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WHEAT RESPONSE TO DROUGHT AND FUTURE ATMOSPHERIC CO₂ LEVEL: A REMOTE SENSING PERSPECTIVE

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Abstract

The spectral-based photochemical reflectance index (PRI) and thermal imaging-derived leaf surface temperature (T_{leaf}) derived from thermal imaging are important metrics of plant functioning. The relationship between PRI and radiation use efficiency (RUE) and T_{leaf} and leaf transpiration could be used to monitor crop photosynthesis and water use. We conducted an [CO₂] enrichment experiment in which three wheat genotypes were grown at ambient (400 ppm) and elevated (550 ppm) [CO₂] under well-watered and drought conditions in two replicate glasshouses. Leaf transpiration (Tr) and latent heat flux (LE) were derived to assess evaporative cooling, and RUE was calculated from assimilation and radiation measurements on several days during the season. Simultaneous hyperspectral and thermal images were taken at 1.5 meters from the plants to derive PRI and the temperature difference between the leaf and its surrounding air ($\Delta T_{leaf-air}$). A PRI-RUE decoupling was observed under drought at ambient $[CO_2]$ but not at elevated $[CO_2]$, likely due to changes in photorespiration. For a LE range of 350 W m-2, the $\Delta T_{leaf-air}$ range was 10°C at ambient [CO₂] and only 4°C under elevated [CO₂]. Thicker leaves in plants grown at elevated [CO₂] suggest higher leaf water content and, consequently, more efficient thermoregulation at high $[CO_2]$ conditions. PRI, RUE, $\Delta T_{leaf-air}$, and Tr decreased linearly with canopy depth, displaying a single PRI-RUE and $\Delta T_{leaf-air}$ – Tr model through the canopy layers. Our study demonstrates the utility of these sensing metrics for detecting wheat responses to future climate and environmental changes.

Keywords: wheat, drought, atmospheric CO₂, remote sensing, spectral-based photochemical reflectance index, leaf transpiration

ASSESSING THE CONSERVATION AND ENHANCEMENT VALUE OF BLOCKS OF REMNANT VEGETATION ON BENEFICIAL ARTHROPOD ASSEMBLAGES IN A PASTURE LANDSCAPE

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Abstract

Investigating the community dynamics of ecosystem service-providing arthropods in non-crop habitats within agroecosystems is crucial in promoting ecological intensification methods that further contribute to engineering sustainable agroecosystems. Arthropods are important as drivers of ecosystem functions and processes, such as pollination and pest suppression. The specific objectives of this study were to compare arthropod assemblages in blocks of native remnant vegetation and exotic pastures, and survey abundances and diversity of beneficial arthropods between remnant vegetation and adjacent pasture in early spring (September 2009) and mid-summer (December 2009 - January 2010) on two farms in southeastern Gippsland, Victoria, Australia. The structure of arthropod communities were significantly different between the core of remnant vegetation and pasture sites in both seasons. Arthropod community assemblages at the edge of remnant vegetation were significantly different compared to assemblages 20 m in adjacent pasture in early spring. However, these assemblages were not distinctly different in mid-summer. Apidae (bees) were of similar abundances in the two habitats. Carabidae (ground beetles) was the only taxa to have significantly higher abundances at pasture sites in early spring. Seven of the 14 ant genera collected, ten spider families and Xylophagidae (awl flies) were found exclusively in remnant vegetation. Bethylidae (bethylids) and Dolichopodidae (long-legged flies) were not found 80 m into adjacent pasture during either season. In early spring, Araneae (spiders), Lycosidae (wolf spiders), Staphylinidae (rove beetles), Bethylidae (bethylids), Syrphidae (hoverflies) and Formicidae (ants) were found to have significantly higher abundances in the core or edge of remnant vegetation compared to pasture sites; in mid-summer the higher taxonomic groups showed no significant differences between sites. These results demonstrate that beneficial arthropods use remnant vegetation as refugia in early spring and that remnant vegetation enhanced invertebrate conservation in pasture systems. Relevance of these findings to improved biological control is also discussed.

Keywords: *beneficial invertebrate, remnant vegetation, natural enemy, non-crop habitat, native vegetation*

POLISH REGIONAL AND TRADITIONAL FOOD PRODUCTS FROM LUBLIN REGION

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Abstract

In the European Union traditional and regional products enjoy great interest. The Europeans more and more willingly buy food produced using traditional methods from local raw materials, which – contrary to mass production – guarantees the highest quality. This is the act of: 17 December 2004 on the registration and protection of names and indications of agriculture products and articles of compositions and on traditional products. Under the act, the Traditional Products List (TPL) has been drawn up, which is run by the Minister of Agriculture and Rural Development and the Marshals of the Voivodeships. The products with documented at least 25 year-old tradition in production may be entered onto the Traditional Products List. Categories of division for the List of Traditional Products: *Cheese and other dairy products; Fresh meat and meat products; Fishery products, inclusive of fish;* Nuts, seeds, cereals, vegetables and fruits (processed and non-processed); Bakery and confectionery products; Oils and fats (butter, margarine, etc.); Honeys; Ready-made dishes; Beverages (alcoholic and non-alcoholic). There are 2089 products (253 in Lubelskie Voivodeship) registered as traditional and regional products in Poland (as on 24.07.2023). They represent all the above-mentioned categories of traditional and regional food. Traditional and regional food is the basic element contributing to promotion of Polish cultural heritage and consumers have an opportunity to try the local cuisine. Promoting the cuisine and regional products is the obvious factor for increasing the number of foreign tourists and for development of agrotourism and country tourism.

Keywords: traditional product, regional product, quality, traditional products list

SELF-PRODUCED FOOD: LIVING STYLE TRANSFORMATION AS A GLOBAL VALUE - CASE STUDY BASED ON SURVEY DATA IN CHINA AND EUROPE

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Abstract

Self-produced food is an important cultural heritage of agricultural civilization for human being, with attributes such as, following the law of nature, allowing nature to flow, intensive cultivation, and upholding simplicity and revere nature.

The data from a survey of self-produced food is doing jointly by Chinese and European scholars shows that up to now, there are 20-47% of households in Europe, and about 90% of households in rural China still maintain this traditional approach. During the Covind-19 pandemic, the proportion of households participating in people continued to rise. Many families in large cities in China, also used street corners, balconies, and planting boxes for small-scale planting, demonstrating the great potential of sustainable development and green life, not only an important path to meeting the needs of people for fresh food and storage it, but also to promote community solidarity and cultural exchange.

The survey shows that self-produced food is playing a potential and active role in promoting alternative food systems, food and consumer ethics, quiet sustainability, garden as home, home as garden, and complementarity between mainstream and non-mainstream economic systems.

The goal of this article tries to explore the possibility of designing food production and circulation in accordance with ecological principles, to advocate a development paradigm of "degrowth, less consumption, and emphasis on nature", and to seek a transformation of the traditional mode of food production, consumption, supply, and governance, based on self-produced food survey analysis from the China-Europe, as a new global value.

Keywords: *self-produced food, ecological principles, green life, model transformation, new global value*

ALPHA-AMYLASE 3 AND BETA-AMYLASE 3 ARE ESSENTIAL FOR OIL YIELD DURING FRUIT DEVELOPMENT OF OIL PALM REVEALED BY TRANSCRIPTOMIC ANALYSIS

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Abstract

Oil palm (Elaeis guineensis Jacq.) produce a high amount of oil from its fruit. A recent study shows that the starch metabolism is highly connected with oil synthesis in this fruit-producing species. Therefore, we aim to detect gene expression changes related to starch metabolism genes throughout oil palm fruit maturity that influence oil production in fruits. The gene expression profiles were examined at six fruit-developing phases (4, 8, 12, 16, 20, and 22 weeks after pollination), with three different oil yields (low, medium, and high). Using the Illumina NextSeq platform, RNA-Seq analysis successfully identified and analyzed differential expression genes in the oil palm mesocarps during development. In the oil palm fruit, starch synthesis and degradation are taking place to support oil production. We found that sucrose transporter 1 (SUT1), ADP-glucose pyrophosphorylase large subunit 1 (AGPL1), and starch synthase 1 (SS1) have a high correlation with oil yield. In addition, hydrolytic enzymes such as a-amylase 3 (AMY3) and β -amylase 3 (BAM3) reveal increased expression in high-yielding compared to low-yielding oil palms during fruit development. The gene expression changes in oil palm fruit development provide valuable information for understanding fruit growth and maturation. The findings also give insight into the relationship of starch with lipid production in oil palm, which might support the creation of new oil palm varieties via breeding programs or genome editing approaches.

COMPREHENSIVE ANALYSES OF STARCH PHOSPHORYLATION

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Abstract

Starch is the second largest biomass source on earth after cellulose and is one of the most important renewable resources (Carvalho, 2008). Moreover, it is the main energy and carbon reservoir of plants to withstand times when photosynthesis is not feasible. The starch metabolism is subject to a severe regulation, which is not yet understood in depth. Thus, phosphoesterification by the starch-related dikinases α -glucan, water dikinase (GWD) at the C6 position and phosphoglucan, water dikinase (PWD) at the C3 position within the amylopectin molecules on the starch granule surface massively alters the starch granule properties. This is accompanied by alterations in the substrate availability for enzymes acting downstream of the dikinases. Phosphorylation represents a key step in starch degradation as well as synthesis (Hejazi et al., 2014). It has already been found that the action of the dikinases results in the formation of single, double, and triple phosphorylated α -glucan chains (Hejazi et al., 2008; Ritte et al., 2004), but nonetheless, the position within the glucan chain where the phosphate group is covalently attached is obscure to date. Similarly, the question arises whether this is done according to a certain or random distribution pattern. Furthermore, it is unknown whether this phosphorylation distribution pattern is conserved for starches from various species, mutants, and tissues.

It was proven by 33P-labeling and MALDI-TOF MS analysis that the in vitro phosphorylation distribution patterns of starches by GWD from Solanum tuberosum L. and Elaeis guineensis Jacq varied. In addition, it is demonstrated that the phosphate groups are not always esterified at the same position within the α -glucans in relation to the reducing ends. GWD enters the starch granule surface and phosphorylates the glucosyl units in vicinity to branching points to convert the highly ordered glucan chains into a less ordered state and to render them accessible for the downstream acting hydrolases.

Keywords: *starch, phosphoesterification, α-glucan, water dikinase*

EARLY PERFORMANCE OF BACTERIAL SPOT TOLERANT ADVANCED PEACH SELECTIONS IN ALABAMA

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Abstract

Peach growers in Alabama are looking for competitive new cultivars to address various production challenges and improve sustainability. The Clemson University peach breeding program is developing new improved peach and nectarine selections with high fruit quality and tolerance to bacterial spot, that could considerably contribute to sustainability. To evaluate performance of advanced peach selections 'SC-1' and 'SC-2' in local conditions, an experimental plot was established at the Chilton Research and Extension Center (CREC) near Clanton in Central Alabama in 2017. The objectives of this study were to assess the vegetative and productive qualities of these advanced selections and develop production recommendations for peach producers in the state. 'SC-1' and 'SC-2' produced their first commercial crop in 2021, and measurements were taken to determine total yield and fruit quality attributes during 2021-2022. Following a hard freeze event in mid-February 2021, a significant crop loss for 'SC-1' was observed. In contrast, 'SC-2' had 80% flower bud survival rate. The total yield per tree for 'SC-2' was higher and averaged at 38.3 and 33.7 kg/tree in 2021 and 2022, respectively. Both selections produced very attractive fruit with excellent taste. During the 2021-2022 season, when severe bacterial spot infections occurred in southeastern peach orchards, both selections exhibited high fruit tolerance to this bacterial disease. Therefore, 'SC-1' and 'SC-2' could be recommended for peach producers in Alabama as cultivars with high yield potential, excellent fruit quality, and bacterial spot tolerance.

Keywords: peach, disease tolerance, yield, fruit quality

PROBLEM WEEDS CONTROL IN STRAWBERRY CROPS IN DIFFERENT GROWING SYSTEMS IN ROMANIA

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Abstract

Irrespective of the growing system practiced, strawberry plants are very susceptible to weed competition, especially in the beginning stage after planting, when they are small and frequent irrigations provide perfect conditions for the weed seeds germination. Weeds emerged inside the cannopies, in perennial crops, negatively influence the longevity of the plantations by weakening the plants or even suffocating them, consuming water and nutrients, favoring the infection with diseases and pests, negatively influencing the ripening of the fruits. The research aimed the identification of problem weeds and measures to combat them in 3 different systems of perennial strawberry crops grown under field conditions. The research and assessments were carried out in Giurgiu County at Hotarele in the strawberry crop cultivated with plastic film in rows and straws substrate between the rows, in the village of Oinacu in the strawberry crop with plastic film in rows and in the experimental field at RDIPP - Bucharest where the strawberry was grown without film and without straws substrate between the rows. Two determinations were made on each row of strawberries in the period 2021-2022, using a metric frame and the observations concerned the density (number of plants/m2), the participation (% in which each species participates in the general weeding), the frequency (% where each species was noticed at the observation points), family, class (monocotyledonous, dicotyledonous) and living period of each species. The growing system with plastic film on rows and with a layer of straws between rows ensured the best protection of the strawberry crop against the weeds competition, on condition that after harvesting the weeds that sprout through the holes of the film, on the interval between rows and around the strawberry field, to be destroyed.

Keywords: strawberry, plastic film, weeds, herbicides

BIOLOGICAL EFFICACY AND SELECTIVITY OF FLUROXYPYR AND FLORASULAM IN CONTROL OF BROADLEAF WEEDS IN WINTER BARLEY

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Abstract

During 2021-2022 two fields trial with the winter barley variety "Lucian" was conducted. The studys was conducted in 2 different locations (Constanța and Călărași) and aimed to evaluate the biological activity of two herbicides based Fluroxypyr and Florasulam in control of broadleaf weeds in winter barley crops. The experiments were placed in randomized blocks, in 4 repetitions with a plot area of 100 m2. Efficacy and selectivity of the herbicides Flurostar Super SE (100 g/l fluroxypyr +1 g/l florasulam) and Tomigan XL 102.5 SE (100 g/l fluroxypyr + 2.5 g/l florasulam), applied at registered and higher rates, was evaluated. The herbicide application was done at the phenophase of the crop – 1st - 2nd stem node (BBCH 30-32). The efficacy of the products by the 10-score scale of EWRS was recorded. The results were compared with untreated controls. The herbicide selectivity for the winter barley by the 9-score scale for phytotoxicity of EWRS was reported. The results obtained showed that the efficacy depends on the dose applied, the type of weeds and their density on square meter. The herbicide based floroxypyr and florasulam ensured a good efficacy in controlling of broadleaf weeds in winter barley, the best results being obtained at the higher dose. For both herbicides (Flurostar Super and Tomigan XL) at all evaluated rates signs of phytotoxicity for the crop were not observed.

Keywords: *winter barley, weeds, herbicides, selectivity, efficacy*

EVALUATING CULTIVARS FOR ORGANIC FARMING: TOMATOES, PEPPERS AND AUBERGINE IN SOUTH ROMANIA

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Abstract

Organic farming has become a significant objective of the European Commission, and by 2030. EU member countries are required to find solutions to achieve the target of at least 25% of agricultural land being used for organic crops. As the area dedicated to organic farming continues to grow, there is a growing demand for cultivars that are optimized for this type of agricultural environment. Numerous studies have demonstrated that crop phenotypes can react differently when cultivated under different management systems, such as conventional versus organic. This has sparked a worldwide debate about whether we should develop cultivars exclusively for organic farming or if we can select suitable cultivars from conventional varieties for organic growing conditions. At the Vegetable Research Development Station Buzau, we have selected eleven cultivars of tomatoes (Siriana, Ema de Buzau, Flaviola, Ovidia, Hera, Andrada, Măriuca, Darsirius, Chihlimbar, Kristinica, Florina), five cultivars of peppers (Regal, Cantemir, A50, Roial, Decebal), and five cultivars of aubergine (Rebeca, Iarina, Romanița, H13Bz, H2Bz) that are typically suited for conventional farming. These cultivars were tested under organic farming conditions to investigate how genotypes interact in distinct growing systems and how this may impact yield and quality potential. Based on our study, we have drawn several conclusions. Darsirius has exhibited high ecological plasticity in both organic and conventional farming. Regal has shown uniform yields and fruits with high nutritional values in both growing systems. Rebeca has displayed tolerance to pest pathogens and has maintained stable yields under the studied systems. These findings are valuable for the ongoing efforts to develop cultivars that thrive in organic farming conditions and contribute to meeting the EU's organic farming goals. Additionally, they shed light on the adaptability of specific cultivars to different agricultural systems and offer insights into maximizing yield and quality potential under organic cultivation practices.

Keywords: Capsicum annuum, conventional farming, ecological farming, Solanum lycopersicum, Solanum melongena

ASSESSMENT OF ROMANIAN PEPPERS CULTIVARS FOR FRUIT QUALITY TRAITS

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Abstract

In recent years, there has been a growing trend among people to be more conscious of the food they consume, seeking products with high nutritional value, bioactive compounds, and antioxidant capacity to promote good health and maintain an excellent body figure. Among the most popular and versatile fresh vegetables worldwide are peppers (Capsicum annuum L.), known for their vibrant colours, delightful flavours, and abundant nutritional benefits. In this study, we aimed to assess the phenotypic diversity in terms of fruit quality traits and yield for five Romanian pepper cultivars bred at VRDS Buzau: two bell peppers (Cantemir, Regal), two hot peppers (Roial, Decebal), and one accession (L-50). To evaluate fruit quality, we measured various parameters including dry matter content, fruit firmness, total soluble solids, titratable acidity, ascorbic acid, lycopene, and β -carotene content at different ripening stages. The results showed that fully ripe fruits exhibited significantly higher levels of bioactive compounds compared to unripe fruits. Specifically, the L-50 variety demonstrated the highest content of total soluble solids and β -carotene, making it a standout choice for its nutritional benefits. On the other hand, the Roial variety stood out with its rich vitamin C content. Moreover, the Cantemir cultivar displayed the highest fruit firmness (10.1 N), indicating an extended shelf-life capacity, which could be advantageous for storage and transportation. Importantly, all studied genotypes exhibited promising antioxidant properties, positioning them as potential natural ingredients for functional foods. In conclusion, our findings underscore the remarkable diversity and nutritional potential of these Romanian pepper cultivars. Their abundance in bioactive compounds and antioxidant capacity makes them excellent choices for health-conscious consumers seeking fresh and nutritious ingredients to support their well-being and dietary goals.

Keywords: antioxidants, Capsicum annuum L., fruit quality, Romanian peppers

PROTECTION OF THE OLD AUTOCHTONUS VARIETY OF PEPPER FROM PERMANENT LOSS IN OUR AREA

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Abstract

In 2007, the Agricultural Extension Service "Sombor", in cooperation with the Provincial Secretariat for Agriculture and the Ministry of Agriculture, launched the Pilot Project Let's Preserve and Protect Old Varieties of Vegetables. The goal of the project was to preserve old domestic varieties of vegetables that are traditionally grown in our area, and their survival is endangered with greater commercialization of vegetable production. They participated 22 primary schools with 3163 students. In this project were collected 5296 samples over three weeks. After collecting, the samples were each individually determined and sorted by plant species, marked, prepared for sowing and recorded in the sample database. Today, in 2022, over 1000 samples of old varieties and populations of vegetables and other plant species are being maintained within this program. A couple of years ago, we began to deal more seriously with old varieties and deepened research on plant species of peppers. This paper will present the phenotypic and morphological characteristics of interesting varieties of indigenous varieties of peppers These varieties are excellent for further production and testing in laboratory conditions and also for organic production. With this project, forgotten plant species, varieties and food populations have been returned to production.

Keywords: old variety, peppers, vegetable production, yield

THE EFFECTS OF AGRICULTURAL TECHNOLOGY ON MAIZE YIELD IN SOMBOR REGION IN SERBIA IN THE 2013-2022 PERIOD

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Abstract

The most cultivated crop in the area of Northwestern Serbia is maize. In the Sombor region maize is grown on about 60,000 ha each year, and in Serbia it is grown on more than 1,000,000 ha, which makes Serbia a significant producer of this cereal. The Agricultural Extension Service Sombor has been monitoring the correlation between agrotechnical measures and maize yield for several decades. The following agrotechnical measures are monitored: time of primary tillage, impact of previous crop, use of mineral fertilizers, time of sowing and selection of hybrids. Each of these measures are in the hands of agricultural producers and through these measures, producers effect the level of maize yield. The primary tillage in dry condition preserves the necessary soil moisture and it is one of the most important moments in production given climate change. Proper usage of mineral fertilizers, the choice of the appropriate pre-crop and sowing time also has a very significant impact on yield. Also, the choice of maize hybrids according to FAO groups and production orientation (mercantile or silage maize, sweet maize, popcorn) has a great influence on yield.

Keywords: maize, sowing time, fertilizer, previous crop

COLLECTION OF PACKAGING WASTE FROM PESTICIDES IN THE AREA OF WESTBACKA DISTRICT FROM 2013 TO 2023

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Abstract

With the increase in agricultural areas and more intensive production, the consumption of pesticides also increases. Together with plant protection products, packaging also reaches the market, which after using the products represents packaging waste. Packaging plays an important role in the safe delivery and use of plant protection products, but after use, an efficient packaging waste disposal system should be provided. Packaging waste from plant protection products represents a potential risk to human health and the environment if it is not managed adequately.

Keywords: pesticide, plant protection, packaging waste, human health risks

CHARACTERISTICS OF PRESERVATION AND PROTECTION OF OLD AUTOCHTHONOUS TOMATO VARIETIES

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Abstract

In 2007, the Agricultural Extension Service "Sombor" in cooperation with the Ministry launched the pilot project "Save the old Vojvodina vegetable varieties". A large number of elementary school students participated in the campaign, and 5296 samples were collected. All samples have been determined, entered into the database and sown on a sample field. Every year, an analysis of selected samples was done with short descriptions of the varieties. In previous years, we selected the most interesting varieties and described them in more detail. In this paper, we would like to present the old authentic varieties of tomatoes that we singled out as the most interesting.

Keywords: old variety, tomato, vegetable production, yield

GAS CHROMATOGRAPHY IN THE FOOD CONTROL PROCESS

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Abstract

Gas chromatography (GC) is a powerful analytical technique used in food control to analyse and monitor the quality, safety, and authenticity of various food products, including meat, eggs, frozen fruit, and vegetables. The purpose of this work is to apply the GC technique in the control process of these food categories. For lipid analysis, GC has been used to determine the fatty acids profile of meat and eggs samples. This analysis provides information about their nutritional quality and authenticity. Another goal was to apply GC to detect and quantify pesticide residues in frozen fruits and vegetables, to ensure that these products are safe for consumption and comply with maximum residue limits. In all these applications, gas chromatography enabled the separation, identification, and quantification of specific compounds of interest, providing accurate and reliable data to ensure the quality, safety and compliance of meat, eggs, frozen fruit, and vegetables in the food control process.

Keywords: gas chromatography, food control, authenticity of food products

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METALS CONCENTRATIONS IN CHICKEN EGGS AND ESTIMATION OF HEALTH RISK FROM EGGS CONSUMPTION

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Abstract

The poultry industry is one of the largest sectors of agriculture throughout the world. Multielement content in animal products is influenced by diet, which reflects soil composition and geographical origin. A total of 50 eggs samples were collected from Romanian markets and local producers and 40 elemental profiles were determined from hen eggs samples, including macro-, micro-elements, metals with toxic potential, and rare earth elements (REEs). The inductively coupled plasma mass spectrometry technique (ICP-MS) was used for the determinations. The results presented quite different concentrations of minerals in egg samples, depending on the rich nutrition system of hens and husbandry practices. In terms of food safety, the toxic element concentrations in the majority of the investigated samples were below the maximum permitted levels set by Romanian and European legislation. Generally, the sum of Target Hazard Quotient for each heavy metal was below 1, indicating no significant health risks associated with the intake of individual heavy metals or mixture through eggs ingestion.

Keywords: metals concentrations, chicken eggs, health risk

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TECHNOLOGICAL SOLUTIONS OF FRUIT PASTILLES AND THEIR QUALITY ASSESSMENT

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Abstract

The production of fruit pastille was aimed at replacing traditional sugar-rich sweets. For ecological and economic reasons, they were mainly made from local raw materials. These fruit pastilles were produced using natural materials such as fruit and vegetables, without the use of any food colouring or other artificial additives such as sweeteners, etc. To produce a healthier alternative to traditional sweets, appropriate technological solutions have been taken. Fruit pastilles were made exclusively from different varieties of apples, as well as by mixing apples and carrots, apples and blueberries without added sugar and with 20 % sugar. The fruit pastilles were evaluated by children aged 4-10 years. The fruit pastilles without added sugar, made from Bogatyr apples and blueberries scored the highest points due to their distinctive taste, as the panellists identified them as blackcurrant pastilles. The moisture content and water activity of the fruit pastilles, which affect texture and shelf-life, were determined. These physico-chemical parameters were found to be higher in the samples with added sugar. This could be due to the sugar-pectin structure formed. Fruit pastilles, both without and with added sugar, were lower in calories than traditional sweets.

Keywords: fruit pastilles, apples, berries, vegetables, quality

ANALYSIS OF GRAIN STORAGE TECHNOLOGIES

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Abstract

Grain storage in elevators poses challenges due to the spread of grain pests and microscopic fungi that spoil grain during storage. The research was carried out between 2020 and 2022 in three different elevators (X1, X2 and X3) located in three different regions in Lithuania. Samples were taken from Triticum aestivum L. and Vicia faba L., sampled for the presence of the following pests: Sitophilus granarius L., Tribolium confusum Jacquelin, du Val, Acanthoscelides obtectus Say, Acarus siro L. and the presence of the microscopic fungi: Fusarium spp. L., Claviceps purpurea (Fr.) Tul. and Tilletia caries (DC.) Tul. & C. Tul. The most abundant fungi in the samples analysed appeared to be bean weevil and Fusarium spp.L.

Keywords: grain hopper, elevator, pests, microscopic fungi

YIELD-FORMING EFFECT OF MINERAL-ORGANIC MIXTURES IN WHEAT AND RAPE CULTIVATION

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Abstract

The quantity and type of fertilizer used directly translate into the size and quality of the harvest, determining its subsequent utilization (e.g., for consumption, fodder, or energy purposes). In today's times, there is a constant search for innovative solutions in fertilizer production technology that would address not only the challenges of modern agriculture but also focus on the production of mineral-organic fertilizers. Such fertilizers, when used systematically, would not only provide plants with essential nutrients but also help in rebuilding organic matter reserves in the soil. Wheat is the primary agricultural crop worldwide, while rapeseed is the most important industrial crop in Poland. The yield of both crops, as well as the quality of the harvested produce, depend not only on the soil and climatic conditions mentioned earlier but also on factors such as crop rotation, species and variety, plant protection methods, fertilization, and soil cultivation techniques. Considering that human influence on soil and climatic factors is negligible, the priority becomes optimizing agrotechnical factors, including sustainable fertilization. The aim of our research was to assess the yield-forming effect of mineral-organic mixtures containing zeolite composites and the addition of organic additives (lignite or leoneradite) in the cultivation of wheat and rapeseed.

Based on the research, it was found that the highest total yield of above-ground parts of spring wheat was obtained in the treatments with the addition of 3% NaX-C composite and 3% leonardite and

with the addition of 3% NaX-C composite and 6% leonardite. The highest total yield of above-ground parts of spring rapeseed was obtained after adding a mixture with the addition of 3% NaX-C composite and 6% leonardite and with addition of 3% NaX-Ver composite and 6% lignite. In general, it can be observed that all of the applied mineral-organic mixtures increased the yields of both wheat and rapeseed at least twice compared to the control object. The use of mineral-organic mixtures contributes to the improvement of plant yield as well as to the improvement of soil properties.

Keywords: spring wheat, rapeseed, yiled, zeolite composites, leonardite, lignite

Acknowledgments: The "Fly ash as the precursors of functionalized materials for applications in environmental engineering, civil engineering and agriculture" no. POIR.04.04.00-00-14E6/18-00 project is carried out within the TEAM-NET programme of the Foundation for Polish Science co-financed by the European Union under the European Regional Development Fund.

CHANGES IN THE CONTENT OF CD, PB AND ZN IN THE SOIL AFTER THE APPLICATION OF MINERAL-ORGANIC FERTILIZER MIXTURES

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Abstract

Soil pollution poses a significant global environmental concern. The presence of heavy metals in soil can have detrimental effects on plant growth and the overall activity of living organisms. Moreover, the inclusion of these toxic elements in the food chain poses a serious threat to the health and well-being of animals and humans. However, there is hope in the potential of zeolite materials to address this issue. These materials possess unique properties that can immobilize toxic elements. Their ion-exchange capabilities and ability to increase soil pH enable the precipitation of potentially harmful metals in the form of oxides or other compounds, which can then be safely entrapped within the zeolite structure.

To investigate the effects of mineral-organic mixtures, including zeolite composites and organic additives such as lignite or leonardite, on contaminated sandy clay soil, a two-year pot experiment was conducted in a controlled vegetation hall. The levels of total Cd, Zn, and Pb were assessed in the soil at the end of the 1st and 2nd year of research, using the ICP-OES method.

The results showed that the application of mineral-organic mixtures led to a notable reduction in total Cd content in the soil, with an average decrease of 18% after 1st year and 20% after the 2nd year compared to the control object. Similarly, the total Pb content was found to be 7% lower than the control after the 1st year and 12% lower after the 2nd year. Additionally, the total Zn content was reduced by approximately 8% after the 1st year and an impressive 24% after the 2nd year of the experiment, compared to the control.

These findings indicate the positive impact of using mineral-organic mixtures, including zeolite composites, in mitigating the content of heavy metals in the soil. This research provides valuable insights into potential strategies to combat soil contamination and its adverse effects on the environment and living organisms.

Keywords: *heavy metals, zeolite composite, soil contamination, exogenous organic matter*

Acknowledgments: The "Fly ash as the precursors of functionalized materials for applications in environmental engineering, civil engineering and agriculture" no. POIR.04.04.00-00-14E6/18-00 project is carried out within the TEAM-NET programme of the Foundation for Polish Science co-financed by the European Union under the European Regional Development Fund.

EFFECT OF COMPOST APPLICATION ON SULFUR CONTENT AND ENZYMATIC ACTIVITY IN SOILS OF ECOLOGICAL FARM

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Abstract

An observed sulfur deficit has been found in Poland's arable soils, particularly in the organic farm soils, due to decreasing sulfur emissions to the atmosphere and ecological activities, including changes in the variety of mineral fertilizers. The definition of organic farming in European Union law is a system of sustainable management of plant and animal production. The sulfur cycle depends on chemical processes; however, biochemical processes play a crucial role. Arylsulfatase hydrolyzes aromatic sulfate esters (R-O-SO3) to phenols (R-OH) and inorganic sulfates, which are available to plants.

The biodynamic farm in Juchowo promotes agricultural practices related to plant biodiversity and conservation cultivation, which improves the properties of the soil. Basic soil parameters were assayed in 2017 and after five years of compost application. The soil samples were collected from 4 cultivated fields (4 plots each) after compost application in doses of 5, 10, and 20 tons per hectare. Texture, bulk density, pH, total organic carbon (TOC), total nitrogen (Nt), plant-available forms of phosphorus, potassium, and magnesium, and cation exchange capacity content were determined. Furthermore, sulfur forms and the activity of arylsulfatase were also determined.

The application of compost caused an increase the pH value in all plots. Concentrations of basic cations and plant-available phosphorus, potassium and magnesium contents in soils were higher in 2022 than in 2017. Soil samples of most plots in 2022 demonstrated an increase in TOC content and a decrease in Nt content. Five years of field experiment resulted in lower total sulfur and sulfate sulfur concentrations in soil than in 2017. Doses of 10 and 20 tons of compost increased arylsulfatase activity in soils. Due to the relatively low sulfur content in the soils of biodynamic farm, the use of kieserite fertilizer should be considered.

Keywords: organic farm, sulfur, arylsulfatase, compost

THE EFFECT OF BIOLOGICAL PREPARATIONS, MANURE AND STRAW MANAGEMENT APPLICATION ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF HAPLIC LUVISOLS

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Abstract

One of the important reasons for the degradation of arable soils is an intensive agricultural activity using traditional cultivation methods based, among others, on deep plowing and other treatments that strongly interfere with the soil structure. Some of its negative effects include a decrease in soil organic matter content, a reduction in soil biological activity, and a reduction in biodiversity. To prevent these unfavourable phenomena in agricultural practice, the current plow tillage system is often simplified by introducing a non-tillage system or direct sowing. However, similarly to the excessive intensification of agricultural production, ill-conceived simplifications may sometimes lead to ecologically and economically dubious consequences, requiring additional measures to be taken to preserve or improve soil biodiversity and fertility. The three-year experiment was carried out on the Haplic Luvisols under winter wheat cultivation in North Poland. The effect of various tillage systems and stubble management on the soil environment biological, physical and chemical features was investigated. Total number of bacteria, cellulolytic and amylolytic microorganisms, actinobacteria, fungi and bacteria of Azotobacter genus; soil respiratory activity; bulk density; pH; organic carbon content; content of available phosphorus, potassium, magnesium; content of total nitrogen, mineral nitrogen forms: N-NO3

and N-NH4 were determined in soil samples. It was shown, that manure application was the factor of the greatest influence on soil properties. The manure fertilization increased the number of soil microorganisms; higher amounts of available forms of phosphorus, potassium, magnesium, and mineral nitrogen were also determined in soil samples from the experimental object cultivated with method including this procedure. The beneficial effect of manure and biopreparations addition on soil properties was enhanced if the chopped straw was left in the field, which confirms the importance of introducing additional sources of organic matter into the soil, as an intervention measure regulating the levels of key soil parameters.

Keywords: *microorganisms, organic matter physical, chemical and biological soil properties, stubble management; Haplic Luvisols*

EFFECT OF IONIC LIQUIDS WITH A NATURAL COMPONENT ON CEREALS

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Abstract

Ionic liquids (ILs) are a huge group of chemical compounds with tremendous potential for use in various industries and agriculture. Initially, ILs, due to their non-volatility, were touted as "green solvents", safe for the environment, and thus were intended to be an alternative to traditionally used organic solvents. However, studies conducted by numerous scientists around the world, very quickly showed that many of these compounds exhibit toxicity to various environmental elements. However, due to the fact that ILs can be designed in such a way that by selecting the cation and anion appropriately, substances can be obtained that will have the desired physical, chemical and biological properties, attempts are being made all the time to create compounds with the desired properties, but non-toxic to the environment.

In this study, we determined the effect of ionic liquids containing a natural component of optically active menthol and chloride anion on introduced soil, on the early stages of growth and development of spring barley (Horeum vulgare L.). Barley seeds were sown in pots containing soil to which the test chemical compound was added at various concentrations: 1 - 1000 mg·kg-1 of soil DW and in pots with control soil.

To determine the effect of IL san spring barley, fresh weight yield and plant dry matter content were determined. Based on the data obtained, EC50 values were calculated. At the same time, a visual assessment of all kinds of damage to the test species was carried out, such as stunting, chlorosis and necrosis, which were documented on digital photographs.

The study shows that the addition of ILs to the soil causes a decrease in plant fresh weight yield and an increase in plant dry matter content. All observed changes were strongly dependent on the concentration of compound used. Compounds with a longer chain showed less toxicity than those with a short chain in the substituent.

Keywords: *ionic liquids, cereals*

Acknowledgments: The scientific work was financed from the Science Resources as research grant (National Centre of Science) OPUS 19 2020/37/B/NZ9/04201.

EFFECT OF IONIC LIQUIDS CONTAINING NITRATE ANION ON CROP PLANTS

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Abstract

Ionic liquids (ILs) are compounds that have been of tremendous interest to researchers around the world for more than two decades. A major advantage of this type of compound is its non-volatility, making it safe for the atmosphere. The almost unlimited possibility of cation-anion combinations means that these compounds are often referred to as "designer solvents." However, although ILs have excellent properties a major problem is their environmental impact.

In this research, we determined the effect of ionic liquids with a natural component, menthol, containing a nitrate anion on the growth and development of selected higher plant species. Wheat (Hordeum vulgare L.) and maize (Zea mays) were selected for the pot experiment. The study was conducted based on the OECD/OCDE 208/2006 Guide. The tested compounds were introduced into the soil at different concentrations (0-1000 mg·kg-1 of soil DW). Inhibition of plant fresh weight yield and inhibition of growth of their roots and shoots, as well as changes in dry matter content of both experimental plants were used as an indicator of toxicity of the tested ILs.

The study showed that the effect of ILs on plants depended on the length of the substituent in the compound. Compounds with a longer chain showed less toxicity than those with a short chain in the substituent. The effect of individual compounds was highly dependent on the concentration used. The plant more sensitive to the presence of ILs in the soil was wheat.

Keywords: *ionic liquids, crop plants*

Acknowledgments: The scientific work was financed from the Science Resources as research grant (National Centre of Science) OPUS 19 2020/37/B/NZ9/04201.

ENHANCING NDVI MONITORING AND SPRING WHEAT YIELD ESTIMATION WITH UAV MULTISPECTRAL IMAGING

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Abstract

Agricultural professionals, including plant breeders, face new challenges in using Remote Sensing (RS) tools and techniques, Geographical Information Systems (GIS) technologies and software, and data maintenance and processing using database management systems. Unmanned aerial vehicle (UAV)-based remote sensing has become a popular tool in precision agriculture due to its unique advantages in flexibility and resolution. The Normalized Difference Vegetation Index (NDVI) is widely used to analyze crop status, making it an essential tool for monitoring crop growth and predicting yield.

This study aimed to extract wheat canopy reflectance and estimate NDVI to monitor growth dynamics and predict yield. The study was carried out at the Institute of Agricultural Resources and Economics (AREI), Stende Research Centre, in the Northwest part of Latvia. Field trials were set up in 2021 and 2022, including 300 genotypes, with a plot size of 5 m2 each, in two replications. Canopy spectral images were collected once a week from plant germination to the end of the spring wheat vegetation period, using a Phantom 4 RTK (Real Time Kinematics) drone equipped with a multi-spectral camera. In average 10 flights were done per each season. To verify the results of the UAV images, yield data were obtained using a plot combine, and plant phenotyping data, such as early vigor, heading date, and plant height, were also collected.

Significant variation in NDVI between different genotypes was found, with NDVI at the early milk stage (flight data in the middle of July) showing the best wheat yield estimation model in this study (r=0.61 in 2021; r=0.67 in 2022). The results show that multi-spectral cameras have an application prospect in spring wheat breeding, supplying an effective tool for monitoring crop growth through NDVI index and estimating yield. This study was carried out in the frame of EEA and Norway Grants project "NOBALwheat – breeding toolbox for sustainable food system of the NOrdic BALtic region".

REUSE OF BLEACHING EARTH: THE GREEN SOLUTION FOR RAPESEED OIL PRODUCERS

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Abstract

The color of rapeseed oil depends on the content of two types of dyes, i.e., carotenoid and chlorophyll dyes. The high content of chlorophylls in the oil negatively affects its stability and sensory attributes, such as appearance, taste, or smell. Reducing the content of chlorophylls is especially important in cold-pressed oils, and thus rich in polyunsaturated fatty acids. Chlorophyll dyes take part in photochemical reactions transforming triplet oxygen into a singlet form (more reactive), thus initiating an avalanche process of oxidation of unsaturated fatty acids. The presence of both carotenoids and chlorophylls gives rapeseed oil a dark brown color that consumers do not desire.

For this reason, cooking oils must be pre-purified by a refining process that removes substances from the oil that are chemically, not fat. The main result of oil refining is an increase in their oxidative stability, thanks to which they can be, among other things, stored longer.

One of the refining stages is the bleaching process, mainly consisting of the removal of chlorophyll and carotenoid dyes with the use of various types of adsorbents, i.e., bleaching earth, silica gel, and active carbon. It is crucial to properly select the bleaching parameters and optimize this process.

The main goal of this research is to investigate the changes in the adsorption properties of bleaching earth in rapeseed oil's low temperature bleaching process.

Keywords: rapeseed oil, bleaching earth, bleaching process, waste reduction

NUTRITIONAL COMPOSITION AND HEAVY METAL CONTAMINATION IN FISH FROM KARDZHALI DAM, BULGARIA

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Abstract

This study aimed to determine the nutritional value, heavy metals, and micro and macro elements in four species of fish from the Kardzhali dam (Carassius gibelio, Perca fluviatilis, Vimba melanops and Rutilus rutilus). Data on the content of proteins, lipids, heavy metals, and micro and macro elements were obtained, and the energy value in kcal/100g and kJ/100 g fresh weight was calculated. The analyzed species can be divided into two groups: with low lipid content (up to 2.0%) - perch (1 g/100g fresh weight); and with medium lipid content (2.0-8.0%) - Prussian carp, malamida, and roach (2.0 to 2.7 g/100g fresh weight). All freshwater fish examined from the Kardzhali dam belonged to the category of foods with medium and high energy content (more than 170 kJ/100g) and were a good source of protein (21.52-24.54%). All four fish studied are essential magnesium, potassium, and sodium sources. Zinc, iron, phosphorus, and calcium predominate in Prussian carp and roach, while copper and manganese in malamida. The content of heavy metals mercury, lead, cadmium, and zinc in all fish examined was below the maximum allowable concentration (MAC). All four tested fish can be recommended for consumption by the population in the area.

Keywords: freshwater fish, proximate analysis, toxic metals, nutrients

INFLUENCE OF ROOTSTOCK CULTIVAR COMBINATION ON THE CONTENT OF HEAVY METALS, MICRO AND MACROELEMENTS IN THE LEAVES AND FRUITS OF APPLES

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Abstract

Heavy metals are among the most hazardous substances present in the environment because their presence in soils results in the contamination of plants and, consequently, food. Consumption of contaminated food (fruits and vegetables) is the primary cause of toxic metals transfer into the human body. Cadmium (Cd), lead (Pb), and mercury (Hg) are among the most toxic heavy metals causing severe health problems in humans. Apples are one of the most preferred seasonal fruits and a reliable source of nutrients. The research was conducted to evaluate the effect of rootstock combinations on the content of heavy metals, micro and macronutrients in the leaves and fruits of apples. The study was conducted in Brestnik village, situated at a 3.5 km distance from the source of pollution - the Non-Ferrous Metal Works near Plovdiv, Bulgaria. Five apple cultivars of "Enterprise," "Modi," "Gala resistant (Gemini)," "Pinova," and "Fujion" were studied on the rootstocks of MM106, M9-T337, and Supporter 4Pi 80 for the content of heavy metals, micro, and macroelements in the leaves and fruits of apples.

Keywords: apples, contamination, mineral composition, toxic metals

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METAGENOMICS INVESTIGATION OF BULGARIAN SOURDOUGH MICROBIOTA BY THREE DNA EXTRACTION PROTOCOLS

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Abstract

Research background. Sourdoughs are spontaneously formed, complex microbial ecosystems of various lactic acid bacteria (LAB) and yeast which, by producing specific metabolites, determine the quality of the baked products. In order to design and control sourdoughs with preferred nutritional characteristics it is crucial that the LAB diversity of the product of interest be elucidated.

Experimental approach. Using the opportunities of next-generation sequencing (NGS), by PCR amplification and sequencing of the V1-V3 hypervariable region of the 16S rRNA gene, we studied the microbial ecosystem of a wholegrain sourdough made of Triticum monococcum, originated from Southwestern Bulgaria. Since the DNA extraction method is considered crucial for the accuracy of the sequencing results, as it can introduce significant differences in the analyzed microbiota, we used three different commercial kits for DNA isolation and analyzed their impact on the observed bacterial diversity.

Results and conclusions. All three DNA extraction kits provided bacterial DNA which passed quality control and was successfully sequenced on Illumina MiSeq platform. The results received from the different DNA protocols showed variations in the microbial profiles. Alpha diversity indices of richness (ACE, Chao1) and diversity (Shannon, Simpson) were also different among the three groups of results. Nevertheless, a strong dominance of phylum Firmicutes, class Bacilli, order Lactobacillales, represented mostly by family Lactobacillaceae, genus Lactobacillus (relative abundance of 63.11%-82.28%) and family Leuconostocaceae, genus Weissella (relative abundance of 3.67%-36.31%) were observed. Lactiplantibacillus plantarum and Levilactobacillus brevis with relative abundance of 16.15%-31.24% and 6.21%-16.29% respectively, were the two dominant species identified in all three DNA isolates.

Novelty and scientific contribution. The presented results give insight into the taxonomic composition of bacterial community of a specific Bulgarian sourdough. Having in mind that the sourdough is a difficult matrix for DNA isolation, on the one hand, and that there is no standardized DNA extraction protocol for this matrix, on the other hand, this pilot study aimed to give a small contribution to the future establishment and validation of such a protocol, which will allow accurate assessment of the specific microbiota of sourdough samples.

Keywords: sourdough, DNA extraction methods, V1-V3 16S rRNA, next-generation sequencing, metagenomics, microbiota

Acknowledgments: This research was funded by the Bulgarian National Science Fund, grant number KP-06-N-36/3 by the Bulgarian Ministry of Education and Science under the National Research Programme "Healthy Foods for a Strong Bio-Economy and Quality of Life".

EFFECT OF Zn NANOPARTICLES ON THE BIOMETRIC PARAMETERS OF TOMATOES GROWN IN VITRO

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Abstract

The growing need for new, non-invasive or less invasive methods to control pests and pathogens in agriculture, as well as the need to grow quality food rich in micro and macro nutrients, necessitates the search for new ways to treat crop plants in agriculture.

Nowadays, one of the widely researched methods for reducing the negative footprint of agriculture on the environment is the use of nanomaterials. This requires a more detailed study of the effects of different nanomaterials on the development of individual plant species, as well as on their general physiological and biological parameters. The present research aimed to evaluate the influence of Zn nanoparticles on the physiological development of in vitro grown tomatoes and their biological indicators. Three different solutions in concentrations of 0,5mg/l, 1,5mg/l, and 2,5mg/l of Zn nanopowder with particles size of 60-70 nm were tested on two tomato genotypes grown in vitro – Rozovo sartse and Ideal. The genotype Ideal in all three tested replications showed increasing in most of the biological indicators like more than 35% increase in the plant high, 60% increase in fresh mass, and 20% increase in the number of roots compared to the control plants unlike the other tested genotype witch results slightly inhibiting of the total plants development. In conclusion, our tests showed that the less stressful for the tested plants were the 0,5 mg/l and the 1,5 mg/l Zn NPs solutions.

Keywords: zinc, Solanum lycopersicum L., in vitro screening, nanoparticles

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LATE SPRING FROSTS AND THEIR IMPACT TO AGRICULTURE IN BULGARIA

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Abstract

The losses of agricultural production in Bulgaria, as a result of climatic anomalies and unfavorable weather conditions during the years since the beginning of the 21st century, are significant and are growing continuously. The dates of the last spring and first autumn frosts limit the potential growing season. Damage from late spring frosts is a major limiting factor for the production of agricultural products. In the last 40 years, studies on the regime and risk of occurrence of late spring and early autumn frosts with data on a sufficient number of observation points have not been done.

The aim of the study is to assess the risk of late spring frosts in the agricultural lands of Bulgaria.

The phenomenon of frost is observed in the NIMH meteorological network. Agricultural crops are affected by frost during the potential growing season. We selected the cases of frost appearance after the permanent transition of air temperatures above 10°C for 50 stations from the territory of Bulgaria. The study period is 1991-2022.

The results of this study will be useful in assessing the agroclimatic resources of a given region and planning agricultural production, especially for some spring crops and orchards.

Keywords: late spring frost, potential growing season, length of frost-free season

CALIBRATION AND PARAMETERISATION OF THE AQUACROP MODEL FOR GROWING WINTER WHEAT IN BULGARIA

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Abstract

The sustainable development of modern agriculture and the manufacturing of quality crop production requires a precise assessment and management of the conditions and potential of the available resources. The use of numerical models in operational practice gives insight into the effective utilization of water resources. Numerical modeling methods can be used to assess of the extent and negative impact of agrometeorological drought. It is an increasingly common phenomenon and affects the quantity and quality of the harvest. The AquaCrop model is suitable for estimating the growth and productivity of agricultural crops in areas with insufficient moisture.

Our research aims to calibrate and optimize the parameters of the AquaCrop model for winter wheat under the conditions of the country. This will be achieved through conducting a field experiment. The collection of observed and measured data will enable their comparison with the results of the model simulation.

Through the AquaCrop model, water effectivity and yield sensitivity to available water reserves will be estimated. In the process of parameterization of the model, the values of the elements of the meteorological, biological, and soil block of the model affecting the soil water balance and natural fertility will be optimized.

The obtained results will be widely used in the compilation of agrometeorological forecasts and determination dates for the onset of drought in different regions of the country.

Keywords: winter wheat, calibration, AquaCrop, parameterization, field experiment, yield simulation

COMPARISON OF SACCHARIFICATION METHODS FOR BIOTECHNOLOGICAL UTILIZATION OF WHEAT BRAN

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Abstract

This study compares various methods used for the hydrolysis of lignocellulosic waste materials in terms of sugar yield and the content of inhibiting substances. Wheat bran was used as the lignocellulosic material, and the following hydrolysis methods were investigated: one-step alkaline hydrolysis, repeated alkaline hydrolysis, acid hydrolysis, and a combination of these methods with enzymatic hydrolysis. The combination of acid and enzymatic hydrolysis yielded the highest sugar yield, with a concentration of sugars in the hydrolyzate reaching up to 60 g/L and a yield of around 90%. The total concentration of phenolic substances, which can act as inhibitors during further biotechnological processing of the hydrolyzate, was approximately 270 mg/L GAE when using acid hydrolysis combined with enzymatic hydrolysis.

Keywords: wheat bran, lignocellulose, saccharification, hydrolysis, biorefinery, circular economy
COMPARATIVE STUDY ON PROPERTIES OF SODIUM CASEIN AND GELATIN FILMS CONTAINING SEA BUCKTHORN OIL

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Abstract

The structural, physicochemical, release, and antioxidant properties of edible films based sodium casein (CAS) and pork gelatin (GEL) incorporated with increasing concentrations (0, 1, 2, and 4%) of sea buckthorn oil (SBO) were compared.

The presence of new peaks in the Fourier transform infrared spectra of the films doped with SBO was noted. Presumably due to the amphiphilic character of the proteins and the ultrasonic emulsification, the SBO was effectively dispersed in the films, contributing only to a moderate increase in surface roughness. The SBO-supplemented films, in contrast to the SBO-free (control) materials, were yellow and less transparent to UV/VIS light, indicating increased opacity. The CAS-based films, in contrast to the GEL-based counterparts, were rapidly and completely soluble in water. The incorporation of SBO decreased solubility and swelling only of the GEL film. The CAS films had a higher moisture content than the GEL-based films. SBO increased the surface hydrophobicity of the CAS film, while the opposite result was observed for the GEL film. The addition of SBO especially improved water vapor barrier properties of the GEL film, although the emulsion films did not differ in terms of water vapor permeability (WVP). Regardless of SBO content, GEL yielded stronger films than CAS. In both film types, the lipid phase acted as plasticizer enhancing the elongation at break. The highest SBO addition level (4%) degreased the tensile strength of the films.

Comparison of migration of SBO from the films into ethanol (a fatty food simulant) revealed that GEL ensured slower and less complete release than the CAS-based carrier. Based on times required for 20% $(t_{20\%})$ SBO release, it was found that the rise in the oil concentration increased its release from the CAS-based carrier, while the opposite tendency was observed for the GEL-based film. Based on the coefficient 'n' of the Korsmeyer-Peppas equation, the migration of SBO from the 1%- and 2%-SBO-added films occurred according to the Fickian diffusion kinetics (n<0.5). In turn, so-called anomalous transport (0.5 < n < 1), involving both diffusion and polymer matrix relaxation, controlled the SBO release from the 4%-SBO-added films.

Based on the times required for 50% neutralization of 2,2-diphenyl-1-picrylhydrazyl radical (DPPH^{*}), it was found that the GEL-based films had higher antioxidant properties than the CAS films. The gradual rise in the SBO concentration increased the antiradical activity of both films.

Keywords: proteins, sea buckthorn oil, FTIR, WVP, mechanical strength, DPPH^{*}

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PHYSICOCHEMICAL PROPERTIES OF ICE CREAM MIXES

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Abstract

The purpose of the work was to study the functional and technological properties of natural ingredients in low-calorie ice cream as potential structure stabilizers and fat substitutes. Ice cream mixes with β glucans from oats and yeast, with fermented and non-fermented pectin-containing beet purée were studied. The viscosity of the mixes was measured on an ultrasonic viscometer Unipan type 505, viscoelastic properties on a Kinexus lab+ device, surface tension on a KSV Sigma 700 tensiometer, water activity on an AWMD-10 device.

According to the results of the research, it was established that oat β -glucan shows greater technological activity in the composition of ice cream mixes with a low fat content (2%), compared to β -glucan from yeast, including the combination with soluble pectin of vegetable purée. Fermented beet purée, which contains at least 1.0% soluble pectin, has the greatest impact on the structural and mechanical characteristics of low-fat ice cream mixes in all its combinations with other structuring ingredients. Ice cream mixes with oat β -glucan and vegetable purée at lower frequencies of measurement of viscoelastic properties show high elasticity, but after exceeding a certain frequency value, the structure is destroyed and the mixes show greater viscosity than elasticity, which will allow more intense saturation of the mixes with air under freezing. A correlation between viscosity, water activity and surface tension of low-fat ice cream mixes was revealed, which is explained by intermolecular interaction between macromolecules of hydrocolloids and active binding of free water by a complex of low- and high-molecular compounds. An alternative substitute for the Vianoks C45 stabilization system (mono- and diglycerides of fatty acids + polysaccharides) in the amount of 0.5% in low-fat ice cream is a complex of natural ingredients - oat β -glucan and fermented beetroot purée in amounts of 0.5 and 15%, respectively.

 β -glucan from oat and fermented vegetable puree reveal synergism between β -glucan macromolecules and vegetable pectin to form complex three-dimensional structures in low-fat ice cream mixes that significantly improve the viscoelastic characteristics, surface tension, and water activity of the obtained ice cream mixes.

Keywords: *ice cream, viscosity, rheology, β-glucan, pectin, purée*

PREPARATION AND EVALUATION OF YOGURTS WITH THE ADDITION OF CHLORELA AND SPIRULINA

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Abstract

Chlorela and spirulina microalgae have witnessed a significant trend in their incorporation into functional foods, driven by their numerous health benefits and increasing consumer preference for natural and nutrient-dense ingredients. The objective of this study was to formulate and evaluate yogurts incorporating chlorella and spirulina as key ingredients. The strains Spirulina maxima and Chlorella vulgaris were used for this purpose. Chlorella (hot water extract) and spirulina biomass underwent treatment with gamma radiation at a dose of 8.3 kGy and they were introduced into the flavoring component of the vogurt (0.5% and 1% for chlorela extract and spirulina biomass, subsequently). The chosen flavors included mojito, green apple, cherry, lemon/lime, chocolate, strawberry, blueberry, and apple. To assess the quality and stability of the enriched fruit components, measurements of total counts of viable bacteria (CFU/g), yeast, and mold counts were conducted at storage intervals of 0, 20, and 40 days. Furthermore, the viable counts of yogurt bacteria and the pH levels were monitored over the same time intervals. Additionally, an ordinal test was conducted to evaluate the overall preference of the vogurts. The vogurts were prepared on a semi-operational scale at a dairy company. The microbiological quality of all fruit components with microalgae addition as well as yogurts met the required criteria set by the legislation, both after production and after 40 days of storage. In the preference order test of yogurts with hot water chlorella extract, the fruit components cherry and blueberry received the highest ratings. Overall, the evaluators showed a preference for yogurts with chlorella extract compared to those with spirulina biomass.

Keywords: chlorela, hot water extract, spirulina, biomass, yogurt, dairy

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STUDY OF ALTERNATIVE MITIGATION THE ECOBIOTOXICOLOGY OF LEACHATE WATER

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Abstract

The largest official municipal solid waste disposal site (SWDS) in Georgia has been serving the capital since 2011. In 2018, a reverse osmosis system was installed at the landfill for the treatment of leachate water, the capacity of which was 12 m3/day, which was insufficient, and accordingly, it was out of order at the end of 2018. At present, since it is not possible to clean the leachate for discharge into the sewage system in accordance with the legal norms, the leachate is collected in open tanks, where sedimentation takes place and then returns to the body of the landfill (circulates), which on the one hand partially limits the pollution of surface waters, and on the other hand accelerates the process of decomposition of mixed waste, but also daily enriches leachate water with both chemical and biological toxins. The goal of our research was to determine the dynamics of the microbiological indicators of the leachate water generated at the largest SWDS in Georgia during the years 2022-2023 and alternative complex treatment of leachate, through which the microbiological indicators will be reduced to the norm without additional measures. The carbon sorbents of different origins and fractions (under static conditions) were used in the framework of the research to treatment of highly polluted waters. It was determined that the sorption of the studied microbiological indicators (Total Coliform, E. coli, Enterococci) on the example of the carbon sorbents used by us is fluctuating and highly dependent on the size of the sorbent, and it should be noted that the optimal result is obtained when using a microsorbent and the degree of sorption of all three microbiological indicators reaches 98 %.

Keywords: Waste, Landfills, Leachate, Microbiological Indicators, Sorpion

Acknowledgments: This research FR-21-12546 has been supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG)

CHARACTERIZATION AND BIOCONTROL ACTIVITY OF NEW ISOLATE OF PANTOEA AGGLOMERANS AND THE STUDY OF ITS MECHANISM OF ACTION AGAINST SPOILAGE YEASTS AND PLANT PATHOGENIC BACTERIA

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Abstract

Postharvest losses of fruits can be quite significant if handling, processing, and storage conditions are not optimal, and the use of synthetic chemical fungicides is the principal method of controlling postharvest diseases. However, synthetic pesticides are being restricted because of concerns regarding their potential impact on human health and environment. Biological control agents are now an important alternative to the use of chemical pesticides.

The bacterium studied was isolated from vine (Vitis vinifera) leaves and cultivated on TGE medium for further analysis. For the bacterial characterization, Oxidase test, Catalase test, and Potassium Hydroxide test were performed. And the strain was identified at species level by MALDI-TOF MS. The effect of temperature and pH on microbial growth was determined, as well.

To screen and identify its biocontrol activity, the contact and the well diffusion methods were used against five bacterial species (Listeria innocua CCM 4030, Staphylococcus aureus 1755, Escherichia coli ATCC 8739, Pseudomonas aeruginosa ATCC 9027, and Bacillus cereus B2078), and seven yeast species (Zygosaccharomyces lentus Y1200, Saccharomyces cerevisiae CBS 1171, Zygosaccharomyces bailii PM 167, Zygosaccharomyces rouxii A9, Pichia anomala J121, Candida parapsilosis Y1011, and Galactomyces geotrichum).

The bacterium tested was identified as Pantoea agglomerans. Preliminary results showed that P. agglomerans isolate could inhibit the growth of the tested bacteria and yeasts under certain conditions, such as low temperature (25 oC), after a short incubation period, on nutrient rich medium.

Further investigation is needed in order to define the exact biocontrol mechanism of P. agglomerans against those and other microorganisms of interest.

Keywords: Pantoea agglomerans, bacteria, yeasts, biological control

Acknowledgements: The research was supported by Stipendium Hungaricum Program and Tempus Public Foundation.

INVESTIGATION OF GREEN TEA AND CLOVE OIL EXTRACTS ON FREEZE-DRIED CHICKEN SAUSAGES DURING STORAGE

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Abstract

In the food industry, natural and synthetic antioxidants are added to fresh and processed meat and meat products in order to prevent lipid oxidation, delay off-flavor development, and enhance color stability. Natural antioxidants, such as grape seed extract, pomegranate, oregano, rosemary, nettle, and cinnamon extracts, have recently replaced synthetic ones in meat products due to the adverse health impacts of synthetic antioxidants.

In this study, freeze-dried chicken sausages were produced with the addition of different amounts of green tea extract (0.15% and 0.20%) and clove oil extract (0.10% and 0.10%) to investigate their antioxidant effects. Moisture, protein, fat, and salt contents and pH values of all sample groups were evaluated before and after cooking. Thiobarbituric acid (TBA) analysis was conducted during two months of storage to observe the effect of natural antioxidants on the lipid oxidation of freeze-dried chicken sausages. TBA values of freeze-dried chicken sausages containing 0.20% of green tea extract and 0.10% of clove oil extract showed a significant (p<0.05) decrease at the end of the second-month storage when compared to the control group, which was produced without the addition of any antioxidant. On the other hand, the 0.20% green tea extract-added sample group and 0.15% clove oil extract-added sample group were given the significantly highest sensory scores by the panelists.

Keywords: Chicken sausages, natural antioxidants, green tea extract, clove oil extract, lipid oxidation

SALT TOLERANT RHIZOBACTERIA MITIGATING THE EFFECTS OF SALINITY STRESS ON GROWTH OF SOYBEAN (Glycine max (L.) Merr.) ON SALINITY SOIL

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Abstract

Salinity is a serious abiotic stress that adversely affects plants. Soybean (Glycine max (L.) Merr.) is not a salt tolerant crop and salt stress is a major problem for its productivity. One way to mitigate salt stress is to inoculate with salt-tolerant growth-promoting rhizobacteria. The purpose of this study was to isolate local strains of salt-tolerant rhizobia and phosphate-solubilizing bacteria and to study their ability to promote soybean growth on saline soils. In our study, isolates of rhizobia and phosphatesolubilizing bacteria were isolated from the rhizosphere and nodules of soybean growing on saline soil. Their growth under salt stress conditions was studied and high salt-tolerant isolates were selected: three isolates of rhizobia and four phosphate-solubilizing bacteria. Under salt stress, isolates of rhizobacteria were studied for nodulation and phosphate solubilization, and active strains were selected. This strains were identified by the molecular genetic method of Sanger. It was found that rhizobia RH21, RH26, RH28 refers to Bradyrhizobium japonicum, phosphate solubilizing bacteria to Pseudomonas koreensis FT4, Bacillus pumilus FM12 and Bacillus sp. FC11. The inoculation with rhizobacteria mitigated of the salt stress was showed. This is demonstrated by an increase in indicators of growth of inoculated plants. The co-inoculation with two strains rhizobacteria (RH28 and FT4) most effectively mitigated salt stress: the roots weight was increased by 3 times, shoot by 2.7 times and number of nodules by more than 3 times compared with control without salinity. Our study showed that inoculation with local strains of salt-tolerant rhizobacteria increased resistance to salt stress, improved growth, and promoted ecological adaptation of soybeans to saline soils.

Keywords: salt-tolerant rhizobacteria, rhizobia, phosphate-solubilizing bacteria, salt stress, soybeans, inoculation, plant growth

CHROMATOGRAPHIC QUANTIFICATION OF BENZIMIDAZOLE FUNGICIDES IN FROZEN FRUIT AND VEGETABLES USING QUECHERS METHOD

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Abstract

Benzimidazolic compounds are important fungicides for the protection of several crops both in field and post-harvest treatments. The determination of fungicide residues in fruit and vegetables is a difficult task, not only because of the low concentration levels typically found, but also because of the complexity of the matrix, which during sample treatment procedures involves various extraction and clean-up stages. In the last decade, high performance liquid chromatography (HPLC) coupled with various detection systems has become the most widely used technique for the quantification of polar pesticides, while the QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) extraction method proved to be an effective method for extraction of different pesticide residues including polar, middle polar and non-polar ones. In this work, a simple, rapid and reproducible analytical method for carbendazim and thiabendazole in frozen fruit and vegetables has been developed. This method is based on QuEChERS extraction procedure, followed by HPLC with photodiode array detection. The method proved to be sensitive, having a good precision and recovery rates, presenting limits of quantification (LOQ) below the maximum residue limits (MRLs) allowed by the legislation, indicating that the method is suitable for the analysis of thiabendazole and carbendazim residues in complex matrices and therefore can be applied to the quantitative determination of these fungicides in frozen fruit and vegetable samples.

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CULTURE OF PISTILS AND ISOLATED OVULES OF VICIA FABA L. AFTER DISTANT POLLINATION

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Abstract

The application of doubled haploid plants in breeding is based on their potential for producing true homozygous lines in one generation, which shortens the production of new varieties in plants. V. faba is popular and valuable vegetable species consumed worldwide, however very little works on haploidization has done so far, as this species is highly recalcitrant to tissue cultures.

The study aimed at the stimulation of the development of haploid cells of the female gametophyte after distant pollination. V. faba was pollinated with pollen of Lathyrus odoratus – a distantly related species. The germination of foreign pollen grains on stigmas under a fluorescence microscope with aniline blue was analyzed. After 5-7 days after pollination pistils and ovules of V. faba and unpollinated controls were cultured in vitro. The development of the explants during in vitro culture was monitored. The cultured explants produced callus, however embryogenesis was not observed.

THE EFFECT OF SPRAY-DRYING ON CAMELINA PRESS CAKE EXTRACT

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Abstract

The goal of spray drying process is encapsulation the bioactive compounds in a shell and protect them from environmental factors. Camelina sativa (L.) belongs to the family of Brassicaceae and is native in Europe and Central Asia. Camelina seeds are also rich in various phenolic compounds and exhibit an widely antioxidant potential. Camelina oil is a valuable part of diet, but the oil industry is generating a large amounts of by-products (Press-Cakes). The press cakes valorization is getting attention due to high content protein and polysaccharides included in this material. The bioactive compounds from Camelina also are interesting especially for future applications in to the food products. An accurate parameters of spray drying could protect the bioactive compounds and be novel patch way for press cakes utilization.

The present study aimed to examine the influence spray-drying on the properties of powders obtained from Camelina Press Cake Extract (CPE). CPE was spray-dried at two different inlet temperatures: 140°C and 180°C.

The solubility, Carr and Hausner Indexes, particle size, color and water activity of the powders were analyzed. The antioxidant potential of reconstituted samples (DPPH, ABTS, FRAP and Reducing Power), Total Polyphenols and Flavonoids Contents, Free Amino Acids were measured as well. Obtained results give an answer about an accurate inlet temperature and key changes after spray drying. Moreover, there could be observed a high potential in the nutraceutical and food additives area of the CPE.

THE BIOACTIVE PROPERTIES OF HEMP OIL CAKE YOGHURT

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Abstract

In recent years, the food industry has continued to search for new raw materials that can be used in food production. Of interest are by-products from food production, which were previously discarded and can now be used. Oil cake, a by-product of the cold pressing of oils, certainly falls into this category. The aim of this study was to investigate the bioactive properties of a hemp (Cannabis sativa) cake fermented with a commercial yoghurt culture.

To characterize the resulting beverages, analyses such as: microbial survival, changes in active acidity (pH), Total Polyphenols Content, Total Flavonoid Content, Reducing Sugar Content, Total Free Amino Acids, Reducing Power, DPPH and ABTS were carried out.

The study showed that a hemp beverage fermented with a commercial yoghurt culture had a lactic acid bacterial survival rate throughout its 28-day shelf life above the 106 CFU/g level considered to be the minimum recommended for FAO for yoghurt. When analyzing changes in bioactive properties during storage of the product, significant statistical differences were noted. After 28 days of storage, fermented snacks made from hemp cake were characterized by a significant increase in total flavonoid content and ABTS and DPPH radical scavenging capacity. The results obtained demonstrate an increase in the antioxidant activity of the hemp cake beverage. In the study conducted, it was shown that commercial yoghurt snacks fermented with hemp seed cake can be an interesting plant–based alternative to traditional yoghurt, especially given its high microbial content and antioxidant properties.

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CHARACTERIZATION AND PHENOTYPIC EVALUATION OF FRUIT QUALITY TRAITS RELATED TO FUNCTIONAL AND ORGANOLEPTIC QUALITY OF SPANISH TOMATO LANDRACES

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Abstract

Among the different vegetable crops, tomato is one of the most popular and widely cultivated in the world due to its socio-economic and nutritional importance. There are more than 25,000 tomato varieties, although only 20% are marketed, which is causing a loss of valuable genetic diversity through the loss of cultivars and the disappearance of traditional and local varieties. In this sense, landraces cover a wide genetic diversity that can help mitigate the current genetic erosion within agricultural diversity, improving nutritional and organoleptic traits compared to commercial F1. The objective of this study was to determine the diversity of fruit quality parameters related to nutritional and bioactive compounds such as glucose and fructose, organic acids as glutamic, malic and citric acid, vitamin C and carotenoids of forty-eight tomato landraces belonging to nine different cultivar groups: 'Flor de Baladre', 'Corazón', 'de la Sierra', 'Muchamiel', 'de la Pera', 'Pimiento', 'Kumato', 'Mesa Murciano' and 'Cherry'. Fruits with different shapes (squared, slightly flattened, rounded, heart-shaped, long oblong and pyriform), colours (yellow, P and R) and sizes (from very small to very large) were included in this study. The highest values in compounds related to the organoleptic quality of the fruits were found in the orange and yellow 'Cherry' varieties. While the varieties belonging to the 'Cherry' and 'Pimiento' types showed a high content of compounds related to the functional quality (vitamin C and carotenoids). The results obtained show an important intravarietal and intervarietal variability, which would allow the selection of varieties to be used in breeding lines focused on obtaining fruits of high organoleptic and nutritional quality.

Keywords: traditional genotypes, germplasm, fruit variability, bioactive composition

STUDY ON THE EFFECT OF ENDOPHYTIC INSECT PATHOGEN FUNGUS ON THE DEVELOPMENT OF PROGRESSIVE MATERIAL IN PEPPER CROP

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Abstract

This study examines the potential of endophytic insect pathogenic fungi to enhance pepper crop growth. Specifically, the study focuses on the use of Beauveria bassiana Balsamo (Vuillemin) (Hypocreales: Cordycipitaceae), an insect pathogenic and endophytic fungus isolated from target insects that has been shown to promote plant growth and protect against parasites (Canassa, 2019). The aim of this research is to investigate the effects of using this fungus as an endophytic treatment on the growth of pepper plants. This study is important as the use of this innovative technique has the potential to serve as an economic strategy for improving plant growth without the need for added nutrients (Tall and Meyling, 2018). This biological treatment differs from systematic human intervention, as Beauveria bassiana spends its life cycle within or between cells forming colonies in healthy tissues of host plants, typically without causing obvious disease symptoms (Wilson, 1995).

Keywords: endophytic fungi, Beauveria bassiana, propagating material, development

FOLIAR APPLICATION OF UREA AS ALTERNATIVE NITROGEN NUTRITIONAL DELIVERY SCHEME FOR KONSERVOLIA AND KALAMON COMMERCIAL OLIVE ORCHARDS

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Abstract

Konservolia and Kalamon olive orchards were tested for their vegetative and fruit growth after foliar urea applications served as nitrogen nutritional delivery scheme. Five urea aerial fertilizations (8-65 kg/m3/ha) from January to September with summer aerial supplement of buffered KNO3 replaced regular fertilization program for the above-mentioned olive orchards. Despite of different stem growth rates due to seasonal effect on tree physiology, throughout the experimental period no major changes in biomass productivity were observed for both varieties. Final size Konservolia fruits did not differ among conventional and foliar urea treatments. Although Kalamon olive fruits including pit data, differ in size among fertilization strategies with bigger size observed in foliar urea treated areas; their flesh firmness was found to be significantly lower to fruits received from soil fertilized orchards. Both varieties produced olives with increased pit weight and size and lower fruit flesh firmness when trees treated with urea. Konservolia decreases its fruit flesh/pit ratio as opposed to Kalamon where treated trees increased the weight of their commercial fruit flesh. Data suggest that each of tested olive varieties respond differently in foliar application of urea as a replacement of soil fertilization strategies. Results for Konservolia reveal that urea foliar applications can be approached as safe, conservative tactic nutritional replacement to soil fertilization for the orchard trees. For Kalamon variety, aerial treatments positively affect fruit size, increased pit size and flesh/pit ratio providing potentially faster harvest maturity times. This alternative nitrogen fertilization delivery strategy for Kalamon olive orchards can be considered as viable approach to restrict groundwater nitrate leaching and atmospheric pollution from previous fertilization conventional plans and increase fruit biomass for olive oil and olive waste byproducts useful in circular economy.

Keywords: olive culture, urea, foliar fertilization, olive fruit characterization

THE ROLE OF AGRI-FOOD CHAIN STAKEHOLDERS IN THE FIGHT AGAINST FOOD LOSS AND WASTE

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Abstract

Food loss and waste exist along the entire food chain as a result of the actions of all stakeholders involved, from farmers, processors and distributors to traders and final consumers. Whilst the FLW phenomenon is widely studied in Western countries, in Central and Eastern Europe it is little known and understood. In this context, awareness of the importance of the phenomenon, adoption of best practices and creation of synergies between all players involved is a necessity in order to adopt sustainable production and consumption patterns. Qualitative research based on semi-structured individual interviews is the basis for identifying their perceptions and practices regarding the FLW phenomenon. The results show the way and degree of involvement of each stakeholder, the methods and tools used in the fight against waste and wastage, and the problems and obstacles they must deal with. The openness to collaboration with life science universities as well as NGOs and Food Banks are positive elements identified so far, which can eventually lead to the creation of future integrated strategies.

Keywords: food loss and waste, stakeholders, Romania, strategies

A STUDY ON THE IDENTIFICATION OF ANTI-FOOD WASTE HABITS IN ROMANIAN HOUSEHOLDS

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Abstract

The phenomenon of food wastage is a constant concern among researchers and policy makers at international level, due to its implications on food security and natural resources conservation. This study aims to highlight the importance of the role of the final consumer in reducing food waste at household level. The research method used was a questionnaire survey addressing 1742 respondents. All the data were collected in Romania in 2022 with the support of IRES, using the CATI method. The results showed that the most wasted food categories are home-cooked meals, but also bread and bakery products. More than half of the respondents said that the amount of food thrown away remained constant compared to 2021. However, there is a significant percentage, 38% of the total, which mentions a decrease in this amount, showing thus a positive aspect in terms of anti-waste behaviour among Romanian consumers. 77% of the participants in the survey consider that they have tried to adopt habits that help them avoid food waste, this behaviour being more common among women and people with higher education. For this category, the main anti-waste tools are using a ,, shopping list", and consuming food according to the ,, best before date". Donations, feeding food scraps to animals or composting are extremely rarely mentioned. As the level of education of respondents increases, there is more concern about the money paid for food thrown away. The results of this survey show the need to continue educating the final consumer on the adoption of sustainable food purchasing and consumption behaviours in Romania.

Keywords: food waste, consumer behaviour, habits, education, Romania

EVALUATION OF THE PRODUCTIVITY OF DIFFERENT VARIETIES OF WINTER WHEAT IN THE CONDITIONS OF THE FUTURE CLIMATE UNTIL 2030 - 2050

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Abstract

In the agricultural practice of the country, more than 50 varieties of winter wheat - local and foreign - are currently used. The majority of them are the product of the Bulgarian selection in the DAI "G. Toshevo" and IPGR "K. Malkov" - Sadovo, but several foreign varieties are also used. All varieties have been created to achieve certain dominant qualities – high yields, resistance to drought, extreme low temperatures in winter and high temperatures in summer, resistance to diseases and pests.

The winter wheat varieties involved in our research are Kristalina, Nikodim, Bojana, Rada, Christi, Karina, Corona, Lazarka, Laska, Marilyn, Kalina, Katarzhina, Kiara, Enola, Dragana, Iveta, Pchelina, Anapurna, Avenue, Shibil, Chudomira, and Fedora.

The purpose of the research is to determine the productivity of some of the current varieties of winter wheat, which find the widest application in practice in recent years under the conditions of the future climate in our country.

Key words: winter wheat, numerical modeling, agroclimatic conditions, development, yields, potential and real productivity

TEMPERATURE CONDITIONS DURING THE DORMANCY PERIOD FOR SOME FRUIT CROPS GROWN IN BULGARIA

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Abstract

Orchard plantations are natural indicator for changing agrometeorological conditions. In all European regions, variations of temperatures have a cyclic character with a relatively regular change for the periods of active vegetation and dormancy. The years from the begging of this century has been characterized by an increased frequency of climatic anomalies and their amplitude. These anomalies affect the productivity orchards, which is directly dependent on agrometeorological conditions.

As a multiannual plants, fruit species in the temperate climate, need to accumulate a cultivar-specific quantity chilly units during the endodormancy, and heat units during ecodormancy for breaking of dormancy state and successive flowering during the spring. The knowledge of chilly and heat requirements is important in the selection of the appropriate species and cultivars for growing in a particular area. The buds remain dormant until they have accumulated sufficient chilly units (CU) during the cold season. When are accumulates enough chilly units, the buds are ready to grow in response to increase temperatures above biological minimum. If there have been enough CU's, the flower and leaf buds develop normally.

The present study aimed to assess the thermal conditions during the dormancy stages of development of some stone fruit plants grown in Bulgaria during a 30 years period. There are analysed the conditions during the deep dormancy in the orchards and the permanent transition of the average daily temperature above 5°C. Chilling requirements for breaking dormancy and growing degree hours (GDH) requirements up to flowering were studied for some peach, and apricot cultivars, located in the regions for industrial producing of these plants. Phenological and hourly temperature observations for 30 years (1971-2010) were used to perform this study. The GDH were calculated as sum of temperatures above 5°C accumulated from the breaking of dormancy to the flowering. The heat requirements (HR) necessary for successful flowering are given. The results indicate that flowering time of orchards in the studied regions is influenced by GDH.

Keywords: *chilly units (CU), chilling requirements, chilling accumulations, heat requirement (HR), growing degree hours (GDH), phenology*

ANALYSIS OF ENVIRONMENTAL AND GROWING CONDITIONS FOR MAXIMUM YIELD OF CHICKPEAS CULTIVATION IN VERTICAL HYDROPONIC SYSTEMS

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Abstract

The global demand for plant-based protein sources increases analogous to the increase of the world population. This conventionally requests the need for more agricultural land, which is unfortunately becoming scarce due to many reasons. Therefore, the interest in innovative and promising farming methods (vertical farming, aquaponic, urban farming, hydroponics, etc.) increased immensely in the last years. The fully automated vertical hydroponics technology is one of the promising soilless culture systems that provides more yield per unit area. However, accurate knowledge about plant requirements at different growth stages are necessary to realize the optimal growing condition within the hydroponic systems and consequently to obtain the highest possible yield and quality of the crop. Chickpeas is one of the most important plant-based protein sources and it has high nutritional value and plays a central role in various diets. However, chickpeas have not been the focus of hydroponics cultivation so far, there are few studies in this field. This paper provides a detailed review about the relevant researches about chickpeas cultivation, to study and analyze the growth parameters needed for the design of appropriate vertical hydroponic systems. In other words, all required parameters (light, temperature, moisture, essential nutrients, etc.) to be controlled are defined and analyzed. Suggestions and recommendations for initial studies and prototypes are generated.

Keywords: Hydroponics, vertical farming, soilless culture, plant-based protein, chickpeas, aeroponics

DEVELOPMENT OF A HYDROPONICS SIMULATOR TO GENERATE GUIDELINES FOR DATA COLLECTION IN HYDROPONICS FOR MACHINE LEARNING APPLICATIONS

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Abstract

Hydroponics, a soilless growing method using nutrient-rich water solutions, offers distinct advantages in plant growth and resource efficiency. Data-driven optimization in hydroponics relies on precise control of environmental factors. To effectively apply data-driven optimization, comprehensive and accurate data describing hydroponic plant growth is essential. In the first part of the project and in this paper, we seek to identify critical parameters that influence plant growth, recommend optimal resolutions and measurement frequencies, and address challenges in data collection. Standardization of data collection procedures and establishment of data collection guidelines are fundamental to obtaining high quality, comparable and reproducible data. Establishing a standard for data collection will allow data from different experiments to be compared and used in future research. In the initial phase of the project and throughout this paper, our primary objective is to identify the relevant parameters affecting plant growth in a hydroponic system. These critical parameters encompass aspects such as light intensity, spectral composition, nutrient solution composition, water quality, pH levels, and more. By conducting a thorough investigation, we aim to recommend optimal resolutions for these parameters. Additionally, we will address the challenges associated with collecting data related to these key variables, ensuring that the data obtained is reliable and useful to further research and scientific exploration in the field of hydroponics. Accurate data on these characteristics enables data-driven decisions and methods, such as machine learning and machine vision, which in turn allow optimization of hydroponic productivity. The study conducted a comprehensive analysis and identified 30 essential parameters crucial for characterizing a hydroponic system. The findings are summarized as a list of relevant parameters that need to be measured or recorded to enable data-driven optimization of hydroponic systems.

Keywords: *hydroponics, plant growth parameters, data driven optimization, machine learning, data acquisition, condition monitoring*

THE BENEFITS OF MIXING PLANT AND ANIMAL PROTEIN

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Abstract

The aim of this research is to investigate gelation process of mixed pumpkin seed protein/egg white gels. Substitution of pumpkin seed protein with egg white protein caused improvement of rheological properties of obtained gels (higher storage modulus, lower tangent delta, higher ultrasound viscosity and hardness). Gels were more elastic and more resistant to breaking structure. Higher concentration of pumpkin seed protein changed gel microstructure on rougher and more particulate. The microstructure was less homogenous with a tendency to break at pumpkin/egg white protein gel interface. A decrease in intensity of amide II band with increased concentration of pumpkin seed protein, what could have an impact on the microstructure. Supplementation of pumpkin seed protein with egg white protein caused a decrease of water activity from 0.985 to 0.928. It can have an impact on microbiological stability of obtained gels. Improvement of rheological properties resulted in lowering of water activity. Supplementation of pumpkin seed protein with egg white protein seed protein with egg white protein of basined gels. The microstructure and better bounding of water.

Substitution of plant protein with egg white protein is necessary to increase nutritional value of the product, enriching it in essential amino acids. In gels it caused improvement of rheological properties. Gels were more elastic and more resistant to breaking structure. Increased concentration of egg white protein caused a decrease of water activity to a level which can have an impact on microbiological stability of obtained gels. Supplementation of pumpkin seed protein with egg white protein resulted in more homogenous gels with stronger microstructure and better bounding of water. Mixed plant protein/animal protein gels are attractive proposition to food industry to obtain new products with novel texture, good nutritional value and microbiological stability.

Keywords: protein, egg white, pumpkin seed, gelation, rheology, microstructure

WHEY UTILIZATION TECHNOLOGIES

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Abstract

The topic of the presentation will be how to manage liquid whey, which is the by-product after obtaining curd and rennet cheeses. The composition of whey will be explained, especially with emphasis on the different whey protein fractions. This will be followed by a discussion of drying methods, and the development of high-protein preparations through advanced separation techniques such as ultrafiltration or ion exchange. Definitions and compositions of the obtained preparations will be presented. Their unique biological and health-promoting properties, functional properties such as foaming, gelation, water holding, emulsification, and the possibilities of managing whey, as well as high-protein preparations in industry will be discussed. Finally, the possibilities of using the preparations to create a whole range of functional products, especially for athletes and physically active people, will be shown.

Keywords: *liquid whey, separation techniques, whey protein preparation, functional properties, functional food*

CORYNEBACTERIUM GLUTAMICUM AS A HOST FOR THE PRODUCTION OF RECOMBINANT XYLANASE

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Abstract

Microbial-derived enzyme preparations are biocatalysts commonly used in industry due to their advantages such as high activity and low price. Through modifications using genetic engineering tools, bacteria can also produce enzymes derived from other organisms. Gram-positive bacteria Corynebacterium glutamicum, due to their beneficial properties, are used for the production of amino acids, organic acids and other bioproducts. C. glutamicum is a bacterium that, unlike the widely used E. coli, does not synthesize endotoxins, and its rapid growth rate and minimal contamination during the production process reduce the time needed to develop a final product. Despite their many advantages, these organisms are not used as widely as other bacteria, including Escherichia coli. Their suitability for synthesizing many of the enzymes, including xylanases, has not yet been determined. Xylanases have attracted considerable interest in recent years because of their potential for use in many biotechnological processes. These are enzymes used in the food, feed, biofuels, paper and pulp industries. Xylanases, together with cellulases and pectinases, account for 20% of the global enzyme market. Recently, there has been an increased demand for microbially derived xylanolytic enzymes with commercial applications and low production costs. In order to obtain such enzymes, bacterial or fungal strains that are easy and inexpensive to culture are used, modified using a number of molecular techniques aimed at improving the properties of xylanases, enabling their wider industrial application.

The aim of the study was to introduce a gene encoding a xylanase derived from the fungus Aspergillus niger into the genome of the Corynebacterium glutamicum PMC1945. In this study, C. glutamicum strains producing recombinant xylanase derived from A. niger were obtained. Enzyme activity in cultures of selected recombinant C. glutamicum strains was determined. In addition, the efficiency of recombinant protein production by E. coli and C. glutamicum strains was compared.

Studies have shown that the efficiency of xylanase production when using the same shuttle vector in C.glutamicum is lower compared to E. coli. These results suggest that although C. glutamicum is a good host for amino acid production, it will not necessarily perform well for heterologous protein expression. Such exploitation of this strain requires the additional use of genetic engineering to optimize the intrinsic attributes of C. glutamicum cells as biocatalysts, which would expand the range of products that can be synthesized by this organism with high efficiency.

Acknowledgments: This work was supported by a funds of the University of Life Sciences in Lublin for activities aimed at the development of young scientists (grant no. VKT/MN-6/BIO/20).

GENETIC BASIS FOR FRUCTOPHILICITY OF LACTIC ACID BACTERIA COLONIZING FRUCTOSE-RICH ENVIRONMENTS

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Abstract

Studies have shown that high sugar concentrations can have diverse effects on bacteria. Highly concentrated sugar solutions are recognized as effective antimicrobial agents, but it remains uncertain whether this effect solely arises from the collective osmotic impact resulting from a blend of sugars, or if the specific type of carbohydrate used also exerts individual chemical effects on bacterial responses. At elevated sugar concentrations, the various solute activities associated with specific sugars encompass a reduction in water activity and exert influences on bacterial growth. Lactic acid bacteria find it more difficult to grow in environments with high sugar concentrations.

Fructophilic lactic acid bacteria (FLAB) are commonly found in fructose-rich environments and exhibit a preference for D-fructose as a growth substrate over D-glucose. FLAB, which are commonly found in fructose-rich environments like flowers, fruits, and fermented foods made from fruits, can be impacted by high concentrations of fructose sugar in several ways. Firstly, FLAB strains exhibit a higher rate of fructose consumption compared to conventional lactic acid bacteria. Additionally, certain FLAB strains that thrive in fructose-rich habitats have been studied for their ability to produce mannitol. Moreover, FLAB has the potential to reduce the content of FODMAPs (Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols) in wheat-derived baked goods. It is important to note that lactic acid bacteria, including FLAB, face challenges in adapting to environments with high sugar concentrations and low pH levels. Despite these difficulties, high concentrations of fructose can still influence FLAB by enhancing their fructose consumption rate, promoting mannitol production, and decreasing the FODMAPs content in wheat-derived baked goods. All these traits have resulted in a unique adaptation to the fructose-rich environment, which is expressed in a number of common traits recorded in the genome.

The genomic characteristics of FLAB suggest that they have undergone reductive evolution to adapt to these fructose-rich habitats. Characteristic features of FLAB include the reduction of genes involved in carbohydrate transport and metabolism, as well as partial deletion of the adhE gene. Such genetic adaptations are common among FLAB and coincide with a reduction in genome size, which is a shared characteristic within the Lactobacillaceae family. These evolutionary adaptations to fructophilicity have enabled FLAB to thrive in fructose-rich environments. Overall, FLAB represents a distinct group of fructose-fermenting microorganisms that have undergone reductive evolution to successfully adapt to fructose-rich niches.

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ISOTOPIC AND ELEMENTAL FINGERPRINT OF HEN EGGS

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Abstract

At global level, in 2021, eggs production was over 86 million tons. The eggs consumption per person continues to rise. The authenticity of food products represents a high priority in today's society as a consequence of globalization and the free trade in goods. For now, the most suitable techniques for tracking the geographical origin of food commodities and the diet of animals are Isotope Ratio Mass Spectrometry (IRMS) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The price of foodstuff (eggs, milk, meat, etc) is directly related to the conditions in which the animal was raised. In this respect, using stable carbon isotopes (13C/12C) contributes to the identification of corn-based feeding. The egg white and yolk samples coming from different hen's rearing systems (yard and industrial farms) were investigated from isotopic and multi-elemental composition point of view. δ 13C values of potential food sources are discussed versus the dietary intake and contribution to the isotopic fingerprint of the eggs to determine mixing of C3 and C4 diets.

Acknowledgments: The financial support for this work was supported by the Ministry of Research, Innovation and Digitization, CNS-UEFISCDI, projects numbers: PN-III-P2-2.1-PED-2021-2406 (contract no. 664PED/2022) and 37PFE/30.12.2021 within PNCDI III.

MEAT AUTHENTICITY – ISOTOPIC AND MULTI-ELEMENT PROFILE

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Abstract

The authenticity of meat is an important consideration for producers and consumers alike. In the context of global economic growth, the consumers are willing to pay a higher price for meat that meets their individual standards and specific requirements. The feeding regime of livestock is often hidden from the consumer. Therefore, this does not have all the information to make a proper and conscious choice.

In this context, the differentiation models for chicken and pork meat samples according to the geographical origin and feeding regime of animals were built by the combination of stable isotopes and multi-element analysis with chemometrics.

Our results showed that LDA was suitable for the geographical origin differentiation of pork meat samples from different regions of Romania, conducting to a percentage of 97.2% for initial classification and 94.4% in the cross-validation procedure. The accuracy of the geographical origin differentiation model obtained by PLS-DA was 71.8% for pork meat and 93.8% for chicken meat. PLS-DA results demonstrated the usefulness of isotopic and multi-element analysis as indicators for the differentiation of meat samples according to the breeding system. In this case, the accuracy of models was 100% for pork meat and 97.9% for chicken meat.

Acknowledgements: This work was supported by a grant from the MRID, CCDI-UEFISCDI, project number PN-III-P1-1.1-TE-2021-0060, within PNCDI III and to the Ministry of Research, Innovation and Digitalisation through Programme 1-Development of the National Research and Development System, Subprogramme 1.2-Institutional Performance-Funding Projects for Excellence in RDI, Contract No. 37PFE/30.12.2021.

TESTING THE POTENTIAL GIVEN BY DATA FUSION STRATEGIES FOR THE DEVELOPMENT OF HONEY CLASSIFICATION MODELS

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Abstract

Recently, a further step in increasing the performance of prediction models for assessing the origin of food commodities is given by the application of data fusion strategies. In this regard, the present work aimed to test the potential given by the low- and mid-level fusion of analytical data obtained through two complementary spectroscopic techniques, namely ATR-IR and FT-Raman, to classify honey samples with respect to the botanical source and harvesting year. The study was based on a data set comprising 106 authentic honey samples produced in Romania in 2020 and 2021 and belonging to four honey varieties (i.e. acacia, colza, linden, and raspberry). The prediction results, obtained by means of Partial Least Squares Discriminant Analysis (PLS-DA), have highlighted the efficiency of data fusion as compared to the use of a single analytical source and the importance of a data dimensionality reduction step prior to model construction.

Keywords: data fusion, honey, Raman, IR spectroscopy, PLS-DA

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EVALUATION OF COLOR AND SENSORY ATTRIBUTES OF SPRING ROLL DURING FRYING IN AIR FRYER OVEN

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Abstract

The objective of the present study was to determine the effect of air fryer technology on quality changes of spring roll during frying in an oven by means of color values (L*, a*, b*), browning index (BI) and frying efficiency. Box-Behnken design was carried out for oven temperature of 200 to 240 °C, a frying time of 15 to 20 min, and tray rack position in oven of 1 to 3. L* values ranged from 47.29 to 82.34. BI values ranged from 27.10 to 160.30 for spring rolls fried in air fryer oven. The highest coefficients of correlation (r=0.99) were determined to be between L* and BI values. The minimum BI value was observed at 200 °C for 18 min with the tray placed on the third rack position. The oven temperature, frying time, and tray rack position played the most crucial role in BI, given the high F-values (77.41, 75.24, 76.41, respectively) and very low p-values (0.000) (p < 0.05). The R2 value of 0.95 and R2pred of 0.89 were found for the air fryer frying of spring rolls. These results suggested that frying with air fryer of spring rolls can be used for maintaining the quality of spring rolls.

Keywords: air fryer oven, spring roll, color, browning

ESTIMATING VISCOSITY OF LOW SUGAR APPLE MARMALADE USING BACKPROPAGATION NEURAL NETWORK

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Abstract

In this paper, a backpropagation neural network (BPNN) model was developed for the prediction of viscosity values of apple marmalade using experimental data collected from several measurements. Stevioside or Sucralose sweetener was used instead of sugar (sucrose) in some of the formulations. In the BPNN architecture, the shear stress, and shear strain with mass concentrations of the Stevioside, Sucrolase, and Sucrose were utilized as input, whereas the viscosity value of apple marmalade was used as an output to be estimated. The Stochastic gradient descent algorithm (SGD) was used to minimize the loss of the BPNN based on the experimental data set. The Mean squared error (MSE), and the coefficient (R2) were employed to assess the performance of the BPNN. The number of hidden neurons was found to be 20 using the adaptive hidden neuron algorithm. With 20 hidden neurons, the least MSE and the highest R2 value were attained. Furthermore, the predicted viscosity values were found to be within 1% of the experimental viscosity values. The developed BPNN model can, therefore, be effectively utilized to predict the viscosity of any fruit marmalade using the same input and output parameters in the data range where the new data is normalized with the experimental data used in this paper.

Keywords: *Backpropagation neural network, stochastic gradient descent algorithm, viscosity, apple marmalade, stevioside, sucrolase*

ULTRASONIC PRETREATMENT OF MICROALGAL BIOMASS TO ENHANCE THE ENZYMATIC HYDROLYSIS FOR SUGAR RECOVERY

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Abstract

From the biotechnological point of view, microalgae are potential candidate of renewable and sustainable biomass resources for high-added value compounds such as bioethanol and enzymes due to their high levels of carbohydrates and low levels of lignin. There still remains significant room for improving the production of fermentable sugars from biomass in a cost-effective way that raises enzymatic saccharification efficiency. Although extraction of polysaccharides to convert fermentable sugar from microalga by acid or alkali pretreatments, and enzymatic hydrolysis are extensively studied, few studies exist that explore the use of ultrasonication (US) as emerging technology for the extraction of fermentable sugars (FSs) from microalgae biomass. To best of our knowledge no work has been reported on usage of ultrasonication as an extraction technique for the bioconversion of microalgae. The objective of the present study was to determine the effect of simultaneous ultrasonication and enzymatic hydrolysis on extraction of fermentable sugars from microalga biomass. C. vulgaris cultivated with red light in photobioreactors is efficient in producing algal biomass and sugar. The ultrasonication pretreatments were carried out in a glass bottle containing 0.3 g of dry microalgae in 100 ml of dilute acid solution. Based on preliminary experiments, the ranges in the pretreatment were selected for the variables of sulphuric acid (H2SO4) concentration (1, 2 and 3% (v/v)), amplitude (60, 75 and 90), and pretreatment time (10, 20 and 30 min). Then, enzymatic saccharification (cellulose and Viscozyme L at 50 C and 120 rpm for 48 h) were employed. Increased amplitude provided significant amount of sugar released. Among the variables studied, amplitude, acid concentration and time showed significant effects (p < 0.05) on sugar released from alga biomass. The sugar released from alga pretreated biomass ranged at 158.14-447.09 mg/g dry weight microalga. The highest amount of biomass (0.38 g/L) and sugar released (447.09 mg/g) was obtained from simultaneous ultrasonication and enzymatic hydrolysis of microalga at a 75% amplitude, 2% H2SO4 and 20 min after 48 h. Thus, the ultrasonication appeared to be a successful alternative method when compared to the conventional pretreatment methods.

Keywords: *microalgae, ultrasonication, enzymatic hydrolysis, reducing sugar*

THE IMPACT OF A FEED ADDITIVE MIXTURE CONSISTING OF YEAST CELL WALLS AND BUTYRIC ACID ESTERS ON FATTENING PIG CARCASSES AND MEAT QUALITY

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Abstract

Nowadays, numerous countries are researching feed additives utilisation in pig feed to improve the feed's biological value, increase pig productivity, and increase disease resistance, enhancing pork quality. So, the aim of this study was to determine the influence of a feed additive mixture consisting of veast cell walls and butyric acid esters on the quality of carcasses and pork from fattening pigs. The feeding test was performed with 32 fattening pigs (65-d-old crossbreeds), which were divided into 2 groups with 4 replicate pens: the control group was fed standard compound feed; the experimental group was fed standard compound feed + 2 kg/t feed additive mixture containing yeast cell walls and butyric acid esters. Pig productivity, muscularity, and fat tissue percentages were assessed during the test. At the end of the trial (179-d-old), 5 fattening pigs were randomly selected from each group and slaughtered; pork carcasses and physico-chemical features were evaluated. The slaughter data of fattening pigs revealed that the carcass weight, carcass yield, longest back muscle area, bacon, and carcass half lengths of the fattening pigs in the experimental group were higher by 1% and 2% compared to the control. However, the feed additive mixture had no significant effect on slaughter data or pork physical or chemical features since no significant difference between the experimental and control groups was discovered (P>0.05). The only indicator of chemical composition that was significantly affected was the ash, which was found to be 0.22% higher in the experimental group compared to the control (P < 0.05). According to the obtained results, it can be concluded that the additive, consisting of yeast cell walls and butyric acid esters, used in fattening pigs feed, has no influence on the quality of pork, but it also does not degrade it.

Keywords: yeast cell walls, butyric acid esters, SCFA, pork, physico-chemical features

HERBAL-ORIGIN ADDITIVES - NOT ONLY TO REPLACE CHEMICAL COCCIDIOSTATS BUT ALSO TO IMPROVE THE MEAT QUALITY OF BROILER CHICKENS

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Abstract

Broiler chicken production is widely applicable due to its rapid development, ease of feeding, low conversion ratio, and nutrients required by the human body. Natural products have emerged as a more naturalistic method of preventing coccidiosis, as have herb-based additives used to improve production performance and meat quality. Thus, the aim of this study was to analyse the impact of feed supplemented with an herbal-origin additive on broiler chickens' meat quality characteristics. The feeding trial was carried out with 1-d-old 600 Ross 308-line combination broiler chickens, which were divided into 2 groups with 4 replicate pens; the control group was fed a standard compound feed (with usual coccidiostats), and the experimental group was fed a standard compound diet (without usual coccidiostats) + 500 g/t herbal-origin additive. At the end of the trial, 10 broilers (35-d-old) were randomly selected from each group and euthanized; breast and thigh muscles were collected postmortem. The morphological composition of carcasses and the physico-chemical composition of muscles were determined. Results showed that the herbal-origin additive in feed significantly lowered total breast fillet weight and leg muscle yield, but increased breast muscle thickness and carcass weight compared to the control group (P < 0.05). Compared to the control group, the experimental group lowered pH in thigh muscles by 0.22, decreased fat content in the breast muscles, and on the contrary, increased it in the thigh; significantly lowered breast muscle redness and drip loss, but increased water binding capacity (P < 0.05). An uneven trend was discovered in the cooking loss results: the experimental group decreased the indicator in the breast muscles, while the one in the thighs significantly increased (P < 0.05). Although the tendentious herbal additive mechanisms were not revealed during our study, this kind of inclusion in poultry feed can positively impact some breast and thigh muscle quality features.

Keywords: *physico-chemical properties, coccidiostats alternatives, natural origin additives, breast muscle, thigh muscle*

CAN FRESHWATER CLADOPHORA GLOMERATA MACROALGAL BIOMASS BE COMBINED IN RABBIT DIETS TO ENHANCE NOT ONLY RABBIT MEAT QUALITY BUT ALSO RABBIT HEALTH?

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Abstract

Despite numerous challenges and rising consumer demands, strategies for growing healthy animals and improving sustainability are being pursued, such as using natural, renewable sources to replace traditional feed materials. Thus, the aim of this study was to analyse the impact of macroalgal C. glomerata biomass on rabbit physiological features. The feeding trial (52-122 days) was carried out with twenty male Californian rabbits assigned to two dietary treatments (n=10 rabbits/treatment) and fed standard compound diet (SCD) and SCD + 4% C. glomerata (CG4). Macroalgal biomass was collected from the Lithuanian River Šventoji. At the end of the feeding trial, twelve rabbits (n=6)rabbits/treatment) were randomly selected and euthanized; samples were collected post-portem. A comprehensive analysis of rabbit organ development, histomorphometry, short-chain fatty acids (SCFA), and ammoniacal nitrogen (NH3-N) accumulation in intestinal contents was performed. The CG4 treatment had no impact on organ or intestinal development or the concentration of NH3-N in the duodenum (P > 0.05). However, the crypt depth was significantly lower in the duodenum of CG4 compared to SCD, but 14.40 m deeper in the ileum (P < 0.05). Although CG4 had no impact on villus height, it had an impact on the villus/crypt ratio (V/C), which was higher in the duodenum in CG4 but lower in the ileum in SCD (P < 0.05). After examining the gut contents from the duodenum, CG4 significantly reduced the lactic acid concentration, which was almost four times lower compared to SCD (P < 0.05). Overall, C. glomerata in rabbit diets can improve the crypt depth in the ileum and therefore the absorption of nutrients that remain digested; nevertheless, it can reduce the crypt depth in the duodenum and thus the digestive area required to carry out the primary nutrient absorption. Moreover, such inclusion can reduce the concentration of lactic acid, whose decrease can affect weaker peristalsis and bowel movements.

Keywords: *alternative feedstuff, freshwater macroalgae, SCFA, histomorphometry, villus height, crypt depth*

UBIQUITOUS VIRUSES AND BACTERIA AND ECONOMIC LOSSES IN AQUACULTURE

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Abstract

Aquaculture is recognised as the world's fastest-producing sector, accounting for one-third of global food production. One of the biggest problems associated with this type of farming is infectious diseases of aquatic organisms causing large economic losses.

Food4Futher is working to develop tests for the rapid detection of pathogens in aquaculture. It currently has validated detection tests for viruses that cause disease in Atlantic salmon, such as infectious pancreatic necrosis virus, infectious salmon anaemia virus, piscine orthoreovirus, piscine myocarditis virus and the bacterium Aeromonas salmonicida ssp. salmonicida. The research panel also includes shrimp pathogens such as yellow head virus, Taura syndrome virus, infectious bacterium. The company is currently working on a test for the rapid detection of human noroviruses, which are one of the main aetiological agents of viral gastroenteritis among adults and children worldwide. These pathogens cause 685 million illnesses and 210,000 deaths each year, but their diagnosis is limited due to the need for testing in the laboratory.

The tests, which are a Food4Future project, use Molecular Binding - Electrochemical Impedance Spectroscopy (MB-EIS) technology, or molecular binding combined with electrochemical impedance spectroscopy. EIS involves introducing a disturbance into the system under test using a sinusoidal current. The tests have 99% specificity and 94% sensitivity. Test time is approximately 15 minutes (without sample preparation). The products are suitable for qualified medical personnel as well as for people without a medical/biological/chemical background. With this test, diagnostics will be possible in aquaculture farms, warehouses, restaurants and homes.

NEW NATURAL FEED SUPPLEMENT FOR DOGS

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Abstract

Dogs fed an appropriate balanced commercial diet should not require any supplements such as vitamins and micronutrients. On the other hand, everyday life stresses can lead to various violations. Consequently, a requirement appears to enrich the diet of animals with antioxidants, immunomodulating and biologically active substances.

R&D Center of Enzym Company in Lviv developed natural feed additive for dog's everyday diet. The additive combines components to act in synergy: inactive dry yeast – with high antioxidant and prebiotic activity, organic essential microelements – with high bioavailability rate and natural phytocomponents – that provide antioxidant and immune modulating action.

Developed additive was examined in few steps trials:

- on laboratory animals – to establish dosing, exclude toxicity, and analyze basic values.

- on sport dogs – to prove efficacy of additive and its safety, and to find an optimal dosage.

Trials were provided on sport dogs, 10 animals per group, which were fed the diet without developed additive and with 0.3% and 0.6% of additive respectively.

Animals fed with the diet with 0.3% supplement dosage have shown the best performance. We confirmed the stimulation of the antioxidant system in the blood, which is especially important for us, in animals that were given 0.3% supplements in their diets.

The developed feed additive with synergically combined biologically active substances has a stimulating effect on the antioxidant and immune systems confirmed in numerous studies, in a recent study on sporting dogs.

Keywords: *inactive yeast, feed supplement, immune response*

PLANT QUALITY IN ORGANIC FARMING. HOLISTIC METHODS ON RED BEET RESEARCH

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Abstract

One of the components of sustainable consumption is the consumption of organic products. Organic food products, characterized by naturalness and health, are increasingly competing with conventional quality products. Therefore, it is important to substantiate the formed opinion about the higher quality value of organic food products, in 2020 At the LAMMC Institute of Horticulture and Horticulture, red beets were grown using two different farming systems: organic and conventional. Beetroots of the same varieties grown in different agricultural systems allow more accurate identification of qualitative differences in indicators between raw materials of sustainable farming and conventional ones. Tests performed: pH; redox potential rH; specific electric wire; energy value of the product P. These indicators of holistic research are the main indicators that determine the energy value of the product, which affects the evaluation of the suitability of the product for the human body. Crystallograms were also performed using the biocrystallization method. The principles of structure formation occurring during biocrystallization allow conventional quality research methods, limited to the determination of the quantitative composition of materials, to be expanded and supplemented with the study of the selffunctionality of a living system. Based on the obtained results, it was analyzed whether the red beets produced by the ecological agricultural system have a higher energy value and are of higher quality than conventional agricultural systems.
THE FERTILIZATION VALUE OF SEWAGE SLUDGE AS AN ALTERNATIVE SOURCE OF NUTRIENTS FOR PLANTS

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Abstract

Sewage sludge is a waste that is managed differently depending on the country. It is generally incinerated or used for reclamation purposes. In Poland, it is allowed to use it, provided that sanitary standards are met (no microbiological contamination) and the content of heavy metals is low (below the acceptable standards). This is due to the abundance of sewage sludge in organic matter and nutrients. In this study, the actual fertilization value of 4 different sewage sludges over a period of 3 years was assessed. There are 400 different municipal wastewaters treatment plants (WWTPs) operating in the Wielkopolskie province, which treat incoming wastewaters in a similar technological system, generating sewage sludge (SS). In this work, samples of sewage sludge were analyzed, which are exemplary and representative materials of typical WWTPs. SS samples used in this study were gathered from four WWTPs differing in size, and consequently the amount of wastewaters purified and the resulting sewage sludge produced. Sewage sludge samples 1 and 2 (SS1, SS2) came from large facilities, serving large urban agglomerations, while sludges 3 and 4 (SS3 and SS4) came from small, local installations, serving smaller towns. The SS samples were collected in three consecutive years after the completed process of SS management at the WWTPs. The assessment of the SS chemical composition was performed using commonly used methods in chemical analysis. Regardless of the tested sludge and the year of study, the amounts of macronutrients ranged from 333.4 to 420.2 g·kg-1 TOC, from 50.3 to 72.6 g·kg-1 N, from 11.4 to 28.3 g·kg-1 Ca, from 3.3 to 4.5 g·kg-1 P, from 3.6 to 5.6 g·kg-1 Mg, from 1.5 to 5.4 g·kg-1 K, from 2.2 to 2.5 g·kg-1 S and from 1.2 to 1.9 g·kg-1 Na. In addition, the tested wastes were characterized by bioavailable amounts of Cu and Zn at the level of 62.9 -119.1mg·kg-1 and of 113.1 - 321.7 mg·kg-1 respectively. The amounts of nutrients in the SS in the years of the study were at the same, comparable level, which was particularly noted for N, TOC, S, P, Mg and Na. This proves that, regardless of the size of the installation, the WWTPs operated with the same efficiency in the years of the study. Additionally, their differences in the content of nutrients between SS should also be noted. In general, sewage sludge from large installations (SS1, SS2) was characterized by a higher nutrient amounts compared to sludge from small installations (SS3, SS4). It was especially visible for Ca, K and Zn (2-fold difference) as well as for N, TOC and P (difference by 30- 40%). Simultaneously the amounts of Na, Mg, S and Cu were at a comparable level in sewage sludge, regardless of the installation size. When assessing the fertilizing value of the SS analysed, it can be assumed that together with the sludge dose corresponding to 170 kg N per ha, we theoretically can introduce on average 1086 g of TOC, 60 g of Ca, 14 g of Mg, 11 g of P, 10 g of K, 7 g of S, and 5 g of Na. Studies have shown that SS is a waste rich in nutrients, significantly exceeding the fertilizing and humus-forming value of organic fertilizers like manure or compost. Therefore, SS that meet legal requirements can be proposed as an alternative source of the nutrients in plant fertilization.

ANALYSIS OF THE PURCHASE PERCEPTION OF BEEF CONSUMED IN THE CITY OF CHILLÁN, CHILE

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Abstract

Perception and preference towards meat consumption have been defined as a complex phenomenon (Troy and Kerry, 2010; Henchion et al., 2017; Barragán et al., 2018), different authors have investigated the consumer's perception of meat, and especially beef, in relation to factors such as product safety (Grunert et al., 2004; Barragán et al, 2018), the environmental impact (Li et al., 2016; Barragán et al., 2018) and even on the nutritional quality of the food (Scollan et al., 2006; Barragán et al., 2018) and even on the perception of reducing meat consumption as a solution to climate change and replacing it with alternative protein sources, such as cultured protein and insects (Cordts et al. 2014; Barragán et al., 2018). The perception of beef consumption is a very important factor, given the growing consumer interest in knowing the nutritional properties of food (Scollan et al., 2006; Barragán et al., 2018). According to a survey by ODEPA (2009), one of the motivations for meat consumption is because it is "rich", "for the pleasure of eating it", the affirmation that meat has high organoleptic value and its consumption produces "enjoyment and pleasure", within the specific sensory attributes that the meat buyer evaluates are freshness, colour, smell, price, consistency, and level of fat.

AN INSIGHT ON FATTY ACIDS PROFILE OF SILKWORM PUPAE (BOMBYX MORI L.) AND THEIR SOCIAL AND ENVIRONMENTAL IMPLICATION

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Abstract

One of the main by-products of silkworm rearing are pupae (SWP), which are proposed to be used in human and animal nutrition, thus avoiding and minimizing the negative environmental impact. Besides the excellent composition of SWP in protein (55.6% as dry matter basis, DM), fat (about 32%), and minerals, the concentrations in amino acids and fatty acids (FA) are important. SWP have a great profile in FAs: i) saturated FA (SFA) class were identified the C16:0 (palmitic) and C18:0 (stearic); in monounsaturated FA (MUFA) class were determined C16:1n-7 (palmitoleic) and C18:1n-9 (oleic), while in polyunsaturated FA (PUFA) family were found as most representative the C18:2n-6 (linoleic) and C18:3n-3 (alpha-linolenic). Thus, a higher concentration was observed for alpha-linolenic, ranging between 17-38% of total FA. The following concentrations were recorded for oleic FA that ranges between 26-38%, palmitic (21-28%), linoleic (3.8-8.6%), and stearic (4.5-9.2%). Unsaturated FA represents more than 60–70% of the oil extracted from SWP (25–30 g can be extracted from 100 g of dried SWP). Of these, 43.6% are PUFA, while MUFA represents about 27.7%. Some traces of myristic (C14:0) and eicosatrienoic (C20:3n-3) were also found. If we refer to the entire SW cycle of development, the PUFA recorded a higher value (42.91%), followed by SFA (30.06%) and MUFA (26.64%). Alpha-linolenic and linoleic, which are EFA, have been viewed as nutraceuticals and functional foods. Interest in n-3 FA began many years ago, but it is still quite active due to their therapeutic effect and view as preventive agents to reduce the risk of certain diseases. According to medical and scientific studies, the pharmacological functions of EFAs include an improvement of insulin sensitivity, a decrease in blood pressure, decreasing thrombotic tendency, anti-inflammatory and antiarrhythmic effects, vascular endothelial functions, and increasing plaque stability.

Keywords: fatty acids, silkworms, pupae

NUTRITIONAL QUALITY AND VALORIZATION OF SILKWORM PUPAE (BOMBYX MORI. L) IN POULTRY DIETS – REVIEW

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Abstract

The development of the poultry industry increased the request for conventional feed ingredients (soybean meal and oil, fish meal), leading to higher costs and environmental pressure. In this context, there is an increased interest in finding sustainable alternatives such as protein-rich insect species as innovative ingredients in poultry diets. Sericulture produces a lot of by-products, including silkworm pupae (SWP), a valuable and less expensive alternative protein source. Therefore, this review firstly presents the nutritional value of full-fat and defatted SWP as potential feed ingredients for poultry. The proximate composition of SWP consists of 37.8–82.8% crude protein (with a higher digestibility ranging from 76% to 98%), 2–36.2% crude fat, 1–9.5% crude fibre, 1–10.6% ash, and 21.9–25.8 MJ/kg gross energy. SWP has high-quality protein and lipids due to their essential amino acids (40-48% of total amino acids content) and fatty acids profiles (especially alpha-linolenic, 20-38% and linoleic, 5.5–21%). The vitamins, minerals, and other bioactive compounds (i.e., 1-Deoxynojirimycin, 1-DNJ) complete their nutritional value. SWP also contains a polysaccharide, chitin (1.5–3.4% of dry matter), with structural function in organisms. Secondly, we reported the effects of using SWP in broilers, laying hens and quails diets, focusing on productive performance, health status and quality of poultry products. The findings demonstrated that SWP could partially replace conventional ingredients in poultry diets, maintaining appropriate performance and/or improving meat or egg qualities.

Keywords: nutrients, silkworm pupae, poultry diets

THE ENTEROTOXIN PRODUCTION AND ANTIMICROBIAL RESISTANCE OF CAMPYLOBACTER STRAINS ORIGINATING FROM SLAUGHTER ANIMALS

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Abstract

The pathogenicity of animal-origin Campylobacter strains, including antimicrobial resistance and enterotoxigenicity, was determined in this study. Overall, 149 Campylobacter isolates originating from cattle, swine and poultry were tested. The antimicrobial resistance profiles were examined by the diffusion disk method. The dominant resistance pattern was CIP_TET. The resistance rates for ciprofloxacin among swine, cattle and poultry isolates were 84%, 51% and 66%, respectively; for tetracycline, they were 82%, 57.1% and 76%, respectively. None of the obtained isolates was resistant to all four antimicrobials tested. The ability to produce enterotoxins was assessed by the use of a suckling mouse bioassay, with intestinal fluid accumulation as a positive result, and by CHO assay, with the elongation of cells as a positive result. The ability to produce enterotoxins was significantly higher among cattle isolates (61.2% and 71.4% positive isolates, respectively) or poultry isolates (14% and 22% positive isolates, respectively). A strong positive correlation between in vitro and in vivo enterotoxicity tests was demonstrated.

EFFECT OF BAICALIN ON CONTRACTILE ACTIVITY OF THE PORCINE UTERINE SMOOTH MUSCLE

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Abstract

Baicalin is one of the major bioactive components of Scutellaria radix, a Chinese herb that has been used since ancient times. As one of the important flavonoid compounds, Baicalin has a wide range of pharmacological effects, such as anti-tumor, anti-angiogenesis, liver protection, anti-oxidation, anti-convulsion, anti-bacterial, and anti-viral effects. Baicalin can shorten the intervals between estrus and play an important role in improving ovarian function and follicular development in polycystic ovary syndrome rats. It has also been proofed that baicalin reduces reactive oxygen species levels of in-vitro cultured porcine oocyte, inhibits apoptosis, and stabilizes mitochondrial membrane function, thereby improving the oocyte maturation rate. In this study, we analysed the effect of Baicalin on the contractile activity of the smooth muscle of the uterus of sexually immature and 14 to 16 days of the estrous cycle. Ten animals were assigned to one of the oestrous cycle.

Uterine sections were excised from the middle uterine horns and contractions were recorded using a Hugo Sachs Elektronik isometric contraction apparatus. The sections were kept in 5 ml of Krebs-Ringer solution at 37° C. During the experiment, the solution was constantly saturated with a mixture of 95% O2 and 5% CO2. After 60-90 min of pre-incubation, sections were stimulated with increasing baicalin concentration (10-13-10-1 M) and changes in amplitude, tension and contraction frequency were measured.

GROUND BEETLES (COLEOPTERA, CARABIDAE) IN ORGANIC AND INTEGRATED SOYBEAN CULTIVATION

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Abstract

Soya is a widely used crop globally, and its cultivation grows regularly. With the growing trend of soya cultivation in Poland, the ecological and protective aspects should also be paid attention. The use of plant protection products is still very controversial. They affect both the plants and the fauna inhabiting the habitats concerned. Although pesticides are becoming increasingly selective, the environment must be constantly monitored to determine the changes they cause. A study was carried out on the effects of chemical protection of soybean cultivation on the fauna of epigeic ground beetles (Coleoptera, Carabidae), which are potential enemies of plant pests.

The research was conducted on experimental production fields in the Wielkopolskie Voivodeship (Western Poland) and cultivated fields in the Warmińsko-Mazurskie Voivodeship (North-Eastern Poland). The experiment consisted of control fields, for which the principle of not using plant protection products (NCP- non-chemical protection) was applied, and fields for which a recommendation-compliant programme of chemical plant protection (CP- chemical protection) was provided. Ground beetles were caught in pitfall traps between May and August 2020 and 2021.

The study resulted in the capture of 17,019 individuals belonging to 54 ground beetle species. Carabidae abundance and richness were significantly higher in fields without chemical protection (NCP) than in chemically protected (CP). The average number of ground beetles caught, irrespective of the year of study, was more than twice as high in the organic fields (NCP). However, no negative effect of chemical protection on maintaining the species diversity of the entomofauna studied was found.

Keywords: carabid beetles, beneficial entomofauna, pesticides, soybean fields

HISTOLOGY AND ULTRASTRUCTURE OF THE LIVER OF CHICKENS FED HIGH LEVELS OF FULL-FAT LARVAL MEAL OF THE BLACK SOLDIER FLY (HERMETIA ILLUCENS, L)

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Abstract

Soybean meal (SM) is the main source of protein in poultry feed, however several reasons indicate that alternative protein-rich components need to be found for animal nutrition. The black soldier fly (Hermetia illucens, HI) is one of the most promising insect species for poultry feed production. Previous studies have shown that replacing SM with a high proportion of the HI larvae full-fat meal in the diet of broiler chickens is unfavorable because it impairs growth performance. The aim of study was to analyze the effects of such replacement on liver structure. Broilers were fed diets, in which 50% (HI50), 75% (H175), and 100% (H1100) SM was replaced with the HI larvae full-fat meal throughout the rearing period. Birds were slaughtered at 42 days of age, and liver samples were prepared for light and electron microscopy. Disorganization of hepatocyte cords and dilatation of sinusoids were observed in birds of HI100 and HI75 groups. Hepatocytes of the H100 group were characterized by dilated cisternae of the rough endoplasmic reticulum containing flocculent material and by the presence of large vacuoles containing similar material. Evidences of release of the cisternae contents into the vacuoles were observed. In addition, hepatocytes contained numerous lipid droplets, but were almost completely devoid of glycogen particles. These changes were less pronounced in the H75 group. The hepatocytes of chickens from the H50 group had only a few dilated cisterns and small vesicles containing flocculent material. Glycogen particles were present in these cells. The results indicate that the replacement of SM with the HI larvae meal at a level higher than 50% has negative effects on the liver of chickens.

Keywords: chicken, poultry, feed, insects, liver, histology, ultrastructure

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LONG-TERM RESEARCH ON THE STUDY OF WHEAT AND CORN FERTILIZATION ON SLOPE LANDS IN BARLAD PLATEAU, ROMANIA

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Abstract

In this scientific work, we present results obtained in wheat and corn culture, during the period 2013-2022, at the "Mircea Moţoc" Perieni Soil Erosion Research and Development Station, through fertilization with several types of organo-mineral fertilizers.

The effect of long term (10 years) nitrogen and phosphorus fertilization upon soil fertility and yield, was followed with doses 0, 40, 80, 120, and 160 kg N/ha and 0, 40, 80, 120, 160 kg P/ha doses. Long term fertilization led to a statistically significant increase of grain yield.

The research carried out highlighted the fact that the rational use of chemical and organic fertilizers, offers the possibility of restoring the fertility of eroded soils in a short period of time, simultaneously with the important increase in production, depending on the type of soil, the degree of erosion and the doses of fertilizers applied.

Organic and organo-mineral fertilizers, are intended especially for ameliorative and soil protection treatments against water and wind erosion. By using organo-mineral fertilizers, erosion is reduced by 30%. By fertilizing with one ton of organo-mineral fertilizers, between three and eight tons of natural fertilizers are substituted and more than five hundred kilograms per hectars of humic acids and synthetic polymers are incorporated into the soil.

Keywords: long term fertilization, production, organic and chemical fertilizers, wheat and corn culture, soil fertility

E-LEARNING TOOLS FOR FOOD TECHNOLOGY AND DEVELOPMENT EDUCATION (E-FOOD)

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Abstract

COVID-19 highlighted the importance of digital education for the digital transformation that Europe needs. The aim of the present work is to present the approaches for digitization of training in the field of food technology within the framework of an Erasmus+ programme project. The project "E-LEARNING TOOLS FOR FOOD TECHNOLOGY AND DEVELOPMENT EDUCATION (E-FOOD) " aims at the development of elements of an e-learning training system in the field of food technology, based on open access resources and developed on the basis of new educational standards. These general objectives and their results will be achieved through the development of educational standards and materials for e-learning training for food industry. The following important activities will be carried out during the implementation of the project: analysis of existing e-learning systems and selection of a system to be used by the partners; development of a system of educational standards for the development of teaching materials with unified content in the field of food technology; development of databases and training materials in the field of food technology; testing the system through training of students and adults in the form of "continuing education". The project will achieve results in the following priority areas of the Erasmus+ program: Development of digital educational content in the field of food technologies; Establishing a system of digital educational standards for food technology training; Establishing sustainable partnership between universities with a training profile in the field of food and food technology; Development of a project for joint program between partner universities for training students in food technologies.

RURAL DEVELOPMENT NETWORK IN EU

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Abstract

The article is focused on rural areas in the European union. These areas are essential for food security, biodiversity and development of the EU. Rural areas account for more than 341 m ha, which represent 83% of the total EU area in 2018. Agricultural land, forest and natural areas account for almost 80% of the EU's area. Effective collaboration and partnership are crucial for successful rural network development in the European Union. Building and maintaining strong relationships with various stakeholders is essential to bridge the gap between rural communities and the resources they need. *Community engagement plays a crucial role in the development of rural networks within the European* Union. In order to bridge the gap between urban and rural areas, it is essential to involve local communities in the planning, implementation, and maintenance of network infrastructure. European Union initiatives and funding play a crucial role in bridging the gap and promoting rural network development. Recognizing the importance of connectivity in rural areas, the EU has launched various programs and initiatives aimed at enhancing digital infrastructure and ensuring equal opportunities for all citizens, regardless of their geographical location. Look at the future, it is crucial to consider the prospects and recommendations for sustainable rural network development in the European Union. The digital divide between urban and rural areas remains a significant challenge, but with the right strategies and investments, it is possible to bridge this gap and create a more inclusive and connected Europe.

Keywords: rural area network, European union, development, digital divide

SUSTAINABLE AGRICULTURE AND SMART AGRICULTURE WITHIN THE SCOPE OF AGRICULTURAL METEOROLOGY

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Abstract

As every other area, agriculture is facing a remarkable transformation. Digital life is dominating traditional agricultural operations. Digital agriculture so called agriculture 4.0 is being enriched with the idea of green production. Advancements in information technology, including sensors, devices, machines as well as smart software systems are providing new opportunities in agricultural practices. Possibility of having efficient, safe and environmentally friendly systems are encouraging the farmers to adopt new technologies in their premises. On the other hand, agriculture is facing a big challenge. Global warming and climate changes are leading to a negative impact on agricultural areas. Access to healthy, high quality and productive products with sustainable agriculture are therefore becoming an extremely important issue for farmers. In order to assure the sustainability, it is necessary to employ a continuous monitoring system over the farming land. There are two main ways to support these monitoring systems; collecting data through sensors and using meteorological data to perform estimation about the impact of atmospheric changes. This study focuses the attention on the latter. Utilising agricultural meteorology for the sake of sustainable food production through generating smart agriculture withing the scope of agriculture 4.0 is the main subject of this research. The paper provides a general overview of sustainable and smart agriculture as well as the agricultural meteorology. A case study called "The Intelligent Agricultural Meteorological Information Management System (AKTEMBIS)" with respective features and capabilities is also introduced as it aims to support farmers through implementing artificial intelligence and agricultural meteorology data for assuring the respective sustainability.

Keywords: sustainable agriculture, agricultural meteorology, smart agriculture, agriculture 4.0, *AKTEMBIS*

THE ROLE OF CIVIL SOCIETY IN DEVELOPING ALTERNATIVE FOOD NETWORKS: CASE OF LEBANON

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Abstract

In the context of hybrid food systems, scientists are exploring the role of civil society in planning food systems and producing alternative food networks. Alternative food networks (AFNs) are conceptualized as holders of transformative potential toward a more just, equal, and sustainable food system. Recently, the AFNs concept has gained the attention of several researchers due to the Covid19 pandemic raising calls for more resilient local food systems. While there is an existing gap in exploring this phenomenon in the global south, this presentation aims to contribute to this discussion by taking Lebanon as a case study. Lebanon is a case of articulation between the global trends and the local contextualization of knowledge production about bottom-up approaches to planning. It is a vibrant terrain of networked civil society actors mobilizing against the traditional hegemonic state while tackling food-related issues where alternative forms of city production are taking shape.

This work is part of a Franco-Lebanese research project titled "SAR_Li: For a resilient and sustainable food system in Lebanon", funded by the ANR. It is concerned with the alternative practices in food provisioning developed by the diverse forms of civil society organizations in Lebanon. Using a governance approach, five significant cases were selected for in-depth analysis after mapping 60 projects. The cases represent a sample of the Lebanese alternative practices within the food sector, allowing an interesting comparison between the different typologies to indicate common themes and patterns connecting them. Qualitative data were collected using desk review, direct observation, and semi-structured interviews conducted with 4-5 main stakeholders for each case. After employing an organizational analysis of the selected cases, it explores their role in planning food systems as well as their planning approaches by focusing on their sociological profile, mobilized resources, and networks.

DEVELOPMENT OF METARHIZIUM ANISOPLIAE FORMULATIONS FOR CONTROL PLANT PESTS AND DISEASES

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Abstract

The entomopathogenic fungus from the Metarhizium genus is considered relevant in reducing the number of harmful pests in agriculture. This entomopathogenic fungus affects about 200 types of insects from orders like Lepidoptera, Homoptera, Hymenoptera, Coleoptera, and Diptera. Except as insect pathogens, these fungi can benefit their host plant through growth promotion and protection against pathogens. The phytophages like black bean aphid (Aphis fabae), a scale insect (Aspidiotus nerii) and spider mite (Tetranychus urticae) are economically essential pests in Kyrgyzstan. This study aims to increase conidia production of local Metarhizium spp-strains by selecting the low-cost media to test obtained bioformulation against the sucking pests and fungal plant pathogens. Natural Metarhizium spp. strains were isolated from dead insect bodies of the Lepidoptera and Apidae families. A cheap nutrient media composition was selected to obtain a high titer of fungi conidia formation. A laboratory bioassay was conducted to evaluate Metarhizium spp.strains against nymphal stages and adults of sucking pests like A. fabae A.nerii, and T.urticae. The inhibitory effect of Metarhizium spp.against Fusarium oxysporum, Alternaria spp. and Rhizoctonia solani was detected using a dual culture technique. The results of in vitro bioassay tests against pests have revealed the LC50 and LT50 values of TLK-1 isolate. The dose that caused 50% mortality in the pest's population was different. The LC50 of this isolate for A. fabae adults was 1×106 conidia mL-1; for A.nerii, it was lower - 7×105 conidia ml-1; for adults T.urticae it was higher- 13×106 conidia \ ml-1. Such mortality occurred after 49.63 hours in A. fabae (LT50), after 46.30 hours in A.nerii (LT50), and after 75.87 hours in deutonymph and adults of T. urticae (LT50). Three isolates, TLK-1, TLA-2 and BZTK1, have exhibited biofingicide activity in pathogen fungi like Fusarium oxysporum and Alternaria spp.

Keywords: *entomopathogenic fungus, Metarhizium spp., bioinsecticide activity, biofingicide activity, bioformulation for plant protection*

BIOTRANSFORMATION OF OIL PRESS CAKES FOR NOVEL PLANT-BASED FERMENTED FOODS

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Abstract

Currently, ail press cakes are carried out as by-products. Nevertheless, they should not be treated only as a by-product of limited value, as they also contain a number of valuable nutrients and are bioactive. It seems particularly important to expand the possibilities of their application in the food industry due to their beneficial nutritional values. Biotransformation gives the opportunity to obtain novel interesting products and is a method for the valorization of press cakes. Obtained products are the result of the metabolic activity of complex microbiota and exhibited antioxidant potential. The aim of the study is to develop a group of functional products in the form of fermented snacks, plant milks, cheese-like products and spray-dried instant products, produced from selected oil cakes (flaxseed, amaranth, black cumin, hemp, camelina, sesame, and sunflower). The project includes the development of products using mixed starter cultures (yogurt and kefir) as well as selected probiotic strains and noble fungal culture (Penicillium camemberti and Geotrichum candidum). The research methods include the determination of their physicochemical properties, the content of bioactive compounds and their durability during refrigerated storage, and survival of microorganisms in the simulated digestive tract. Moreover, of a broad spectrum of bioactivity including antioxidants, antimicrobial properties of products obtained in relation to selected pathogens determining their potential in the prevention of food poisoning, and effects on enzymes involved in civilization diseases will be studied.

SYNERGETIC BIO-PRODUCTS BASED ON ORIGINALLY FERMENTED POLLEN AND COLOSTRUM AS POTENTIAL DIETARY SUPPORT FOR HEALTHY GUT MICROBIOTA WITH SPECIAL TARGET ON THE "NEXT-GENERATION" PROBIOTIC AKKERMANSIA MUCINIPHILA

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Abstract

Fermented foods with tribiotic properties, stand out due to their gut microbiota-modulating capacity. There is an increasing interest in the commercial use of such foods or supplements as many contain not only health-promoting bacteria, but also other important natural compounds.

The last researches suggest that under normal conditions intestinal microbiota contribute to a healthy metabolism but when imbalance occurs (changes of its composition), it can induce various metabolic disorders and the pathogenesis of chronic diseases. One of the most important bacterium in the gut microbiota is Akkermansia muciniphila, a gram-negative, anaerobic, mucin-degrading bacterium. It may represent 3%–5% of the gut microbial community but its beneficial effects in metabolic diseases, such as diabetes and obesity are supported by scientific data. The abundance of Akkermansia might be sustained by the quality of ingested food, especially by the polyphenol rich foods, that can restore the integrity of the gut mucosa.

In previous studies, bee pollen and colostrum, two popular foods/supplements were processed by original fermentation procedures using SCOBY with two special media, i.e. Kombucha for bee pollen and kefir enriched with C. lipolytica MIUG D67 for colostrum. These procedures resulted in two new ingredients with valuable nutritional and functional composition. Although not in high amounts, Akkermansia muciniphila is also present in both kombucha and kefir together with a variety of other probiotics. Various synergetic combinations of the two food ingredients were tested to get the optimal concentrations of flavonoids.

EVALUATION AND COMPARISON OF MINERALS CONTENT IN DIFFERENT TYPES OF LOCAL AND IMPORTED HONEY IN KOSOVO

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Abstract

Production of artisanal honey is increasing in Kosovo and honey is sold as a health food premium product due to its nutritious characteristics. This study aimed to determine levels of eight selected macro and micro-minerals (Zn, Ca, Fe, Cu, K, Mg, Mn, and Na) and assess elemental differences between artisanal honey samples produced in Kosovo and honey from the import. The study material consisted of 15 artisanal honey samples produced in various regions of Kosovo and 15 other honey samples imported from six foreign Countries. The differences between means of elemental concentrations were compered using ANOVA (Analyses of Variance). The artisanal honey contained more K, Fe, Mn, and significantly more Cu, but less Na, Ca, Zn, and Mg than honey from import. There were significant differences (p < 0.05) between artisanal Acacia honey from Kosovo and imported Acacia honey in K, Mn. Significant differences (p < 0.05 or p < 0.01) were also found between local and imported Multi floral and Forest honey in K, Mn, Na, Zn and Cu.

Spearman rank correlation analyses showed a significant positive correlation between the contents of Zn and Na, Ca and K, Ca and Mg, K and Mg, and K and Mn in honey from Kosovo (p < 0.05). The positive correlation coefficients in imported honey were found for Zn and Ca, Zn and Mg, Ca and Mg, Fe and Mg, Fe and Mn, and K and Mn (p < 0.05 or p < 0.01). No significant negative correlations were found in the assessed samples.

This study revealed that artisanal honey produced in Kosovo is a good source of the main macro and micro-minerals, especially K, Fe, Mn, and Cu. Further studies could assess the degree to which the demand for these eight minerals is met by honey products.

Keywords: Kosovo' honey, artisanal honey, imported honey, macro-minerals, micro-minerals

HISTOLOGY AND ULTRASTRUCTURE OF THE LIVER OF CHICKENS FED HIGH LEVELS OF FULL-FAT LARVAL MEAL OF THE BLACK SOLDIER FLY (HERMETIA ILLUCENS, L)

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Abstract

Soybean meal (SM) is the main source of protein in poultry feed, however several reasons indicate that alternative protein-rich components need to be found for animal nutrition. The black soldier fly (Hermetia illucens, HI) is one of the most promising insect species for poultry feed production. Previous studies have shown that replacing SM with a high proportion of the HI larvae full-fat meal in the diet of broiler chickens is unfavorable because it impairs growth performance. The aim of study was to analyze the effects of such replacement on liver structure. Broilers were fed diets, in which 50% (HI50), 75% (H175), and 100% (H1100) SM was replaced with the HI larvae full-fat meal throughout the rearing period. Birds were slaughtered at 42 days of age, and liver samples were prepared for light and electron microscopy. Disorganization of hepatocyte cords and dilatation of sinusoids were observed in birds of HI100 and HI75 groups. Hepatocytes of the H100 group were characterized by dilated cisternae of the rough endoplasmic reticulum containing flocculent material and by the presence of large vacuoles containing similar material. Evidences of release of the cisternae contents into the vacuoles were observed. In addition, hepatocytes contained numerous lipid droplets, but were almost completely devoid of glycogen particles. These changes were less pronounced in the H75 group. The hepatocytes of chickens from the H50 group had only a few dilated cisterns and small vesicles containing flocculent material. Glycogen particles were present in these cells. The results indicate that the replacement of SM with the HI larvae meal at a level higher than 50% has negative effects on the liver of chickens.

Keywords: chicken, poultry, feed, insects, liver, histology, ultrastructure

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RELATIONSHIP BETWEEN LITTER MOISTURE AND PARTICLE SIZE DISTRIBUTION ON USED AND FRESH BEDDING IN COMMERCIAL TURKEY HOUSES AT MARKET AGE

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Abstract

Bedding material is expensive; therefore, it is commonly reused after windrowing in the grow-out phase in commercial turkey houses in the United States. Bedding material is significant to keep the high moisture away from the birds, which can deteriorate their performance and welfare.

This study aimed to determine the relationship between litter moisture and particle size distribution in commercial turkey houses at the end of the grow-out phase (average 118 days of age).

Composite litter samples were collected from turkey barns (N=17), then subsamples in triplicate were dried and material separated by vibration on 10 various pore sizes of sieves ranging from 25.40 mm to 0.15 mm, plus the remainder. The material remaining on each sieve was weighed and expressed as a percentage of material retained. For used bedding, on sieve sizes 1-3, a total of 8 samples were collected (N=7 rice hulls, N=1 wood shavings), and from sieve size 4 onward, N=10 (N=7 rice hulls, and N=3 wood shavings). A total of 7 samples were collected from fresh bedding placed in the barn at the start of the grow-out phase (N=4 rice hulls, N=2 wood shavings, N=1 combination of rice hulls and wood shavings). For the used bedding, the litter moisture was positively correlated with large particles, i.e., sieve 1 correlated very strongly (>25.40 mm, r=0.81, P=0.015), and it tended to correlate with sieve 2 (19.05 mm, r=0.64, P=0.086).

A negative correlation was revealed between litter moisture and finer particles, i.e., sieve 6(1.68 mm, r=-0.78, P=0.008), sieve 7(1.19 mm, r=-0.95, P=0.0000), sieve 8(0.84 mm, r=-0.95, P=0.0000), sieve 9(0.60 mm, r=-0.83, P=0.003, sieve 10(0.30 mm, r=-0.73, P=0.016), and remainder (<0.15 mm, r=-0.81, P=0.005). No relationship was found for fresh bedding between moisture content and particle size distribution.

The relationship between litter moisture and particle size distribution indicated that on used litter, coarse particles are associated with higher litter moisture, and fine particles are related to lower litter moisture. It is assumed that the accumulated mixture of feather, spilled feed, and excreta influenced the characteristics of litter, including water releasing capacity and water holding capacity, besides other information such as litter depth, number of times the litter is being used, length of growing period, and in the case of various bedding materials, further studies are needed.

Keywords: *bedding, rice hulls, wood shavings, litter moisture, particle size distribution, turkey, poultry, used litter*

PROMOTION AND PRESERVATION OF EU AGRICULTURAL PRODUCTS FROM INDIGENOUS SPECIES AND ITS TRADITIONAL KNOWLEDGE

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Abstract

The preservation of local livestock breeds and plant varieties and its associated traditional knowledge of how to use them is becoming increasingly important. Intellectual property rights are a way of controlling access to local and traditional resources. Geographical indications are an important tool to conserve local genetic resources, to regulate access and property rights to them, to strengthen the rural economy and to allow the holders of traditional knowledge to share in the benefits in a fair manner. Collective trademarks are another way of protecting native livestock breeds and plant varieties. Further the Convention for the Safeguarding of the Intangible Cultural Heritage offers an opportunity to protect nonphysical intellectual wealth, such as traditions and knowledge which are considered by UNESCO to be part of a place's cultural heritage. Biodiversity non-governmental organizations may also grant intellectual property rights to preserve autochthonous breeds and traditional knowledge. There are still many native livestock breeds to be revived and saved. Both for reasons of biodiversity and genetic resources, but also as valuable specialties for regional food supply chains. Therefore, there is a need to further explore the market for these indigenous specialties and the traditional knowledge associated with.

Keywords: *EU* quality schemes, geographical indications (GIs), national quality schemes, intellectual property rights (IPRs), traditional knowledge (TK), indigenous or autochthonous species, culinary heritage

BIOMASS IN BARLEY GENOTYPES (Hordeum vulgare L.) AND ASSOCIATION WITH ENVIRONMENTAL EFFECTS UNDER RAINFED CONDITIONS

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Abstract

Biomass in barley is one physiological parameter associated with grain yield and quality in barley genotypes. In the present study, there were various relations between NDVI and parameters investigated barley genotype. This research was carried out in the Trakia region over four environments during the 2018-2019 cycles. The experiment was set up with 25 barley genotypes in a randomized complete block design (RCBD) with four replications. In the study, normalized difference vegetation index (NDVI), grain yield (GY), plant height (PH), days of heading (DH), 1000-kernel weight (TKW), test weight (TW) and protein ratio (PRT) were investigated. The results of the variance analysis (ANOVA) for NDVI are presented in Table 1. The combined ANOVA revealed there was a significant difference in E2 and E4 locations between genotypes in the Z34 period. In the Z55 period, there was a significant difference between genotypes in E1, E2 and E3 locations. Correlation coefficients between NDVI and the parameters tested were determined by Pearson's correlation analysis. Over four environments, NDVI was made in barley genotypes in the Z34 and Z55 periods, NDVI in the Z34 period was slightly positively related to grain yield in E1 and E4. NDVI also had a positive effect on thousandgrain weight in three (E1, E3, E4) environments, on test weight in E1 ($r=0.583^{**}$) and E4 ($r=0.679^{**}$). NDVI had a positive effect on protein ratio in genotypes over four environments. The positive effect of NDVI on grain yield in the heading period (Z55) showed the importance of the relationship between vield and NDVI value. Normalized difference vegetation index had a positive effect on TKW in three environments (E2, E3 and E4), to TW in 4 environments during the Z55 period. In the study, a slightly different relationship was determined between NDVI and protein value in the Z55 period. The positive effect of NDVI on yield and quality values has shown that it is an important physiological parameter that can be used in selection. It is recommended that the increased biomass genotypes identified could be used as parents in a breeding programme to produce genotypes with a higher yield.

Keywords: Barley, normalised vegetative difference index, genotypes, yield, quality, correlations

SEEDLING AND ROOT WEIGHT IN DURUM WHEAT (Triticum durum Desf.) GENOTYPES AND ASSOCIATION WITH AGRO-PHYSIOLOGICAL PARAMETERS

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Abstract

Durum wheat (Triticum turgidum L. var. durum) under Mediterranean conditions is frequently limited by both high temperature and drought during grain growth stages. The research was carried out in the 2017-2018 cycles, with 25 genotypes in randomized completely blocks design with 4 replications. Data on grain vield, seedling fresh weight, root fresh weight, flag leaf area, tillering number, normalized difference vegetative index, canopy temperature, chlorophyll content, days of heading, peduncle length, spike length, spikelet number per spike, number of kernel per spike, and relationships among characters were investigated. The analysis of variance revealed highly significant differences (p<0.01) among the genotypes parameters investigated except for canopy temperature. In the study, G21, G6 and G22 had higher grain yields. The largest flag leaf area was measured in G3 (31.3 cm2), followed by G9 and G3. The seedling fresh weight and root fresh weight were established at the Z25 growth stages. The highest seedling fresh weight was determined in G23, followed by G19 and G18. Genotypes G5 and G8 had the highest root fresh weight. G15 had the highest tillering capacity. The longest spike was determined in *G8, the highest spikelet number per was in G10 and the kernel number per spike was in G25. The lowest* canopy temperature was measured in G15 and the highest chlorophyll content was measured in G25, G19 and G23. Correlation analysis showed that there are different coefficients between the parameters examined. Flag leaf area positively correlated with grain yield. Seedling fresh weight was positively correlated with chlorophyll content ($r=0.517^{**}$), peduncle length and kernel number per spike. Root fresh weight in genotypes had a positive effect on peduncle length, spike length, spikelet number per spike and kernel number per spike. A significant positive correlation was determined between the normalized difference vegetative index at Z55 with spike length ($r=0.412^*$), and spikelet number per spike $(r=0.620^{**})$. Canopy temperature measured at the heading stage had a slightly negative effect on peduncle length, spike length and spikelet number per spike. Chlorophyll content measured at the heading stage had a positive effect on peduncle length (r=0.402) and spikelet number per spike (r=0.300). Although the research was conducted under rainfed conditions, positive correlations were found between some physiological and yield components.

Keywords: Durum wheat, genotypes, physiological parameters, yield components

COMPARATIVE STUDY OF CALCIUM AND IRON ELEMENTS IN PROSO MILLET (PANICUM MILIACEUM (L.) WHOLE GRAIN VARIETIES

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Abstract

Calcium and iron are essential nutrients, but calcium can inhibit iron absorption. A balanced consumption of both minerals is essential, particularly for those at risk for iron deficiency. Spreading out calcium and iron intake and consuming diverse nutrient-rich foods can help ensure adequate intake. Millet is a commonly consumed food in developing countries due to its high nutritional value. It is considered a rich source of calcium and iron. We investigated calcium (Ca), iron (Fe), and zinc (Zn) elements concentrations in 1 red colour (Rumenka) and two yellow colours (Biserka and Gyöngyszem) of Hungarian Proso millet varieties. Were compared with two sorghum varieties, Farmsugro 180 and Alföldi 1. Were cultivated at Institutes for Agricultural Research and Educational Farm of the University of Debrecen and the Research Institute Nyiregyhaza. The mineral concentrations were detected using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The statistical analysis revealed a significant variation in the (Ca) mg/kg and (Fe)mg/kg concentrations, with a significant value of P < 0.05. The result showed significant variation in the iron and calcium content of different proso millet genotypes. Rumenka has the highest (Ca) mg/kg content, Ca (473mg/kg) in 2021 data sets, Gyöngyszem has the highest (Fe) mg/kg content in 2020 and 2021 sets, as follows Fe (61.9 mg/kg) and (67.6 mg/kg), but there is variation in the amount. Rumenka has demonstrated a strong correlation between iron mineral R=.794; also, the results showed that (Ca)mg/kg and (Fe)mg/kg were increased in bran after decortication of a percentage more than 80%. Which was indicate that the decortication process has a positive impact on mineral concentration among proso millet varieties. These findings highlight the importance of selecting the suitable proso millet genotype for specific purposes. Further research may be needed to determine the best genotypes for different applications and to identify factors that influence mineral content in proso millet.

Keywords: human diet, grains, dehulled grains, correlations, magnesium

HPLC-DAD METHOD FOR ANALYSIS OF GLYCOALKALOIDS ALPHA-SOLANINE AND ALPHA CHACONINE IN CONVENTIONAL POTATO

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Abstract

A simple and fast HPLC-DAD method has been developed for separation and quantification of two glycoalkaloids, alpha-solanine and alpha-chaconine, in potatoes. Separation of the analytes was performed on a Shimadzu Shim-pack GIST C18 column (250mm x 4mm I.D., 5 μ m particle size) applying isocratic elution of the mobile phase consisting of 30% (v/v) acetonitrile and 70 % KH2PO4 (20 mM and pH 6.57). The flow rate on the mobile phase was 1 mL/min and the detection of solanine and chaconine was performed on a wavelength of 204 nm. The retention time of α -solanine was 12.8 min and for α -chaconine 14.6 min. Liquid-liquid extraction of analytes was performed from dehydrated potatoes using methanol-acetic acid (95:5, v/v), followed by SPE with Sep-Pak C18 columns. Satisfactory results for the repeatability and accuracy of the method confirmed that the extraction method as well as HPLC method are appropriate for analysis of alpha-solanine and alpha-chaconine in potatoes.

Keywords: alpha-solanine, alpha-chaconine, potatoes, HPLC-DAD

CHARACTERIZATION OF THE WINE LEES SEDIMENT OF WHITE WINE FROM LOCAL GRAPE VARIETY VIORICA

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Abstract

The wine sector is of great importance in the Republic of Moldova. The country has a long tradition of winemaking, and wine production is a significant contributor to the Moldovan economy. The volume of wine produced in 2020 in the Republic of Moldova was 9,1 million dal. This is a sector which generates considerable amounts of waste, which can lead to serious environmental problems. By-products are obtained throughout the entire technological process and represents from 20 to 30 %. A valuable by-product that is obtained after wine fermentation, filtration and centrifugation is wine lees, which constitutes between 2 and 6% of the produced volume. In this study are analyzed the physico-chemical and microbiological properties of the wine lees sediment of wine from local variety Viroica.

Key words: winemaking, wine lees, local variety, by-products

DRIED FRUITS, ESPECIALLY DATES, INCREASE THE LIFESPAN OF CAENORHABDITIS ELEGANS

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Abstract

The effects of five commercially available dried fruits on the longevity of nematodes were investigated. All five dried fruits significantly increased the lifespans relative to the control. In particular, dates extended the lifespan significantly more than the control and the other four dried fruits. The mean lifespan and maximum lifespan of the nematodes that consumed dates were 40.9 and 21% longer than those of the control group, respectively. The total concentration of polyphenol compounds was measured to investigate whether the lifespan-extending effect of dates was due to antioxidants. The results showed that the polyphenol contents of dates and prunes were higher than those of the other dried fruits. However, there was no significant difference in the total polyphenol concentrations between dates and prunes. Therefore, dates may contain substances other than polyphenol-related compounds that are responsible for their lifespan-extending effects, or which may promote the activities of polyphenols.

Keywords: dried fruits, life extension, antioxidants, prune, date, Caenorhabditis elegans

GROWTH AND QUALITY OF MARIGOLD (Tagetes erecta L.) AND PETUNIA (Petunia hybrida L.) AS AFFECTED BY SUBSTRATE MOISTURE

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Abstract

The research was conducted in Požega in 2019. The purpose of the study was to study the influence of substrate moisture on growth and quality; number of flowers / plant, number of branches / plant, plant height, fresh flower mass, green aboveground mass and diameter of flower of tagetes (Tagetes erecta L.) and petunia (Petunia hybrida L.). The study was set up according to a random block schedule in three replicates. Irrigation treatments were: a1 = 70%, a2 = 85% and a3 = 100% retention capacity (RK). According to the results of the research, irrigation treatments in merigold significantly affected the mass of fresh flower, green aboveground mass and flower diameter. As for the petunia, according to the results of the study significantly higher number of flowers, number of branches and diameter of flowers on the irrigation treatment with the highest rate of irrigation. There was no significant difference in plant height in both plant species. The observed parameters increased linearly with increasing irrigation rate.

HAIR CORTISOL LEVELS IN CATS BEFORE AND DURING THEIR STAY AT A HOMELESS ANIMAL SHELTER

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Abstract

Cortisol is a hormone produced by the adrenal glands in response to stress, and it can be measured in hair samples. Hair cortisol levels provide a long-term measure of stress, as cortisol accumulates in the hair over time. Furthermore, elevated levels of cortisol over time can indicate chronic stress. Using hair samples to measure cortisol levels is a well-established method for assessing anxiety in animals, including cats. This study's primary goal is to learn more about the welfare of cats housed in homeless animal shelters and the factors that affect it. Being in a shelter environment can cause increased stress levels in cats. But is staying in a shelter more stressful than living on the street? This study compared cats' cortisol levels during their stay at the shelter with their cortisol levels before they entered the shelter.

Keywords: cortisol level, animal shelter, cats, stress

Acknowledgements: The work was part of the project entitled "Reducing the stress level in shelter cats through environmental enrichment". Co-financed by the Minister of Education and Science from the state budget under the program "Student science clubs create innovations".

HAIR AND CLAW CORTISOL LEVELS IN SHELTER CATS

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Abstract

Cortisol is a hormone released by the adrenal glands in response to stress. It is often used as a biomarker to objectively measure animal stress levels. For example, hair and claw cortisol levels represent long-term cortisol levels. It is, therefore, a way of determining chronic stress. The study aimed to analyze the cortisol level in the hair and claws of shelter cats, performed to assess the level of stress and well-being. The relationship between the cortisol concentration in the hair and cats' claws was evaluated.

Acknowledgements: The Minister of Education and Science co-financed the research from the state budget under the program "Student science clubs create innovations".

INFLUENCE OF SOIL MANAGEMENT SYSTEM ON SPRINGTAILS (HEXAPODA: COLLEMBOLA) COMMUNITY COMPOSITION IN APPLE ORCHARDS

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Abstract

Soil fauna is an essential component and soil management practices can qualitatively and quantitatively modify the functioning of soil ecosystems by disrupting the activities of soil fauna. Collembola species, which live in the top layer of all soil types, represent an important tool for the evaluation of the impact on the environment, respectively the potential negative effects on the soil biota, which could result from soil management practices in agricultural ecosystems. The study investigate the springtail abundance and community composition, similarity and differences between two apple orchards one managed with mineral fertilization and one with unfertilized control plots. At both orchards the weeds were controlled by herbicide application along the tree rows while the inter-rows were managed by integrated mowing (mower with brush or disc). The sampling of the soil fauna was performed by the mean of pitfall traps. A total of 8 species belonging to two families were identified, as follows: Entomobryidae (2 genus and 6 species), and Hypogastruridae (1 genus and 2 species). Overall, the community structure of Collembolla species was dominated by Entomobrya lanuginosa (with 67% of total catches) followed by Lepidocyrtus violaceus (21.47%). Other two species, commonly found in both analyzed orchards were Entomobrya atrocincta (3.7%) and Lepidocyrtus ruber (3.43%). Both orchards have the same species richness (6 species) but they were different in term of springtail communities structure, species dynamic and abundance. The main achievement of the monitoring of the springtails fauna in these apple orchards from southern Romania is that allowed obtaining the first data on the biodiversity of species that can be considered bioindicators of soil health, representative of the study area. The paper further discuss the similarities and differences of springtail communities between the two orchards induced by soil management practices.

Keywords: soil fauna, springtails diversity, apple orchards, soil management practices