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PROPERTIES OF OIL EXTRACTED FROM OAT GRAINS BEFORE AND AFTER THE ROASTING PROCESS CONDUCTED UNDER DIFFERENT CONDITIONS

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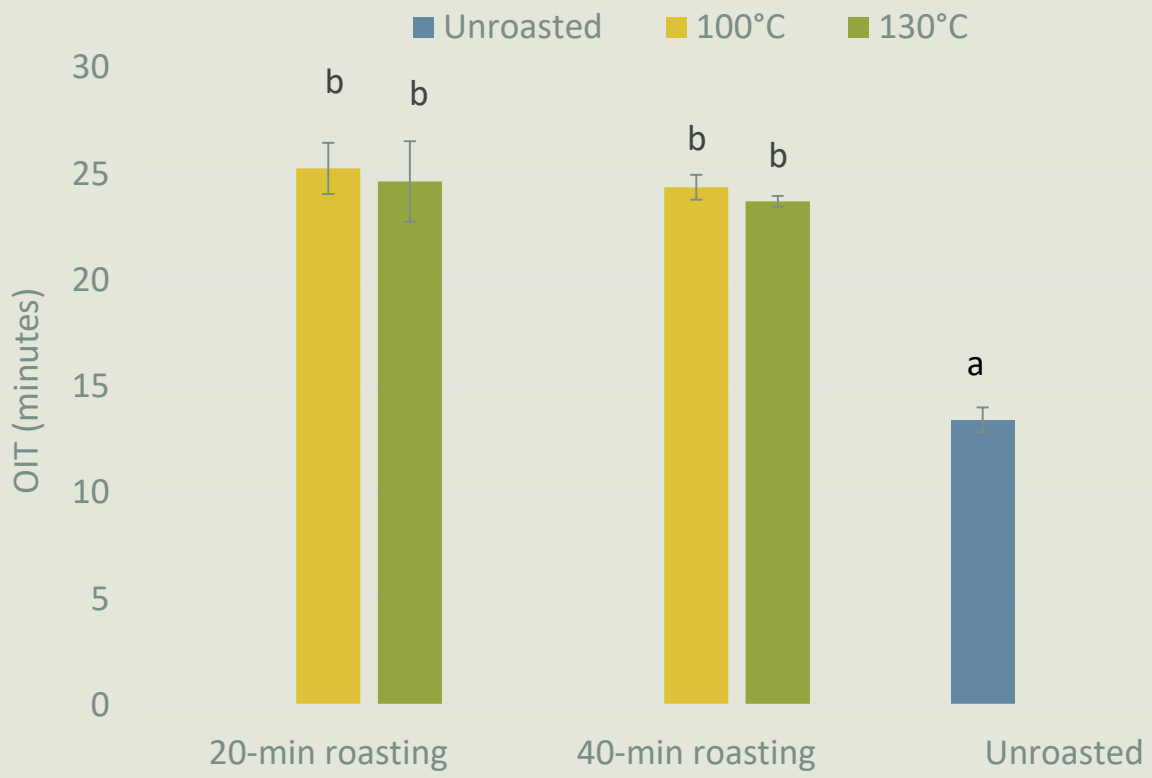
Introduction and Aim of Work

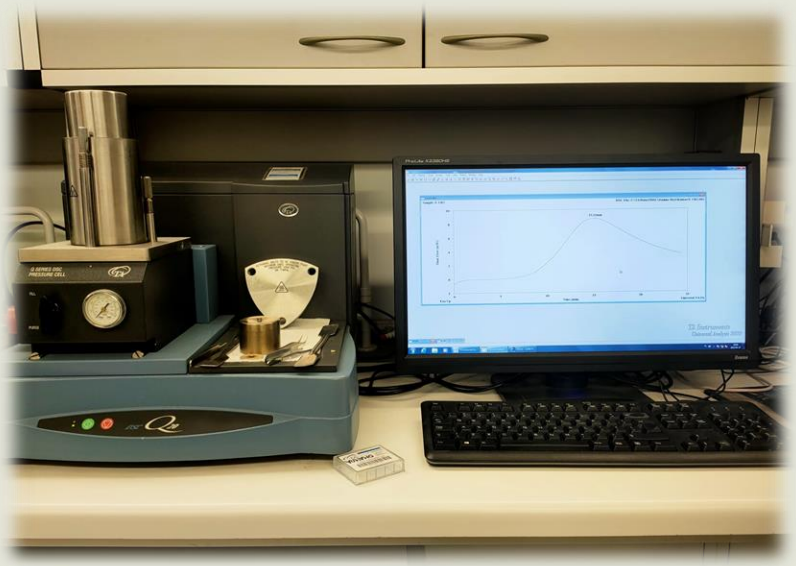
- Oats have been known for thousands of years. The earliest evidence of human consumption dates to more than 30 000 years ago.
- Oat grains are a great source of protein, fibre, minerals and fats.
- The BINGO oat variety was selected for this study. BINGO variety was characterized by the highest content of dietary fiber and a high index of bioactive values. Its yielding potential significantly exceeds the varieties present in the Polish market.
- Roasting is a temperature treatment without exceeding the roasted material's melting point. Roasting is one of the most common and important food processing, that significantly improves processed food taste, aroma, colour, tenderness, and crispness.
- Consuming oats can help prevent chronic diseases like cancer and cardiovascular disease. Lipids in oats have both a healthy and technological potential.
- **The aim of this research is to discuss the differences in quality characteristics of oils extracted from oats before and after roasting at different temperatures.**

Methods

- The roasting was done at 100°C and 130°C in the laboratory dryer for the duration of 20 and 40 minutes. Oil from roasted oats was extracted using Soxhlet method.
- **Oxidative stability** of extracted oil was determined using the calorimetric method. Raw experimental data was recorded with the use of the differential scanning calorimeter (DSC Q20 TA Instruments) equipped with a high-pressure cell (PDSC). The samples were placed in aluminium pans, filled with oxygen, and pressurised in an isobaric module (1400 kPa) with a temperature set at 120°C. The oxidative induction time was obtained from the PDSC curves.
- The determination of **fatty acid composition** was carried out by gas chromatographic analysis of fatty acid methyl esters (FAME). FAME was prepared according to the standard ISO method 5509 and injected into a gas chromatograph equipped with an FID detector according to ISO method 5508.
- Peroxidase (PV) of the oils was determined by iodometric technique and acid value(AV) by titration with 0.1 M ethanolic potassium hydroxide in correspondence with ISO standards 3960: 2007 and 660: 2009 respectively.
- The calorific value of the whole grains has been determined by using the calorimetric bomb.

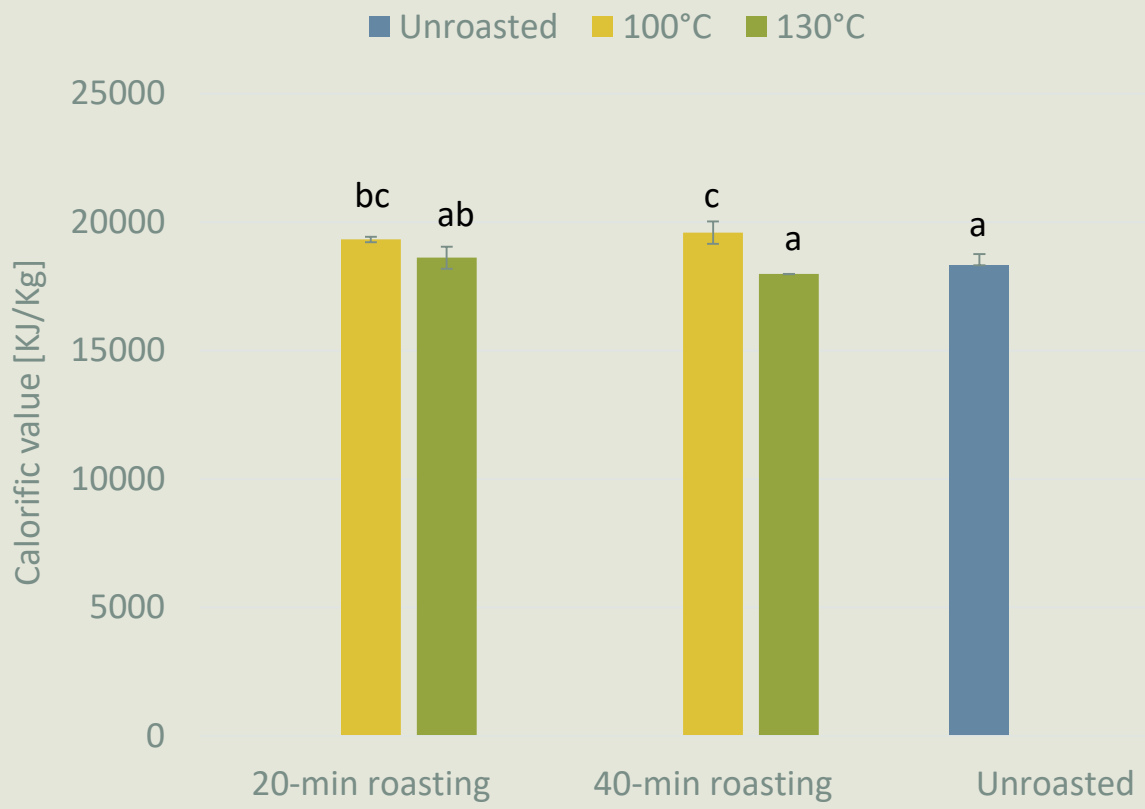
Results - Oxidation Induction Time (OIT)





*Different letters indicate that the samples are significantly different at $p < 0.05$

Results - calorific value of samples



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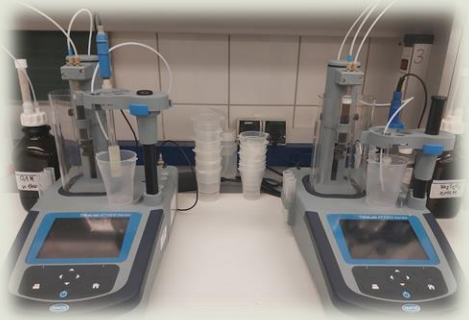
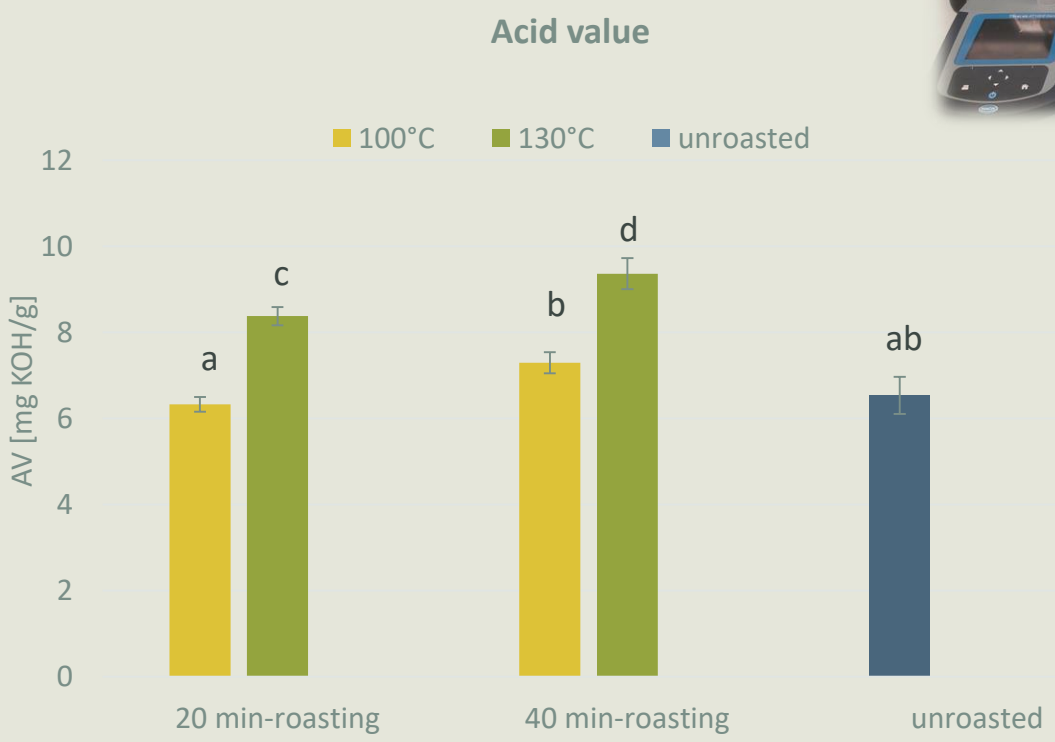
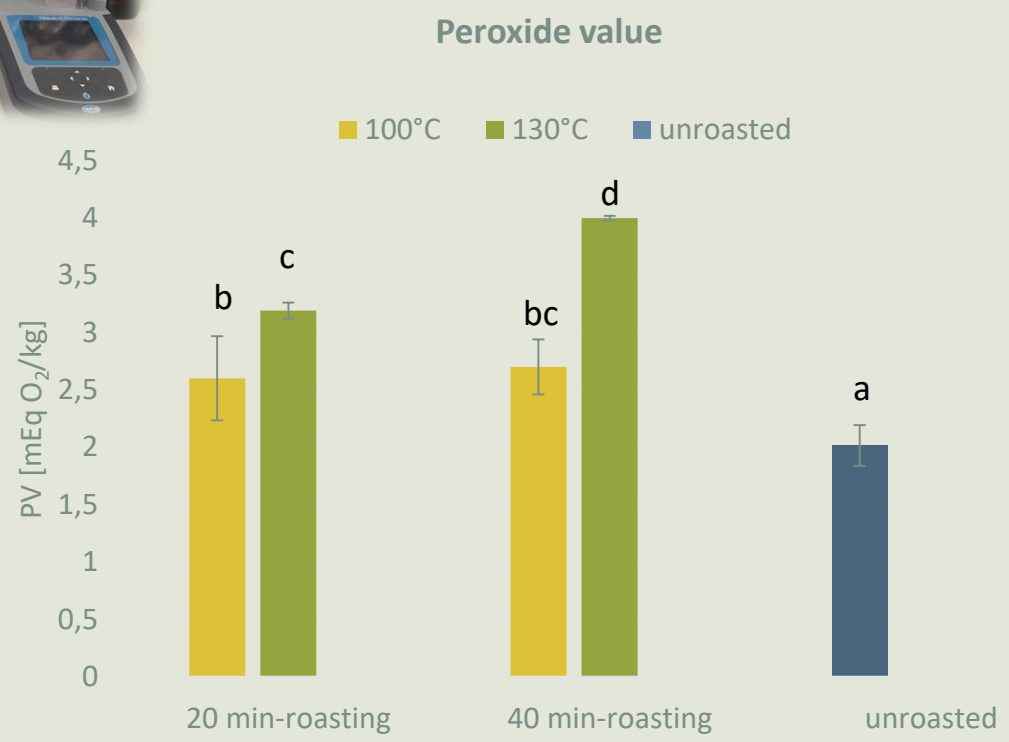
Results - acid and peroxide value

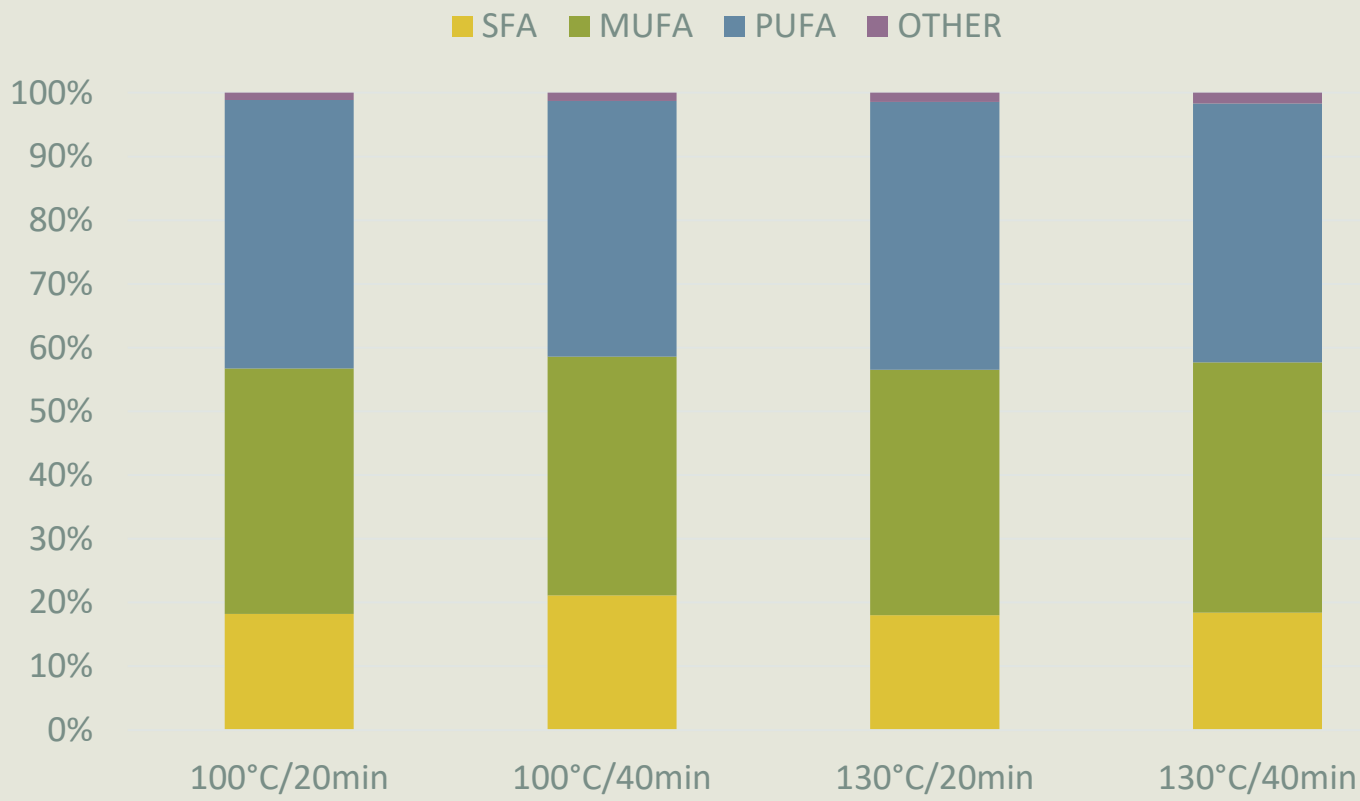






*Different letters indicate that the samples are significantly different at $p < 0.05$

Results - fatty acid composition



SFA- Saturated Fatty Acids MUFA- Mono Unsaturated Fatty Acids PUFA- Poly Unsaturated Fatty Acids

Results - fatty acid composition

FATTY ACIDS	UNROASTED	100°C/20 min	100°C/40 min	130°C/20 min	130°C/40 min
C14:0	0.23±0.14	0.35±0.01	0.55±0.30	0.35±0.01	0.40±0.08
C16:0	17.73±0.35	16.26±0.08	19.04±4.99	16.12±0.35	16.29±0.25
C16:1	0.240±0.001	0.32±0.01	0.38±0.09	0.32±0.02	0.34±0.01
C18:0	1.89±0.14	1.380±0.001	1.28±0.17	1.35±0.03	1.39±0.10
C18:1 n-9	42.10±0.18	37.00±0.02	35.95±2.40	37.02±0.14	37.41±0.46
C18:2 n-6	34.62±0.13	40.090±0.007	38.29±2.28	39.99±0.10	38.68±1.56
C18:3 n-3	1.20±0.01	2.03±0.01	1.84±0.22	2.06±0.01	1.94±0.08
C20:0	0.31±0.01	0.19±0.01	0.23±0.04	0.19±0.04	0.32±0.14
C20:1	1.68±0.04	1.16±0.02	1.16±0.23	1.18±0.64	1.51±0.52
OTHERS	1.080±0.001	1.19±0.07	1.26±0.16	1.410±0.001	1.70±0.61

Conclusions

- The data results of the samples were collected based on evaluations such as oxidative induction time, acid values, calorific value and fatty acid compositions.
- Oil from roasted oat grains is characterized by a lower acid and peroxide value than oil from grains that have not been heat treated.
- All analyzed oat samples were characterized by a high calorific value.
- The result obtained using PDSC shows the oxidative stability of the oil increased after the roasting process.
- The higher the temperature and longer the roasting time, the worse the hydrolytic and oxidative quality of the oil.
- Roasting does not cause significant changes in the composition of fatty acids.

Thank you for your attention!

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