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BERK, Z.: Food powders – an important but largerly neglected subject. Editorial. pp. 101-104. zeki@trchunix.technion.ac.il

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JOVANOVIĆ, S., BARAĆ, M., MAĆEJ, O. and DENIN DJURDJEVIĆ, J.: Page analysis of milk proteins altered by high thermal treatment. pp. 105-112. snezanaj@agrifaculty.bg.ac.yu

Changes that occur in milk proteins during heat treatment were studied. Milk was heat treated at 87 ºC for 10 min. Samples of untreated milk, demineralised whey powder and heat treated milk were analysed by discontinuos PAGE and by densitometric analysis of destained gels. PAGE experiments showed that heat treatment induces changes on milk proteins. During heating at 87 ºC for 10 min all amount of b-lactoglobulin present in milk interacted with casein, while small amount of a-lactalbumin did not interact with casein. It could be hypothesized that heating of milk at 87 ºC for 10 min influences complete denaturation of b-lactoglobulin and formation of complex with casein, while a-lactalbumin denatures and interacts with b-lactoglobulin when b-lactoglobulin has already linked with casein micelles.

Keywords: heat treatment, milk proteins, PAGE

SÁRKÖZI, Á., THEN, M. and SZENTMIHÁLYI, K.: Mineral element content of greater celandine (*Chelidonium majus* L.). pp. 113-120. sagnes@drog.sote.hu

Chelidonii herba has long been known in herbal medicine for its choleretic, cholagogue, spasmolytic and antiviral activities. It is important to monitor the amount of mineral elements in Chelidonii herba preparations consumed mainly for their phytotherapeutical effects. In addition to organic compounds, dissoluble mineral elements in the teas and tinctures of herbs may also have a role in therapy. The concentration of 24 elements (Al, As, B, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Ti, V, Zn) in crude drugs (herb and root), in their aqueous solutions (infusion, decoction) and alcoholic extracts were studied by ICP-OES. The difference between the concentration of elements in extracts - except for copper, manganese and sodium - was highly significant. It has been found that the root contains higher concentrations of mineral elements except for boron, copper, phosphorus and sulphur. The infusion contained most elements in the highest concentration and proved to be the best source for obtaining minerals. The same tendency was observed in the case of dissolutions. In aqueous extracts, the dissolution of mineral elements was between 10% and 65% for most elements, especially for potassium (65%) and phosphorus (54%). The dissolution of mineral elements in the case of tinctures decreased with increasing alcohol concentration. It may be stated that the presence of macro- and microelements in extracts greatly contribute to their therapeutical value.

Keywords: *Chelidonium majus* L., Chelidonii herba, mineral elements, tea, tincture

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MORAIS, H., FORGÁCS, E., and CSERHÁTI, T.: The use of spectral mapping for the study of the enzyme production of the edible mushroom *Pleurotus ostreatus*. pp. 121-130. tevi@cric.chemres.hu

The effect of the addition of extracts of agro-industrial wastes to the culture media on the production of β-glucosidase, xylanase, laccase, manganese-dependent and independent peroxidases by the edible fungus Pleurotus ostreatus was determined. The relationship between cultivation parameters and the enzyme activities was assessed by spectral mapping technique combined with non-linear mapping. It was proved that extracts enhanced markedly the activities of laccase, manganese-dependent and independent peroxidases. Multivariate mathematical-statistical methods indicated that the enzyme activities were the highest in culture containing pepper extract. It was further demonstrated that the selectivity of the enzyme production was negligible up till 14 days of fermentation and reached the maximum at the 28th day.

Keywords: agro-industrial wastes, enzyme production, *Pleurotus ostreatus*, spectral mapping

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SEREGÉLY, ZS. and NOVÁK, I.: Evaluation of the signal response of the electronic nose measured on oregano and lovage samples using different methods of multivariate analysis. pp. 131-139. zsolt.seregely@uni-corvinus.hu

In case of spices or crude drugs of medicinal- and aromatic plant origin, sensory characteristics, especially odour, has great commercial importance. The instrumental sensory analysis the so-called 'electronic nose' has proved to be a significant, new and quick method in chemometry.
The sensor signal responses (data recorded by the electronic nose instrument) of the electronic nose were evaluated by statistical methods, including principal component analysis (PCA) and canonical discriminant analysis (CDA) and the combination of these methods by applying the discriminant analysis on the first eight principal components. The aim of this paper is the comparative analysis of the above evaluation methods as data processing tools of the sensor signal response of the electronic nose (chemosensor array).
The essential oil of oregano (Origanum vulgare subsp. hirtum) selected line No 10. was compared to the oil distilled from the selected line No. 11; and dried root samples of lovage (Levisticum officinale) harvested at different times from the two- and three-year-old population, were investigated with electronic nose (NST-3320, AppliedSensor Sweden AB) Principal component analysis, as a first step of the evaluation, did not clearly distinguish either oregano or lovage samples. Further statistical evaluation of the original sensor signal responses of the electronic nose with canonical discriminant analysis improved the separation power of the model. The best separation could be achived by the combination of the two methods, whereby canonical discriminant analysis was applied to the first eight principal components, which described 99% of the differences. In all cases more than 92%, while in several experiments 100% of cross-validated grouped cases were classified correctly.
Based on the results, the application of the electronic nose and the combination of multivariate methods, PCA and CDA, could be an appropriate tool either for identification of cultivars to accelerate selection process or to distinguish crude drugs of different age or different harvesting period.

Keywords: oregano, lovage, electronic nose, chemosensor array, principal component analysis, canonical discriminant analysis

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DOGRUER, Y. and GUNER, A.: Effect of using sodium and potassium nitrate on degrading and residue level of nitrate and nitrite contents of pastirma during the storage period. pp. 141-144. ydogruer@selcuk.edu.tr

Our aim was to determine the effect of using sodium and potassium nitrate on residual nitrate and nitrite levels of pastirma and to compare degradation of these curing agents. For this purpose, longissimus dorsi muscules were used, and three different groups were formed during salting. The first group (control) was salted only with NaCl at 10 % proportion of meat weight. In the second and third group, sodium nitrate and potassium nitrate were added to the salt at 0.1 % proportion of meat weight, respectively. After production process of about twenty days, pastrami samples were strored at 4±1 ºC in vacuum package for 60 days. During the storage period residual nitrate and nitrite contents were examined. Residual nitrate and nitrite contents of pastirma samples were determined to be 51.66-203.08 ppm, 22.13-51.06 ppm on the first day of storage and 25.53-38.80 ppm, 3.20-9.51 ppm on the 60th day of storage, respectively. Residual nitrate and nitrite contents of the third group cured with potassium nitrate were found to be lower than the second group cured with sodium nitrate. In conclusion, using sodium and potassium nitrate at this level as curing agents in pastirma production had no effect on the acceptable level of nitrate and nitrite contents of pastirma. In addition, potassium nitrate was degraded faster, and it was lower than sodium nitrate during the storage period.

Keywords: pastirma, nitrate, nitrite, residue

BALOGH, S., HAJNAL, F., BELEC, B., KÓMÁR, M., PAPP, R., NAGYMAJTÉNYI, L. and PAULIK, E.: Factors associated with the consumption of fruits and vegetables in south-east Hungary. pp. 145-152. balogh@oali.hu;

Several risk factors of diet-related diseases are present in the nutrition of the Hungarian population. The aim of the study was to investigate the health status and the association of the daily consumption of fruits and vegetables as indicators of healthy diet with sociodemographic factors, health behaviours in the south-eastern part of Hungary.
In 2002, a cross-sectional study based on interviewer-administered questionnaires was conducted in the south-eastern part of Hungary. The sample comprised of 3419 people, aged between 15 and 75, with about 40 persons from each practice.
The results demonstrated that fruit and vegetable consumption of the studied population were determined by certain demographical, economical and lifestyle factors, and were also associated with self-assessed health and health status.
Altering the habits of nutrition is an integral part of health intervention programs. Success rate may, however, be largely reduced by the social and economic background of the habits in question.

Keywords: fruit consumption, vegetable consumption, sociodemographic factors, health behaviour, health status

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TACZMAN-BRÜCKNER, A., MOHÁCSI-FARKAS, CS., BALLA, CS., and KISKÓ, G.: Mode of action of *Kluyveromyces lactis* in biocontrol of *Penicillium expansum*. pp. 153-160. andreabruckner13@yahoo.co.uk

Numerous yeasts are reported as being effective in controlling plant pathogenic moulds. By selecting new biocontrol agents, knowledge about the mode of action of mould inhibition is important. In our study, mode of action of *Kluyveromyces lactis* – successfully applied against *Penicillium expansum* in former studies – was investigated. According to the results, volatile compounds are supposed to play a role in restriction of mould growth. Antibiotic substances and killer toxins produced by the tested Kl. lactis strain were not detected.

Keywords: biocontrol, mode of action, *Penicillium expansum*, *Kluyveromyces lactis*

SZENTMIHÁLYI, K., TABA, G., LADO, C., FODOR, J., THEN, M. and SZŐKE, É.:
Medicinal plant teas recommended as nutritional source for element supplementation. pp. 161-167. szkalri@chemres.hu

Herbal teas may be effective in adjuvant therapy for the prevention of complications of diabetes mellitus II. *Agrimoniae herba, Betulae folium, Bursae pastoris herba, Foenigraeci semen, Galegae herba, Maydis stigma, Taraxaci radix, Phaseoli fructus sine seminibus, Urticae folium*, and their teas were analysed by ICP-OES for element content. Concentration of the elements of crude drug samples obtained are in good agreement with the average concentrations of plants, although some significantly high concentration has been found for manganese (893 mg kg-1), zinc (275 mg kg-1) and iron (492 mg kg-1) in *Betulae folium*, for copper (41.2 mg kg-1) in *Galegae herba*, for iron (2692 mg kg-1) in *Taraxaci radix*, for calcium (41210 mg kg-1) and magnesium (6275 mg kg-1) in *Urticae folium*. The common characteristic feature of crude drugs is the relatively high concentration of chromium (0.8-16.3 mg kg-1). Ion concentrations of teas are relatively low. The quantities of metal ions do not cover the daily needs, nevertheless, they may be important as food supplements. According to U.S. Recommended Dietary Allowances (RDA), the following teas are good sources: *Agrimoniae herba* for chromium, Betulae folium for manganese, *Taraxaci radix* for copper and chromium, *Urticae folium* for potassium and calcium. The dissolution of elements from plant drugs varies: potassium (22.5-74 %), sodium (1.9-60.5%), calcium (6.6-28.1%), magnesium (12.3-52.5%) and copper (3.7-51.4%) are readily dissolved. The dissolution of manganese (6.8-32.3%) and of zinc (0-31%) is lower. The dissolution of chromium from *Agrimoniae herba* (9.55%) is significantly higher, while the dissolution ranges from other plant drugs are between 0-5.9%.

Keywords: medicinal plant extracts, element (K, Na, Ca, Mg, Mn, Fe, Cu, Zn, Cr) content

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THEN, M., SZENTMIHÁLYI, K., GERE, A., JASZTRAB, SZ. and SZŐKE, É.:
Antioxidant properties of *Myrtilli folium, Phaseoli fructus sine seminibus* and drug mixture extracts. pp. 169-176. szklari@chemres.hu

In vitro investigations for the antioxidant and free radical scavenging activity of *Myrtilli folium-, Phaseoli fructus sine seminibus*- and a drug mixture (*Equiseti herba, Myrtilli folium, Phaseoli fructus sine seminibus, Urticae folium*) extracts showed antioxidant (LPO inhibitory and chain-breaking antioxidant) activity and free radical (superoxide anion and hydroxyl radical) scavenging effect. The extracts inhibited lipid peroxidation induced enzymatically by adding NADPH and non-enzymatically by adding Fe^{2+} in brain microsomes and in brain homogenates, respectively. The extracts reduced the stable free radical 1,1-diphenyl-2-picrylhydrazyl (DPPH), which showed chain-breaking antioxidant activity. The extracts scavenged superoxide radicals ($O^{2-}\bullet$) by inhibiting the reduction of nitro blue tetrazolium

evoked by phenazine methosulphate. In addition, the extracts inhibited Fenton-reagent (Fe^{2+} and H_2O_2) induced deoxyribose degradation, therefore, it was concluded that the extracts have hydroxyl radical ($OH^{\cdot}$) scavenging property.

Keywords: *Myrtilli folium, Phaseoli fructus sine seminibus*, antioxidant and free radical scavenging activity (in vitro)

SZENTPÉTERY, ZS., KLEINHEINCZ, CS., SZÖLLŐSI, G. AND JOLÁNKAI, M.: Effect of nitrogen top-dressing on winter wheat yield, quantity and quality. pp. 177-185. szentpetery.zsolt@gek.szie.hu

The effects of nitrogen (N) applications on Hungarian, French and Serbian winter wheat cultivars were studied in field trials conducted from 1996 to 2003 in a central Hungarian region, Hatvan-Nagygombos. Fertilizer rates of 0, 40, 80, 120, 40+40 and 80+40 kg ha^{-1} active ingredient were applied at tillering and after anthesis (Feekes 3 and Feekes 10.5.). The N-fertilizer applied was ammonium-nitrate in 36% cc. Split-split plot design with four replications was used. In the experiment the changes of quantity and baking quality of the yield were analysed.
Differences in rainfall during the vegetation period – especially in April and May – had a strong effect on wheat yield. In drought periods N top-dressing had a great importance. In the dry 2001-2003 years, the 80 and 120 kg ha^{-1} fertilizer doses were the most effective. The increasing dose of N top-dressing and its division resulted in this trial in an outstanding quality improvement in spite of the unfavourable ecological circumstances. Especially, great improvement was seen in case of foreign varieties that were of lower quality compared to the Hungarian ones. The top-dressing stabilized the falling number values in the 250-350 top range.

Keywords: wheat, nitrogen, top-dressing, divided nitrogen top-dressing

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OPREAN, L., DARIE, N. and GASPAR, E.: Fermentative capacity of residual wine yeast. pp. 187-191. oprean_letitia@yahoo.com

The yeast biomass, remaining after drawing off the young wine, has not entirely lost either its viability or its fermentative capacity. There have been studies on the possibilities of yeast reusing in a fermentative process in order that an alcoholic liquid should be obtained either for vinegar production or for distillable alcohol. High CO_2 level was obtained when a 20% saccharose concentration in syrup was established. Inoculating 20% residual wine yeast, the maximum fermentative activity occurs after two days. The study results suggest the residual wine yeast, which acts upon some syrup, should not have less than 15% or more than 25% sugar in order to avoid a heavy and lingering fermentation or plasmolysis.

Keywords: Residual wine yeast, CO_2 evolved, fermentative capacity

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GÜLÇİN, İ, BEYDEMİR, Ş., ŞAT, İ.G. and KÜFREVİOĞLU, Ö.İ .: Evaluation of antioxidant activity of cornelian cherry (*Cornus mas* L.). pp. 193-202. igulcin@atauni.edu.tr

In present study, water extract of cornelian cherry (*Cornus mas* L.) (WECM) was studied for antioxidant properties. The antioxidant properties of WECM were evaluated using different

antioxidant tests, including reducing power, free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging, and metal chelating activities. These properties may be the major reason for the inhibition of lipid peroxidation. The concentration of 20, 40, and 60 μg ml^{-1} of WECM showed 75.8, 93.4 and 97.5% inhibition on peroxidation of linoleic acid emulsion, respectively. On the other hand, 60 μg ml^{-1} of standard antioxidants such as BHA, BHT and α-tocopherol exhibited 96.5, 99.2, and 61.1% inhibition on peroxidation of linoleic acid emulsion, respectively. In addition, the WECM had effective reducing power, free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging, and metal chelating activities at the same concentrations (20, 40, and 60 μg ml^{-1}). Those various antioxidant activities were compared to reference antioxidants such as butylated hydroxyianisole (BHA), butylated hydroxytoluene (BHT), and a-tocopherol. In addition, total phenolic compounds in the WECM were determined as gallic acid equivalent.

Keywords: antioxidant activity, cornelian cherry, *Cornus mas*

BALOGH, T., TÓTH, Á. and KOSÁRY, J.: S-layer, a new support for enzyme immobilization. pp. 203-208. judit.kosary@uni-corvinus.hu

The immobilization of enzymes has not been reported earlier on the two-dimensional crystalline bacterial cell surface (S-layer). In this study we tested S-layer isolated from *Bacillus stearothermophilus* PV72 for enzyme (b-glucosidase, hexokinase and aldolase) immobilization. The carbodiimide method gave yields less than 5%. The yields of co-cross-linking method with glutaraldehyde were enhanced compared to the carbodiimide method, but the yield was higher than 10% only in the case of b-glucosidase. Because of the fine structure of S-layer, immobilized enzymes could be removed from reaction mixtures only by centrifugation, therefore these preparations were entrapped in calcium alginate gel. The yields of entrapping procedures were between 15% and 37%. It was presumed that the new immobilized b-glucosidase preparation could be used in a preliminary testing for flavour enrichment of wines. Efficiency of this preparation was compared to that of the immobilized b-glucosidase on Acrylex C-100 support described earlier. We found that the immobilization of b-glucosidase on both Acrylex C-100 support and S-layer followed by gel entrapping resulted in active enzyme preparations that could be used for flavour enrichment of wines without enhancing their protein content.

Keywords: S-layer, immobilization, aldolase, hexokinase, b-glucosidase, wine flavour enrichment