

**Előszó/Preface Fodor, P. and Pedryc, A.:** Preface to the special issue. P. 1.

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**Belák, Á., Kovács, M., Hermann, Zs., Holczman, Á.N., Márta, D., Cenič Stojakovič, S., Bajcsi, N. and Maráz, A.:** Molecular analysis of poultry meat spoiling microbiota and heterogeneity of their proteolytic and lipolytic enzyme activities. Pp. 3-22. [anna.maraz@uni-corvinus.hu](mailto:anna.maraz@uni-corvinus.hu)

Psychrotrophic *Pseudomonas* species *P. fluorescens*, *P. fragi*, and *P. lundensis* were found as predominant bacteria of chicken meat stored at chill temperature, which showed high level of molecular diversity, while isolates of the psychrotrophic yeasts *Candida zeylanoides*, *Metschnikowia pulcherrima*, *Rhodotorula glutinis*, and *Rhodotorula mucilaginosa* formed clusters of high level similarity within the different species as revealed by RAPD-PCR analysis. Combination of multiplex PCR and sequencing of the *rpoB* gene resulted correct identification of the *Pseudomonas* isolates, while the routine diagnostic tests led to improper identification in case of half of the isolates, which indicated the extended biochemical and physiological heterogeneity of the food-borne pseudomonads. Majority of *P. fluorescens* and *P. lundensis* isolates were strong protease and lipase producers, while *P. fragi* strains were weak or negative from this respect. Proteolytic and lipolytic activities of the isolated yeast strains were species specific and protease production was less frequent than lipolytic activities.

**Keywords:** poultry meat, spoilage, *Pseudomonas*, yeasts, molecular characterisation, protease, lipase

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**Egressy-Molnár, O. and Jókai, Zs.:** Development of a GC-based method for the determination of egg content in dried pasta with the focus on method validation. Pp. 23-32. [zsuzsanna.szatura@uni-corvinus.hu](mailto:zsuzsanna.szatura@uni-corvinus.hu)

The current Hungarian standard for the determination of egg content in dried pastas does not fulfil its purpose because of the possibly high relative deviation of parallel measurements (up to 60%) therefore a new GC-FID-based method was developed. The method uses cholesterol as marker of the egg content, prescribes an extraction with ethyl-acetate, derivatization with bis-trimethylsilyl-trifluoroacetamid (BSTFA), GC separation, and FID detection. A tight correlation between egg and cholesterol contents was found, 94 mg cholesterol in 1 kg pasta per egg. The RSD of the measurements was 5%, limit of detection was found to be 0.1 mg l<sup>-1</sup> cholesterol, and limit of quantification was 0.47 mg l<sup>-1</sup>. For the determination of egg content a reference chart was created with the use of control materials containing exactly 1, 4, and 8 eggs in 1 kg of dried pasta, respectively. The reference chart was verified with a control sample of 4.4 eggs, proving the table to be fit for purpose. The method was also tested on commercially available unknown pasta samples and it was found that not all samples contained the declared amount of eggs.

**Keywords:** dried pasta, egg content, cholesterol, gas chromatography, derivatization, BSTFA

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**Geösel, A., Sipos, L., Stefanovits-Bányai, É., Kókai, Z., Gyórfi, J.:** Antioxidant, polyphenol and sensory analysis of *Agaricus bisporus* and *Agaricus subrufescens* cultivars. Pp. 33-40. [gomba@uni-corvinus.hu](mailto:gomba@uni-corvinus.hu)

In the past decades many papers were published on the nutritional effect and bioactive components of edible mushrooms. The fungi are able to accumulate secondary metabolites, for example, phenolic compounds, polyketides, terpenes, and steroids. In case of mushrooms the button mushrooms are preferred in the Eastern-European region. Therefore white and cream type button mushroom (*Agaricus bisporus*) and different *A. subrufescens* (syn. *A. blazei*) cultivars were cropped, total phenolic content and antioxidant capacity (FRAP) were measured in two years of experiments. To develop the description method of mushroom products, software-supported profile analysis was applied to characterize them. The aim of the research was to compare the sensory profiles of the samples, and to find those characteristics, they actually differ in.

**Keywords:** mushroom, total phenolic content, antioxidant, sensory analysis, medicinal food

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**Kaszab, T., Kovács, Z., Szöllösi, D. And Fekete, A.:** Prediction of carrot sensory attributes by mechanical tests and electronic tongue. Pp. 41-58. [timea.kaszab@uni-corvinus.hu](mailto:timea.kaszab@uni-corvinus.hu)

The objective of the work reported was to predict some sensory attributes of carrots stored under non-ideal conditions from the data obtained on taste measured by electronic tongue and on the physical properties (acoustic stiffness, cutting force, deformation work ratio, and luminosity). There was a close correlation between the mechanical characteristics and the non-ideal storage time. Sensory evaluation showed significant ranking in “bite and chewing”, “sweet taste”, and “global impression” attributes according to the Page test. Principal component analysis (PCA) plots were determined for the acoustic stiffness coefficient, cutting force and deformation work ratio and these showed that PC1 followed a tendency similar to that of the storage time. PCA plots were determined for the electronic tongue measurements and this PCA separated the sample groups along PC1 and PC2. We used PLS regression to predict „bite and chewing” from the acoustic stiffness coefficient, cutting force, and deformation work ratio with an acceptable correlation. The “sweet taste” was predicted from the electronic tongue measurement results with good correlation. The “global impression” was predicted by the acoustic stiffness coefficient, cutting force and deformation work ratio, and by the electronic tongue measurement results with close correlation.

**Keywords:** PLS prediction, sensory evaluation, acoustic stiffness, cutting force, deformation work ratio, carrot, electronic tongue

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**Kiskó, G., Kaffka, K. and Daood, H.:** Preliminary studies on developing a new method for quality control of tomato purée. Pp. 59-66. [gabriella.kisko@uni-corvinus.hu](mailto:gabriella.kisko@uni-corvinus.hu)

In the industrial practice Howard mould count (HOWARD, 1911) is used for the estimation of mould contamination of foods. It was developed originally for the investigation of mould contamination of tomato purée. It is also used nowadays for quality control purposes for other food products as well. Recently this constitutes the basis of the acceptance of the finished products in international trade. This technique demands experts with a lot of practice and

morphological proficiency. The investigation makes use of eyes and so the tiredness of the investigator can cause uncertainties. The possibility of other methods for the determination of mould contamination of tomato purée was investigated to replace the Howard method. The NIR technique - as a rapid, non-destructive, reagentless and accurate method - was anticipated as a suitable method for the mentioned purpose. Canned tomato purée had been allowed to become mouldy then the sample was blended with non-mouldy samples in different ratio, so a series of tomato purées containing known amounts of mouldy purée was prepared. Howard mould counts and ergosterol content - another mould contamination relating value - was used as reference for NIR calibration. At quantitative investigation better results were obtained using ergosterol values. The best correlation coefficient ( $R=0.93$ ) and the smallest standard error of calibration ( $SEC=0.008$  mg g<sup>-1</sup> ergosterol) was achieved with triangular smoothing and second derivation of the spectra. At qualitative investigation Polar Qualification System (PQS) was used. Clusters between samples with low and high ergosterol levels could be separated.

**Keywords:** moulds, NIR, ergosterol, Howard Mould Count

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**Kiss, Zs., Vecseri-Hegyessy, B., Kun-Farkas, G. and Hoschke, Á.:** Optimization of malting and mashing processes for the production of gluten-free beers. Pp. 67-78.  
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In the course of our work we aimed to develop a product from gluten-free raw materials (millet, sorghum and buckwheat) that is similar to beer made of barley malt but is consumable by coeliacs. Our measurements were started by qualification of cereal/pseudo-cereal grains. Next malts were made of them with different steeping, germination and kilning parameters, and their most important quality characteristics were determined. Qualification of grains were done by grading, determination of thousand-kernel and hectolitre weight, and protein content, while malts were examined with congress mashing, Hartong mashing and lauter test, as well. Gelatinization point of the starch found in grains and malts were determined by Brabender amyloviscograph which helped to set the temperature of  $\beta$ -amylase rest in future mashings. The gelatinization points were higher in our samples, than in the barley's starch. Optimization of mashing was continued with malts that fulfilled requirements needed for brewing. Mashing programs were written for each raw material with the help of our laboratory mashing equipment, and resulting worts were analyzed (for extract content), then carbohydrate content was measured by HPLC,  $\alpha$ -amylase activity by Phadebas test, and free  $\alpha$ -amino nitrogen (FAN) content by the ninhydrin method. Those worts were selected for further fermentation tests that had the highest extract and FAN content, best filtration time and appropriate sensory characteristics. Optimal malting temperatures and time periods, aeration and water uptake were determined, and then the duration and temperature of protein and enzyme rests of mashing were set. The malting process that proved to be the most suitable for brewing requirements (high extract content, good lautering characteristics, high FAN content) has the following parameters: steeping with 25°C water for 18 hours with aeration in every 5 hours; germination at 15°C for 84 hours; kilning at 50°C for 48 hours.

**Keywords:** gluten-free, beer, millet, buckwheat, sorghum, malting, mashing, coeliac

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**Leskó, A., Kállay, M., Nyúl-Pühra, B. And Nyitrai-Sárdy, D.:** The change of polyphenolic composition and tyrosol content of the wine as an effect of sur lie method. Pp. 79-90.  
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While keeping wines on the fine lees the composition of nitrogen-containing substances, including the amino acid concentration, changes as a result of the autolysis of yeasts. During the course of former experiments, it was proven that yeasts were able to reduce the polyphenolic composition of wines. As part of the research for the present publication, the change of polyphenolic content in Chardonnay wines kept on the lees was analysed. In addition the quantity of tyrosol, required for the forming of simple phenolics, was examined. The results proved that yeasts reduced the quantity of polyphenolics. In addition, due to the increased amino acid concentration, yeasts reduced the quantity of tyrosol that is derived from the amino acid called tyrosine.

**Keywords:** sur lie method, tyrosol, polyphenolic composition

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**Leskó, A. And Kállay, M.:** Variations in the extractability of certain phenolic components in *Vitis vinifera* cv. Blaufraenkisch clusters and wines as a function of vine load. Pp. 91-100.  
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During the course of research, the extractability of various phenolic compounds were analysed in 'Blaufraenkisch' berry skins and wines produced by six types of vine load. A sample of the berry skin was detached from the harvested crop and following the extraction with hydrochloric acid-methanol the composition of the extractive and the wines prepared by microvinification was analysed. During the course of the tests, the total polyphenolic-, anthocyanin-, leucoanthocyanin-, and catechin content of the samples were measured by the application of the spectrophotometric method. Based on the measured data, the extraction coefficients (EC %) were calculated for each vine load, and then through the application of statistical methods, the data of three vintages were evaluated. The results revealed that extractability does not necessarily depend on the method of cultivation or the vine load. No significant differences were found pertaining to either the extractability of the total polyphenolic-, leucoanthocyanin-, or catechin content. However, the extraction coefficient of the anthocyanins in crops produced by cluster selection and cane-based cultivation was significantly lower than in the cluster-selected crops of vine-stocks with less bud load.

**Keywords:** vine load, polyphenolics, extraction coefficient

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**Mráz, B., Kiskó, G., Hidi, E., Ágoston, R., Mohácsi-Farkas, Cs. and Gillay, Z.:** Assessment of biofilm formation of *Listeria monocytogenes* strains. Pp. 101-108.  
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Biofilm formation of four *Listeria monocytogenes* strains with different origin was compared as a function of surface material (stainless steel, polystyrene and glass) and surface conditioning. Hydrophobicity of strains was also examined. The number of adhered cells in PBS broth was determined for all strains during 144 h of incubation at 30 °C with epifluorescent microscopy. *L. monocytogenes* strains were similar in biofilm forming abilities. The slight differences in biofilm formation could not be explained by hydrophobicity. Results also showed that stainless steel provided the best surface for biofilm

formation. The effect of pre-conditioning of the surfaces with milk was dependent on the surface material. Significantly lower attachment could be observed on milk conditioned surfaces in case of cheese isolate.

**Keywords:** biofilm formation, *Listeria monocytogenes*, glass, metal, plastic surfaces, hydrophobicity

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**Németh, S., Szalay, L., Ficzek, G., Stéger-Máté, M., Sándor, G., Végyári, G. and Tóth M.:** Analysis of chemical parameters determining the fruit quality of apricot cultivars during ripening. Pp. 109-119. [szilvia.nemeth@uni-corvinus.hu](mailto:szilvia.nemeth@uni-corvinus.hu)

A HPLC instrument was used to analyse various acid (citric, malic, succinic acid) and sugar (sucrose, glucose, fructose, sorbitol) components in the fruit of three cultivars grown in Hungary (Gönci magyar kajszi, Mandulakajszi and Harcot), while the  $\beta$ -carotene content was analysed spectrophotometrically. Changes in the chemical content of apricot varieties have not previously been monitored in the course of ripening. The quality of various food products is greatly influenced by the chemical components of the raw materials. The cultivar Gönci magyar kajszi had exceptionally high  $\beta$ -carotene (3.79 mg 100 g<sup>-1</sup> in 90% maturity) and sugar content (sucrose: 11253.9 mg 100 g<sup>-1</sup>, fructose: 315.2 mg 100 g<sup>-1</sup>, and glucose: 1434.8 mg 100 g<sup>-1</sup>). Mandulakajszi was the most acidic (citric acid: 1597.2 mg 100 g<sup>-1</sup>). The malic acid content was similar for all three varieties during ripening. In case of Harcot, the  $\beta$ -carotene content was high in 2008 (3.58 mg 100 g<sup>-1</sup> in 90% maturity), however in 2010 it was lower due to environmental influences (2.38 mg 100 g<sup>-1</sup>). The pH value was similar for all examined varieties in all ripening stages (3.16-3.50), the TSS/TA value was highest in the 100% mature fruit (18.41) of Gönci magyar kajszi.

**Keywords:** *Prunus armeniaca*, sucrose, glucose, malic acid, citric acid,  $\beta$ -carotene, HPLC, spectrophotometer

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**Nótin, B., Stéger-Máté, M., Juhász, R., Jakab, D., Monspart-Sényi, J. and Barta, J.:** Changes of phenolic compounds in black currant during vacuum drying process. Pp. 120-129. [beatrice.notin@uni-corvinus.hu](mailto:beatrice.notin@uni-corvinus.hu)

In this study the effect of drying temperature and pressure on the antioxidant capacity and phenolic compounds of black currant (*Ribes nigrum* L., cultivar Titánia) was investigated. Samples were vacuum dried at 10 mbar at temperature 40, 50, and 60 °C until a wet content lower than 10% was reached. As control, atmospheric drying at 60 °C was also performed. During the drying processes the amount of total polyphenol, total anthocyanin, catechin, and leucoanthocyanin as well as the antioxidant capacity (FRAP) were measured. The drying curves were also determined. The drying temperature affects the duration of the drying, the rate of water loss, and the remaining amount of antioxidant compounds. The amount of phenolic compounds decreased during drying. The amount of phenolic compounds decreased the least of all during atmospheric drying at 60 °C. Among vacuum drying technologies temperature level of 50 °C proved to be the best to preserve antioxidant phenolic compounds. Greater loss was observed when black currant was vacuum dried at higher temperature (60 °C) or at lower temperature (40 °C) for a longer time.

**Keywords:** black currant, vacuum drying, polyphenol, anthocyanin, catechin,

leucoanthocyanin

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**Novák, I., Sipos, L., Kókai, Z., Szabó, K., Pluhár, Zs. And Sárosi, Sz.:** Effect of the drying method on the composition of *Origanum vulgare* L. subsp. *Hirtum* essential oil analysed by GC-MS and sensory profile method. Pp. 130-138. [szilvia.sarosi@uni-corvinus.hu](mailto:szilvia.sarosi@uni-corvinus.hu)

In the case of a widely used spice – *Origanum vulgare* subsp. *hirtum* – the effect of different drying methods (natural, and by using dryers at temperatures of 30C, 40C, 45C) was investigated referring to the essential oil amount and composition in the final material. The sensory characteristics of olive oils flavoured by the oregano samples were also determined. The essential oil amount and the area percentage of its main component – carvacrol – were significantly influenced by the different drying temperatures. Compared to the natural way of drying in the case of the essential oil content the drying temperature of 40C and 45C was preferable for the higher amounts. Referring to the carvacrol area percentage the drying temperature of 30C resulted in the highest amounts (89.74 +/- 0.28%), that was affirmed by the sensory analysis as well; based on the taste descriptions the consumers found it the most pungent one. According to our results sensory analysis data in most of the cases corresponds to the GC-MS measurements and give a much more complex characterisation of a spice.

**Keywords:** origanum, volatile oil, carvacrol, drying, trained sensory panel, computerized sensory profiling

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**Novák, E., Zok, A., Forgács, I, Pedryc, A. and Oláh, R.:** Evaluation of regeneration capacity in grape towards the improvement of new cultivars with enhanced berry and wine quality. Pp. 139-149. [edina.novak@uni-corvinus.hu](mailto:edina.novak@uni-corvinus.hu)

To raise the efficiency of plant regeneration we studied the important and necessary elements of the procedure. The embryogen capacity of 33 various grape genotypes were tested on four different induction media. We successfully obtained anther derived embryogenic calli in 27 genotypes with the range of 1-12 %, this is the first reported protocol for embryogenesis from Korai bíbor, Odysseus, Orpheus and Pannon frankos cultivars. Two sorts of sterilization treatments were examined before inducing somatic embryos. For optimisation of grape regeneration system the propagation of calli was attempted in Richter 110 cultivar, there was no any significant differences in the measured values, but CPE medium proved more successful in maintaining embryogenic capacity of callus. We experienced high developmental differences between the propagated embryogenic culture of Richter 110, Teleki 5C and Chardonnay derived from MSNOA liquid medium and from MSE solid medium. Regenerated plants from embryogenic callus were obtained in 21 genotypes, in Chardonnay cultivar CP medium influenced more positively the plant regeneration than the MS/2 medium.

**Keywords:** 2,4-D (2,4-dichlorophenoxyacetic acid), BAP (6-benzylaminopurine), TDZ (thidiazuron), NOA (2-naphthoxyacetic acid), embryogenic callus, *Vitis*

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**Pfeiffer, P. and Hegedűs, A.:** Review of the molecular genetics of flavonoid biosynthesis in fruits. Pp. 150-163. [hegedus.attila@uni-corvinus.hu](mailto:hegedus.attila@uni-corvinus.hu)

Fruits are rich sources of flavonoid polyphenolic compounds that seem to be associated with favourable health-effects. Commonalities and differences are well-known in the flavonoid contents of different fruit crops, which suggest alterations in the flavonoid biosynthesis pathway of fruit tissues. This review aims to collect data from molecular genetic studies on the structural and regulatory genes in grape, berries, citrus, pomes, and stone fruits to get impression on the state of the art of this field of science. Results indicate that the expression of flavonoid genes is a genotype-dependent and developmentally regulated process. In addition, genetic alterations resulting in specific changes in flavonoid composition are also highlighted. Analysis of colour mutants of grape, bilberry and orange identified the genes responsible for the altered phenotype, and this strategy might offer valuable tools to identify several other candidate genes in different fruits. The application of such data is also discussed in relation with the development of molecular markers.

**Keywords:** anthocyanin, biosynthesis, flavonoids, fruit, molecular genetics

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**Pós, V., Hunyadi-Gulyás, É., Caiazzo, R., Jócsák, I., Medzihradzsky, K.F. and Lukács, N.:** Induction of pathogenesis-related proteins in intercellular fluid by cadmium stress in barley (*Hordeum vulgare* L.) – a proteomic analysis. Pp. 164-175. [noemi.lukacs@uni-corvinus.hu](mailto:noemi.lukacs@uni-corvinus.hu)

The effect of cadmium on protein expression in the aerial parts of barley (*Hordeum vulgare* L. cv. 'Mandolina') seedlings was investigated by proteomic analysis of leaf apoplast proteins. Dramatic changes were observed in the protein pattern of intercellular washing fluid from Cd-treated (0-300  $\mu$ M) barley leaves both by 1D- and 2D-PAGE. By mass spectrometric (MALDI-TOF and/or LC-MS/MS) analysis of induced proteins PR1 proteins, certain 1-3-glucanases (PR2), chitinases (PR3), members of the chitin binding PR4 family, a rich set of thaumatin-like proteins (PR5) and two PR17 proteins were identified, indicating that a general plant defence response, inducing massive secretion of pathogenesis-related proteins (PR) into the extracellular space, is an important part of the Cd-induced stress reactions. Although systemic induction of PR proteins is probably important for an adequate plant response to cadmium stress, many of these proteins are known to have an allergenic potential and as such present a health risk to plant eaters, even when the heavy metal concentration in the given plant organ is low.

**Keywords:** cadmium stress, barley, proteomics, apoplast, PR-protein

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**Radva, D. and Kosáry, J.:** Production of new immobilized  $\beta$ -glucosidase preparation for food industrial purposes by using kinetic desorption method. Pp. 176-187. [judit.kosary@uni-corvinus.hu](mailto:judit.kosary@uni-corvinus.hu)

A new  $\beta$ -glucosidase enzyme preparation for food industrial use was produced. The enzyme was immobilized on an anion exchange resin Amberlite IRA-900 by adsorption followed by cross-linking of the enzyme molecules on the surface of the carrier with glutaraldehyde. To examine and develop the parameters of the steps of the immobilization process, a test method called kinetic desorption method was worked out that permitted the examination of interactions between the enzyme and the carrier. By using the efficiency of kinetic desorption method developed in our laboratory we determined the optimal conditions of procedure: the concentration (0.10 M) of the buffer (sodium acetate pH 5.50), the ratio of the carrier and the

enzyme (10:1), the 24 h reaction time at 25 °C for the adsorption step, the pH of the buffer (pH 5.50), the time of treatment (30 min), and the concentration [0.25% (m/v)] of glutaraldehyde for the cross-linking process. The maximum yield of immobilized enzyme activity was 21.4%, the immobilization process changed the pH optimum of catalytic activity from 5.50 to 4.50 and the temperature optimum from 50 °C to 60 °C. The immobilized enzyme is to be tested in various food industrial processes.

**Keywords:**  $\beta$ -glucosidase, immobilization, characterization, adsorption, cross-linking, Amberlite IRA-900, glutaraldehyde, kinetic desorption method, food industry

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**Sági-Kiss, V. and Fodor, P.:** Development of a SPME-GC-MS method for spoilage detection in case of plums inoculated with *Penicillium expansum*. Pp. 188-197.  
[virag.sagi.kiss@gmail.com](mailto:virag.sagi.kiss@gmail.com).

The objective of our project was to develop an analytical method which can measure the VOCs (volatile organic compounds) to find the important microbial metabolites to predict the spoilage during storage of fruits. As a model system plums (*Prunus salicina*) inoculated with *Penicillium expansum* were chosen. Analyses were performed by solid-phase microextraction (SPME) coupled to gas chromatography (GC) - mass spectrometry (MS). The current study employs multivariate experimental design for the optimization of 4 factors, namely extraction time, desorption time, agitation, and desorption temperature, by a 24-1 experimental design. Desorption time and agitation showed no significant effect on the amount of extracted concentration. For extraction time 25 minutes and 250° C for desorption temperature were chosen for the 2 important factors. Four kinds of samples (agar inoculated with *P. expansum*, plum inoculated with *P. expansum*, control plum and control agar) were measured for 4 days. Styrene, 1-methoxy-3-methylbenzene, methyl linoleate and a 'non-identified aromatic compound', were reported here as possible *P. expansum* marker compounds.

**Keywords:** volatile organic compounds (VOC), solid phase microextraction (SPME), gas chromatography - mass spectrometry (GC-MS), optimization, *Penicillium Expansum*, plum

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**Sipos, L., Király, I., Bábel, L., Kókai, Z. and Tóth, M.:** Role of sight in flavour perception: sensory assessment of apple varieties by sighted and blind panels. Pp. 198-213.  
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The present study investigated how sighted and blind sensory assessors evaluated the quality of various apple varieties: Regal Prince (Gala Must), Jonagold Schneica (Jonica), Watson Jonathan, Golden Reinders and Generos. A total of 80 sighted and 12 blind people participated in the study, in three groups (sighted people without blindfolds, sighted people with blindfolds, blind people). The preference of sensory attributes (size, shape, colour, texture, taste and odour) was evaluated on a six-category scale. The data were analysed using single-factor (ANOVA, LSD95%, 99%) and multi-factor (Cluster analysis, ANOVA, LSD95%, 99%) evaluation. The results showed that blind and sighted assessors made similar judgments on external attributes perceptible by touch (size, shape), but differed in their evaluation of certain quality factors (flavour, taste), resulting in opponent patterns of preference on some apple varieties (Generos, Jonagold Schneica). A further conclusion of the experiment is that there was less deviation between the judgements of sighted assessors when they saw the apples than when they were blindfolded. The background of this phenomenon



might be explained by the uncertainty and disturbed perception, which lead to inconsistent judgements.

**Keywords:** blindness, flavour perception, consumer preference, apple varieties, cluster analysis

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**Szarvas, J., Geösel, A., Pál, K., Naár, Z. and Gyórfi, J.:** Comparative studies of the cultivable King Oyster Mushroom (*Pleurotus eryngii* (DC.: Fr.) Quél.) isolates by RAPD-PCR method. Pp. 214-221. [gomba@uni-corvinus.hu](mailto:gomba@uni-corvinus.hu)

The king oyster mushroom (*Pleurotus eryngii*) is becoming more and more popular amongst the producers due to its excellent taste and relatively easy cultivation technology. Though investigations aiming to involve the mushroom in industrial cultivation had started in Hungary already in the 1950's, significant efforts were not made until 2002. In contrast to this, the volume of production in Europe and the United States has been growing continuously in the last decade. Although the species have been subjected to some taxonomical investigations, there are still a lot of contradictions in the taxonomic positioning of the *P. eryngii* species complex. In this study we investigated the genetic variability and taxonomic relationships among *P. eryngii* strains by using the RAPD-PCR method. Fifteen strains were analyzed from our collection that represents mostly the Eastern-Hungarian habitats. Twenty-five random decamer primers were tested in the preliminary experiments and six were chosen that were used for binary coding. A neighbour-joining tree prepared from this matrix shows the coherence among the taxonomic relations and production sites of the potentially cultivable Hungarian strains.

**Keywords:** *Pleurotus eryngii*, species-complex, cultivation, RAPD-PCR, neighbour-joining tree

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**Szigedi, T., Dernovics, M. and Fodor, M.:** Determination of protein, lipid and sugar contents in bakery products by using Fourier-transform near infrared spectroscopy. Pp. 222-229. [marietta.fodor@uni-corvinus.hu](mailto:marietta.fodor@uni-corvinus.hu)

The use of Fourier-transform near infrared spectroscopy (FT-NIR) to measure the content of protein, lipid and sugar contents in bakery products was investigated. The samples were dried, homogenized, sieved and measured in the wavelength range of 780-2500 nm. The calibration was based on partial least squares (PLS) regression with cross-validation. The performance of the final model was evaluated according to root mean square of cross validation (RMSECV), root mean square error of estimation (RMSEE) and the determination coefficient (R<sup>2</sup>). The developed models use the ranges of 1100-1245 nm and 1590-2600 nm for protein determination, 1330-1840 nm and 2170-2350 nm for lipid, 1400-1630 nm, 2000-2170 nm, and 2230-2570 nm for sugar determination, respectively. Protein, lipid and sugar could be determined directly with R<sup>2</sup> values of 98.93, 99.07 and 98.81, and RMSECV values of 0.16 m/m%, 0.79 m/m% and 0.28 m/m%, respectively. It can be concluded that FT-NIR spectroscopy can be used for the routine determination of protein, lipid and sugar content of bakery products and it can contribute to the estimation of calorie content in a fast and non-destructive way.

**Keywords:** bakery products, protein, lipid, sugar, FT-NIR

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**Végh, A., Palkovics, L., Hevesi, M., Király, I. and Tóth, M.:** Susceptibility of traditional pear cultivars to fire blight caused by Hungarian *Erwinia amylovora* isolates. Pp. 230-239. [magdolna.toth@uni-corvinus.hu](mailto:magdolna.toth@uni-corvinus.hu)

*Erwinia amylovora* (Burrill) Winslow et al. is one of the most important pathogens of pear and apple and subject to strict quarantine regulations worldwide. Fire blight disease causes serious damages in pear orchards in Hungary. The aim of our experiment was to test the susceptibility of pear cultivars to Hungarian *E. amylovora* isolates under laboratory conditions. For inoculation test isolates were chosen from different host plants, areas and years. Seven traditional pear cultivars were chosen for testing. Fruit infection was rated according to the diameter of spots produced by the pathogen around the inoculation puncture. Cultivars and isolates were assigned to five susceptibility groups (symptomless, low susceptibility, moderate susceptibility, susceptible and very susceptible). The Hungarian *Erwinia amylovora* isolates showed different results. We found different susceptibility of traditional pear cultivars. The cultivars 'Alexander Lucas' and 'Stössel tábornok' represented the less susceptible category. 'Eldorado', 'Serres Olivér', 'Diel vajkörte' were moderately susceptible. Thus, the most susceptible cultivars were 'Téli esperes' and 'Drouard elnök'. In conclusion, these results can be used for the classification of *Erwinia amylovora* isolates and in future breeding programmes for resistance.

**Keywords:** fire blight, pear cultivars, fruit susceptibility, virulence of isolates, in vitro test