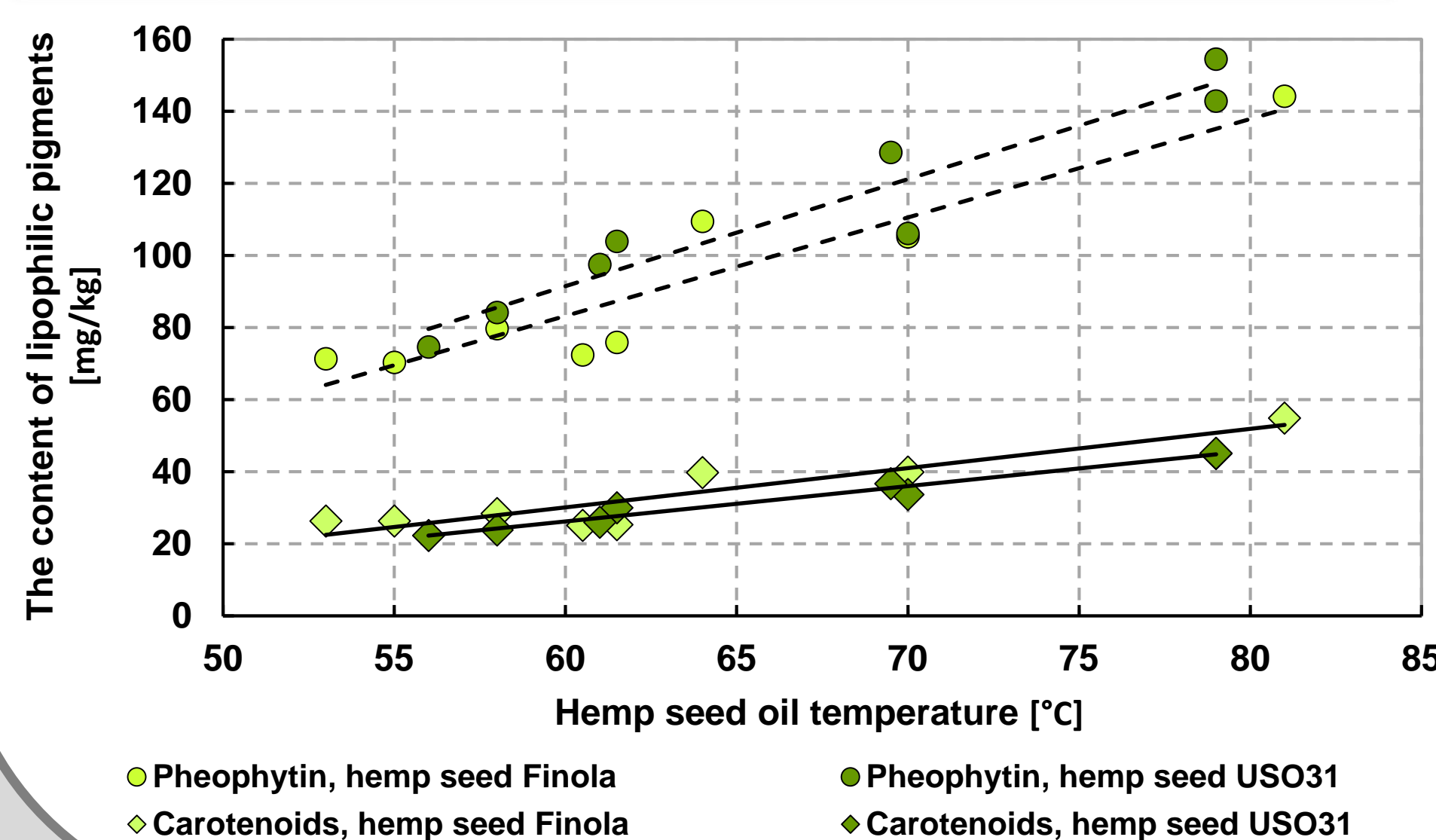
- **Special design of screw presses** for the processing of oilseeds in the modified atmosphere of argon is an **original approach**.
- The study was devoted to the effect of screw pressing on the yield of **bioactive compounds** (tocopherols, phytosterols, pigments).
- Protective atmosphere was minimizing the risk of undesired autoxidation reactions.

Optimization of flaxseed and hemp seed screw pressing: dissipation of mechanical energy



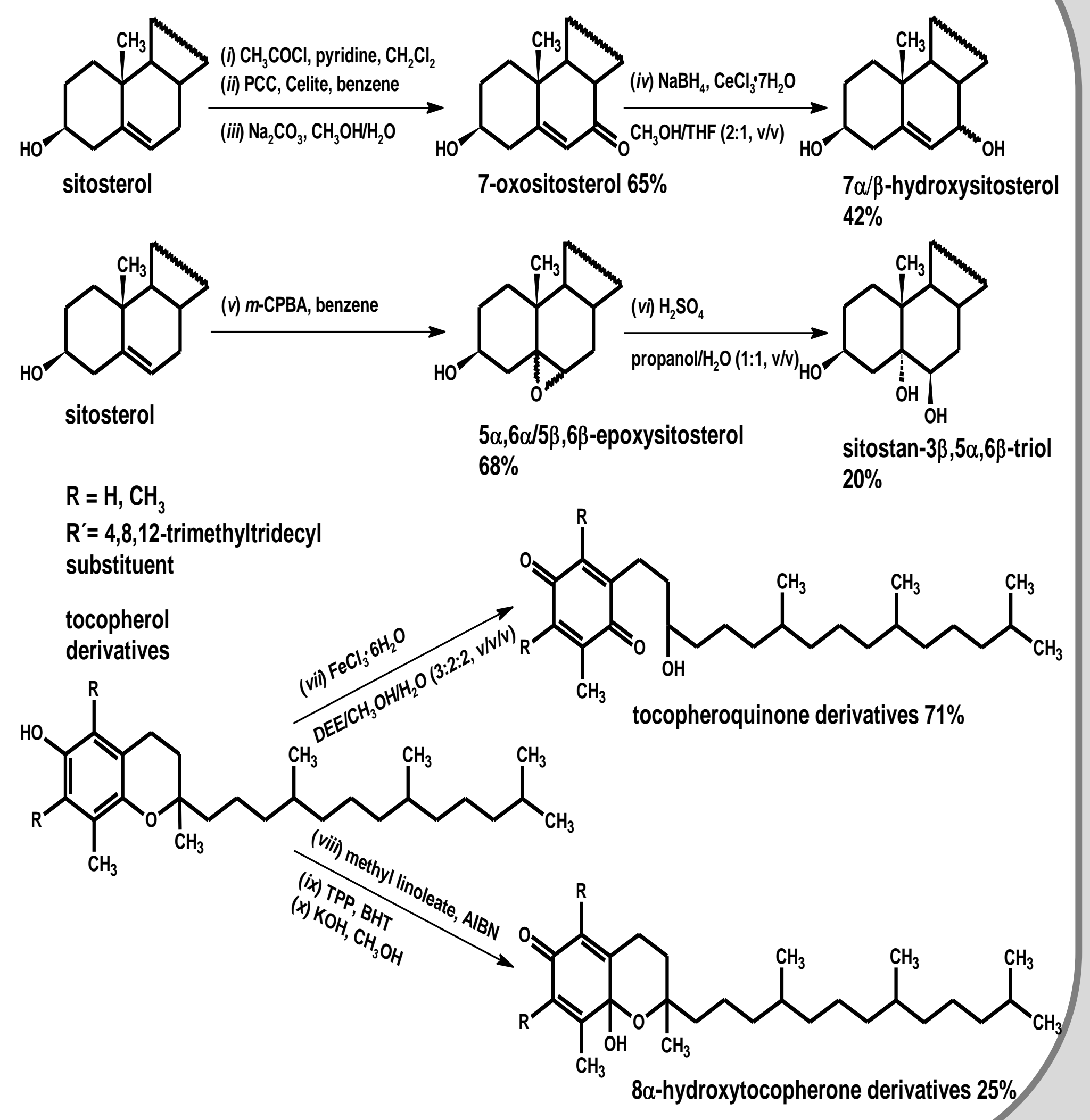
The **Control** of Prooxidant and Antioxidant Contents and Synthesis of **Oxidation Markers**

The control of Prooxidant Contents



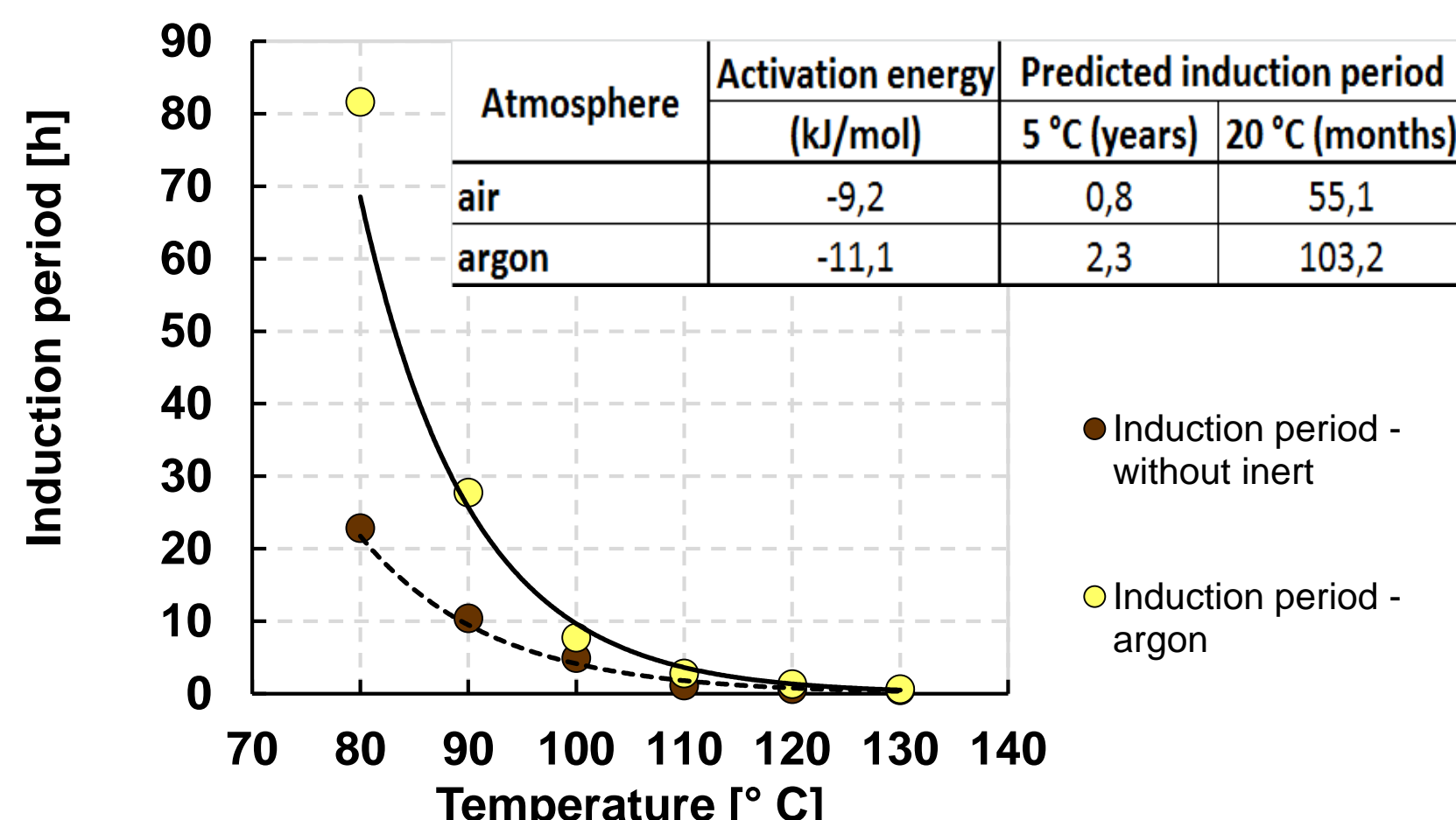
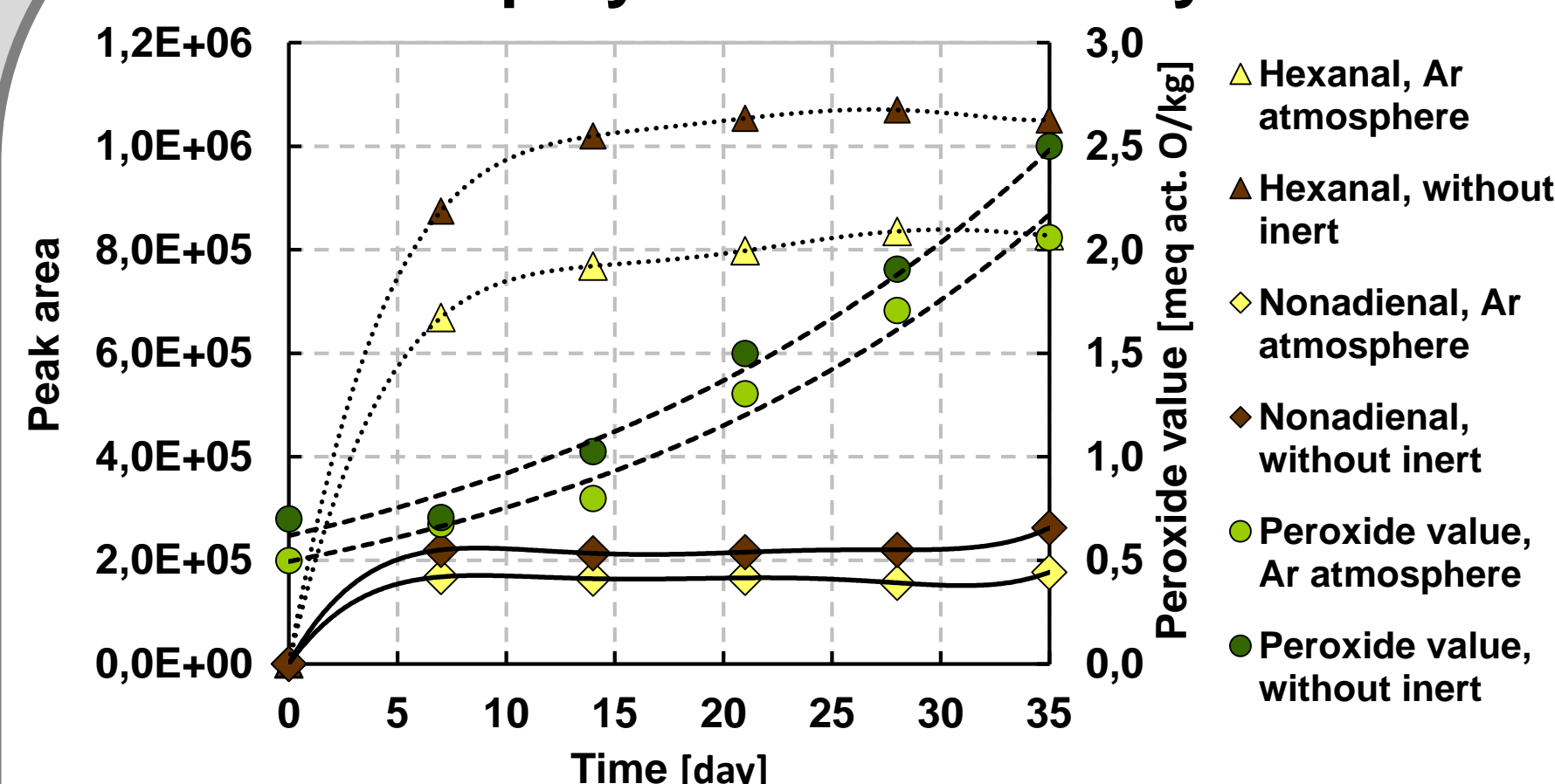
- The aim of the screw pressing optimization conditions was an effective protection of nutraceuticals and other beneficial compounds prone to oxidative damage.
- Temperature-dependent isolation of pigments (pheophytins, carotenoids) was observed.
- Dissipation of mechanical energy doubled the content of pheophytins.
- The higher the screw pressing temperature, the higher the content of γ -tocopherol (223 - 416 mg/kg).
- Novel markers such as *ortho*- and *para*-tocopherylquinones, 5,6-epoxy-, 7-hydroxy-, 7-oxophytosterols; and polyphenol oxidation products were synthesized and characterized by EI-MS, APCI-MS and 1D/2D NMR techniques.

Synthesis of novel autoxidation markers



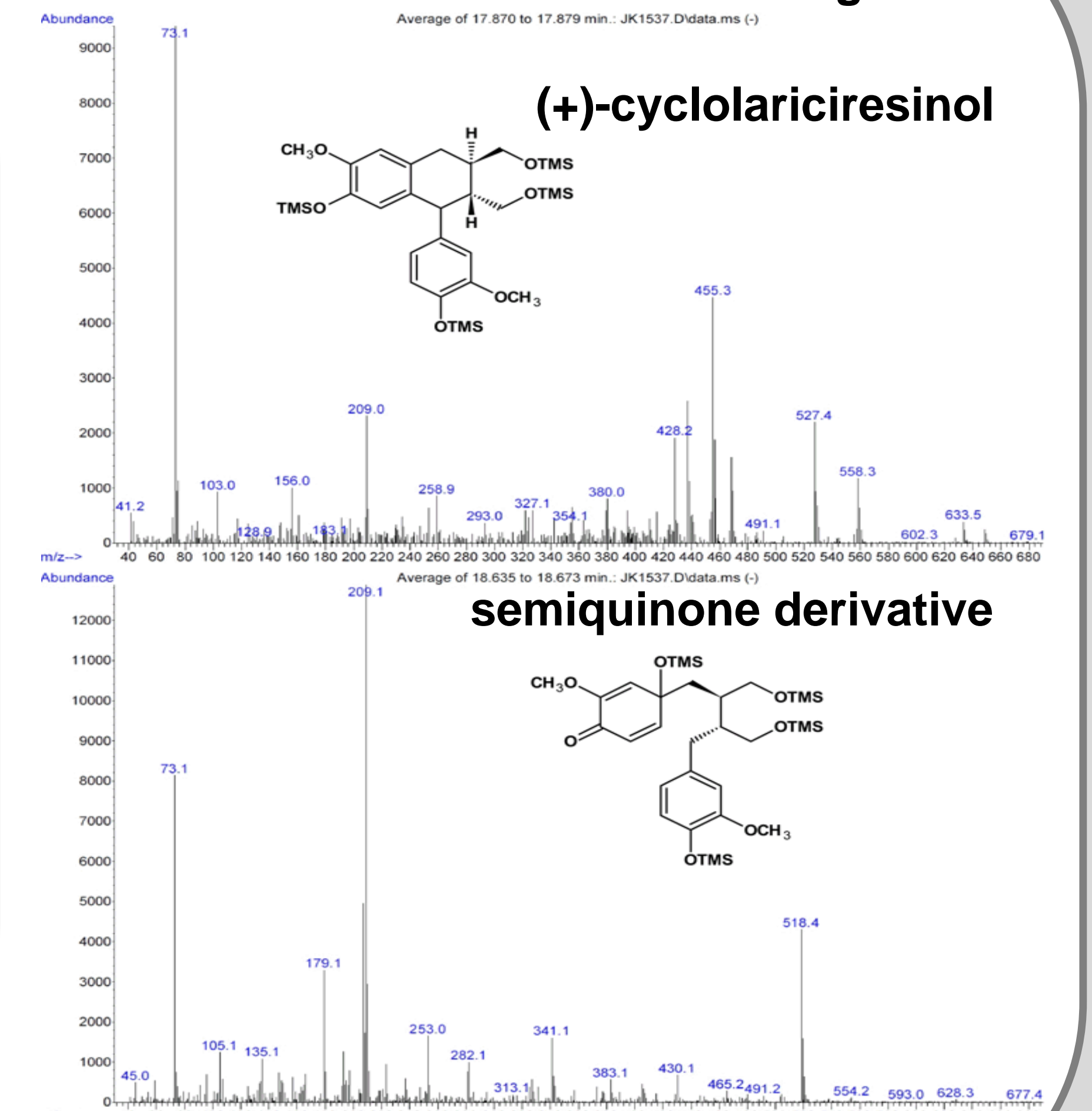
The **Shelf-life** of Flaxseed/Hempseed Oils Isolated with and without **Protective Atmosphere** of Argon

The fate of polyunsaturated fatty acids



- In the second part of the study, ageing of selected compounds was investigated in oilseed products under conditions simulating storage by consumers (5, 25 °C).
- Initial peroxide values of vegetable oils did not exceed the level of 1 meq act. O/kg.
- Application of protective atmosphere resulted in the lower formation of volatile carbonyl compounds. Moreover, oxidation products of phytosterol and tocopherols (10^0 - 10^1 mg/kg) were detected only for unprotected oils.
- Two dominant secoisolariciresinol oxidation products were observed in total ion current profile. First compound was identified as (+)-cyclolariciresinol, known as isolariciresinol, and second compound was identified as semiquinone lignan derivative.

Identification of novel oxidized lignans



This work was supported from funding NAZV QK1910302/2019

*Kyselka et al., *Eur. Food Res. Technol.*, (2017), 243:1633 DOI: 10.1007/s00217-017-2871-9.