

Editorial: BARANYI, J.: Quantitative microbial ecology of food. pp. 335-337.
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JOSHI V. K., SHARMA, S. & BHUSHAN, S.: Effect of method of preparation and cultivar on the quality of strawberry wine. pp. 339-353. vkjoshipt@rediffmail.com

Strawberry fruits of three cultivars viz. Camarosa, Chandler and Doughlas were used to prepare wine by four different methods (control, thermovinification, fermented on the skin and carbonic maceration). Physico-chemical characteristics of the cultivar Camarosa were rated superior to Chandler and Doughlas. The must from the fruits fermented on the skin gave the highest rate of fermentation and ethanol content. The application of various treatments improved the fermentation behaviour of treated strawberry musts compared to the control as revealed by their physico-chemical characteristics. Thermovinified wines had many desirable characteristics such as more total phenols, esters and colour with comparable amount of higher alcohols, volatile acids, ethyl alcohol, sugars and anthocyanin. The carbonic maceration resulted in wines with more alcohol, higher pH, lower acidity, lesser higher alcohol and volatile acids than other wines. Fermented on the skin treated wines were typical for higher amount of anthocyanin, lower reducing sugar and total sugar than the control wines. Thermovinified wines, irrespective of cultivars, scored the highest with respect to most of the sensory quality characteristics. Wines from Camarosa cultivar registered many desirable characteristics such as esters, optimum acidity, more red colour units with comparable contents of alcohol and total phenols, while Chandler cultivar had higher amount of ethyl alcohol, more phenols, anthocyanin than other cultivars. Some of these differences are correlated with their initial characteristics, while others have been influenced by method of vinification. Based on the physico-chemical and sensory qualities, the wines from cv. Camarosa was rated the best, though the wines of all the cultivars were acceptable.

Keywords: Strawberry, cultivar, Camarosa, Chandler, Doughlas, wine, thermovinification, fermented on the skin, carbonic maceration, sensory quality,

RAINA, C.S., SINGH, S., BAWA, A.S. & SAXENA, D.C.: Rice flour based pasta: effect of ingredients on quality and formula optimization. pp. 355-365. dcsaxena@yahoo.com,
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Rice brokens were utilized in the development of pasta products. Response surface methodology (RSM) was used to analyze the effect of pre-gelatinized rice flour (from rice brokens), vital gluten, water, glycerol mono stearate (GMS) and sodium alginate on the quality responses (sensory, cooking quality, rehydration ratio and solids loss) of the pasta product. A rotatable central-composite design was used to develop models for the responses. Responses were affected most by changes in rice flour and vital gluten levels and to a lesser extent by water, GMS and sodium alginate levels. The maximum sensory score (39.69), cooking quality (12.38), rehydration ratio (3.11) and minimum solids loss (15.64) were identified at 671.05 g kg⁻¹ rice flour, 242.40 g kg⁻¹ water, 74.70 g kg⁻¹ vital gluten, 2.14 g kg⁻¹ GMS and 9.71 g kg⁻¹ sodium alginate levels.

Keywords: rice brokens, rice flour, gluten, GMS, sodium alginate, RSM, process optimization.

STEVANOVIĆ, P. & VUJKOVIĆ, I.: Thermoformed polypropylene packaging for sterilized dairy products. pp. 367-372. tan@edunet.yu

The paper presents results of comparative investigations of packaging materials and packages made by thermoforming of polystyrene ribbon, polypropylene compound ribbon and co-extruded multi-layer ribbon containing polypropylene layer, barrier layer and polypropylene layer. The investigations have established that polypropylene compound packaging has much better characteristics, and particularly the one made of co-extruded multi-layer ribbon. In this way a better protection is provided for the packed content. Polypropylene package ensures the conditions of sterilization at temperatures up to 121 °C.

Keywords: packaging, sterilized dairy products, plastic packaging, physical properties

VECSERI-HEGYES, B., FODOR, P. & HOSCHKE, Á.: The role of zinc in beer production, Part I. Wort production. Pp. 373-380. beata.vecseri@uni-corvinus.hu

The most sensitive and time-consuming technological step of beer production is the fermentation of wort. Problems during fermentation will not only prolong production time but it will lead to the deterioration of beer quality. Most often it is due to low zinc concentration of the wort or the yeast. Due to lack of zinc the fermentation lasts longer, composition of fermentation by-products changes, maltose intake slows down, sedimentation ability and heat sensitivity of the yeast increase.

In Part I. of our work, the factors affecting the degree of zinc supply of wort were examined. During the examination of zinc supply of wort two kinds of beer were produced: all-malt beer and beer with adjunct. Change of zinc concentration was followed throughout the brewing process at every technological step. It was found that concentration of zinc gradually decreases during production of wort, and only a small fraction of the calculated amount appears in it. Wort made with adjunct has even lower zinc concentration than all-malt wort. In all malt wort 3.4 %, while in wort containing adjunct only 0.4 % of the zinc appeared in the wort.

Yeast can absorb only the ionic form of zinc during fermentation, thus we had elaborated a method for the separation of the organic and inorganic form of zinc, which was followed by the determination of the concentration of ionic zinc in wort prior to fermentation.

Keywords: zinc, beer, trace elements, adjunct

VARGA, J., KISS, R., MÁTRAI, T., MÁTRAI, T. & TÉREN, J.: Detection of ochratoxin A in Hungarian wines and beers. pp. 381-392. jvarga@bio.u-szeged.hu

Ochratoxin A is a mycotoxin produced by *Aspergillus* and *Penicillium* species. This mycotoxin is a common contaminant of various food products including cereal products, spices, dried fruits, coffee, beer and wine. Besides cereal products, beer and wine contribute significantly to ochratoxin exposure of humans. We examined the ochratoxin content of Hungarian wines and beers using an immunochemical technique. The detection limit of this technique is 0.01 mg l⁻¹. Altogether 65 wine and 25 beer samples were analysed. The presence of ochratoxin A was confirmed by HPLC in positive samples. Ochratoxin A was detected in 97.7% of wines, with ochratoxin concentrations ranging from 0 to 0.533 mg l⁻¹. The mean ochratoxin A concentration in wines was 0.110 mg l⁻¹. Only one of the Hungarian wines examined contained more than 0.5 mg l⁻¹ ochratoxin A, the previously suggested EU limit for wine. Our data indicate that red wines are more frequently contaminated, and have higher mean ochratoxin contamination (0.117 mg ml⁻¹) than white wines (0.0967 mg ml⁻¹), in accordance with previous observations. A North-South gradient in wine ochratoxin concentrations is not evident from our data. For beers, all but one of the samples was found to be contaminated with small amounts of ochratoxin A with a mean concentration of 0.127 mg l⁻¹ (range: 0.030-0.250 mg l⁻¹). Only one of the beers contained ochratoxin A above 0.2 mg l⁻¹, the anticipated European Community maximum allowable limit in beer. We could not detect correlation between the type and origin of beer and ochratoxin contamination.

Keywords: beer, HPLC, immunochemistry, ochratoxin A, wine

Suhaj, M. & Koreňovská, M.: Application of elementary analysis for identification of wine origin. A review. pp- 393-401. milan.suhaj@vup.sk

Analysis of trace elements and ratios of stable isotopes have been shown to be a valuable tool to discriminate wines according to their region of origin. Several factors, such as environmental contamination, agricultural practices, climatic changes, and vinification processes may change markedly the multielement composition of the wine and may endanger the relationship between wine and soil composition. This article brings some information about environmental and technological aspects of wine geographical authentication and gives a review about using trace elements, isotope ratios analysis, multivariate statistical methods and some joint techniques for these purposes.

Keywords: wine origin, elemental analysis, isotope ratio, multivariate statistics

DAREWICZ, M., DZIUBA, J. & MINKIEWICZ, P.: Some properties of b-casein modified *via* phosphatase. pp. 403-415. jerzy.dziuba@uwm.edu.pl

Modified b-casein forms were prepared with acid/alkaline phosphatase. The choice between acid and alkaline phosphatases was critical for the physico-chemical properties of b-casein. Removal of phosphoryl groups from b-casein *via* alkaline phosphatase increased the retention time measured using RP-HPLC and did not change the second-derivative UV spectra. Moreover, the pI value shifted to neutral pH and the solubility decreased, especially at the alkaline pH range. b-Casein modified enzymatically *via* alkaline phosphatase formed a foam with volume and stability similar to that formed with intact one. In turn, a dramatic decrease in foam stability was found for b-casein modified *via* acid phosphatase. Chromatographic,

spectral and electrophoretic results suggest proteolytic activity of acid phosphatase preparation.

Keywords: acid/alkaline phosphatase, b-casein, foam properties, IEF, RP-HPLC, SDS-PAGE, solubility, UV spectroscopy

IWANIAK, A., DZIUBA, J. & NIKLEWICZ, M.: The BIOPEP database - a tool for the *in silico* method of classification of food proteins as the source of peptides with antihypertensive activity. pp. 417-425. jerzy.dziuba@uwm.edu.pl

A database of potentially biologically active peptide sequences, named BIOPEP (<http://www.uwm.edu.pl/biochemia>), has been developed and applied for classification of numerous food proteins as potential sources of peptides with antihypertensive activity. More than one hundred proteins included in the BIOPEP database were analyzed and classified according to the frequency of the occurrence of antihypertensive fragments. As the example of detailed profile of potential biological activity, the bovine beta-globulin A is presented.

It was found that apart from the dominant antihypertensive activity, other effects (opioid, dipeptidyl peptidase IV inhibitory, immunomodulative, antioxidative) may be present.

It can be concluded that this method may be a useful tool in this field.

The antihypertensive activity was the most dominant because fragments with such activity were present in all of the examined proteins. It encouraged us to classify proteins into families, which may be better or the worse source of antihypertensive fragments. We found statistically significant differences between the values of parameter A ($P < 0.001$) among the all five families we obtained. We found that *in silico* analysis can be useful in the analysis of the large quantities of data in the field of proteins as the source of biologically active peptides.

Keywords: food proteins, bioactive peptides, computer databases, antihypertensive activity protein families

PIGA, A., MINCIONE, B., RUNCIO, A., PINNA, I., AGABBIO, M. & POIANA, M.: Response to hot air drying of some olive cultivars of the south of Italy. pp. 427-440. mpoiana@unirc.it

Olive fruit dehydration is always done locally in non-industrial ovens. This technology poses concern about the quality and safety of the end product. Most of the problems involved in this empirical technology may be solved by a proper control of process parameters. Olive fruits of fourteen Italian cultivars underwent hot air dehydration in mild conditions in a tangential airflow cabinet dryer. At the start, at regular intervals and at the end of the process, sampling was performed to calculate dehydration curves and quality loss. Pre-treatments such as blanching in hot brine, piercing of the skin and salting after blanching were applied. The drying kinetic is strongly affected by pre-treatments and olive characteristics: fruit size, flesh to pit ratio, dry matter. Results showed that mild drying temperature led to slow drying kinetics, even if pre-treatments reduced drying time to a certain extent. Blanched olives

showed, in general, the highest polyphenols content. The fastest drying was measured in the pierced olives, but the best taste was achieved for the salted product.

Keywords: blanching, drying kinetic, olive, piercing, process parameters, salting

VETTER, J., HAJDÚ, CS., GYÓRFI, J. & MASZLAVÉR, P.: Mineral composition of the cultivated mushrooms *Agaricus bisporus*, *Pleurotus ostreatus* and *Lentinula edodes*. pp. 441-451. Vetter.Janos@aotk.szie.hu

Contents of 23 elements were estimated in pilei and stipes of different varieties of three cultivated mushrooms (*Agaricus bisporus*, *Pleurotus ostreatus* and *Lentinula edodes*). The average data of element's composition were evaluated and compared to each other and to the average composition of the wild growing fungi. The high and remarkable K (and partly P) contents are postulated, first of all to *Agaricus bisporus*. The Ca and Mg contents are in general relative stable and balanced. Copper and Mn as valuable microelements required to the normal human biochemical processes have important quantities. Low sodium levels are characteristic to all examined mushrooms, the lowest values were found for *Pleurotus ostreatus*. The high K and the low Na contents mean a valuable rate of K and Na (to all species) in the human nutrition of some patients. Selenium level of *Agaricus bisporus* (2.3-2.7 mg kg⁻¹, d.m.) may improve the Se-supply of the customers. Our data demonstrate clearly that the Cd and As levels of three species are reassuringly low and do not present toxicological risk. Some elements have higher contents in pileus than in stipes (16 elements in *Agaricus*, 14 in *Lentinula*, and only 10 elements in *Pleurotus*), while other ones have an opposite distribution (7, 9 and 13, respectively). Four elements (K, P, Ca and Mg) give 97-98% of the total element concentration of the three cultivated mushrooms, whereas the other 19 elements give only 2-3%.

Keywords: *Agaricus bisporus*, *Pleurotus ostreatus*, *Lentinula edodes*, elements

POGONYI, V., PÉK, Z., HELYES, V. & LUGASI, A.: Effect of grafting on the tomato's yield, quality and main fruit components in spring forcing. pp. 453-462. lugasi@oeti.antsz.hu

Soil-born diseases often cause problems in vegetable forcing; this is because growers use greenhouses for the longest time possible. During the years several solutions have been found to displace chemical control. Grafting is a possible chemical free solution that shows several changes in plants thanks to the vigorous rootstock. In this study we examined the effect of grafting on the yield and fruit characteristics in tomato cultivar. Lemance F₁ was used as scion and Beaufort as rootstock. Earliness, total yield, fruit weight and number of each graft combination were recorded. Moreover, the main fruit components such as Brix°, carbohydrate, acid and the carbohydrate/acid ratio were analysed. We harvested more yield from the grafted plants. The increase of yield was mainly caused by higher average fruit weight. Brix° and carbohydrate content were lower in the fruits on grafted plants than on ungrafted ones but there was no significant difference in acid content.

Keywords: acid, Brix°, carbohydrate, grafting, quality, tomato

BIRÓ, L., RABIN, B., REGÖLY-MÉREI, A., NAGY, K., PINTÉR, B., BERETVÁS, E., MORAVA, E. & ANTAL, M.: Dietary habits of medical and pharmacy students at Semmelweis University, Budapest. pp. 463-471. birol@oeti.antsz.hu

The lack of data regarding dietary and lifestyle habits of Hungarian university students prompted us to undertake a cross-sectional pilot study of students of Semmelweis University, Budapest.

A total of 264 students (78 males with mean age of 21.4 ± 2.6 y and 186 females with a mean age of 21.2 ± 2.6 y) were involved in the study. The questionnaires contained inquiries of energy and nutrient intake, use of vitamin and mineral supplements, food frequency, meal frequency and physical activity. Statistical analysis was carried out using SPSS for Windows 9.0.

The energy, protein and fat intake was somewhat higher than the Hungarian Recommended Dietary Allowances (HRDA) (Biró et al., 1999a). Sodium intake was alarmingly high. Vitamin D consumption was inadequate. The intake of the members of vitamin B group with exception of B₁₂ and niacin was insufficient. The daily consumption of milk, dairy products, fruits and vegetables was deficient. The meal pattern was unbalanced. Only 66% of males and 52% of females were involved in a regular physical activity.

Our results suggest that nutrition should be introduced into the medical curriculum as a separate and full-fledged course of study.

Keywords: university students, eating habit, physical activity

HAZRA, K. M. & LASKAR, S.: Functional properties of protein concentrates from *Mimusops elengi* Linn. (Bakul) seed. pp. 473-482. slaskar01@yahoo.co.in

Studies on functional properties of a protein concentrate produced from the seeds of *Mimusops elengi* Linn. (Bakul; family: *Sapotaceae*) have been carried out. Solubility of the protein was minimum at pH 4.0. Water and oil holding capacities of the seed protein concentrate were 1.7g g⁻¹ and 3.23g g⁻¹, respectively. Minimum foaming capacity, minimum emulsifying activity, minimum emulsion stability and maximum foam stability were found at pH 4.0. Moreover, emulsion stability of the protein concentrate was high (above 88.3 %) over the pH range of 2-10.

Keywords: *Mimusops elengi*, seed protein concentrate, functional properties.

GAJDOŠ KLJUSURIĆ, J., DJAKOVIĆ, S., KRUHAK, I., KOVAČEVIĆ GANIĆ, K., KOMES, D. & Ž. KURTANJEK: Application of Briggs-Rauscher reaction for measurement of antioxidant capacity of Croatian wines. pp. 483-492. jgajdos@pbf.hr

Briggs-Rauscher (BR) reaction is one of the most commonly studied oscillation reactions that has been applied for measurement of antioxidant activity of water-soluble substances. There is an immediate quenching of oscillations when free radicals are added from fruits or vegetables. The reaction is monitored potentiometrically and the inhibition time (IT), or time of no oscillations, is proportional to the concentration of antioxidants. pH of the BR reaction is about 2, which is similar to that of the fluids of the main digestive process (human stomach), giving *in vitro* information on antioxidant activity under “real digestion conditions” and can help in assessment of nutrition for the maintenance of health and prevention of diseases.

Antioxidant activities of different concentrations of native Croatian red and white wines are analysed by the inhibition of BR reaction and determination of total phenols using gallic acid as the calibration standard is also carried out. Using mathematical models, relative antioxidant activities of antioxidants and amounts of total phenols are estimated. Second order polynomial calibration curve is estimated in the range of 150-2500 gallic acid equivalent (GAE mg l⁻¹), with standard error of 84 GAE mg l⁻¹.

Keywords: Briggs-Rauscher reaction, white and red wines, antioxidant capacity, prediction of total phenols in wine

VARGA, L.: Use of a long-chain polyphosphate mixture for shelf-life extension of processed cheese spreads. pp. 493-498. VargaL@mtk.nyme.hu

The influence of a food-grade long-chain polyphosphate mixture on the growth and survival of spoilage micro-organisms during storage in an experimental processed cheese spread formulation was evaluated. The emulsifying salt was added to the cheese blend at a concentration of 0.5% or 1.0%. A control product was also manufactured, which contained monophosphate instead of polyphosphate as emulsifying salt, with all other ingredients being identical to those in the experimental processed cheese spread. Half of the finished products were subjected to accelerated shelf life testing at 37°C for 10 days, whereas the other half of them was stored refrigerated at 4°C for 120 days. Microbiological analyses (enumeration of viable cell counts, mesophilic sulphite-reducing clostridia, coliforms, yeasts and moulds) and sensory tests were performed at regular intervals. The results showed that polyphosphates had a beneficial effect on the shelf-life of the processed cheese spread tested in that they significantly reduced (P<0.05) the growth or survival rates of spoilage bacteria, especially of mesophilic sulphite-reducing clostridia. Polyphosphates also beneficially influenced the sensory, including textural properties of the experimental processed cheese spread. All the samples containing less than 1% polyphosphate showed signs of butyric blowing significantly earlier (P<0.05) during both accelerated shelf life tests and regular refrigerated storage contrary to products fortified with 1% polyphosphate. In conclusion, the suitability of the long-chain polyphosphate formulation tested for shelf life extension of processed cheese spreads was demonstrated.

Keywords: processed cheese, emulsifying salt, polyphosphate, clostridia, shelf-life

KULISIC, T., BERKOVIC, K., PAVIC, S. & SUSTRA, A.: Preliminary study of physico-chemical and microbiological features of brine in the process of preserving the green olives of Oblica cultivar. pp. 499-505. tea@ktf-split.hr

Lactic fermentation is the most natural way for foodstuffs to reach microbiological stability and prolonged shelf life. The purpose of this research was to screen a spontaneous lactic fermentation during the process of preserving the green olives of Oblica cultivar (the autochthonous Croatian cultivar) in the agriculture cooperative near Split (Croatia).

Using API 50CHL and APILAB PLUS software, the species *Lactobacillus curvatus* was isolated and identified during the second week of the brining process. In the latter phase of the fermentation process, the presence of microorganisms belonging to this genus was not identified, which proves that spontaneous lactic fermentation in the process of preserving green olives of the Oblica cultivar had been incomplete. This was also proved by the values of fundamental physico-chemical features (low pH, high total acidity concentration, inadequate temperature). Presented results show the necessity of applying starter culture in the process of preserving green olives of the Oblica cultivar.

Keywords: lactic fermentation, *Lactobacillus*, Oblica cultivar, table olives