

**FARKAS, J. & BECZNER, J:** IN MEMORIAM JOHANN FRIEDRICH DIEHL (1929-2008). P. 1.

**Editorial: RASPOR, P:** The European declaration on food, technology and nutrition. Pp. 3-7. peter.raspor@bf.uni-lj.si

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**BÓNA, ADÁNYI, N., FARKAS, R., SZANICS, E., SZABÓ, E., HAJÓS, Gy., PÉCSVÁRADI, A. & ÁCS, E:** Variation in crop nutrient accumulation: selenium content of wheat and triticale grains. Pp. 9-15. lajos.bona@gk-szeged.hu

Selenium (Se), a main antioxidant component in cereal grain, is essential for animals and human health reducing risk factors of many dangerous diseases. Over the past decades, intake of this trace element had dropped due to low Se content in large areas of European countries including Hungary. Se-rich, high-protein cereal products became a focus for both animal feed and human consumption. In the study, we examined the following: i) grain Se concentration of wheat (*Triticum aestivum* L.) and triticale (*Triticosecale* Wittm.) intake to detect intra- and inter-genetic variations and ii) possible comparison relationship of this trace element to end product integrity, quality and relevant technological aspects. Se content of the whole meal grain was tested via atomic absorption spectroscopy (AAS). Despite generally poor Se soil content of the experimental area where samples were collected, significant differences were found for both species. In general, triticale contained higher Se concentration than wheat did. Spring type cereals had significantly higher grain Se and protein concentration than those of winter ones did. Grain Se content showed positive correlation with magnesium, copper, zinc, manganese, tocopherol and crude protein concentration. Remarkable intra-specific variations were found in Se concentration, however in future, additional studies, methods and resources will be required for identifying ways of increasing Se content in cereal foodstuff and feed.

**Keywords:** cereal, grain quality, antioxidant, bio-enhancement, selenium, protein, genotypes, variation

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**VETŐ-KISZTER, A., SCHUSTER-GAJZÁGÓ, I. & CZUKOR, B:** Heat sensitivity of different mustard (*sinapis alba* L.) Genotype myrosinase enzyme. Pp. 17-26. andrea.veto-kiszter@t-online.hu

Mustard seed (*Sinapis alba* L.) has valuable chemical composition and its cultivation in moderate climate, especially in Hungary is economic. In spite of the advantageous chemical composition and colloid-chemical properties, the use of mustard seed flour is limited in food industry or in animal feeding because of its pungent taste. The pungent taste develops through the action of myrosinase enzyme; but it could be eliminated by heat inactivation of the enzyme. In the course of our preliminary experiments, it was observed that the heat inactivation of the myrosinase enzyme depended on mustard variety. The heat stability of myrosinase enzyme prepared from different mustard varieties was examined and compared in our research work. Crude myrosinase enzyme was prepared from three mustard genotypes (Budakalászi, Tilney, and LM-1 (a low erucic acid content cultivar) and the heat stability was determined at 60, 70, or 80°C for 5, 10, 15, 20 and 30 min. The semi-logarithmic plots of myrosinase activity as a function of time at different temperatures indicated that heat inactivation of crude myrosinase enzyme follows first-order kinetics. Characterising the rate

of inactivation by the slope of the curve, significant differences were established in heat stability between genotypes at 60°C. There were no significant differences between varieties at higher temperatures (70 and 80°C). Longer than 10 min heat treatment causes more than 90% inactivation of the enzyme.

**Keywords:** mustard seed, myrosinase enzyme activity, enzyme inactivation, heat treatment, residual enzyme activity, rate of inactivation

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**HELYES, L., LUGASI, A., POGONYI, Á. & PÉK, Z:** Effect of variety and grafting on lycopene content of tomato (*Lycopersicon lycopersicum* L. Karsten) fruit. Pp. 27-34. Helyes.Lajos@mkk.szie.hu

Lycopene, found primarily in tomatoes, is a member of the carotenoid family and has potent antioxidant capability. The aims of the present study were: 1) to investigate the effect of grafting on lycopene content of tomatoes, and 2) to evaluate the effects of different varieties on lycopene content (open-field with supporting-system, open-field with processing varieties) under the same ecological conditions.. The effect of grafting on lycopene content was analyzed in the case of two varieties, between the years 2001 and 2003. Lycopene content of tomato fruits decreased significantly by grafting. Ten commercial varieties of tomato produced in Hungary were examined for their lycopene content. Lycopene content of tomato turned out to be extremely diverse, and variable (63.0-155.0 mg/kg fresh weight). It was found that the variety of tomato is one of the most important determinants of lycopene content.

**Keywords:** Biotic factors, variety, grafted plant, lycopene, tomato

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**M. ZOMMARA, M., HUNG, M., IMAIZUMI, K. & ATTA, M:** Growth parameters and tissue lipid profiles of c57pl/6n mice fed roselle seed oil. Pp. 35-43. bassimatta@yahoo.com

The effect of diets containing corn, olive, roselle seed oils and ghee (pure milk fat) on growth and tissue lipid profiles of C57PL/6N mice was investigated. No diet had deleterious effect on mice growth; however milk fat significantly increased mice body weight gain. Comparing with ghee, vegetable oils reduced serum cholesterol whereas corn oil had the superior effect. Serum of mice fed olive oil and ghee held significantly higher levels of HDL cholesterol than the other groups. Among all mice, serum total/HDL cholesterol ratio was significantly lower in corn oil group, however, the olive oil diet significantly reduced serum LDL cholesterol. The ghee group held significantly eminent serum triglycerides (TG) content. Liver cholesterol content of mice fed corn or roselle seed oil was significantly lower than that of the other groups. The weight of adipose tissue and its content of TG were comparable among all groups. The present study demonstrates for the first time the nutritional properties and beneficial effects of roselle seed oil on tissue lipid profiles using experimental animals. The obtained results may support the claim of using roselle seed oil in human nutrition.

**Keywords:** corn oil, olive oil, roselle seed oil, ghee, C57PL/6N mice, lipid profile

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**KOLADO, W. & BALCERZAK, M:** Tthe examination of migration of primary aromatic amines from laminated plastic food packaging materials into food simulants by

spectrophotometric method. Pp. 45-54. mbal@ch.pw.edu.pl

Technological progress in the production of attractive food packaging materials results in the introduction to the market of products containing a large variety of chemical substances. The occurrence of potentially toxic compounds in food contact packagings may cause problems to health of consumers. The problem of the occurrence of primary aromatic amines (PAAs), exhibiting high toxicity to humans, in widely used laminated food contact materials is discussed in this work. Legislation introduced in the European Union countries limiting the migration level of PAAs into foodstuffs is presented. Methods of the examination of migration of PAAs from packaging materials into food simulant solutions are described. The results obtained for twelve examined materials by the use of a spectrophotometric method based on the diazotisation of amines and coupling of the diazo salts with N-(1-naphthyl) ethylenediamine are presented.

**Keywords:** food-packaging materials, laminates, primary aromatic amines, migration, UV-VIS spectrophotometry

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**FIRTHA, F:** Detecting moisture loss of carrot samples during storage by hyperspectral imaging system. Pp. 55-66. ferenc.firtha@uni-corvinus.hu

Moisture-content is one of the most significant properties to determine quality of carrot during storage. The optical measurement methods of moisture content promise non-destructive, non-contact and fast solution for quality control, for monitoring quality changes during storage and also for real-time classification tasks. The high absorption coefficient of water makes NIR analysers a commonly used tool for accurate moisture analysis. Hyperspectral system is able to detect the spatial distribution of reflectance spectrum as well. In case of finding correlation between the moisture-content of carrot and the reflectance spectral data, a hyperspectral system would be suitable for testing quality. Experiments were made to investigate spectral changes of different cultivars and different tissues of carrot stored under different conditions. Moisture-decrease of pieces and also the spectral data of carrot slices were recorded. Statistical analysis of the data has shown the optimal intensity function to describe moisture-content. Eliminating homogeneous spectral changes caused by destructed tissues, only a narrow interval of NIR range was sensitive to the moisture-decrease of xylem tissues. The equipment and the measurement procedure were able to identify carrot tissues and detect their changes during drying. For non-destructive applications of the system, further experiments are needed to inspect the behaviour of rhizodermis.

**Keywords:** hyperspectral, calibration, noise, real-time data reduction, carrot, moisture content

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**BUDIĆ-LETO, I., VRHOVŠEK, U., GAJDOŠ KLJUSURIĆ, J. & Lovrić:** Anthocyanin pattern of skin extracts from the babiĆ and plavac mali grapes and anthocyanin pattern of the produced wine. Pp. 67-75. irena@krs.hr

Anthocyanin composition and profile were analyzed in skin extracts from red grapes and wines of the autochthonous Croatian cultivars of BabiĆ and Plavac mali by HPLC-DAD-MS method. Higher relative abundance of malvidin-3-monoglucoside and lower relative abundance of peonidin-3-monoglucoside and cyanidin-3-monoglucoside were identified in wine in relation to their earlier abundance in grapes. Using principal component analysis

(PCA), the wine samples showed differences between wine types, although the grape samples did not show any considerable differences concerning the anthocyanin composition. The main differences between Babić and Plavac mali wines were detected in a monoglucoside acetate (malvidin-3-monoglucoside acetate), a monoglucoside-caffeoate (malvidin-3-monoglucoside caffeoate) and a group of monoglucosides (malvidin-3-monoglucoside, delphinidin-3-monoglucoside), petunidin-3-monoglucoside and peonidin-3-monoglucoside).

**Keywords:** grape, wine, anthocyanins, HPLC-DAD-MS, Babić, Plavac mali, PCA

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**DE LEONARDIS, A., MACCIOLA, V. & NAG, A:** Antioxidant activity of various phenol extracts of olive-oil mill wastewaters. Pp. 77-86. [antomac@unimol.it](mailto:antomac@unimol.it).

In this laboratory research, we produced and compared different phenol extracts from olive-oil mill wastewaters. The extracts and sample preparation was as follows: 1 CW-Acetone (wastewater, previously centrifuged and treated with acetone to precipitate colloid substances); 2 CW-Ac-HCl-EtAc (this extract was recovered by ethyl acetate from the 1 CW-Acetone prior to being hydrolysed by 1N HCL at 80 °C for 1 h); 3.2 CW-20% MetOH and 4.2 CW-80% MetOH (fractions separated by solid-liquid extraction (SPE) with methanol:water mixtures at 20% and 80% (v/v), respectively). Determined in each sample were: (i) total phenols and ortho-di-phenol conducted by spectrophotometric methods; (ii) phenol composition by HPLC analysis and finally, (iii) antioxidant activity on a lard sample, using rancimat test under 120 °C temperature and 20 l h<sup>-1</sup> air flow. The extract 1 CW-Acetone, composed essentially of local wastewater phenols, was less effective than the other extracts. Best antioxidant extract was 3.2 CW-20% MetOH that prolonged the lard's oxidative stability 3.5 and 7.0 times at doses of 100 and 200 mg kg<sup>-1</sup>, respectively. Antioxidant effectiveness of the various extracts were found to be directly correlating with percentage of free hydroxytyrosol. Finally, antioxidant properties of olive-oil mill wastewater extract samples was found to be the result of their phenol composition rather than their phenol content.

**Keywords:** olive-oil mill wastewater; food antioxidant; natural phenols; hydroxytyrosol.

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**MANZANO, M., GIUSTO, C., IACUMIN, L., CANTONI, C. & COMI, G:** Molecular methods for *Bacillus cereus* and *Bacillus thuringiensis* from humans, pesticides and foods, differentiation. Pp. 87-95. : [marisa.manzano@uniud.it](mailto:marisa.manzano@uniud.it) *B. cereus* and *B. thuringiensis* strains have been associated with gastro-intestinal infections due to enterotoxins production. The possibility of differentiating between *B. cereus* and *B. thuringiensis* is a real need in preventing intoxication and in monitoring potentially contaminated foods. The use of DNA comparison provides clearer results than classical microbiological methods in distinguishing *B. cereus* from *B. thuringiensis*. The use of a Polymerase Chain Reaction (PCR) followed by Endonuclease Restriction (RE) made the distinction possible in spite of the huge similarity between the two closely related species

**Keywords:** RE, PCR, *Bacillus cereus*, *Bacillus thuringiensis*, food

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**SZABÓ, A., BÁZÁR, G., ANDRÁSSY-BAKA, G., LOCSMÁNDI, L. & ROMVÁRI, R:** A near infrared spectroscopic (nir) approach to estimate quality alterations during prolonged heating of lard. Pp. 97-106. [szan1125@freemail.hu](mailto:szan1125@freemail.hu) Lard is a preferred frying fat in the Hungarian culinary routine. Our study aimed at measuring conventional fat quality indices

and performing NIR-based calibrations of those indices, during prolonged heating. Lard was heated for 4 days at 8 different temperatures (160, 170, 175, 180, 185, 190, 200 and 230 oC) for 8 hours a day (n=32+1, i.e. the original sample). Acid value (AV) and carbonyl value (CON) increased in parallel with the duration of heating and heating intensity.. Peroxide value (PV) increased in the first 8 hours, and decreased back during further treatment. P-anisidine value (pAV) increased at each heating temperature below 200 oC, while temperatures above 200 oC decreased it. NIR analysis (NIRSystems 6500) was performed on original samples in transfectance mode (400-2500 nm wavelength range, 0.1 mm layer thickness, aluminium-plated reflector). Treatment characteristics (temperature, heat-sum, sampling event) could be estimated effectively. Calibration for AV was robust: R<sup>2</sup>=0.927; 1-VR =0.786. Weak relationship was found for PV (R<sup>2</sup>=0.48) and CON (R<sup>2</sup>=0.109). For pAV, good calibration was gained, expressly below 200 oC, in the 2000-2500 nm wavelength interval (R<sup>2</sup>=0.912; 1-VR =0.772). Based on calibration and cross-validation results, NIR technique may be a rapid, solvent-free alternative for the estimation of acid value and p-anisidine value of lard below 200 oC.

**Keywords:** NIRS, lard, frying, deterioration

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**ARORA, S., JOOD, S., KHETARPAUL, N. & GOYAL, R:** Effect of germination and fermentation on ph, titratable acidity and chemical composition of pearl millet based food blends. Pp. 107-115. ramjood@rediffmail.com Two indigenous food mixtures were developed by mixing raw and germinated pearl millet flour, whey powder and tomato pulp (2:1:1w/w), autoclaving, cooling and then fermenting with *Lactobacillus acidophilus* curd (5%) which supplied 106 cells/ml to the slurry at 37 0C for 12h. The growth of *L. acidophilus* in germinated + autoclaved + fermented food mixture was found to be significantly higher (8.64 CFU g<sup>-1</sup>) as compared to non-germinated pearl millet based food mixture. Significant drop in pH with corresponding increase in titratable acidity was also observed to be maximal in germinated + autoclaved + fermented food mixture as compared to non-germinated food mixtures. Germination and probiotic fermentation did not bring about any significant effect on moisture, fat and ash contents whereas significant change was observed in crude protein and crude fibre contents. A significant (p<0.05) reduction in the contents of phytic acid and polyphenols was noticed due to cumulative effect of germination, autoclaving and fermentation, which ultimately caused significant improvement in protein digestibility by about 44% in non-germinated and 55% in germinated food mixtures, respectively.

**Keywords:** Pearl millet, *L. acidophilus*, pH, titratable acidity, proximate composition, antinutrients, in vitro protein digestibility

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A REVIEW:

**BÁNÁTI, D:** Animal cloning for food supply. Pp. 117-132. d.banati@cfri.hu

Cloning by somatic cell nuclear transfer (SCNT) involves replacing an egg's nucleus with the nucleus of an adult cell (or that derived from an embryo or foetus) to be cloned, and then activating the egg's further development without fertilisation. Provided that unhealthy clones would be detected at veterinary inspection and quality controls and thus be prevented from entering the food chain, the currently available data indicate that food products from clones of cattle and pigs and their progeny are as safe as food products of livestock derived by



conventional breeding. None of the available studies have identified any differences outside the normal variability in the composition of meat (cattle and swine) and milk (cattle) between clones or clone progeny, and their comparators. After years of study and analysis it has been concluded that meat and milk from clones of cattle, swine and goats and the offspring of clones from species traditionally consumed as food, are as safe to eat as food from conventionally bred animals. Doubts have been expressed whether the current situation regarding the welfare and health of animal clones is ethically justified by the existing arguments in support of cloning for food.

**Keywords:** animal cloning, cloned food, food safety, animal welfare, ethics, perception, SCNT

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**BARTH, O.M., MUNHOZ, M.C. & LUZ, C.F.P:** Botanical origin of apis pollen loads using colour, weight and pollen morphology data. Pp. 133-139. barth@ioc.fiocruz.br

Samples of commercially available bee pollen loads or pellets, denoted by common names and presenting several colours, were examined using pollen analysis in order to obtain their botanical and regional origin. Two grammes of each of the nineteen well-mixed samples, comprising of c. 300 pellets, were used. Each sample was grouped into subsamples considering the colour of the loads that were weighed again. Pollen slides were prepared without the use of acetolysis. Thirteen samples presented a dominant pollen type of equal or more than the half of the sample's weight. The dominant pollen loads may be monochromatic or polychromatic, and the identified pollen types were of *Arecaceae*, *Baccharis*, *Brassicaceae*, *Crotalaria*, *Eupatorium*, *Myrcia*, *Mimosa scabrella* and *Piper*. These taxa indicated that the samples proceeded from the South and Southeast regions in Brazil. The common names agreed with the scientific names only in three samples. In other samples they did not agree with the dominant pollen type. Pollen analysis, therefore, is a very useful technique for the exact identification of floral and regional pollen origin.

**Keywords:** Apis, pollen loads, pollen analysis, load's weight, load's colour, trophic origin, vegetation

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**SREČEC, S., REZIĆ, T., ŠANTEK, B. & MARIĆ, V:** HOP PELLETS TYPE 90: INFLUENCE OF MANUFACTURE AND STORAGE ON LOSSES OF -ACIDS. Pp. 141-147. bsantek@pbf.hr

Hop pellets type 90 are the most frequent hop products used in brewing. They are usually manufactured by drying hop cones, temporary storage of dry and pressed cones, milling and pelletising. Other possibility is a complete integration of hop harvest, cone drying, milling and pelletising in continuous process without temporary storage of pressed cones. The paper deals with the losses of bitter substances (primary -acids) during hop cones drying, their pelletisation by two manufacturing procedures and storage in different conditions. The results of this study show that integrated procedure of hop pelletising decreases the total loss of -acids compared to the usual procedure. During storage of hop pellets (produced by integrated procedure) the highest decrease (loss) of -acids content was observed in pellets stored at 21°C in the presence of air and the lowest under inert atmosphere (N<sub>2</sub>) at 4 to 7°C, respectively.

**Keywords:** hop pellets type 90, manufacture, storage, -acids loss