

COMPARISON OF DIFFERENT METHODS FOR EXTRACTION OF BIOACTIVE COMPOUNDS FROM OAT FLAKES



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Introduction



- Grain products are the main source of carbohydrates but also they contain other bioactive compounds (BAC) such as phenolic compounds etc.
- Project overall aim is to increase a knowledge on impact of triticale and hull-less spring cereal species on human health potential by development of grain products with increased levels of bioactive compounds.

First step of experiment is to develop method for isolation of BAC. Factors influencing extraction efficiency could be divided in 2 parts:

- plant material properties (microstructure, particle size etc. and type of processing applied before extraction) (Tomsone et al., 2014);
- extraction parameters (temperature, mechanical treatment and solvent properties – polarity, physical parameters (Angela and Meireles, 2009).

The objective of the current research was to determine the optimal method and solvent for extraction of bioactive compounds from oat flakes.

Materials and methods

Full grain oat flakes
“Herkules” (JSC Rigas dzirnavnieks)

Conventional extraction

Solvents:

- ethanol (95%),
- ethanol / water (80/20 v/v);
- ethanol / acetone / water (7/7/6 v/v/v).

Extraction duration: 2, 5 and 17 hours

Ultrasound assisted extraction

Solvents:

- ethanol (95%),
- ethanol / water (80/20 v/v);
- ethanol / acetone / water (7/7/6 v/v/v).

Extraction duration: 20, 30 and 60 minutes

Soxlet extraction

Solvents:

- ethanol (95%),
- ethanol / water (80/20 v/v);
- ethanol / acetone / water (7/7/6 v/v/v).

Analytical methods

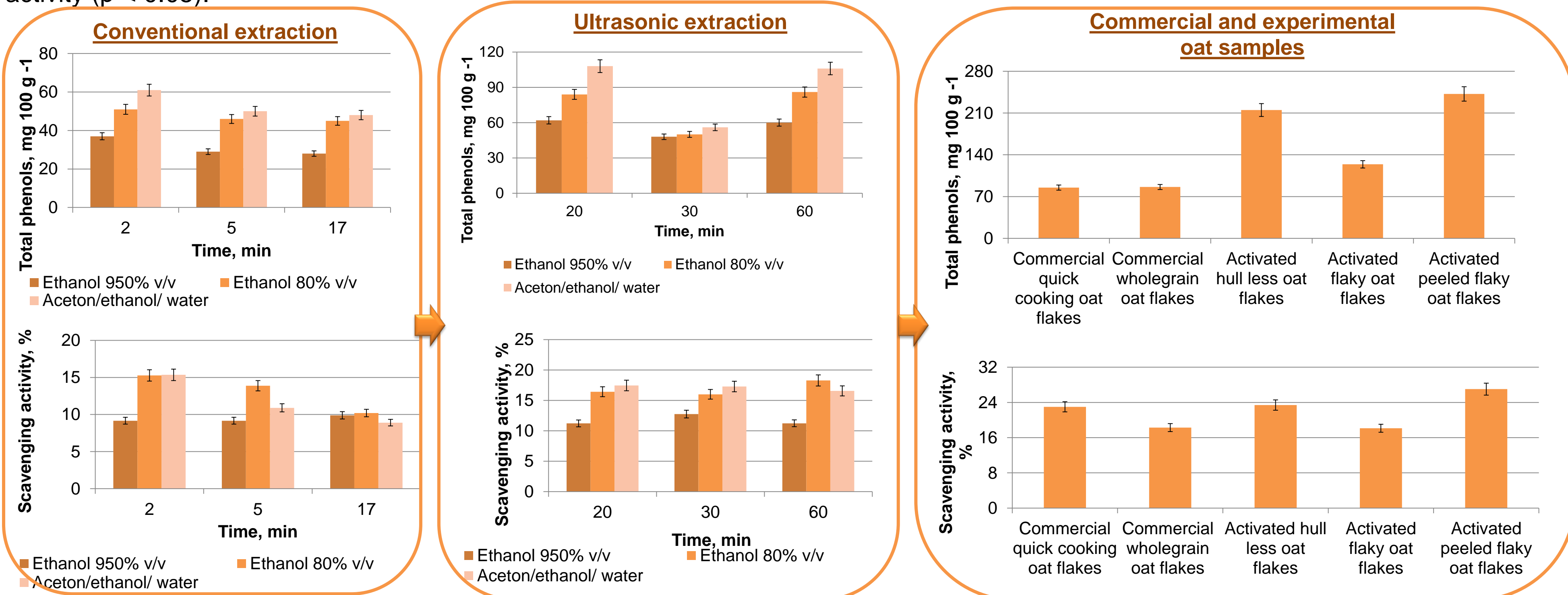
Total phenolic content (TPC), Total flavonoid content (TFC), Radical scavenging activity (RSA) (scavenging activities of the stable ($DPPH^{\cdot}$) radical and radical scavenging capacity by $ABTS^{\cdot+}$ radical cation assay

Selection of the extraction method

Analyses of different oat flakes using selected method

Results

Results showed that both method used for extraction and solvent are significant factors affecting phenolic content and radical scavenging activity ($p < 0.05$).



The highest $DPPH^{\cdot}$ activity in extracts obtained with ultrasound assisted extraction for 60 minutes (two times per 30 minutes) using ethanol/water solution was determined. Whereas the highest TPC in extracts obtained by ultrasound assisted extracts for 60 minutes with ethanol / acetone / water solution was determined.

Conclusion

Optimal method for extraction is ultrasound assisted extraction for 60 minutes, and solvent should be selected based on target compounds:

- for phenolic compounds – ethanol / water (80/20 v/v),
- for substances with antiradical properties ethanol / acetone / water (7/7/6 v/v/v) solution.

References

- Angela M., and Meireles A. (Eds.) (2009). Extracting Bioactive Compounds for Food Products Theory and Applications. Taylor & Francis Group, LLC, UK.
- Tomsone L., Kruma Z. (2014) Influence of freezing and drying on the phenol content and antioxidant activity of horseradish and lovage. 9th Baltic Conference on Food Science and Technology “Food for Consumer Well-Being”, FOODBALT 2014 Conference Proceedings, Jelgava, LLU, 2014, pp.192-197.

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