

Editorial: BECZNER, J.: Microbial stress, stress adaptation and food safety. pp. 1-3.
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VERBEKE, W. & PIENIAK, Z.: Benefit beliefs, attitudes and behaviour towards fresh vegetable consumption in Poland and Belgium. pp. 5-16. wim.verbeke@UGent.be

This paper reports findings from a cross-sectional consumer survey on benefit beliefs, attitudes and behaviour towards fresh vegetables in Poland and Belgium. The Theory of Planned Behaviour (TPB) served as basic frame of reference for the analysis of consumer's decisions towards fresh vegetables. Benefit beliefs were investigated through principal component analysis and used for belief-based market segmentation. Health prevention, hedonism and nutrition are found to be the main beliefs associated with eating fresh vegetables. Three distinct clusters with different socio-demographic composition, attitudes and behaviour emerged. The findings point towards a need for greater attention to young males in future health communication, irrespective of nationality. Polish consumers claim lower fresh vegetable intake, despite stronger health benefit beliefs as compared to Belgians. Potential explanations for cross-national differences may pertain to the availability and variety of fresh vegetables, particularly during winter time. Investigation of the TPB confirms a strong positive predictive link between attitude and behavioural intention of eating fresh vegetables, as well as between intention and behaviour in the strict sense. Perceived behavioural control and subjective norm were insignificant as determinants of behavioural intention in the TPB model.

Keywords: benefit beliefs, consumer, fresh vegetables, Theory of Planned Behaviour

VECSERI-HEGYES, B, FODOR, P. & HOSCHKE, Á.: The role of zinc in beer production, Part II. Fermentation. pp. 17-24. beata.vecseri@uni-corvinus.hu

Fermentation of wort is the most critical step of beer production. Fermentation difficulties may be caused by inadequate wort composition i.e. insufficient supply of trace elements. Wort provides trace elements for yeast. Among them zinc, which is essential for beer fermentation, is not available in the required amount in wort.

Zinc utilization in fermentation was studied in beers made with adjunct (maize, barley). Inductively coupled plasma-atomic emission spectrometry was used as analytical method for the determination of zinc concentration.

Addition of zinc made the fermentation faster. The best result was achieved at 0.4 mg l⁻¹. Synthesis of aroma compounds was also promoted at this concentration. Concentrations higher than 0.4 mg l⁻¹ did not affect significantly either the fermentation rate or the maximal ethanol concentration. Addition of zinc at the end of wort boiling did not prove to be practical, it is better to supply yeast with zinc.

Keywords: zinc, beer, trace elements, fermentation, adjunct

SZENTPÉTERY, ZS., KLEINHEINCZ, CS., TARNAWA, A & JOLÁNKAI, M.:
Herbicide residues' changes in wheat samples in late weed control. pp. 25-31.
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Since the change of the Hungarian agriculture the increased weed infection causes great losses in wheat. It is necessary to apply herbicides on the weedy field as harvest approaches to make the harvest easier and avoid losses. In our small plot trials at Nagygyombos, between 1996 and 2002 the applicability of fluroxipir, bromoxynil, dicamba, tribenuron-metil and MCPA in late weed control was examined in four wheat varieties. We found that the late application against weeds did not have a total eliminating effect, however reduced the number of weeds, restricted their development and the reproductive organs below and above ground dried. Weed seed infection was slowed down and the dried stems made harvesting easier. In the last three years, we found that fluroxipir (Starane) and tribenuron-metil (Granstar) impeded a little the maturing and water extraction in the milk maturation stage of wheat, but this difference was not seen in full maturation. Examinations showed that after late weed control, all of above-mentioned chemicals except bromoxynil (Pardner) was discharged at the time of the harvest and were under the maximum residue tolerance limit. So the experimentally involved herbicides can be used for late weed control – in accordance with international experiences.

Keywords: wheat, late weed control, herbicide residue, chemical breakdown

MULLEROVA, D., MULLER, L., SCHNEIDROVA, D. & ZLOCH, Z.: Czech Republic.
pp. 33-40. dana.mullerova@lfp.cuni.cz

Nutrition plays an important role in the health and development of children. Therefore, it is necessary to make the correct recommendations as well as knowing the real state of nutrition of the children involved. In the scope of prospective longitudinal monitoring of 200 children, randomly selected at birth from 2 regions of the Czech Republic, an examination of their dietary intake and food composition in the year 2000/2001 during their 14-25 months of age (mean 19.2±2.7 months) was performed. A standardised food frequency questionnaire was administered to the whole sample (response rate through mothers was 98%). Moreover, every second mother who has not yet breastfed the child was asked for a 24-h dietary weight record of her child (response rate 79%). Twelve percent of the children were long term breastfed. The "Food pyramid" of sample was created by the following daily portions: milk and dairy (3.5), other protein-rich food (1.0), fruits and vegetables (4.2) and cereals (2.5). The energy intake of non-breastfed children, comprising of 15% protein (41.7±17.4 g), 35% fat and 50% carbohydrates, was 4.9±1.6 MJ. The results of micronutrient dietary intake in comparison to the European „Population Reference Intake” were satisfying with the exception of iodine. The analysis of the nutrition of Czech children aged 14-25 months did not show any serious problem without a low representation of long-term breastfed children and probably lower intake of iodine, when compared with European recommendations.

Keywords: toddlers, dietary intake, food composition, breast-feeding

BLÁZOVICS, A., FEHÉR, E., KOCSIS, I., RAPAVI, E., SZÉKELY, E., VÁLI, L. & SZENTMIHÁLYI, K.: How can Beiqishen tea consumption influence redox homeostasis in experimental hyperlipidemy? pp. 41-52. blaz@bel2.sote.hu

In general, biologically active polyphenolic compounds have indirect lipid lowering effects, antioxidant properties and they can also eliminate the accumulated toxic metal elements in the liver in cases of hyperlipidemy. Because of all these, we studied the effect of Beiqishen tea on altered lipid metabolisms, redox parameters and on liver metal contents. Although it was expected, there was not any liver protecting activity of the Beiqishen tea extract in the hyperlipidemic rat model, which was proved by biochemical and morphological studies. The reason for our expectation was the significant polyphenol content of Beiqishen tea. Although, the detoxifying activity of tea polyphenols could be observed in hyperlipidemy, at the same time toxic metal element content (As, Mo, Ni, Pb and Cr) of the tea infusion accumulated in the liver in both normo- and hyperlipidemic rats.

Keywords: antioxidants, trace elements, redox homeostasis, Beiqishen tea

Antal, M., Regöly-Mérei, A., Biró, L., Nagy, K., Fülöp, J., Beretvás, E., Gyömörei, E., Kis, O., & Vámos, A.: Nutrition, life-style practice, serum vitamin D concentration and bone density in Hungarian adolescents. pp. 53-61. antalm@oeti.antsz.hu

This study investigates the nutritional status, life-style practices, serum vitamin D and bone density of adolescents. A total of 326 adolescents, aged between 11 and 14 years, were involved in the present examination: after winter 110 boys and 97 girls (March 2002 and February 2003), and after summer 66 boys and 53 girls (October 2002 and 2003) were investigated. Energy and nutrient intake and life-style practices were assessed. Body mass and height were measured, body mass index was calculated. Serum concentration of 25-hydroxyvitamin D [25(OH)D] was determined. Bone mineral density of calcaneus was measured. Protein intake was higher than the Hungarian RDA. All of the students had vitamin D intake far below the RDA, 33.3% of boys and 43.2% of girls had Ca intake below 70% of RDA, and sodium intake was more than twice higher than the RDA. After winter, 2% of boys and 8% of girls were considered vitamin D deficient and 11% and 19% vitamin D insufficient, respectively. After summer, 24% of boys and 21% of girls had 25(OH)D level over the reference range. The mineral content of bone was insufficient in 12.9% of boys and 10.4% of girls, respectively. The majority of the students had physical activity only in school, incorporated in the timetable.

Keywords: nutritional status, life-style, serum 25(OH)D, bone mineral density, adolescents

Mahmoud, Y. A.-G.: Biodegradation of water hyacinth by growing *Pleurotus ostreatus* and *P. sajor-caju* and trial for using in production of mushroom spawn. pp. 63-72. Yehiam@dec1.tanta.edu.eg

Two *Pleurotus* species were used to ferment water hyacinth (*Eichhornia crassipes*) plants without roots. The mushroom delignified the lignocellulose of water hyacinth and produced sugar, protein and organic matter. *Pleurotus ostreatus* and *P. sajor-caju* delignified 26.2±2.0 and 30.4±3.0 % of the plants and utilized most of its hemicellulose after 7 weeks under its growing condition more than in solid-state fermentation. The produced biomass was enriched with mycelia protein, organic matter and reducing sugars, which increased gradually with incubation time. The effect of incubation time and moisture contents on spawn production by using chopped water hyacinth biomass was also studied. Seventy percent moisture content

and 14 days of incubation are the optimum conditions for spawn production for both tested *Pleurotus* species.

Keywords: water hyacinth, *P. sajor-caju*, *P. ostreatus*, cellulose, protein, solid-state fermentation, spawn

DVARANAUSKAITĖ, A., VENSKUTONIS, P. R. & LABOKAS, J.: Radical scavenging activity of raspberry (*Rubus idaeus* L.) fruit extracts. pp. 73-83. rimas.venskutonis@ktu.lt

Thirty one raspberry (*Rubus idaeus* L.) plants were collected in different natural habitats of Lithuania located in 17 districts and replanted in the experimental field. The fruits from different accessions were extracted with ethanol and the extracts were tested for their antioxidant activity (AA) by using ABTS^{•+} radical cation decolourisation and DPPH[•] radical scavenging methods. All tested raspberry fruit extracts were antioxidatively active; their radical scavenging capacity at the applied concentrations varied from 52.9 to 92.6% in DPPH[•] reaction system and from 52.5 to 97.8% in ABTS^{•+} system. The total amount of phenolic compounds in fruits varied from 5.6 to 13.7 mg of gallic acid equivalents in 1 g of plant extract. However, strong correlation between the radical scavenging capacity and the total amount of phenolic compounds in the fruit extracts was not observed, which indicates remarkable differences in the composition and antioxidant power of phenolic compounds present in the fruits harvested from raspberry accessions collected from different natural habitats. Most likely, environmental conditions and genetic factors should play an important role for the accumulation of active compounds in raspberry fruits.

Keywords: raspberry fruits, *Rubus idaeus*, radical scavenging, total phenolics

LUGASI, A., HÓVÁRI, J., HAGYMÁSI, K., JAKÓCZI, I. & BLÁZOVICS, A.: Antioxidant properties of a mixture of *Lamiaceae* plants intended to use as a food additive. pp. 85-97. lugasi@oeti.antsz.hu

Culinary herbs and medicinal plants could be used as natural food ingredients to replace synthetic antioxidants. Two natural antioxidant preparations, namely Rosmol (liquid) and Rosmol-P (powder) were produced by extraction from a mixture of medicinal plants belonging to the *Lamiaceae* family, such as rosemary (*Rosmarinus officinalis* L.), self heal (*Prunella vulgaris* L.), hyssop (*Hyssopus officinalis* L.), and lemon balm (*Melissa officinalis* L.). The main active compound of the extract is supposed to be a phenolic (caffeic) acid derivative. The total polyphenol content of the preparations is very high, 8.72 g l⁻¹ for Rosmol, and 93.7 g kg⁻¹ for Rosmol-P. The products acted as primary and secondary antioxidants, chelating transitional metal ions and inhibiting the autoxidation of linoleic acid. Rosmol and Rosmol-P scavenged free radicals formed during Fenton type reaction measured by chemiluminometry, and also exhibited strong antioxidant property in Randox TAS measurement. The antioxidant activity of the products was unchanged after six months of storage. According to the *in vitro* studies, the products are suitable to use as antioxidant ingredients instead of synthetic ones in lipid containing food products.

Keywords: rosemary, self heal, hyssop, lemon balm, *in vitro* antioxidant activity

LUKÁCS, GY., LINKA, B. & NYILASI, I.: *Phaffia rhodozyma* and *Xanthophyllomyces dendrorhous*: astaxanthin-producing yeasts of biotechnological importance. A minireview. pp. 99-107. lgly2@freemail.hu

The nutritional value of carotenoids such as α - and β -carotene, β -cryptoxanthin and astaxanthin has been known for many years, and their antioxidant properties and their efficiency in the prevention of certain human diseases have also been claimed. Accordingly, interest in these compounds from a nutritional aspect has increased substantially. *Phaffia rhodozyma* and *Xanthophyllomyces dendrorhous* are the most promising industrial sources of astaxanthin. Since *Phaffia* was described in 1972, many studies of the phylogenesis, and biochemical and biotechnological properties of this red-pigmented yeast have been performed. The commercial demand for astaxanthin is increasing and, although biological production is still not economical, progress is being made in strain improvement and in fermentation methods.

Keywords: astaxanthin, *Phaffia rhodozyma*, *Xanthophyllomyces dendrorhous*

SZAMOS, J.: Behaviour of carp proteins and corn proteins in three-phase partitioning. pp. 109-116. j.szamos@cfri.hu

In three-phase partitioning (TPP) ammonium sulphate and 2-methyl-2-propanol (*tert*-butanol) are used for separation of proteins by collecting and concentrating them into the middle layer or third phase of the system. During the last two decades, TPP has been primarily applied to enzyme purification at laboratory scale, however, its analytical type application for investigating meat has also been reported. Here, an experimental set of TPP feasible to analytical scale experiments is described to study partitioning behaviour of carp and corn proteins.

In partitioning experiments, corn proteins extractable with borate buffer, and sarcoplasmic proteins of carp were investigated. In the pH-range of 4.8–7.9, composition of partitioned corn proteins showed independence of pH as it was indicated by nonequilibrium pH gradient electrophoresis (NEpHGE) patterns. In case of carp, the alterations of protein composition in the pH-range of 3.7-8.0 unambiguously indicated the pH-dependent partitioning of carp proteins.

The analytical scale method, based on three-phase partitioning is a new approach to investigate food proteins

Keywords: three-phase partitioning, carp sarcoplasmic proteins, corn proteins

STÉGER - MÁTÉ, M., HORVÁTH, D. & BARTA, J.: Investigation of colourant content and stability in elderberry (*Sambucus nigra* L.). pp. 117-126. monika.stegernemate@uni-corvinus.hu

For colouring of foods anthocyanins are widely used, which are present in great quantity in black elderberry (*Sambucus nigra*). Experiments were done to study the anthocyanin content

of several varieties and candidates, from which the highest value was found in the Haschberg cultivar. Further experiments were performed with this cultivar to study the anthocyanin stability of *S. nigra* under different circumstances (heat-treatment at various pH and temperatures). Our results revealed that anthocyanins react sensitively to temperature and pH increase.

Keywords: *Sambucus nigra*, anthocyanin, pH, temperature.

DOGAN, M., SILICI, S., SARAYMEN, R. & ILHAN, I.O.: Element content of propolis from different regions of turkey. pp. 127-130. dogan@erciyes.edu.tr

Levels of Na, K, Ca, Mg, N, Cu and Zn of propolis samples originating from different geographic locations of Turkey were investigated. Sodium was the most abundant element in the samples. The calcium content was found between 0.118-0.0793 mg g⁻¹. The highest magnesium content was found in samples from Yozgat region, whereas the lowest was in those of Adana region. Potassium content changed between 0.121-0.364 mg g⁻¹. There were no statistical differences in nitrogen levels. Interestingly, no sulphur (S) was detected in propolis samples. The copper and zinc content changed between 0.045-0.096 mg g⁻¹, 0.176-0.676 mg g⁻¹, respectively. Finally, mineral content of Turkish propolis was about the same as the commercial propolises from other countries. The content of Cu in propolises was generally within safe limits, and compared well with levels in foods from Turkish Food Codex, though Zn contents were high.

Keywords: propolis, element content, Turkey

NAGY-GASZTONYI, M., KARDOS-NEUMANN, A. & TAKÁCS-HÁJOS, M.: Characterization of red beet and carrot with special emphasis on nitrate accumulation. pp. 131-138. m.gasztonyi@cfri.hu

Nitrate accumulation in plants is a natural phenomenon resulting from uptake of nitrate ion in excess of its reduction and subsequent assimilation. The water soluble nitrate content of various carrot and red beet varieties was measured as a function of irrigation and mineral supplement in three years. In the first year, the nitrate content increased in both roots (significant differences were found for three carrot and at three red beet cultivars) following the irrigation. The activity of nitrate-reductase in the leaves was also significantly higher after irrigation in three red beet varieties in 1998. The mineral supplement in most of the carrot varieties increased the nitrate content. In the third year, the impact of water supply showed various tendencies in nitrate accumulation in both vegetables. On the basis of results for three years, the conclusion was that the seasonal and varietal differences were also remarkable.

Keywords: carrot, red beet, irrigation, nitrate, nitrate-reductase
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