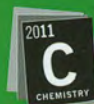




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4-P45

**COPPER, SELENIUM SUPPLEMENTED YEAST BIOMASS - A SOURCE OF MICROELEMENTS****ANEŽKA POLÁKOVÁ, SILVIA ŠILLEROVÁ, BLAŽENA LAVOVÁ, DANA URMINSKÁ and EVA SZABOVÁ***Department of Biochemistry and Biotechnology, Faculty of Biotechnology and Food Sciences, Slovak University of Agriculture, Tr. A. Hlinku 2, 949 76 Nitra, Slovakia  
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Yeast can accumulate of selenium and copper. After an absorption in gastro-intestinal tract, copper is bound to albumin. Selenium is incorporated into organic selenium-containing compounds, mainly selenomethionine<sup>1,2</sup>.

Production strain *Saccharomyces cerevisiae* 612 was cultivated under aerobic conditions for 48 hours with 0; 10; 20; 30; 40 and 50 mg l<sup>-1</sup> of sodium selenite and with 0; 20; 40; 60; 80; 100 µg CuSO<sub>4</sub> 100 mg l<sup>-1</sup>, respectively. The medium (YPD) contained (in g l<sup>-1</sup>): yeast extract 10; peptone 20; glucose 35. The Se content in yeast cells was found increased with increasing concentration of sodium selenite in the medium<sup>3</sup> and the highest value of Cu was reached using 100 µg of copper sulphate in the medium<sup>4</sup> (Table I).

Table I, Biomass yield and total selenium and copper content in *Saccharomyces cerevisiae* strain 612

Na <sub>2</sub> SeO <sub>3</sub>	Content of Se	CuSO <sub>4</sub>	Content of Cu
[mg l <sup>-1</sup> ]	[mg kg <sup>-1</sup> ]	[µg l <sup>-1</sup> ]	[mg kg <sup>-1</sup> ]
0	2,38	0	3,46
10	121	20	7,2
20	463	40	11,2
30	1068	60	14,8
40	1675	80	16,8
50	1741	100	21,6

This study confirmed the possibility of accumulation of selenium and copper by *Saccharomyces cerevisiae*. Se, Cu enriched biomass can be potentially used in human nutrition.

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## REFERENCES

- Skalická M., Koréneková B., Kožárová I.: *Potravinárstvo* 1, 64 (2009).
- Yin H., Fan G., Gu Z.: *Food Sci. Technol.* 43, 666 (2010).
- Poláková A., Szabová E., Urminská D., Šillerová S.: *Potravinárstvo* 1, 76 (2011).
- Šillerová S., Poláková A., Urminská D., Szabová E.: *Potravinárstvo* 1, 85 (2011).

4-P46

**EFFECTS OF EXTRACTION CONDITIONS ON THE ANTIOXIDANT ACTIVITY OF BUCKWHEAT AND SPELT FLOURS****BLANKA TOBOLKOVÁ<sup>1,2</sup>, MARTIN POLOVKA<sup>2</sup> and MILAN SUHAJ<sup>2</sup>***<sup>1</sup>Brno University of Technology, Faculty of Chemistry, Department of Food Science and Biotechnology, Purkyňova 118, 612 00 Brno, Czech Republic, <sup>2</sup>Food Research Institute, Department of Chemistry and Food Analysis, Priemyselná 4, 824 75 Bratislava, Slovak Republic  
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Cereals and pseudocereals (including spelt and buckwheat) play an important role in maintaining good health. Flours are significant source of bioactive compounds, e.g. dietary fibre, vitamins, minerals and last but not least phenolic compounds that are frequently associated with the health benefits of cereals. Functional foods are specially designed products with modified content of compounds of interest, most frequently antioxidants. To do so, it is important to optimize the extraction process leading to their isolation, characterization of their properties and to find conditions suitable for their application is a way promising their maximum efficiency in new matrix. The present study was focused on comparison of five different extractions solvent systems used to prepare extracts from spelt and buckwheat flours, i.e., absolute ethanol, 50 % ethanol in water (v/v), distilled water, 20% acetone in water (v/v) and 50% acetone in water (v/v). Antioxidant and radical-scavenging activities of extracts were tested involving several commonly assay, i.e. DPPH and ABTS<sup>•+</sup> by means both UV-VIS and EPR spectroscopy. Total phenolic content (TPC) was evaluated using Folin-Ciocalteu assay. Besides them, CIE Lab color coordinates of all samples were assessed under standardized conditions. As regards the results obtained, significant differences in TPC content were found especially between extracts prepared to absolute ethanol and 50% acetone. For both, spelt and buckwheat extracts, 50% acetone extract revealed the highest content of phenolic compounds compared to the other extraction systems. Antioxidant activity assessed using the ABTS<sup>•+</sup> test decreased in the order: 50% Acetone > 50% EtOH > 20% Acetone > H<sub>2</sub>O > EtOH, whereas in case of DPPH assays, antioxidant activity decreased in order: 50% Acetone > 20% Acetone > 50% EtOH > H<sub>2</sub>O > EtOH. Results obtained indicate that the extraction solvents significantly alter the antioxidant activity of spelt and buckwheat flour extracts. In summary, absolute ethanol is the least effective solvent for the extraction of phenolic compounds from both types of flours, followed by distilled water. On the contrary, 50% acetone could be recommended as a solvent suitable to prepare antioxidant extracts from spelt and buckwheat flours with maximum polyphenols yield.

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4-P83

**DETERMINATION AND COMPARATIVE STUDY OF SOLUBLE OXALATE IN GRAIN AMARANTH MUTANT LINES****ANDREA HRICOVÁ<sup>1</sup>, MILAN SUHAJ<sup>2</sup>, MONIKA KEČKEŠOVÁ<sup>3</sup> and ALENA GAJDOŠOVÁ<sup>1</sup>**

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Grain amaranth (*Amaranthus* spp.) is a widely known pseudocereal with interesting nutritional characteristics including proteins, well suited to human nutritional needs. Its highly nutritious gluten-free grain make amaranth a good alternative to cereals or legumes and can be used in gluten-free diet. However, there are also naturally occurring anti-nutrients like oxalate that represent potential risk factor for kidney stone development and its presence in food lowers calcium and magnesium availability<sup>1-4</sup>.

Soluble oxalate with potentially dietary injurious implications for human health were determined in some amaranth gamma-irradiation induced mutant lines by capillary isotachopheresis and compared to their reference genotypes *Amaranthus cruentus* Fichta and hybrid K-433 during the cultivation period 2006-2010. Factor and canonical discriminant analysis demonstrated significant differences among reference and mutant lines. Kruskal-Wallis one-way analysis of variance and multiple comparisons with t distribution confirmed statistical significant differences ( $p \leq 0,01$ ) among compared amaranth genotypes. Five out of nine tested lines were identified as variants with the significant and long-term lower soluble oxalate concentration in comparison to respective reference amaranth genotypes. Detailed analysis of other biochemical traits in these lines showed also improved nutritional quality of the grains over the control samples. Therefore, this plant material might be a good matrix in the further breeding programme of this crop.

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## REFERENCES

1. Hönow R., Hesse A.: *Food Chem.* 78, 511 (2002).
2. Chai W., Liebman M.: *J. Food Comp. Anal.* 18, 723 (2005)
3. Judprasong K., Charoenkiatkul S., Sungpuag P., Vasanachitt K., Nakjamanong Y.: *J. Food Comp. Anal.* 19, 340 (2005).
4. Lilbert B., Franceschi V. R.: *J. Agric. Food Chem.* 35, 926 (1987).

4-P84

**CADMIUM, LEAD AND MERCURY CONTENTS IN FISHES****TOMÁŠ TÓTH, ALENA VOLLMANOVÁ, JÁN TOMÁŠ, JAROSLAV ANDREJI, PETER LAZOR, JURAJ MIŠŠÍK, JURAJ TÓTH and DANIEL BAJČAN**

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Fish meat is a perfect foodstuff which is up to standard of rational nourishment. It is source of healthy and good digestible material rich on proteins, minerals and vitamins. Fish muscles especially back and lateral muscles are the most important parts of fish organism consumed for excellent chemical composition. Proteins in fish meat are rich on high aminoacids content. The content of fish fat is usually low with the high proportion of unsaturated fatty acids. Also minerals and B, A and D vitamins are very important components of this foodstuff. According to rational nourishment the fish meat should be consumed minimal 2-3 times weekly.

Our research was focused on analysis of bottom sediments in water reservoir Kolinany from the aspect of Cd, Hg and Pb contents, the determination of observed heavy metal contents in different parts of carp body and the evaluation of hygienic status and suitability of fish meat for the human consumption<sup>1,2</sup>. Our results confirmed hygienic harmless of bottom sediments in water reservoir Kolinany. The Cd, Pb and Hg contents in sediments represent no risk their input into the fish organisms. The Cd content in fish meat is lower than maximal available amount given by legislative norms, but in selected parts of fish organism such as skin, gills and fins the Cd hygienic limit is 2,9 – 6,6 times exceeded. The Pb content in fish meat is under the hygienic limit, only in skin, gills and fins is the content of this heavy metal 1,31- 2,64 higher than maximal available value given by legislative. Fish skin, gills and fins belong to the non consumed parts of fish body by people. The Hg content in fish meat is also lower than hygienic limit. The highest Hg content was observed in fish muscles ( $0,0544 \text{ mg kg}^{-1}$ ) and the lowest one in fish gonads ( $0,0058 \text{ mg kg}^{-1}$ ). The results of Cd, Pb and Hg content determination in carp body confirmed that fish muscles belong to suitable foodstuffs for the human consumption.

*This contribution is the result of the project implementation: Centre of excellence for white-green biotechnology, ITMS 26220120054, supported by the Research & Development Operational Programme funded by the ERDF.*

## REFERENCES

1. Andreji J., Stráňai I., Massányi P., Valent M.: *J. Environ. Sci. Health* 40, 899 (2005).
2. Andreji J., Stráňai I., Massányi P., Kačániová M., Valent M.: *J. Environ. Sci. Health* 41, 1071 (2006).