

**Faculty of Agriculture
Goce Delcev University - Stip**



**1st INTERNATIONAL MEETING
AGRISCIENCE & PRACTICE (ASP 2018)**

BOOK OF ABSTRACTS

**10th - 11th May 2018
Stip, Republic of Macedonia**

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BOOK OF ABSTRACTS
SECTION: AGRICULTURAL ECONOMICS

DEVELOPMENT OF FAMILY BUSINESS IN TOBACCO PRODUCTION
ACTIVITIES Silvana Pasovska^{1*}, Trajko Miceski²

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Abstract

Concerning the development of modern family business, with tobacco production as its basic activity, it is necessary to develop management with the overall activities and appropriate motivation of the engaged members. In this way, greater efficiency and effectiveness in operations, lower production costs, increased productivity and improved performance are achieved. It should be directed in accordance with the trends of contemporary world achievements in the activity. This implies increasing attention to the production itself, both its quantitative limitation and its qualitative suitability, the protection of the environment, social security, economic effectiveness, healthy way of growing and developing plants, meeting the demands of a large number of non-governmental organizations and the World Health Organization, etc. The development of a modern tobacco manufacturing business involves the obligation of tobacco farmers to take into account the numerous factors, greater commitment, greater engagement and control over all operations and processes in tobacco production. In this paper, through the text, tables and graphs the production trends of tobacco are presented, with engaged vendors and sown hectares, as well as their correlation dependence.

Key words: motivation, managerial functions, yield, correlation, business

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

AGROECOLOGICAL CONDITIONS FOR GROWING SOME HYBRIDS OF SUNFLOWER IN OVCE POLE REGION Ivan Donev^{1*}, Ljupco Mihajlov², Emilija Arsov³, Sasa Mitrev³

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Abstract

Sunflower is a very important agricultural crop in the Republic of Macedonia and in other countries around the world. It is a high-yielding oilseed industrial culture, and it is characterized by high fatness that ranges up to 50% of the total weight of the seed in newer hybrids. This study used the latest hybrids that are grown in Macedonia without irrigational conditions in the Ovce pole region (dry and warm region). These characteristics in the production of sunflower were a challenge to set up and examine 12 varieties of hybrids in the Ovce pole region in the period from 2016 to 2017, from the sowing stage (April 2016/17) up to the phase of the sunflower harvest (Sept. 2016/17). In addition to the examined standardized characteristics (yield and sensitivity of diseases and pests), the emphasis in the research was to produce cold press oil and to check its quality. The hybrid varieties that were the subject of the research are: Experto, Armoni, Fortimi, Adagio, Neoma, Torino, Arisona, Bacardi, Feliks, Neostar, Kondi and Talento. The varieties were grown under irrigational conditions, in order to examine the agro-ecological conditions for growing sunflower. The results of the survey in the two comparative years showed that the yield of seed sunflower in the 2016 season was significantly higher than 2017 (4,320 kg/ha in 2016, compared to 2017 2,539 kg/ha) due to the higher rainfall in 2016 compared to 2017 (295 L/m² in 2016 compared to 2017 167 L/m²).

Key words: oilseed, hybrids, irrigation, sowing stage, sunflower harvest

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

EXAMINATION ON YIELD AND YIELD ASSOCIATED PARAMETERS IN DIFFERENT RICE GENOTYPES Kata Angelova¹, Verica Ilieva^{1*}, Natalija Markova Ruzdik¹, Ilija Karov¹, Ljupco Mihajlov¹, Mite Ilievski¹

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Abstract

The aim of this paper was to evaluate the grain yield and some yield related traits in different rice genotypes grown in the Republic of Macedonia. Nine rice genotypes (*Prima Riska*, 78/12-3-1, 79/22-2, *Ronaldo*, *Onice*, *Opale*, *Gloria*, *Pato* and *San Andrea*) were used for this research. All rice genotypes were from Italy except *Prima Riska* variety and two promising lines (78/12-3-1 and 79/22-2) which have Macedonian origin. The field experiments were carried out during 2014 and 2015 on the field areas in Kocani, Republic of Macedonia. Each genotype was set up on 5 m² test area in three repetitions in randomized block design. Grain yield and some important yield associated traits, like plant height, panicle length, 1 000 grain weight and the number of plants per m² were evaluated. This study investigated the effect of genotype and environment, but also their interaction on the grain yield. Besides the importance of genotype, the analysis of variance showed that the grain yield was strongly affected by environmental conditions (over 87 %). During the first experimental year, *Ronaldo* variety had the highest value for grain yield (11 000 kg/ha) and the lowest was recorded by *Gloria* (6 400 kg/ha). In second testing year, the grain yield was highest by *Prima Riska* variety (4 482 kg/ha) and the lowest was obtained by *Pato* (2 867 kg/ha). The average grain yield for all tested genotypes during the period of study was 6 100 kg/ha.

Key words: grain yield, rice, agronomic traits, genotype, environment

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

PROTEIN PROFILE OF SOME GENOTYPES OF FLAX (*Linum usitatissimum* L.) IN THE STRUMICA REGION, REPUBLIC OF MACEDONIA Mite Ilievski^{1*}, Biljana Atanasova¹, Dusan Spasov¹, Dragica Spasova¹, Verica Ilieva¹, Natalija Markova Ruzdik¹, Pavle Vuckov¹

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Abstract

Flax (*Linum usitatissimum* L.) is an industrial crop and has a great importance for humans and economy. An analysis of five different flax genotypes, produced in the Strumica region, Republic of Macedonia, in 2014 and 2015 is being made, regarding the protein content in the flaxseed. The experiment consisted of five variants in three repetitions, divided by the method of randomized block system. During the vegetation, standard farming practices for field flax production were used. Analysis of the protein content in flaxseed was made in the Laboratory for plant and environmental protection, at the Faculty of Agriculture, “Goce Delcev” University – Stip (Standard: ISO 20483:2006). The content of protein in flaxseed was analysed by *Kjeldahl method*. The results were statistically processed by the method of *analysis of variance*, and the differences were tested by *LSD – test*. The content of protein in flaxseed of the tested genotypes ranged from 26.9% to 29.4%. All flax genotypes had higher percentage of proteins in the seed. But, the genotypes *Belinka* (29.3%) and *Velušina* (28.5%) are characterized by the highest average content of protein in the seed, regardless the year of production. *Belinka* and *Velušina* are perspective genotypes for the food industry, as they have higher content of proteins in the seed than the other analysed genotypes.

Key words: flax, seed, content, genotype, percent, protein

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

OPPORTUNITIES AND RECOMMENDATIONS FOR CULTIVATION OF CHICKPEAS (*Cicer arietinum* L.) Monika Gligorova¹, Ljupco Mihajlov^{1*}

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Abstract

Chickpeas (*Cicer arietinum* L.) production may be imperative for agricultural producers who carry out production without the possibility of irrigation. This paper explains the breeding technologies and recommendations for achieving a satisfactory yield and health state of the chickpea. Initially, the economic significance and utilization value of the chickpea, as well as the significant statistical indicators of the distribution and surfaces of the world are listed, which according to the data of FAOSTAT 2017, in 2016, the production of chickpea in the world was 12.1 million tons, India participates with 64%. Botanical characteristics, classification, varieties from the region, agrotechnical measures are described in separate chapters with particular reference to recommendations for ways of sowing, fertilization and implementation of significant measures for care during the vegetation. The number of published works in Macedonia and the region for this culture is small, therefore we appreciate that this work is of special importance for agricultural producers who would like to include the production of chickpea in crop rotation in agricultural production in arid conditions.

Key words: production, arid conditions, crop rotation, care, yield

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

GENETIC AND ENVIRONMENTAL EFFECT ON THE GRAIN YIELD OF SPRING BARLEY VARIETIES CULTIVATED IN THE REPUBLIC OF MACEDONIA Nenad Petkovski¹, Ljupco Mihajlov¹, Natalija Markova Ruzdik^{1*}

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Abstract

The aim of this paper was to evaluate the genetic and environmental effect on the grain yield of spring barley varieties cultivated in the Republic of Macedonia. Five spring barley varieties (*Makedo*, *Xanadu*, *Josefin Variety*, *Gladys* and *Scarlet Variety*) were used as an experimental material. *Makedo* is a Macedonian variety and the other barley varieties are introduced. The field experiments were carried out during 2013 and 2014 on the field areas in Probistip, Republic of Macedonia. The experiment design was randomized complete block with three replications. The results were analysed to synthesize the relative proportion of the influence factor (η %) such as variety or year, as well as the interaction between variety and year on the grain yield. Besides the year conditions, the impact of variety contributed significantly to the overall variability of yield (over 98 %), compared to the influence of year and the interaction between variety and year. Two year average yield was in range of 4 904 kg/ha to 6 895 kg/ha. The average grain yield for all tested varieties during the period of study was 5 910 kg/ha. In both years of study, the highest value for yield was obtained by *Makedo* variety (6 886 kg/ha in the first experimental year and 6 801 kg/ha in the second testing year) and the lowest was showed by *Scarlet* variety (4 965 kg/ha and 4 934 kg/ha, consequently). Also, *Makedo* variety has the highest values for number of spike per m² and number of grains per spike.

Key words: grain yield, barley, genotype, agronomic traits

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

STUDY OF QUANTITATIVE CHARACTERISTICS IN ORIENTAL TOBACCO GENOTYPES Ana Korubin – Aleksoska^{1*}, Milan Mitreski¹, Jane Aleksoski², Mohammad Ayaz Ahmad³, Sime Dojcinov⁴, Zarko Bebic⁵

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Abstract

Ten genotypes of oriental tobacco (three varieties and seven newly created lines) were investigated for some major morphological and agronomic traits: height of the plant without inflorescence, leaf number per plant, length/width of the middle belt leaves and dry mass yield/plant. The trial was set up in the Experimental field of Tobacco Institute–Prilep in 2016 and 2017, in randomized block design with four replications, using traditional agricultural practices. Measurements of the first three traits were made in the stage of butonization and beginning of flowering, while the dry mass yield was recorded during the treatment of cured tobacco. The results were statistically processed. The aim of the research is to study the quantitative traits of Oriental genotypes, to determine the stability of the population through their variability and to emphasize the best among the selected assortment. From the set of genotypes we selected three superior lines with a high degree of homogeneity. The coefficient of variation of quantitative traits in these lines was lower than 10%, which is a sign of their stability. After their acceptance by the Commission for recognition and approval of varieties within the Ministry of Agriculture, Forestry and Water Economy of R. Macedonia, these genotypes will be placed on the market.

Key words: tobacco, oriental genotypes, quantitative traits, variability

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

THE EFFECT OF BACKCROSS METHOD IN TOBACCO BREEDING Jane Aleksoski*

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Abstract

The paper encompasses investigations of four oriental tobacco varieties (P10-3/2, P-23, P-84 and YK 7-4/2) and their diallel crosses F₁, F₂, BC₁ (P₁) and BC₁ (P₂) crosses in the course of 2016 and 2017, for the characters leaf number per stalk and dimensions of the middle belt leaves. The research was carried out on the experimental field of the Scientific Tobacco Institute - Prilep in randomized block system with four replications. The measurements were made in the stage of rapid growth (butonization), and the values obtained were processed by variational-statistical analysis. Heritability (h²) of the traits was calculated using the Mather and Jinks method. The aim of the research is to study the effect of backcross breeding on improving the quantitative traits of tobacco, to open up the possibility of selecting individuals at the maximum number of crosses enabled by diallel cross of parental genotypes and to offer directions for further selection. The obtained results showed different modes of inheritance in all generations studied. Heritability of the crosses was over 95%, which is a sign of high heritability of the studied traits. The offered pattern for further successive selection can also be used for other plant species to improve a range of traits, including resistance to diseases.

Key words: tobacco (*Nicotiana tabacum* L.), backcross, diallel cross, heritability

BOOK OF ABSTRACTS
SECTION: PLANT PRODUCTION

DEGUSTATIONAL PROPERTIES OF SOME BASMAK TOBACCO VARIETIES Karolina Kochoska^{1*}, Milan Mitreski¹, Romina Kabranova², Ilija Risteski¹

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Abstract

Degustational properties of tobacco are one of the most important parameters that determine the quality of tobacco in smoking. Investigations of these properties were performed in 2009, 2010 and 2011 year on one varieties of Yaka type and three varieties of the oriental type Basmak: JK 7-4/2 Ø, MK-1, MB-2, MB-3. Degustational properties of tobacco varieties were evaluated by the Taste panel of Tobacco Institute – Prilep, composed of seven members, by the method of "anonymous tasting" according to the standard and the "Key for taste evaluation of oriental aromatic tobacco". The aim of this paper was to make comparative investigation on degustational properties in some varieties of Basmak tobacco grown under same conditions and to mark all the differences among them. The best average results regarding the investigated properties were obtained in the variety MK-1 (68.39 points). Common opinion of the Taste panel is that all investigated varieties show good degustational properties that are typical for oriental tobacco, but MB-2 and MB-3 are the most prominent among them. The investigations have shown that Basmak varieties, due to their good tasting characteristics, can be successfully grown in the Republic of Macedonia.

Key words: oriental, (*Nicotiana tabacum* L.), testing, type

Plant protection

**DETECTION OF *Pectobacterium carotovorum* subsp. *carotovorum*,
BACTERIAL STALK AND HEAT ROT DISEASE ON SUNFLOWER SEEDS**

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Abstract

The important protection measurement in sunflower production is to check the quality status of the seeds, by health control. The most spread diseases on sunflower transmitted by seeds or during the season are stalk rot (*Sclerotinia sclerotiorum*) and downy mildew (*Plasmopara halstedii*), which were the only quarantine pathogens observed on the fields in Macedonia. Many sunflower pathogens have never been reported in Macedonia, such as bacterial diseases. Although, the diseases can reduce yield and seed quality, they occur only intermittently and seldom are of any economic concern. *Pectobacterium* (formerly *Erwinia*) *carotovorum* subsp. *carotovorum* is a Gram-negative plant-specific pathogen, and also catalase positive, oxidase negative and pectolytic. In our observation this bacteria damages the sunflower seeds before seedling season, during checking the health condition of seeds in UNILAB (laboratory for plant health control), in the season 2018. Biochemical laboratory analyses were done to confirm *Pectobacterium*, but also the morphological status of bacteria was viewed with SEM (scanning electron microscopy). This is the first paper about *Pectobacterium carotovorum* subsp. *carotovorum* on sunflower seeds which damages the seed and it is known as a bacterial stalk and head rot in the field.

Key words: sunflower, health control, *Pectobacterium*, gram-negative, SEM.

**STUDY OF STOLBUR PHYTOPLASMA ON WINE GRAPEVINE VARIETY
IN THE REPUBLIC OF MACEDONIA** Tuckovska Biljana¹, Arsov Emilija^{1*},
Mitrev Sasa¹

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Abstract

Phytoplasmas are microorganisms that besides the grapevine also attack other plant species, such as corn, tomato, pepper, periwinkle and some wild plants. The disease seriously modifies the structure of leaf the grapevine phloem, the chlorophyll content and the functioning of sink–source system. Insect vectors and insufficiently tested planting material are the most common way for the transfer of phytoplasmas to Macedonian vineyards. In the Republic of Macedonia, they are known under the name *yellowing* or *redness* on the grapevine. The characteristic symptoms occur on the leaves (yellowing / redness, bending of the edges to the inside of the nervous system), the rosters (incomplete retention), and the bugs (sputtering). The grapevine field crops visited in the period from October 2015 to September 2016, were fully and thoroughly analysed and the field analysis confirmed the presence of phytoplasmic disease. To prove phytoplasmas in the grapevine, the already established method for isolating DNA and molecular PCR reaction was used. Total number of 105 grapevine wine samples were collected from the Tikves vineyards in Macedonia. All samples were analysed on three stolbur specific genes: *tuf*, *stamp* and *vmp*, because all of the results on tested samples from vineyards in Macedonia, show the presence only on stolbur phytoplasma. The study continuously checks and confirms the present status of stolbur in the biggest vineyards in Macedonia, in Tikves regions.

Key words: grapevine, phytoplasma, yellowing, redness, DNA, PCR

IMPACT OF AMPELOTECHNICAL MEASURES IN THE GRAPEVINE PROTECTION FROM OCCURRENCE OF GREY MOULD (*Botrytis cinerea*) Bojkov Gligor¹, Arsov Emilija^{1*}, Mitrev Sasa¹

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Abstract

Grey mould (*Botrytis cinerea*) is one of the most important economical disease on grapevine, whose progress and development during vegetation causes serious economic losses. The aim of this study, was to determine how ampelotechnical measures influence on the development of the disease in order to reduce the number of chemical treatments. Locality Kraiste, Kavadarci, Republic of Macedonia, was the experimental field with black variety Vranec which was continuously observed. Working hypothesis was to follow the development of the disease after 14 days from the last treatment, when the impact decreases of the fungicide and by applying agrotechnical measures and green operations to control the development of the disease. Those variants where there was a reduction of irrigation, and to which were applied ampelotechnical measures, had significantly lower intensity of infection in relation to control.

Key words: grey mould, ampelotechnical measures, green operations, infection, control

BOOK OF ABSTRACTS
SECTION: PLANT PROTECTION

USE OF SOME ESSENTIAL OILS IN BIOLOGICAL CONTROL OF PLANT PATHOGENIC FUNGI Natalija Atanasova-Pancevska^{1*}, Jane Bogdanov², Violeta Boskovska¹, Verica Peneva¹, Dzoko Kungulovski¹

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Abstract

Biologically active essential oils represent a rich potential source of an alternative and perhaps environmentally more acceptable disease management compounds. In phytotherapy, they can present a serious candidate to replace the various chemical pesticides commonly used against infectious diseases of fungal origin. The aim of this study was to evaluate the antifungal efficacy of anethole, alone, and in combination with several other essential oils against some important plant pathogenic fungi. The *in vitro* activity of different concentrations (1%, 0.5%, 0.25%, 0.125%, 0.0625%, 0.03125%, 0.015625% and 0.0078%) of anethole, alone, and in combination with other essential oils (cimetaldhid, eugenol, α -pinen, γ -terpinen, menthol, karvon, β -pinen, camphor, linalool, estragol and fenchon) was investigated. Minimal Inhibitory Concentrations (MICs) and Minimal Fungicidal Concentrations (MFCs) were evaluated by broth microdilution method. As test microorganisms we used plant pathogenic fungi: *Aspergillus ochraceus* FNS- FCC 46, *Alternaria alternata* FNS- FCC 47, *Fusarium oxysporum* FNS- FCC 48, *Botrytis cinerea* FNS- FCC 49, *Penicillium* sp. FNS- FCC 50, *Plasmopara viticola* FNS- FCC 51, *Aspergillus niger* FNS- FCC 52 and *Aspergillus niger* ATCC 16404. All tested EOs showed valuable antimicrobial activity against all tested isolates, with MICs between 0.25% - 0.0625%, and MFCs between 1% - 0.25%. As the most susceptible microorganism *Alternaria alternata* FNS- FCC 47 was found, while as the most resistant microorganisms were *Aspergillus niger* FNS- FCC 52 and *Aspergillus niger* ATCC 16404. The results indicate that tested combination of EOs have strong antifungal activity. The results of this study confirmed the possibility of using these oils in agriculture to prevent the growth of plant pathogenic fungi and they have the potential to replace the synthetic fungicides in the future.

Key words: essential oils (EOs), antimicrobial, plant pathogenic fungi, fungicides

BOOK OF ABSTRACTS
SECTION: PLANT PROTECTION

EFFECTIVE CONTROL OF THE TOBACCO SEEDLINGS FROM DAMPING OFF DISEASE IN DUAL INFECTION IN BEDS Biljana Gveroska*

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Abstract

Damping off disease is caused by pathogenic fungi *Rhizoctonia solani* and *Pythium debarianum*. Its control is very difficult because of the similarity of symptoms and use of non-compatible fungicides for the target pathogens. The biggest problem is the dual infection which is very often, therefore the use of the correct control is necessary. According to these facts, the aim of this study was to determine the most effective way of control. The investigations were carried out in tobacco beds. There were two applications of fungicides. They were chosen by instructions, and the results from artificial inoculation and the previous practice. The most effective control is combination of two fungicide who act separately to each pathogen. The highest effectiveness is achieved by two combinations: Orvego (300g/L amectradin + 225g/L dimetomorph) 0.1% + Manfil 80WP (800 g/kg mancozeb) 0.25% - 88.64% and Orvego 0.1% + Signum 33 WG 0.1% - 84.23% effectiveness. Fungicides which suppress both pathogens in artificial inoculation, also achieved the highest results: Quadris 25 SC (250g/L azoxystrobin) 0.15% - 100% effectiveness and Signum 33 WG (267 g/kg boscalid + 67g/kg pyraclostrobin) 0.1% - 85.05%. These fungicides are good chemical controllers for damping off disease in dual infection by two pathogens in tobacco beds.

Key words: damping off, fungicides, effectiveness, Quadris 25 SC, Signum 33 WG, Orvego

IMPLEMENTATION OF MODERN IT TOOLS IN AGRICULTURAL PRACTICE Zoran Zdravev^{1*}, Emilija Arsov², Fidanka Trajkova³, Sasa Mitrev²

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Abstract

The modern agriculture is based on utilization of laboratory analyses and different tools for reaching high and good quality yields, with implementation of environmental friendly production practices. The Online Pesticide Database and the Online Calculator for Fertilizer Use were developed in order to facilitate and support the modern concepts of agricultural production in Republic of Macedonia. The Online Pesticide Database is Open Resource Character, providing information about diseases, pests and weeds for different crops, the pesticides for their control and the active ingredient of pesticides. Online Calculator for Fertilizer Use is created to support application of correct amounts of fertilizers. This on-line tool provides recommendations for necessary application of nitrogen, phosphorus and potassium to different crops, based on existing data on pre-crop, nutrient demand of next crop and laboratory analysis for already available nutrients in the soil. Both tools are freely available to any interested party and they are created in a manner that the data is accessible with IT tools operating on Windows, iOS or Android platform, and accordingly they are accessible even from the field. The Online Pesticide Database and Online Calculator for Fertilizer Use are created to support agricultural production in accordance with the principles and guidelines of Good Agricultural Practice (GAP) in Macedonia.

Key words: IT tools, online pesticide database, online calculator for fertilizer use, online application, pesticide, fertilizer calculator

BOOK OF ABSTRACTS
SECTION: PLANT PROTECTION

***Xylella fastidiosa* – POSSIBLE THREAT IN PRODUCTION OF GRAPEVINE AND OLIVE TREES IN THE REPUBLIC OF MACEDONIA**

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Abstract

Pierce's disease, caused by bacteria *Xylella fastidiosa*, was recorded in South America in 1884 for the first time, and it was later described by Pierce in 1892 who had given its name by him. For a long time, Pierce's disease (PD) was thought to be caused by a virus, but, the real cause of the disease was determined in 1978 with electron microscopy from xylem, where the presence of bacteria was established. Diseases caused by *X. fastidiosa* are mainly tropical or subtropical. They seem to be rare or absent in the cold winter regions. Grapevine is the main host of the disease, but it can also cause disease on olives, almond, burning of peach etc. The disease can be transmitted by insect vectors from the *Cicadellidae* family. The bacteria is not present in Europe. In the Republic of Macedonia, it has already a quarantine status.

Key words: disease, bacteria, virus, insect

Quality control and food safety

PARTICULAR FEATURES OF THE HORSE MEAT AGING Stefan G. Dragoev^{1*}, Dessislava B. Vlahova-Vangelova¹, Dessislav K. Balev¹, Kolyo T. Dinkov¹, Aco Kuzelov²

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Abstract

Over the last decade the horse meat went deeper into the field of vision of both consumers and scientists. The objective of this study is to identify the specific features during aging of the horse meat. The changes in microstructure, morphology, protein autolysis, soluble proteins, pH, WHC, drip loss and colour was studied in horse m. *Longissimus dorsi* during 12 d of wet aging at 0 – 4°C. At 3 d post mortem the A- and I-zones were more difficult to distinguish. Some shortening of the sarcomere was observed. The rigor mortis period in the horse meat occurs between day 3 and day 5. In this period the muscle fibres are contracted, the red colour component was decreased by 2-3 units, the pH and the WHC were minimal - 5.80 and 13 - 14%, respectively, and the drip losses were maximum about 20%. In intra-cellular spaces release of free water was found. After 5 d post mortem, single cracks and strains were observed - an indicator of the ongoing autolytic processes. The solubility of the proteins stabilized at about 1.750 mg/ml. An increased share of protein fractions with a molecular weight of 28-23 KDa, considered as an indicator of increased meat fragility, was found after 5 days. From 5 to 12 d, higher levels of α -actinin, desmin and light meromyosin were found. After 7 d of post-mortem destructive changes were deepening. Z-lines were very torn. A- and I-discs were difficult to distinguish. Myofibrils were highly fragmented and I-zones were not distinguishable.

Key words: m. *Longissimus dorsi*, microstructure, morphology, protein autolysis, soluble proteins, drip loss, colour

MONITORING UDDER HEALTH AND MILK HYGIENE ON-FARM USING QUICK SCREENING METHODS Dimitar Nakov^{1*}, Metodija Trajchev¹

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Abstract

In this paper the use of on-farm screening methods for monitoring udder health and milk quality are discussed. Special attention was given to evaluation of usefulness of California mastitis test (CMT) as quick field screening test for detection of udder quarters with an intra-mammary infections caused by major mastitis pathogens. Application of CMT in dairy herd health management in period of early lactation is illustrated through the two years cross sectional study that was carried out to screening the quarter milk samples with abnormal milk secretion (AMS) and using of microbiological culture for detection of intramammary infections (IMI). The quarter milk samples were obtained in two periods of early lactation: the period from calving until 21st day in lactation and period from 22nd to 42nd day in lactation. The quarter level prevalence of AMS and IMI in the first 21 days in lactation was 5.33% and 4.03%, and up to the 42 days in lactation the prevalence of AMS and IMI was 5.45% and 4.38%, respectively. The prevalence of AMS and IMI from udder quarters that show positive reaction on CMT in the first 21 days in lactation was 56.96 and 55.42; and 55.42 and 44.58 in the period from 22nd to 42nd day in lactation, respectively. The results indicated that positive CMT reaction in early lactation may be good indicator for IMI; there was a significant association between the frequency of isolation of major pathogens and the CMT score in milk samples obtained in the period of early lactation (Pearson's $\chi^2=240.031$, $df=9$, $P<0.001$).

Key words: california mastitis test, dairy cows, intra-mammary infection

CHARACTERIZATION OF LEAD ISOTOPE RATIOS IN VARIOUS PLANT FOODS AND BEVERAGES WITH APPLICATION OF Q-ICP-MS Biljana

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Abstract

Studies of the isotopic composition of lead are commonly used in the environmental science. If lead is present in the soil, a plant will take up small amounts and subsequent isotope ratio studies might provide unique means of differentiating between different plant sources of origin. Among all the naturally occurring lead isotopes, only ²⁰⁴Pb is non-radiogenic, whereas, ²⁰⁶Pb, ²⁰⁷Pb and ²⁰⁸Pb are the daughter products of the radioactive decay of ²³⁸U and ²³⁵U and ²³²Th, respectively. Small Pb isotope abundance variation occurs in nature and the isotopic composition of lead in the environment is dependent on local pollution sources. Being able to accurately measure all of the Pb isotopes is very important for the number of investigations. Quadropole inductively coupled plasma with mass spectrometry (Q-ICP-MS) was used to investigate whether this chemical application can offer a reliable and practical solution to the problem of the polyatomic overlap in the presence of organically based matrix samples. Very good sensitivity was obtained for ²⁰⁶Pb, ²⁰⁷Pb and ²⁰⁸Pb isotopes, while, ²⁰⁴Pb suffers from isobaric interference from ²⁰⁴Hg. Satisfactory linearity (R) was obtained in the range from 5 to 100 µg/L. The study summarizes the instrument optimization procedure for Pb isotope measurements in plant food and wine samples. The calculated isotope ratios ranges: a) ²⁰⁷Pb/²⁰⁶Pb: from 0.985 to 1.122 with standard deviation of data distribution of 0.038 and b) ²⁰⁸Pb/²⁰⁶Pb: from 2.221 to 2.998 with standard deviation of data distribution 0.21. The isotopic ratios were presented for samples from the same and different geographical regions.

Key words: lead, isotope ratio, plant food, wine, Q-ICP-MS

DETERMINATION OF THE INFLUENCE OF CATTLE BREEDS ON THE COLOUR OF CALF MEAT Dimche Kitanovski¹, Vladimir Kitanovski^{1*}, Elena Joshevska¹

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Abstract

Three breeds „Busha“, „Friesian“and „Simmental“ were examined in the analysis for determining the influence of cattle breeds on the colour quality of the meat. As the most attractive colour quality analyses were taken on muscles (*m. Semimembranosus*) and (*m. Longissimus dorsi*). Analysed parameters for determining the quality of meat colour were: intensity of the colour L*, the red component of the colour a* and the yellow component of the colour of the meat b*. The L* values of colour of the long muscle *Longissimus dorsi* were higher and statistically significant ($p>0.05$) at analysed samples taken from the "Simmental" breed - 33.54, in contrast to the meat from the breed "Friesian"- 27.61 and from meat of the Busha breed - 25.65. The L* values of Semimembranosus muscle were higher in meat from breeds "Friesian" - 32.20 and "Simmental" - 31.59. In the results of these two breeds, statistically significant levels ($p>0.05$) were not observed, unlike the results of meat obtained from the Busha breed, which showed significantly lower ($p>0.05$) values - 29.18. From the obtained results, a conclusion can be reached and that is that characteristically darkest colour on two analysed muscles were obtained at Busha breed, and most attractive rich red colour was obtained at the muscles of the "Simmental" cattle breed.

Key words: *m. Semimembranosus*, *Longissimus dorsi*, intensity of the colour, *Friesian*, *Simmental*, *Busha*

SEASONAL CHANGES ON BOVINE BULK TANK MILK QUALITY FROM THREE REGIONS IN MACEDONIA

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Abstract

The aim of this study was to give an overview of the milk quality parameters and to investigate variations of milk composition, Somatic Cells Counts (SCC) and Total Bacteria Counts (TCC) by season of year and region of milk collection. The present study was conducted during the period of eight months in three regions in Republic of Macedonia: Berovo, Pehcevo and Delcevo. Raw bulk tank milk samples were collected from the selected dairy factories. The correlation between observed parameters was calculated with Pearson's coefficient of correlation using all data. All results of the research were processed using one-way analysis of variance (ANOVA). The Pearson's coefficient of correlation showed that there was statistical significant interdependence at level $p < 0.01$ between region of collected milk and fat content, raw milk temperature and acidity level and total bacteria count. Statistical significant correlation existed between months in year when milk samples were collected and content of dry matters and proteins, raw milk temperature, specific gravity and acidity level. There was found statistical significant difference ($p < 0.001$) in fat, dry matter and protein content, the presence of added water, mean raw milk temperature, specific gravity and milk acidity level between regions where milk samples were taken. The contents of fat, dry matter and protein, the presence of added water, mean raw milk temperature, specific gravity and milk acidity level were statistically significantly differed ($p < 0.001$) depending on months in year when milk samples were taken. The other milk quality characteristics did not differ depending on months in year.

Key words: Raw milk composition, somatic cell count, bacteriological quality

CHANGES IN FATTY ACID COMPOSITION OF POULTRY MEAT AFTER HEAT TREATMENT Mitre Stojanovski^{1*}, Anita Čakarova², Aco Kuzelov³, Elena Joshevska¹, Gordana Dimitrovska¹, Dzulijana Tomovska¹, Katerina Bojkovska¹

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Abstract

The purpose of the paper is to determine the changes in the fatty acid composition of fat in poultry meat after the heat treatment, after frying in different types and combinations of fats. Lard, sunflower oil, palm oil and a combination of three parts of lard and one part of sunflower oil, three parts of lard and one part of palm fat and three parts of palm fat and one part of sunflower oil were used for the examination. After frying with lard in the meat, there is a greater change in the fatty acid composition, where the fatty acid C18:1n9c of 45.84%, which it had before frying, increased to 49.05%, C18:0 decreased from 10.18% to 7.45% and decreased C16:0 from 29.55% to 27.45%. After frying in sunflower oil and palm oil, there has a formation of new fatty acids in insignificant amounts. In combination of three parts of lard and one part of sunflower oil, minimal changes in the fatty acid composition of less than 1% have been observed. In frying with three parts of lard and one part of palm fat fatty acid C14:0 from 0.88% to 23.81%, fatty acids C16:0 decreased from 27.24% to 1.72%, C18:1n9c from 48.05% to 15.16% and C18:2n6c from 12.44% to 0.20%. After the heat treatment of the meat in three parts of palm fat and one part of sunflower oil, there is an increase in the content of fatty acid C18:2n6c from 8.42% to 11.62%

Key words: quality, frying, lard, palm oil, sunflower oil

ANTIMICROBIAL ACTIVITY OF POMEGRANATE PEEL EXTRACTS FROM “KARAMUSTAFA” AND “IDŽIS” VARIETIES

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Abstract

The aim of this study was determination of antimicrobial activity of pomegranate peel extracts from “Karamustafa” and “Idžis” varieties. For this purposes, the peel of the two varieties of pomegranates was dried, powdered and extracted three times by methanol: water solution (80:20). After evaporation, the extracts were investigated for their “in vitro” antibacterial and antifungal properties using a disk-diffusion method in Petri dishes. The pomegranate peel extracts were tested for antibacterial activity against one Gram-positive bacterial strain *Staphylococcus aureus* (ATCC 25923), and against one Gram-negative bacterial strain *Escherichia coli* (ATCC 25922), and for antifungal activity using *Candida albicans* (ATCC 1023). In brief, each microorganism was suspended in Mueller Hinton (MH) broth and diluted approximately to 10E6 colony forming unit (cfu)/mL. Gentamicin (20 µg/well), nalidixic acid (30 µg/well), ciprofloxacin (5 µg/well) and erythromycin (15 µg/well) were used as positive control. The antibacterial activity is ranked from no activity (-: inhibition diameter < 10 mm), low (+: inhibition diameter between 10 and 15 mm), moderate (+: inhibition diameter between 15 and 20 mm) and high activity (+++: diameter inhibition ≥ 20 mm). All tests were performed in triplicate and clear halos greater than 10 mm were considered as positive results. Our results showed very high antimicrobial activity of the extracts from both variety against *Staphylococcus aureus* (ATCC 25923) with inhibition zone of 40 mm. The antifungal activity against *Candida albicans* (ATCC 1023) was very low with inhibition zone of 10 mm.

Key words: pomegranate extracts, antibacterial, antifungal, disk-diffusion method, *Staphylococcus aureus*.

Soil science and hydrology

BOOK OF ABSTRACTS
SECTION: SOIL SCIENCE AND HYDROLOGY

AEROBIC GRANULATION TECHNOLOGY FOR COST EFFICIENT MUNICIPAL AND INDUSTRIAL WASTEWATER TREATMENT <GRANULIS> Kungulovski Ivan^{1*}, Kungulovski Dzoko²

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Abstract

Nitrogen load in municipal and industrial wastewater is an important parameter for the quality of treated wastewater. Therefore, there is a constant need to improve the treatment efficiency and reduce the use of energy on the existing and new wastewater treatment plants. Aerobic granular sludge is a promising technology to be applied in various industrial and municipal wastewater treatment plants (WWTP). The purpose of the project is to establish, fine-tune and scale up a novel aerobic granular process, which are applied on small and medium industrial and domestic WWTPs and also used to upgrade the existing medium and large WWTPs. Aerobic granules are prepared using pre-selected microorganisms, with known properties for granulation. At least 30 microbial strains (based on 16S rRNA characterization) are used for "basic granules" preparation. Formation of granules are done on chemically defined medium containing acetate as a primary carbon source and (NH₄)₂SO₄ as a nitrogen source. This project resulted with new and optimized protocols for fast aerobic granulation process, new operating protocol for scale up of aerobic granules production, high quality and quantity production output due to controlled conditions in laboratory facility. A comprehensive microbial, chemical and biological profile of aerobic granules was developed, which has been patented and trademarked product ready for market application. The newly established Research Centre for Applied Microbiology and Biotechnology received an ISO 17025 certification that offers new innovative services to the existing market in the region. The novel aerobic granular process for nitrogen removal and WWTPs upgrade will lead to beneficial impact on environmental issues (reduction of energy consumption, reduction of wastes, water resources saving and sustainable production processes) and therefore adequately support the "Environmental Action Plan for sustainable development" of the European Communities (COM 122-2002), as well as the "EU Water Framework Directive".

Key words: granulation, nitrification, denitrification, wastewater treatment, ISO certification

THE INFLUENCE OF THE PERLITE AS A SUBSTRATE FOR IMPROVING ON SOME WATER PROPERTIES ON THE FLUVIAL SOIL WITH AN APPLICATION OF RETENTIONAL CURVES Vesna Markoska¹, Kiril Lisichkov², Blazo Boev³, Rubin Gulaboski⁴

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Abstract

This work is focused on the determination of potential of moisture retaining in perlite and fluvial soil. For assessing this parameter, the method of Bar extractors and Porous plate extractors have been explored. The method is applied on 7 different regimes of pressure, (0.1; 0.33; 1; 3; 6.25; 11; 15 bars), in samples composed of perlite and fluvial soil, where different ratios of 20/80, 30/70, 50/50 are present. The major goal of this study is to explore the experimental results of moisture content and to show the effectiveness of the water retention properties of perlite. Water retention curve is the relationship between the water content, and the soil and substrate water potential. This curve is characteristic for different types of soil and substrate, and is also called the soil moisture characteristic. The retention curve reflects the moisture content during a different tension. The data determined in this work are useful to assess the effective zone of the root system. We show that perlite exhibits specific features in respect to the water retention in several types of soils. Because of the good physical properties and the high porosity, the expanded perlite has a significant role in maintaining and improving of the water-air regime in the fluvial soils. In addition, it gives better accessibility of air and moisture for the plants, having a very positive influence on the soil features.

Key words: perlite, fluvial soil, retention curves

Viticulture, enology and fruit production

THE EFFECT OF PRUNING ON FRUITING CAPACITY OF MICHEL PALIERI TABLE GRAPE VARIETY, GROWING IN TIKVES VINEYARD

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Abstract

The subject of research was the table grape variety Palieri, grown in the Tikves vineyards. The aim of this paper was to determine the effect of various types of pruning on fruiting of Michel Palieri variety, given that no research has been done so far for this variety. The research lasted three years (2014, 2015 and 2016), and three pruning variants were used (16, 20 and 24 buds/vine). Different values were obtained for the examined elements primarily as a result of the varietal specificity and the extent of the load on the vines with the native buds. In the years of examination, the percentage of fruiting buds in all variants is quite stable and with insignificant variations. The coefficient of variation ranges from 2.74 (variant 2) to 10.24 (variant 3). The average number of bunches per fruiting canes (absolute coefficient) is in the range of 1.3 to 1.4 and with high stability both in variants and in the years of examination. The average mass of bunches ranges from 401 g (variant 2) to 492 g (variant 3). After several years, significant variation in variants 1 (28.84) and 3 (20.25) was observed in the mass of bunches.

Key words: table grape, pruning, fertility, mass of bunches

AGROBIOLOGICAL ESTIMATION OF GRAPEVINE VARIETIES FOR WHITE AND RED WINES Venelin Roychev^{1*}, Angel Ivanov¹, Neli Keranova¹, Nikolay Tsaykin¹

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Abstract

A comparative agrobiological estimation of grapevine varieties for white and red wines from different ecology-geographical groups have been done through application of mathematical methods - analysis of variance, cluster and factor analysis. It has been established that the varieties Fetească albă, Fetească regală, Pamid, Dimiat and Mavrud distinguish statistically which has been proved according to almost all examined characteristics. The importance of the analysed indicators in the structure of the yield in the case of the oriental varieties is summarized in five factors, in the case of those from the Black Sea – in four, which are enough to explain more than half of their common variability. With the biggest proved direct impact on the yield in the case of all varieties from the first group are the indicators from the summarized factor F_3 , and from the second – F_1 . Other factors which are not analysed also have an impact on the formation of their yield.

Key words: analysis of variance, cluster analysis, agrobiological indicators, wine grape varieties, agrobiological estimation

VINEYARD IRRIGATION SYSTEMS CONTROLLED ONLINE THROUGH GSM MODULE Efremco Nikolov¹, Dimitrija Angelkov², Violeta Dimovska^{3*}

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Abstract

In this paper we show how solar energy is used by farmers in the Republic of Macedonia for irrigation and remote management using a GSM module. Over the last three decades, a number of advanced process controls have been installed in production plants. The need for upgrading these systems over an Internet network provides opportunities for design and analysis of remote-controlled systems with immense stability and reliability. In the last two decades, web based systems in real time play an important role in the production of a quality product, in our case raw grapes. This paper is a solution that allows us to obtain quality and remote-controlled equipment for low-cost equipment with the purpose of activating and disabling the pumps powered by solar energy and serving to irrigate vineyards. Use existing available technologies that are free to use and in combination with the new solutions from this paper, a managed system is run that will work seamlessly with mechanisms through which all errors will be annulled. Several systems that offer cheap solutions that will meet the requirements of the growers are considered in the Republic of Macedonia.

Key words: grape production, remote management, irrigation systems

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