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PREFACE

The main challenge for the modern food and agricultural sectors is to simultaneously provide enough food, in quantity and quality, to meet nutritional needs of a growing world population and to conserve the limited natural resources for present and future generations. FAO estimates that to meet the food demand of a growing and more affluent population, food production should increase by at least 60 percent by 2050.

Changes for optimizing both food consumption and food production are important to move towards more sustainable food systems and to achieve food and nutrition security. Fostering the necessary changes implies designing and implementing appropriate policy instruments based on sound and accurate scientific knowledge. Closing the knowledge circle and making agricultural knowledge available for and accessible by all the relevant stakeholders is of utmost importance for achieving transition towards sustainable food production and consumption.

The International Scientific Symposium “Agrosym” is, since four years, an annual platform for international scientific discussion on agriculture, food, rural development and environment. Agrosym represents a good opportunity to exchange ideas, to strengthen existing and to create new academic networks, and to foster dialogue between the academia, public institutions, the private sector and civil society organizations on the recent global and regional trends in the agro-food sector. The fourth edition, Agrosym 2013, focuses on six thematic areas: plant production, plant protection and food safety, organic agriculture, environmental protection and natural resources management, animal husbandry, and rural development and agro-economy.

Agrosym 2013 has all the ingredients for a real success. Full papers submission exceeded any expectation. Overall, more than 300 contributions were submitted by scholars and practitioners from 38 countries (Albania, Algeria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, Germany, Ghana, Greece, India, Indonesia, Iran, Iraq, Italy, Japan, Kazakhstan, Lebanon, Republic of Macedonia, Malaysia, Montenegro, Morocco, Niger, Pakistan, Poland, Romania, Russia, Serbia, Slovenia, South Africa, Spain, Slovakia, Tunisia, Turkey, Ukraine, Vietnam). We are so happy that we have been able to get such a broad participation of scientists, researchers, practitioners, students, policy makers, private sector actors, NGO representatives from three continents.

This publication includes all accepted abstracts. We are convinced that this input will contribute to a more effective dissemination of fresh knowledge to academicians, practitioners and the wider audience about important issues regarding agriculture, food, environment and rural development.

We would like to express our sincere appreciation and gratitude to the invited speakers and to all participants. Moreover, we are very grateful to all people who have worked hard for organizing Agrosym 2013 and making it successful from any standpoint. Finally, we would like also to express our genuine gratitude to the sponsors for their valuable support.

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Committee



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KEYNOTE PAPERS

NEW TECHNOLOGIES FOR IMPROVING MAIZE BREEDING

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Abstract

Limited sources of germplasm used in maize breeding programs, increased the importance of prebreeding activities. Advances in technologies have allowed other methods to add efficiencies to modern commercial maize breeding. These include the use of Doubled haploids, genomics, molecular markers and transformation. Doubled haploids method creates completely homozygous inbreds in 1-2 years versus 7 in traditional breeding. Molecular markers serve as a starting point for genes and have a significant role in selection. MAS is the use of markers to identify the presence of a specific gene or combination of genes that carry a desirable trait, which allows direct use of the inbred to create specific combinations and more rapid trait improvements can be made. Genomics helps scientists to identify which genes determine important traits, and how genes interact with each other. The complete DNA sequence of the maize genome, along with more comprehensive transcriptome, proteome and metabolome information, help to further unravel the complexities of how genes and gene networks function to produce productive maize plants. Genetic improvement is resulting in improved agronomic, disease, and/or end use traits. Application of all new technologies will help breeders to achieve greater harvestable yield and product development systems.

Key words: *maize, prebreeding, molecular breeding, genomics*

NEGATIVE EFFECTS OF IRON CHLOROSIS

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Abstract

Three different experiments were conducted to determine the distribution and causes of iron chlorosis at Strategy I (grape vine) and Strategy II plant (maize). In first experiment, during 2007 field research on maize covered 132 sites. Chlorosis was quantified by visual ratings and chlorophyll meter readings. From the chlorophyll meter data collection the relative chlorosis (Kl_rel) were calculated and mapped. Relative chlorosis has averaged 41.42% and increased with increasing pH value of the soil. Second experiment included vegetation pots trial in greenhouse. Maize hybrid OsSK 617 was sown in pots filled by regosoil, with two levels of field water capacity. Iron chlorosis was determined by chlorophyll meter readings, leaf chlorophyll concentration and leaf total Fe. Higher relative chlorosis (43.88%) was recorded in maize grown in wet condition as result of reduced synthesis of chloroplast pigments. Highly significant negative correlation was found between the relative chlorosis and total concentration of chloroplast pigments. The difference in the concentration of iron in the shoots of maize in dry and wet conditions was not statistically justified. Third research was conducted during 2009 on grape vine included field measurements of the intensity of chlorosis and laboratory analysis of soil and plant material. On soils with a high pH values and HCO_3^- , chlorosis was detected frequently, which is a common phenomenon that occurs as iron deficiency. The average value of the relative chlorosis was 36.45%. The concentration of iron in the leaves and petioles of grape vines was not significantly correlated with the relative chlorosis, which can be result of physiological inactivation of iron

Key words: *maize, grape vine, iron chlorosis, chlorophyll meter*

WHEN ECONOMICS MATTERS IN MEETING FOOD SECURITY CHALLENGE: FOOD AFFORDABILITY AND ACCESSIBILITY IN THE MEDITERRANEAN

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Abstract

Food security is built on four pillars: availability, access, utilization and stability. For most Mediterranean people affordability is a key factor determining access to food. This is dependent not only on food cost but also on the disposable income that can be spent on food. The paper aims at analysing food accessibility in the Mediterranean region. Secondary data from different sources (*e.g.* FAO, World Bank) were used to analyse the trends of different indicators: food affordability; food consumer price index; household food expenditure; and cereals imports dependency. According to the Global Food Security Index, food affordability is still a challenge in the Mediterranean. In March 2013, food affordability score ranged from 34.8 in Syria to 86.5 in France. The share of food consumption expenditure in total household expenditure is high; 67.3% and 43.9% in Albania and Algeria, respectively. FAO food price index increase was higher than consumer price index increase in the period 2000-2011. During the period 2005-2011, the highest increase of the food consumer price index was recorded in Egypt followed by Turkey and Algeria. FAO consumer cereal price index increased more than meat price index in the period 2004-2012. Cereals import dependency is high in all Mediterranean Arab countries; up to 80% in drought years in Algeria. Accessible and affordable diets should not be taken for granted in the Mediterranean. Adequate and consistent economic access to safe, nutritious and high quality food, even in times of crisis, is a prerequisite for achieving sustainable food and nutrition security in the Mediterranean.

Keywords: *food affordability, food security, Mediterranean region.*

THE IMPACT OF LAND USE ON SOIL EROSION IN THE RIVER BASIN BOLJANSKA RIJEKA IN MONTENEGRO

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Abstract

Soil erosion is acknowledged as a major environmental problem, threatening sustainable livelihoods around the world. Inappropriate land use and land management is often viewed as main cause of accelerated erosion rates. Therefore, modelling soil erosion rates under various land use and climate conditions is key to understand the impact of future land management and climate change on land degradation. For the Boljanska Rijeka River Basin (Polimlje, Montenegro), we studied soil erosion processes, using a series of data that are reflecting variations in land use over a period of four decades (1970-2013). The computer-graphic IntErO model was used to calculate soil erosion intensity, taking data of Forest Management Plans, Cadastre, Landsat images and Statistical Yearbooks into account. It was concluded that the condition of the vegetation cover and the land use influenced the development of erosion processes in the river basin. For the current state of land use, calculated maximal outflow from the river basin is 212 m³s⁻¹ and the net soil loss is 8644 m³/year. This indicates that the river basin belongs in „Destruction Category V”, according to the classification system of Gavrilovic. The erosion process is very weak. Change of the land use in structure for the period of four decades (1970-2013), in the studied river basin, decreased the soil erosion intensity by 3.95%.

Key words: *Soil erosion rates, Runoff, Land use, Modelling, Prediction, IntErO model.*

1. PLANT PRODUCTION

RESPONSE OF DIFFERENT MAIZE HYBRIDS TO LIMING

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Abstract

Soil acidity is the major growth-limiting factor for more than 40% of the world's arable land. It is assumed that over 50% of soils in Serbia belong to a group of acid soils and that this percentage is permanently increasing. Species and genotype within species greatly differ in their tolerance to acid reaction and Al toxicity. As the majority of cultivated plants require slightly acid, neutral to alkaline reaction of the soil, a very small number of crops can tolerate an extremely acid reaction and conditions of these types of soils that have been gradually expanding. Six maize hybrids were grown under field conditions on acid soil (pH in 1n KCl = 4.41) in three replicates at the stationary field experiment on the arable land of Kraljevo (pseudogley) for 2-year period (the growing seasons 2007–2008). Fertilization treatments were the following: a = unfertilized (control); b = lime – 3 t ha⁻¹; c = lime – 5 t ha⁻¹. In addition to the statistical differences between various hybrids greatest difference in yield was achieved when comparing NS 5010 and NS 6010 approximately 1762 kg ha⁻¹ dry grain. Two-year results, which are used in this study showed that the maize yield was higher in 2008 year which had a favorable agro-meteorological characteristics. Individual highest yield was obtained with hybrid NS 6010 in 2008 year and amounted to 11930 kg ha⁻¹. Genetic adaptation of plants to acid reaction and Al toxicity may provide a sustainable strategy to increase crop yield in the tropics at relatively low costs and low environmental impacts.

Key words: *soil acidity, liming, maize hybrids.*

IN SITU BREEDING FOR SOIL ABIOTIC STRESS TOLERANCE IN WHEAT

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Abstract

Plant breeding programs are mainly settled in breeding institutions accompanied by experimental fields established nearby. Experimental fields are usually organized in favorable agro-technical conditions on a soil as best as possible. That is understandable, because the targets of breeding process, as well, as selection criteria are adjusted for intensive agricultural conditions. However, the increasing demand for food requires all the available resources to be put in good use. In that aspect, the land non-suitable for agricultural production, at the moment, become of certain interest for broadening agricultural potentials. More intensive agricultural use of less productive or degraded soil, involves novel genotypes obtained under adequate selection criteria in specialized breeding programs. The general debate is whether *ex situ* breeding programs were good enough to meet the challenge or *in situ* established breeding would be required? Experiences and results from parallel wheat breeding trials on chernozem, and solonetz soil are commented in the article.

Key words: *wheat, breeding, abiotic stress, soil.*

THE STABILITY PROPERTIES OF WHEAT PRODUCTION ON ACID SOIL

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Abstract

The investigation was carried out on the experimental field of Center for Small Grains, Kragujevac. This paper presents the results of winter wheat varieties (Takovčanka, KG 100, KG 56S, Ana Morava and Lazarica). Grain yield, 1000 kernel weight and test weight in grain the investigated wheat cultivars was determined in a two-year field experiment.

Average grain yield of wheat cultivars ranged from 2.151 t/ha to 4.206 t/ha. Grain yield differed significantly between years and the average of all cultivars was higher in 2006/07. compared to 2005/06. The study of physical properties of grain, cultivar KG 56S had the largest average grain yield in 2005/06th year (2.455 t/ha), while in the second year the highest yield was cultivar Ana Morava (4.206 t/ha). Average values of 1000 grain weight of wheat cultivars varied in the range from 36.26 to 42.58 g.

The difference found between the significance of the impact on the quality of grain and test weight of wheat cultivars were significant for grain yield. Analysis of the data revealed that the genotype is very significant impact on the 1000 grain weight.

Key words: 1000 grain weight, grain yield, wheat.

PRODUCTION OF ANNUAL CARAWAY IN SERBIA

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Abstract

Caraway (*Carum carvi* L.) is an aromatic herb of the Apiaceae family. It has two forms: a biennial, which is grown in the colder and humid climates, and annual that is grown in temperate climate. In Serbia is mostly cultivated biennial caraway, which in the first year formed only a leaf rosette, and with the end of the growing season above-ground parts dies and the roots over winter and in the spring of the second year of plant development begins early. After four to five weeks from appearing of first leaves, it started growth of flowering stems. Lack of cultivation of these forms of caraway is that in the first year does not provide benefits but requires investment. Unlike the biennial forms, vegetation period of annual caraway lasts from 140-160 days, it forming a rosette with less leaves, and very quickly starts to develop flowering stems. For this reason, the aim of our study was to investigate the possibility of growing annual caraway in condition of Serbia.

Trials were conducted at three locations in Serbia, during 2011 and 2012. Sowing was carried out during April to row spacing of 35 cm, after germination of plants, thinning plants was carried to obtain 70 plants per meter. From our research, it can be concluded that the yield of annual caraway, weather conditions have a statistically significant impact. In a favorable year (2011) has been achieved the average yield of 850 kg ha⁻¹, while in the dry year yield was very reduced (193 kg ha⁻¹).

Keywords: *annual caraway, yield, weather conditions.*

THE EFFECT OF CYTOPLASMIC MALE STERILITY ON YIELD STABILITY OF MAIZE INBRED LINES

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Abstract

Nowadays the production of hybrid maize seed is increasingly based on using cytoplasmic male sterility (CMS) in order to reduce costs of detasseling. Since inbred lines are unstable due to their performance, it is very important to investigate the influence of the specific type of sterility on yield stability. With the aim to analyse the effect of CMS on yield stability, seven maize inbred lines, developed at Maize Research Institute "Zemun Polje" were examined in this study. Each of these seven inbreds was investigated in five variants: with normal cytoplasm (N), with C type sterile cytoplasm (CMS-C), the fertile counterpart C (RfC), with S type sterile cytoplasm (CMS-S) and the fertile counterpart S (RfS). The yield was analysed using the method of Eberhart and Russell on the basis of the coefficient of linear regression. The inbred line ZPL-1 was the best ranked within inbreds with N, CMS-S and RfS type of germplasm. Therefore, this inbred line was most stable within the stated genotypes. On the other hand, values closest to one were detected in the inbred line ZPL-6 within the inbreds with CMS-C and RfC germplasm, so this inbred was the most stable for those two types of cytoplasm.

Keywords: *maize, yield, cytoplasmic male sterility, inbred lines.*

RELATIONSHIP BETWEEN SOYBEAN VARIETIES, RHIZOBIA INOCULATION AND SPAD-502 CHLOROPHYLL METER READINGS IN WESTERN SIBERIA

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Abstract

Due to climate change and an increasing demand for food and fodder, the production of soybeans (*Glycine max*) in Russia as well as in Western Siberia increases. Within the framework of the interdisciplinary German-Russian project SASCHA a field trial was installed in Kuchak, Western Siberia (Russian Federation) in 2013 to investigate the relationship between soybean varieties, rhizobia inoculation and SPAD-502 chlorophyll meter readings. Within two German and one Siberian variety SPAD values were measured as well as numbers of nodules counted. The plants were grown in two variants (with and without inoculation) in a completely randomized block design with four replications. Only the inoculated varieties developed nodules. The German varieties showed significant higher SPAD meter readings at the latest measurement during mid of seed development. Due to low soil temperatures differences may not have occurred earlier.

Keywords: *Soybean, inoculation, nodulation, chlorophyll content, nitrogen fixation*

GRAIN YIELD AND YIELD STABILITY OF ZP MAIZE HYBRIDS IN DROUGHT CONDITIONS IN SERBIA

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Abstract

Selection of maize hybrids in Maize Research Institute “Zemun Polje”(ZP) exists for over 60 years. In this study 12 ZP hybrids from different maturity groups from FAO 300-600 and two foreign hybrids as checks were tested. Macro experiments were set up at 18 locations throughout Serbia during 2012. The past 2012th year was extremely unfavorable for corn production. Besides significant lack of rainfall, grain yield was reduced and affected by the extreme heat during pollination and grain filling period of maize. The average yield on the 18 selected sites was 5.87 t/ha. The highest yield was obtained by ZP 505 (6.39 t/ha). Mid-early and mid-late maturing hybrids have achieved better results on average compared to a long growing season hybrids. The most stable is the new hybrid ZP 427, which showed equally well to both favorable and unfavorable growing conditions. Besides mentioned hybrid, high stability was obtained by hybrid ZP 505. ZP 434 was the most unstable hybrid, which showed significantly better adaptation to poorer growing conditions, as well as hybrids ZP 548 and ZP 555, which also showed unstable, but better adapted to favorable growing conditions. ZP 341 obtained the best performance in poor growing conditions. Based on the results of the tests, it is concluded that ZP hybrids had good performance in agroecologically unfavorable 2012th year. Mid-early and mid-late maturing hybrids (FAO 300-500) are recommendation for dry areas and years in Serbia, which was concluded by their both, grain yield and stability.

Keywords: *maize, grain yield, stability performance, drought.*

EFFECTS OF 1-METHYL-CYCLOPROPENE ON THE PHYSICO-CHEMICAL PROPERTIES OF CHERRY FRUIT DURING STORAGE

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Abstract

This study examined the effects of 1-methylcyclopropene (1-MCP) on basic physico-chemical characteristics of sweet cherry fruits, 'Burlat' cultivar. The fruits were exposed to 1-methylcyclopropene at concentrations of 0.05, 0.1 and 0.5 ppm, for 20 hours at 5°C. After treatment, the fruits were stored in the cold room (3°C) with normal atmosphere for 15 days, followed by 5 days storage at room temperature (shelf life). The average fruit weight, fruit firmness and total soluble solids in the fruit juice were determined and compared to the average values of these parameters before treatment. The obtained results indicate that 1-methylcyclopropene has an impact on the studied parameters. Fruit weight loss was the lowest in samples treated with 0.05 ppm 1-MCP and the highest at 0.5 ppm 1-MCP. The average fruit firmness was the lowest in the fruits treated with 0.05 ppm 1-MCP, and the highest in the non-treated fruits. The average value of the soluble solids content in the fruit juice was the lowest in fruits treated with 0.05 ppm, and the highest at 0.1 ppm.

Keywords: *cherry 'Burlat', 1-methylcyclopropene, fruit storage.*

AGRONOMIC EFFICIENCY OF FERTILIZATION AT DURUM WHEAT UNDER CONTRAST CLIMATE CONDITIONS

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Abstract

The agronomic efficiency for nitrogen and phosphorus fertilization at durum wheat varieties „Progress” was studied in a long-term fertilizing experiment in Institute of field crops – Chirpan, Bulgaria. The investigation was established in two field crops rotation cotton – durum wheat under rain conditions for the period 2005 – 2011. The studied fertilizing systems were: single nitrogen (N) and single phosphorus (P_2O_5) fertilization in rates 0; 40; 80; 120 and 160 kg N or P_2O_5 per hectare, and combined nitrogen-phosphorus fertilization in rates: 1). $N_{80}P_{80}$; $N_{120}P_{80}$; $N_{160}P_{80}$; 2). $N_{80}P_{120}$; $N_{120}P_{120}$; $N_{160}P_{120}$; 3). $N_{80}P_{160}$; $N_{120}P_{160}$; $N_{160}P_{160}$. Nitrogen fertilization in the form of NH_4NO_3 was applied before sowing (1/3 of the rate) and at early spring (2/3 of the rate). The phosphorus fertilization was done before sowing in the form of triple superphosphate. According hydrothermal conditions during the wheat vegetation three of the experimental years (2005, 2007 and 2009) were classified as dry and hot. The hydrothermal conditions of the three other experimental years were close to the long term average norms of temperature and rainfall for the region.

It was established that climate conditions during the growing season were the key determinant factor for the agronomic efficiency for nitrogen in wheat. Maximum value of 27.6 kg grain $kg N^{-1}$ was obtained when nitrogen N_{80} was combined with P_{80} . Agronomic efficiency for phosphorus was significantly lower than AE_N . Applying of phosphorus alone in rates higher than 80 kg $P_2O_5 ha^{-1}$ was inefficient at durum wheat, apart from the low content of available phosphates in the soil.

Keywords: *agronomic efficiency, fertilizing, durum wheat.*

PHOSPHORUS AND POTASSIUM AVAILABILITY CHANGE BY LIMING OF ACID SOILS

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Abstract

Soil acidification results with the chemical changes in soil, especially with availability changes of P, K, Ca, Mg, essential and potentially toxic heavy metals. The aim of this paper was to determine the influence of acid soils liming to phosphorus and potassium availability change and to determine plant response. Liming and fertilization pot experiment of alfalfa cultivation on acid soils was set up with two types of acid soils with different texture, Silt loam (SiL) and Silty clay loam (SiCL) in a year 2009 and 2010. Ten liming and fertilization treatments were applied in four repetitions. Soil was sampled and analysed after first and second year of investigation and plant material was sampled in three cuttings at the beginning of blooming stage in each year and analysed. Results showed significant increase of soil pH values impacted by liming treatments. Soil pH increment by liming significantly increased phosphorus availability from 1,8 till 4,9 mg/kg per t/ha CaCO₃ and potassium availability from 1.3 till 1.5 mg/kg per t/ha CaCO₃ in both soils. Mineral and organic fertilization resulted with the same trend and expectedly raised phosphorus and potassium availability in soil. Furthermore, liming as well as mineral and organic fertilizer rates impacted on phosphorus and potassium concentrations increment in alfalfa leaf and stalk. Concentration increment in leaf dry matter was increased by liming from 31.1% till 38.5% for phosphorus and 20,2 % till 35.8% for potassium. Significant increment of phosphorus and potassium concentration was recorded for alfalfa stalk as well. Therefore, liming significantly increased phosphorus and potassium availability in the soil and their transfer into aboveground plant organs.

Key words: *acid soils, liming, soil availability, plant concentrations.*

THE EFFECT OF REGALIS CONCENTRATION ON THE SHOOT CHARACTERISTICS OF PEAR VARIETY PASSE CRASSANE

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Abstract

The effect of Regalis (Prohexadione Calcium) on shoot growth was evaluated on pear variety Passe Crassane. Three different doses of Prohexadione Calcium were applied: 50 ppm, 100 ppm and 150 ppm. Treatments were compared with control without treatments. 4 foliar treatments were applied with the first one 5 days after petal fall and the others every 10 days after. Significant differences between the control and the treatments were observed. Final shoot length was generally reduced by treatments by 14.5% to 22% as compared to untreated trees. The length of the shoots was not significantly different between 50 ppm and 100 ppm.

Keywords: *Regalis, pear, shoot length.*

GGE BILOT ANALYSIS OF WHEAT MEAN PERFORMANCE AND STABILITY AT DIVERSE LOCATIONS IN REPUBLIC OF MACEDONIA

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Abstract

Wheat is the most important cereal crop in Republic of Macedonia. Development of genotypes that will have high grain yield with stable performance in different growing conditions is of paramount importance. The objective of this research was to evaluate and to quantify the magnitude of the genotype x environment interaction effects on wheat grain yield and to determine the winning genotype for the test locations. Ten wheat genotypes were tested at three locations (Skopje, Strumica and Prilep) for two years (2006 and 2007). The grain yield data for each location were subjected to the GGE biplot analysis. This analysis depicted the adaptation pattern of genotypes at different locations and discrimination ability of testing locations. Out of the three locations, Prilep was identified as the most discriminative and representative location. The genotype Bt 04-073 had the highest overall mean yield, and an average stability over different locations. In each location, Radika and Bt 04-073 were the closest to the "ideal" genotype, followed by Bt 04-024. Those genotypes can be recommended for production in wheat growing regions in Republic of Macedonia.

Keywords: *wheat, genotype x environment interaction, GGE biplot, grain yield, stability analysis.*

MORPHOLOGICAL DIVERSITY OF SOME OPIUM POPPY GENOTYPES(PAPAVER SOMNIFERUM L.)

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Abstract

Cluster analysis using qualitative variables is a useful tool in estimating genetic diversity between genotypes in a germplasm collection. The objective of this study was to classify opium poppy genotypes based on several morpho-qualitative traits of the flowers, capsules and seed. The collection of 50 poppy genotypes with different origin was evaluated in 2010, on experimental field near Skopje. The classification of the genotypes was done based on Gower distance and the dendrogram was constructed using UPGMA method. Two main clusters were identified, each comprising different number of subgroups. All genotypes with white petal color were grouped in the second cluster. Genotypes with colored petals belonged to the first cluster. The origin of the genotypes had no influence on the classification. The results of this study enabled clear overview of the morphological diversity identified in the studied germplasm.

Key words: *opium poppy, morphological diversity, qualitative traits, cluster analysis.*

THE PRODUCTIVE CHARACTERISTICS ON BLACK MAGIC TABLE GRAPE VARIETY, GROWING IN THE TIKVES'S VINEYARD, REPUBLIC OF MACEDONIA

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Abstract

Table grape variety Black Magic was introduced in Republic of Macedonia in 2000. The variety is grown in the Tikveš vineyard area at 1.0 ha surface, on high cordon with trick system of irrigation. During the period of 2007-2009 Black Magic was studied including the following parameters: amount of harvested grape (total and packed), dimension and shape of cluster and berry, mechanical properties of berry (breaking resistance and resistance of pressure) and chemical content of must (content of sugar and total acids). On the base of obtained results, it was found that Black Magic variety had a high stability with no significant variation during the period of study. Thus, the average yield was 5.6 kg/vine, the cluster had average weight of 369 g and the berry 5.5 g. Furthermore, the berry had a high resistance of pressure (2.715 g) and high breaking resistance (811 g). In the period examined, the average content of sugar in the grape must was 126 g/L and total acids 5.0 g/L.

Keywords: *Black Magic, cluster, berry, mechanical properties, sugar, total acids.*

INFLUENCE OF CROP SEQUENCE AND WEEDS ON MAIZE HEIGHT AND GRAIN YIELD

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Abstract

The effect of two crop sequences: maize monoculture (MM), as old cropping system and maize-soybean-wheat crop sequence (MSW), as newer cropping system, was examined on plant height and maize grain yield. Both sequences had weed treatments: weed removal (B1) and weedy check (B2). Experiment was set up 2009 on experimental field of Maize Research Institute on calcareous chernozem soil type. After finishing first crop sequence (maize, soybean and wheat) maize height and grain yield were compared in monoculture and maize-soybean-wheat crop sequence.

In 2009, plant height and achieved grain yield had equal values in all treatments, as it was expected. In 2012, plants were higher in three crop rotation, for 16.3 cm (B1) and 23.6 cm (B2), then in monoculture. Maize grain yield was also higher in three crop rotation than in monoculture: in weedy check (B2) grain yield was higher 1.53 t/ha and in treatment with weed removal (B1) 1.49 t/ha. Based on LSD test, all these differences were significant except difference in yield between monoculture (MM) and three crop rotation (MSW) in treatment with weed removal (B1).

With respect to obtained results, it can be concluded that three crop rotation affected much more maize height and grain yield then it was present in monoculture.

Key words: *maize, monoculture, three crop rotation, weeds and yield.*

EFFECTS OF FERTILISING SYSTEMS ON MAIZE PRODUCTION IN LONG-TERM MONOCULTURE

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Abstract

Maize monoculture is still present in Serbia and usually increases weed and pest infestation and decreases yield. It can also deteriorate physico-chemical and biological properties of soil. The objective of the study was to evaluate effects of an applied fertiliser system in long-term maize monoculture on soil properties and yield.

The experiment was set up at the Maize Research Institute (MRI), Zemun Polje, in 1972 and since then, the late maturing maize hybrid ZPSC 684 Ultra was continuously grown in the same field with the application of cattle manure each fifth year. The crop residues were ploughed down in the whole and half of the amount, and they were removed from the third variant. The mineral fertiliser application included three variants: without mineral fertilisers, the application of NPK fertiliser in autumn and of N in spring, and the application of only N fertiliser in spring. The content of N, P and K and organic matter in the soil was evaluated twice per maize growing season - at the beginning and at the harvest time, during the last two seasons - 2011 and 2012. The maize grain yield was evaluated and calculated at 14% moisture.

Crop residues increased the N, P, K and organic matter contents in the soil especially in the variant without application of cattle manure. In both years, the highest average maize yield was achieved with the application of cattle manure, whole amount of crop residues, and N fertiliser distributed over the soil surface at the beginning of the growing period. Nevertheless, although the late maturing hybrid potential and fertiliser rates were high in the maize monoculture, the highest yield amounted to not more than 10.4 t/ha. This underlines the importance of all cropping practices (crop rotation, fertilization, and hybrid type), their interaction and integrated effects on maize production.

Key words: *monoculture, maize, fertilisers, soil properties, yield quality.*

IMPACT OF *LAETIPORUS SULPHUREUS* (BULL. EX FR.) MURRILLON DESTRUCTION OF OAK WOOD

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Abstract

Samples for the research have been taken from the heart wood zone of a sound tree of *Quercus petraea* agg. from the area of East Serbia, from association *Quercetum montanum* (Cer. et Jov., 1953). In the periods of 2, 4 and 6 months, the samples have been exposed to the impact of the mycelia of the brown rot fungus on oak tree: *Laetiporus sulphureus* (Bull. ex Fr.) Murrill (Sulphur Polypore). In order to determine the effect of *L. sulphureus* on decrease of the properties of oak wood, the following has been investigated: wood mass loss and hardness (according to Brinell). It has been concluded that mass loss of *Q. petraea* agg. wood under the impact of the fungus *L. sulphureus* after for 2, 4 and 6 months have been 0.90, 1.66 and 4.29% respectively. The hardness of the wood of *Q. petraea* agg. under the impact of *L. sulphureus* after 2, 4 and 6 months decreased to 96.44, 91.74 and 41.00%. In addition to separately displayed comparative review of the loss of mechanical properties in relation to mass loss, depending upon the duration of the impact of *L. sulphureus*, based on the review, the respective percentages of hardness of wood of *Q. petraea* agg. have been determined for the recorded mass losses in the period after 2, 4 and 6 months.

Key words: *Laetiporus sulphureus*, hardness; wood properties.

ADVANTAGES AND DISADVANTAGES OF THREE MATHEMATICAL MODELS OF A PEAR BORDER

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Abstract

Various factors have influence on the growth and development of bio-materials. Consequently, shape variability is very important and should be examined. In many processes of heat exchange, as well as in other processes in bio-material handling, the physical properties of a fruit such as dimensions, shape, surface area and volume play significant role. The purpose of this study is to find a function which approximates a pear border line as precisely as possible. One type of estimation of an average pear border line was relying on the sixth order polynomial and proposed algorithm. Also, another two different ways of calculating the Williams pear border line were shown earlier. The first one included spline functions for an estimation of a pear border line, while the second way used regression function obtained by the nonlinear regression method. The regression function had two independent variables, the length and total length of a pear. Border lines of all pears in the sample were fitted with one regression function with large precision ($R^2=97.48$). The surface area and volume of a pear were calculated based on the regression function and total pear length. In this paper, it is compared three different ways of pear border line calculation.

Key words: *shape variability, integral calculus, cubic spline, nonlinear regression.*

GENETIC VARIATION OF MACRO AND MICROELEMENTS IN GRAIN OF MAIZE INBRED LINES

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Abstract

In any breeding program, germplasm screening for a trait of interest is an important first step to genetic improvement. In the case of biofortification, nutritional breeding also starts with assembly of parental germplasm for crosses based on the evaluation of a large amount of genetic material. The objective of this work was studying the variability of macro and microelements in grain of 74 maize inbred lines. The highest protein content had lines from European germplasm and the lowest line of the Lancaster heterotic group. Lines from the BSSS group had the lowest oil content and the lines of Lancaster heterotic group the highest. Starch content was highest in lines from Lancaster heterotic group and lowest in the lines of European germplasm. The highest average concentration of Mg, Fe and P had inbred lines from European germplasm while inbred lines from BSSS germplasm had the highest Zn concentration. Lines from BSSS had the lowest average Mg and Fe content as well as lines from Lancaster germplasm had the lowest Zn and P content.

Key words: *maize, macroelements, microelements, inbred lines.*

SPIKE TRAITS VARIABILITY IN WHEAT GROWN ON SOLONETZ AND HUMOGLEY

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Abstract

The utilization of less productive soil could be one of the ways to enhance food production. That kind of soil under amelioration and suitable cultivar could give economically sound results. Wheat, being a durable cultivar could be used for agricultural production in less productive soil conditions. Moreover, single plant trait variability became increasingly important in abiotic stress conditions. A phenotypic variability for spike parameters was studied in trial established on two soil types – humogley and solonetz. Humogley exhibits less favorable water-physical properties, while solonetz represents sodium reach, alkaline soils with a subsurface clay horizon. Familiarization with wheat plant behavior in those agro-ecological conditions could be of help for special purposes wheat breeding or selection of suitable wheat varieties among existing genetic variability.

Key words: *wheat, solonetz, humogley, spike traits.*

OLIVE MULTIPLICATION IN DIFFERENT PHASES OF MERISTEMATIC DEVELOPMENT

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Abstract

The object of this research is propagation through green macro explants derived from the apical segment of the sprig in the variety “Kaninjot, Mixan, Bllanic and Himara. The parts were treated with Indole-3 Butyric Acid, 1g l⁻¹, 3g l⁻¹, 5g l⁻¹ and Control in four phases of the meristematic development; February (½ asleep), May (active), September (active) and December (asleep).

Thermal regimes 24°C/18°C (±1 °C), the mist technique was applied according to Photo synthetically Active Radiation 5 sec/11-13 k.kal/cm².

After 70 days, the percentage of rooting of studied cultivars varies from 23 to 90%. The two IBA dosages have not affected rooting in the same way within each period. IBA at 3 g l⁻¹ and 5g l⁻¹ gave high rooting percentages for Kaninjot and Mixan cultivars. At high cambial activity, the IBA concentration of 3g l⁻¹ resulted more effective; whereas under conditions of low cambial activity, high IBA concentrations yielded better results. At active vegetation stage the IBA in high concentrations shows inhibitory and toxic effect. The concentration of 1g l⁻¹, had weak reactions and was inefficient. The control gave low rooting percentage and with significantly highlighted changes compared to IBA treatments. Cultivars have their highest endogenous rhizogenic capacity in May and September, period which corresponds to the active cambium activity. Defoliation has varied between 8.3 and 14.1%. The presence of the leaves has been a stimulating factor for rooting ($r^2=0.93$). The number of roots has increased in parallel with the increase of concentration, ($r^2=0.72$).

Keywords: *Olive, cultivars., mist-propagation, explants, hidroalcoholic, culture.*

EFFECT OF AGRO-ECOLOGICAL CONDITIONS ON GRAIN YIELD IN SOME GENOTYPES OF BUCKWHEAT

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Abstract

Buckwheat (*Fagopyrum esculentum*) is an important field crop in our mountainous areas. It has long been neglected, but more recently, the area under buckwheat has increased. There is no official data on the areas where buckwheat is grown, or what are its average yields in Republic of Srpska.

In the two-year period, our research has included four varieties of buckwheat (Gray, Darya, Bednja and Novi Sad) at two sites (Sarajevo and Sokolac). On the basis of the survey, data confirms the hypothesis that the buckwheat plant is suited to more humid regions, because of the higher yield at the sites and years that were richer with precipitation. Year 2012 was with unfavorable sum and distribution of precipitation and high air temperatures which resulted in average yield and other quality characteristics of the tested varieties of buckwheat. Varieties Darya and Bednja in extreme conditions achieved the same average yields. In both years of testing these varieties had significantly higher yields compared with gray and Novi Sad varieties of buckwheat.

Key words: *buckwheat, variety, temperature, precipitations, yield.*

EVALUATION OF FRENCH APRICOT CULTIVARS IN THE REGION OF BELGRADE

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Abstract

The evaluation of 10 introduced apricot cultivars of French origin was carried out in the region of Belgrade over a period of four years (2009-2012). Control cultivar for comparison was 'Hungarian Best'. Average time of flowering was late March and early April, while average time of maturing ranged from June, 26 ('Sylred') to July, 15 ('Helena du Roussillon'), or from 7 days before to 12 days after the 'Hungarian Best'. Compared with the control cultivar, significantly higher yield was achieved in five cultivars: 'Sylred', 'Bergeron', 'Pinkcot', 'Silvercot', and 'Bergarouge', while significantly higher fruit weight was found in four cultivars: 'Silvercot', 'Sylred', 'Polonais', and 'Bergeron'. Among studied cultivars, the best results were shown by 'Sylred', 'Silvercot' and 'Pinkcot', which can be recommended for growing in this region, predominantly for fresh consumption. 'Bergeron' and 'Bergarouge' can also be recommended as cultivars of combined traits, both for fresh consumption and processing.

Key words: *Prunus armeniaca*, flowering, maturing, yield, fruit quality.

EFFECTS OF FOLIAR FERTILIZERS ON MAIZE INBRED LINES

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Abstract

Crop fertilization is one of the most important cropping practises. Fertilisation provides optimal plant growth and development. Foliar fertilizing enables rapid absorption and quick plant response to applied fertilizer. Foliar fertilizing also can contain microelements and amino acid. The aim of this study was to examine effect of two foliar fertilizers (formulation: 12:4:6+0.2MgO+ME+AA and 10:40:10+4MgO+ME) on five maize inbred lines. The first fertilizer was applied at the 5-6 leaf stage of maize, while second in 11-12 leaf stage. Influence of foliar fertilizers was examined on fresh matter at 48h, 21 day after application and in flowering stages and on grain yield. Application of foliar fertilizers increase fresh matter in maize lines in all examined stages compared to control. The greatest differences in fresh matter were recorded for 21 days after application of foliar fertilizers compared to control. Foliar fertilizers also increased grain yield of maize lines. Although both fertilizers significantly increased fresh matter and grain yield, the first fertilizer (12:4:6+0.2MgO+ME+AA) shows as better than the other tested fertilizer.

Key words: *maize inbred lines, foliar fertilizers.*

CHARACTERIZATION OF NATURAL MEADOWS AND PASTURES IN PEŠTER

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Abstract

The phytocenological composition is estimated on grasslands of hilly-mountain area of Pešter (vicinity of Sjenica). Meadows and pastures in this area are developed on the forest land based on stone with feldspat and silicate. On the geological base of nonorganic sediments, sandstone, gravels and clays and seldom phillites are developed different associations. During the study, there are identified 124 different plant species which belong to different plant life form and different associations. Investigation were carried out from May to August, 2012. In this region prevail natural pasturelands distributed on large plateau located approximately 1200m above the sea level on the acid soil type pseudogleys, luvisol. Large area is used for grazing and meadow area near the villages. It is exploited for hay production and after that used for grazing. These natural grasslands exist without application of scientific farming technology measures. In these successive inventories of lands are registered floristic associations and identified individual plant species. Investigation showed different floristic elements and phytocenological associations on meadow and pastures.

Key words: *Floristic diversity, meadow, pasture, mountain.*

WEED SPECIES AND THEIR MANAGEMENT IN ORGANIC SWEET CHERRY PRODUCTION IN ISPARTA (EGIRDİR) PROVINCE

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Abstract

This study was conducted in 2003, 2004 and 2005 in Isparta (Egirdir) province in Turkey. Organic agriculture and IPM (Integrated Pest Management) implementations were applied in sweet cherry orchards where are determined the main weed species and density of annual and perennial weeds. Control methods were applied against weeds. The studies on IPM orchard were carried out in order to compare it with organic orchard. Based on the results of surveys, *Sorghum halepense*, *Cuscuta campestris*, *Lactuca serriola*, *Trifolium* sp., *Polygonum convolvulus*, *Cynanchum acutum*, *Cirsium arvense* and *Veronica hederifolia*. *Sorghum halepense*, *Cuscuta campestris*, *Lactuca serriola* and *Trifolium* sp. were the most frequently observed weeds species in organic orchard. *Cynodon dactylon*, *Convolvulus arvensis*, and *Cynanchum acutum* were the most frequently determined weed species in IPM orchard.

In organic and IPM orchard were found perennial weeds which are difficult to control. For the control of perennial weeds, deep tillage was applied and their roots were removed from soil. Annual weeds were controlled by hand picking and tillage. Although in organic orchard was performed tillage to control perennial weeds, this application was not sufficient and in addition is applied mowing twice and digging in some years. These activities were enough to control weeds in organic cherry orchard. Same activities were done in order to control weeds in IPM orchard. None herbicide was applied to weed control in IPM orchard, because sweet cherry trees were under 4 years.

Keywords: *Egirdir, sweet cherry, weed, organic, control.*

COMPOSTED POSIDONIA, CHICKEN MANURE AND OLIVE MILL RESIDUES, AN ALTERNATIVE TO PEAT AS SEED GERMINATION AND SEEDLING GROWING MEDIA IN TUNISIAN NURSERY?

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Abstract

In order to reduce the peat use in Tunisian nurseries, authors tested new types of composts for seed germination and seedling growth of tomato. These composts were made at three different combinations from *Posidonia oceanica*, chicken manure and solid fraction of olive mill residues. These wastes are abundant and therefore considered as a pollution source in Tunisia. Tomato seeds were sown in potting media containing mixtures of three composts (C₁, C₂ and C₃) and peat at increasing ratios (10%, 30% and 50% v/v). Control potting media was consisted of using 100% peat. Weekly and during five weeks the percentage seed germination and the seedling length were studied. At the end of the experiment, shoot and root dry matter weights were measured. Toxicity test of compost extracts was conducted on tomato and radish seeds. The results showed higher seeds germination and seedling growth rates in the media containing the three composts comparing to control. Toxicity test showed that compost extracts were not toxic. The tested composts might be used as an alternative to peat and the mixtures compost-peat as a growing media for tomato.

Keywords: *Compost, Posidonia oceanica, Chicken Manure, Solid Fraction of Olive Mill Residues, Growth.*

EFFECT OF ACID SOILS FERTILIZATION ON MORFOLOGICAL AND PRODUCTIVE CHARACTERISTICS OF TRITICALE

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Abstract

This paper presents the results of some morphological and productive characteristics of two triticale cultivars depending on fertilization systems of acid soils.

The experiment included three different fertilizer rates and two triticale cultivars (KG-20 and Tango). The I variant of fertilization included NPK 80:80:60 combinations, II variant is a combination of nutrients and had 80:100:60, and the III variant with NPK fertilizer 80:80:60 had added 4 t ha⁻¹ of lime fertilizer “Njival Ca” and 20 t ha⁻¹ of manure. With the use of mineral fertilizers with a higher dose of phosphorus, as well as a combination of mineral fertilizers with lime and organic fertilizers, there was a significant increase in all morphological and productive characteristics of triticale. The highest yield of both cultivars was achieved with the one that had a combination of mineral, lime and organic fertilizers. The yield of cultivar Tango in that variant was 7.41 t ha⁻¹, and cultivar KG-20 6.68 t ha⁻¹. This yield was significantly higher than the yield achieved in the variant I, where was applied mineral fertilizer 80:80:60. Statistically, there were no significant differences in grain yield between variants I and II, and between II and III. Also, differences were apparent between cultivars. Plant height, spike's length, absolute grain mass, hectoliter grain mass and grain yield were higher in Tango cultivar in relation to the cultivar of KG-20.

Key words: *triticale, fertilization, absolute mass, hectoliter mass and yield.*

GRAIN YIELD AND YIELD COMPONENTS OF TRITICALE ON AN ACID SOIL DEPENDING ON MINERAL FERTILISATION AND LIMING

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Abstract

A field experiment with triticale cvs. 'Tango', 'KG-20' and 'Odyssey' was established on a pseudogley (gleysol) in 2010/11 and 2011/12 to evaluate the effect of different rates of mineral fertilisers and lime on grain yield and yield components. Mineral fertilisation and liming led to a significant increase in grain yield components, notably grain number and grain weight per spike, thus resulting in increased grain yields in fertilised treatments. Liming gave a higher grain yield as compared to the increased P rate, mostly due to P immobilisation in the highly acidic environment. Growing triticale on very acid soils should involve liming, if considered economically feasible, to increase soil pH above the suboptimal level (pH 5.0) for the realisation of its yield potential.

Keywords: *triticale, grain yield, mineral fertilisation, liming, acid soils.*

THE EVALUATION OF MORPHOLOGICAL, BIOLOGICAL AND PRODUCTIVE OF THE MAIZE HYBRIDS

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Abstract

The maize is the most prevalent crop in the world. It is considered as a green mine, because in a short time (100-135 days), it gives a dry mass production (grain and green mass), that can't be completed by any other plant. It has high and diverse values of use. Studies of maize plants are numerous, and they continue for different aspects: genetics, breeding, improving of technological parameters and its processing. Study of hybrids and their suitability in an area and micro-area constitutes a permanent field of study to increase the maize production and improving its quality. Based on this principle, a study of ten maize hybrids in western coastal plains of Albania, and specifically in Toshkëz-Lushnja is undertaken.

For the hybrids under study (from Italy, Serbia, Albania), production indicators (number of rows, number of grains in row and ear, production per plant and grain yield) were evaluated. Yield and yield components were evaluated for ten maize hybrids originated from Italy, Serbia and Albania.

Keywords: *Maize, hybrid, morphology, yield components, yield.*

PRODUCTION AND BIO-ACTIVE POTENTIAL OF OLD TOMATO CULTIVARS ORIGINATING FROM FORMER YUGOSLAVIA

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Abstract

Two old tomato cultivars (*Sarajevski jabucar* and *Novosadski jabucar*) have been studied for the production and bio-active potential. Investigation was performed in Burmir, Sarajevo, Bosnia and Herzegovina. The research included fruit weight and the yield of the fresh fruits per hectare. Lycopene was found in fresh fruits both in physiological and technological maturity. Fruit weight was significantly higher for *Sarajevski jabucar* than for *Novosadski jabucar*. Lycopene level in *Sarajevski jabucar* in physiological maturity was from 6.20 to 9.95, and in technological from 8.35 to 13.60 mg per 100 grams of fruit. Old varieties that have become domestic in the Balkan belong to genotypes rich in lycopene. The production potential was at the satisfactory level in some growing areas.

Keywords: *tomato, old varieties, yield, level of bioactive matters.*

YIELD AND MINERAL COMPOSITION OF TWO NEW ONION VARIETIES FROM BOSNIA AND HERZEGOVINA

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Abstract

Onions are grown for a variety of purposes. The purpose of the production determines the choice of variety and growing technology. In this paper, the Federal Institute for Agriculture in Sarajevo introduces two new varieties- Konjica's and Zenica's onion. The new varieties are specially developed for production from onion sets to suit the environmental conditions of Bosnia and Herzegovina. This paper evaluates the new varieties production characteristics and their bulb mineral composition, tested in Butmir (Sarajevo municipality) over 2009 and 2010 with the Stuttgarter cultivar used as a standard. The new varieties are medium late, the plants are well developed and have erect leaves that are dark green in color and have a pronounced waxy coating. The new onion varieties significantly out-yielded the standard cultivar. Over two years, Konjica's onion yielded 30.68 t ha⁻¹ on average (51% more than Stuttgarter cultivar), while Zenica's onion yielded 24.83 t ha⁻¹ on average, 21% more than the standard cultivar. The mean concentrations of trace element in the bulbs of the new varieties were in the order: Zn>Fe>Mn>Cu indicating onions from Bosnia and Herzegovina as a good source of various vitamins and minerals important to maintain human health.

Keywords: *onion varieties, yield, mineral composition.*

POMOLOGICAL PROPERTIES OF „GALA“ APPLE CLONES IN THE REGION OF SARAJEVO

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Abstract

The paper presents results of two–years study of some pomological properties of four clones of apple cultivar ‘Gala’ (‘Mondial Gala® Mitchgla’, ‘Gala Schniga® SchniCo(s)’, ‘Gala Must®’, ‘Galaxy’). The research was carried out in the apple orchard for cultivar testing of Federal Bureau of Agriculture of Bosnia and Herzegovina and included the phenological characteristics, physical characteristics of the fruit and yield.

The obtained results have confirmed that agro – environmental conditions of Sarajevo are favorable for growing the above – mentioned clones. All four of ‘Gala’ apple clones has shown good physical properties of the fruit and they can be recommended for commercial growing in the region of Sarajevo. These cultivars may greatly contribute to the advancement of Bosnia and Herzegovina apple assortment.

Key words: *apple, clones, ‘Gala’, pomological properties.*

FIRST RESULTS OF INDUSTRIAL PROPAGATION OF WALNUT (*J. REGIA* L.) IN BULGARIA BY THE HOT CALLUS METHOD, USING HOT WATER INSTALLATION

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Abstract

The experiment was carried out at the Fruit-Growing Institute – Plovdiv, Bulgaria. The principles of the hot callus method of walnut propagation were applied. A hot water installation was built for maintaining a temperature of 27°C ($\pm 1^\circ\text{C}$) at the place of grafting. The installation comprised of a boiler, a pump, metal tunnels with doors, soil heating pipes, valves, etc.

The principles of the installation and the elements of the technological process were described. The results showed that successfully propagated walnut plants were obtained by applying the hot water installation. The percentage of the successfully propagated plants was 70.0% when cool-stored scions were used and 82.0% when using unstored scions. It was concluded that the hot water installation could be applied in practice.

Key words: *walnut(J.regia L.), propagation, hot callus, hot water installation.*

PREDATORS OF ROSY APPLE APHYD, (*DYSAPHIS PLANTAGINEA*) PASS., (HOMOPTERA, APHIDIDAE) IN BULGARIAN APPLE ORCHARDS

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Abstract

The presence of predators associated with Rosy apple aphid, *Dysaphis plantaginea*, (Pass.) (Homoptera: Aphididae) was surveyed in two apple orchards in two different ecological regions in Bulgaria during 2012. In the colonies of *D. plantaginea* in both orchards were found 18 predatory species belonging to respective orders Coleoptera – 5 (Coccinellidae 4, Cantharidae 1), Diptera – 4 (Syrphidae 3, Cecidomyiidae 1), Hemiptera – 4 (Anthocoridae 3, Miridae 1), Neuroptera – 4 (Chrysopidae 4), Dermaptera – 1 (Forficulidae 1). Some of the most frequent predators in this research were *Adalia bipunctata* (L.) (Coleoptera: Coccinellidae), *Episyrphus balteatus* (DeGeer) (Diptera: Syrphidae) and *Aphidoletes aphidimyza* (Rond.) (Diptera: Cecidomyiidae). In April, when the colonies of *D. plantaginea* were small in numbers, syrphid eggs and larvae were mostly found and less often ladybird eggs and larvae. Other predators such as *Anthocoris nemoralis* (Fabr.), *Orius minutus* (L.) and *Orius majusculus* (Rt.) (Hemiptera: Anthocoridae), *Deraeocoris ruber* (L.) (Hemiptera: Miridae), *Chrysopa carnea* (Steph.), *Ch. septempunctata* (Wesm.), *Ch. perla* (L.) and *Ch. prasina* (Burm.) (Neuroptera: Chrysopidae), *Forficula auricularia* (L.) (Dermaptera: Forficulidae) and *Cantharis fusca* (L.) (Coleoptera: Cantharididae) were also observed to feed in the colonies of *D. plantaginea*. Although these predators are considered to play an important role in the regulation of aphid populations, they did not prevent *D. plantaginea* damage that affected up to 45 % of the terminals in one orchard and up to 43 % in another. Some possible causes for this ineffectiveness are discussed.

Key words: *Bulgaria, Rosy apple aphid, aphidophagous, biological control.*

POSTHARVEST EVALUATION OF CUT "WHITE SIM" CARNATION FLOWERS

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Abstract

Two separated experiments were performed in order to evaluate the effects of different concentrations of silver nanoparticles, methanol extract of *Crambe orientalis* L. plant, S-carvone, Salicylic acid, Humic acid, Silver thiosulphate and ethylene on longevity and some quality characteristics of cut 'White Sime' carnation flowers (*Matthiola incana*) based on completely randomized design with 5 replication. These experiments were carried out in postharvest laboratory of Mohaghegh Ardabili University in 2011. The results of first experiment showed that ethylene reduced the vase life of flowers and STS at all concentrations blocked the ethylene effects and increased the longevity of carnation flowers. In second experiment, STS and nano-silver increased flower vase life, while Humic acid, S-carvone and *Crambe orientalis* L. extracts did not influence longevity of cut carnation flowers. However, the higher levels of *Crambe orientalis* L. extract positively influenced the RFW of flowers. The results also showed that flowers subjected to 0.25 and 0.5 mM of STS maintained solution uptake until the last day of experiment and showed higher rate compared to control and other treatments. Moreover, the lower concentration of STS was more efficient than higher ones even in flower subjected with 10 and 100 $\mu\text{l l}^{-1}$ of ethylene.

Keywords: *Fresh weight, Longevity, Postharvest, Solution uptake.*

THE YIELD AND QUALITY OF DIFFERENT *ELYMUS HISPIDUS* ACCESSIONS IN DRYLAND REGIONS

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Abstract

Planting suitable species of forages can be a proper way to overcome feed shortages. For measuring the forage yield and quality traits of *Elymus hispidus*, 19 accessions of this plant were sown using randomized complete block design (RCBD) under dry land farming system. The 19 genotypes were grouped into 4 clusters based on Ward cluster analysis method. Collected data were analyzed for DM, plant height, stem number, leaf to stem ratio (LSR), dry matter digestibility (DMD), water soluble carbohydrate (WSC), crude protein (CP), acid detergent fibre (ADF) and ash. The results showed significant differences between genotypes for all of traits except LSR, CP and ash. Four genotypes (Khosh Yeelagh, Patava, Sabzkoh and Mimand) with average values of 4034, 3068, 2942 and 2450 kg ha⁻¹ had higher yield, respectively. Two genotypes (Khosh Yeelagh and Mimand) had higher quality and in terms of both yield and quality recognized as the best genotypes. There was positive correlation between DM with plant height and stem number. DMD showed positive and negative correlation with WSC and ADF, respectively. The relationship between CP and total ash was positively significant. The principal component analysis used to show variation between five quality traits (DMD, WSC, CP, ADF and ash). In the first component, four quality traits (DMD, WSC, CP, and ADF) determined about 76% of the total variations. Whereas DM yield and stem number were the important traits in the second components. The results showed that some genotypes of *Elymus hispidus* can adapt well to local climate conditions in dry regions.

Key words: *Elymus hispidus*, yield, quality, dry land, farming system.

THE INFLUENCE OF FOLIAR FERTILIZATION ON TOMATO LEAVES CHEMICAL CONTENT GROWN IN PROTECTED SPACES

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Abstract

It was examined the impact of foliar fertilization with mineral fertilizers on the chemical content of leaves of tomatoes grown in protected spaces in terms of Strumica region. Experiment was set in six variants and three repetitions. The variants in the experiment were:

1. Control (untreated variant);
2. Chelan sol 11-4-42 + ME;
3. Folifertil 12-4-6 + ME;
4. Potassium nitrate 13-0-46;
5. Ariston 0-0-30;
6. Megagreen (CaCO₃ 82.3%, SiO₂ 5.56%, MgO 3.02%, CaO 41.7%, Fe 8783 mg/kg, Mn 156 mg/kg).

The experiment was set in 18 rows, and in each variant and repetition was included in 62 plants. During the vegetation were carried out seven treatments with following fertilizers at a concentration of 0.4%.

Before setting up the experiment agrochemical analyses of soil were performed and good fertility was determined with the nitrogen and phosphorus and medium fertility with potassium. Performed chemical analysis of tomato leaves showed that foliar fertilization had a positive impact. In the leaves of five variants with different fertilizers was found higher content of all tested parameters compared with the leaves of control untreated variant. The highest average phosphorus content (0.24%), potassium (0.71%) and zinc (0.017%) obtained in the leaves at variant 2.

The highest average calcium content (4.99%) and magnesium (0.67%) was determined in the leaves at variant 6.

The highest average iron content (0.018%) was determined in tomato leaves of variant 2 and variant 6.

Key words: *mineral fertilizers, tomato, leaves.*

A STUDY OF BASIL TYPES IN THE COASTAL PLAINS OF ALBANIA

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Abstract

Basil is a plant of Lamiaceae family, with wide spectrum use in food industry, perfumery, as fresh spice, flavoring different environments, as well as in medicine. This is why basil is considered both a spice and a medical herb. These values are resulted from high content of ocimol in all plant organs (leaves, flowers, fruits, seed and roots). The fact that Dioscorides mentions that herb early in the first century, as a medicinal plants for the disinfection of premises, mouth and teeth, shows the values and its recognition since Antiquity. In Albania it is a known and cultivated plant, in families, gardens, and it has synonyms by area. For essence production, it begins to be cultivated in the 60s and, nowadays the demand is growing. Basil studies are limited in technology and comparisons of subspecies and varieties. A study of five subspecies in coastal plains of Albania (Toshkëz-Lushnja) is presented in this paper. The differences found are statistically necessary.

Keywords: *essence, spice, the cultivation.*

THE EFFECTS OF DIFFERENT FERTILIZERS ON SPELT GRAIN YIELD (*TRITICUM AESTIVUM* SSP *SPELTA*)

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Abstract

The paper examined the impact of fertilizers in organic farming technology on spelt grain yield (*Triticum aestivum* spp. *spelta*). In mountainous conditions at over 1000 m above sea level research was conducted so as to examine the microbiological effects of different fertilizers (Uniker and Slavol) and soil conditioner (zeolite) on spelt yield in organic farming systems. Organic farming technologies included conventional tillage of soil, where agricultural production has not been organized for ten years. Soil conditioners and fertilizers Uniker microbiological, and combinations thereof are applied by treating the soil just before sowing of spelt (cultivar Nirvana). Microbiological fertilizer (Slavol) was applied in top-dressing.

Applying the statistical analysis of data on grain yield, it was found that the greatest difference in yield was recorded between the investigation years: 4.60 t ha⁻¹ (2010/11) and 2.82 t ha⁻¹ (2011/12). When applying top dressing some differences were recorded, but they were not statistically significant (3.66 t ha⁻¹ : 3.76 t ha⁻¹). When it comes to a basic fertilization, the highest grain yield was recorded with a combination of microbiological fertilizers and soil conditioner (4.62 t ha⁻¹) and the lowest in the control (2.63 t ha⁻¹).

Key words: *spelt, organic farming, fertilizer, grain yield.*

INFLUENCE OF APPLIED AGRICULTURAL MEASURES ON THE SEEDLING QUALITY OF LETTUCE

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Abstract

In the region of Zeta and Bjelopavlići mostly two varieties of lettuce are cultivated: cabbage lettuce (*Lactuca sativa* var. *capitata*) and leaves of lettuce (*Lactuca sativa* var. *Acephala*). With a goal to determine the influence of time of sowing (3.VII and 1.VIII), fertilizers (Slavol, WUKSAL super 8:8:6+mei Poly-Feed MAR 20:20:20+me) and substrates (Profi-substrat i Blumenerde) on a cultivation of lettuce, the experiment has been set up in the plain of Zeta (in the region of Podgorica). The examined parameters were the beginning of germination, the percentage of emerged plants, the time of the first leaf appearance, rosette leaf number at the time of planting, the mass of the plant seedling.

By using the microbiological fertilizers one gets the better germination and the earlier springing up of lettuce plantations. The seed of the Nadine F1 lettuce, treated with Slavol before sowing, has sprung up two days earlier than the seed that hasn't been treated at all. The plants of lettuce plantations have big needs for nutrients because of the intensive growth, therefore the higher yield has been gained by using the fertilizers that provide more nutrients. Blumenerde substrat has, in the both times of sowing, showed better results than theProfi-substrat, where the mass of a plantation was 1,97g i 2,19g.

Key words: *lettuce, Nadine F1, times of sowing, fertilizer, substrat.*

POLLEN GERMINATION OF SOME POMEGRANATE (*PUNICA GRANATUM*L.) VARIETIES GROWN IN MONTENEGRO

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Abstract

The research on pollen germination of three most important pomegranate varieties grown in coastal region of Montenegro and the hinterland is presented in this paper. The trial was carried out during the three consecutive years (2002-2004) on two sweet ('Slatki barski' and 'Šerbetaš'), and one sour ('Dividiš meke kore') pomegranate varieties. Pollen germination was tested on solid 1 % agar medium (Agar Plate method) with two concentrations of sucrose (10 and 15 %). 'Slatki barski' and 'Šerbetaš' varieties showed higher degree of germination at the 15 % sucrose medium (65,96 and 71,27 %) than at the medium with 10 % (42,41 and 39,70 %). The degree of pollen germination was significantly lower in 'Dividiš meke kore', on both sucrose concentrations (16,5 and 22,54 %). Therefore, pollen germination parameter in this variety should be tested before planting in mono-varietal orchards.

Key words: *pomegranate, Punica granatum L., pollen, germination.*

SEED GERMINATION AND MORPHOLOGICAL PROPERTIES OF SEEDLING GENOTYPES OF CORNEL FROM UPPER POLIMLJE REGION

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Abstract

The paper presents results of seed germination and morphological characteristics of 11 seedling genotypes of cornel (*Cornus mas* L.) taken from natural population of Upper Polimlje Region from 2000 through 2004. Cornel is a long-lived plant, but is exceptionally slow at the beginning of growth. Seeds do not germinate in the first year. They germinate afterwards. The seedlings grow very slowly. Cornel starts producing fruit after 8, 9 or 11 years. The seeds of tested genotypes hardly germinated in the second year. The best germination was with the seed of genotype BP 25 – 48 %. Seedlings of cornel grow very slowly, especially in the first year, in the second year their growth is considerably faster. The average height of one-year-old seedlings is 27,54 cm, and two-year-old ones are 80,27 cm. The diameter of two years old seedlings was between 0,5 cm (genotype BP 36) and 1,16 cm (genotype BP 16). The maximum uniformity with respect to the diameter of two-year-old seedlings was found in genotype BP 07 ($Cv=7,85\%$), and in terms of height in genotype BP 16 ($Cv=9,38\%$).

Key words: *cornel, seed germination, morphology, seedlings.*

METHODOLOGY FOR ACIDITY CORRECTION OF DEFICIENT MUSTS BASED ON GRAPE MATURATION INDICES AS PART OF PRECISION OENOLOGY

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Abstract

Acidity corrections are one of the most important pre-fermentative operations, with significant consequences on wine quality. The proposed methodology is based on the study of two grape maturation indices, °Brix/%TA and °Brix x pH², which were determined and evaluated before and after the application of acidity correction. This paper proposes a methodology in agreement with the principles of precision oenology for acidity corrections of deficient musts, especially those from areas located in European zones CII.

Keywords: *precision oenology, maturation indices, quality assurance, acidity corrections.*

THE INFLUENCE OF THE WAVELENGTH OF LIGHT ON SEEDLINGS LETTUCE GROWING

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Abstract

The study was conducted at the Faculty of Horticulture in Bucharest, Romania Department of Hortivicol Bioengineering Systems in 2012.

The seedlings production involves high costs for thermal energy. Using LED lighting leads to a shorter growing season and finally to an overall reduction in production costs.

The experiments were performed in growth chamber under controlled conditions regarding temperature, humidity and light. As biological material we used lettuce (*Lactuca sativa* L).

We found that there were differences in the growth of young plants of lettuce. Depending on the combination of colours (proportion between red and blue light) the reaction of plants was differently. All data obtained were processed with National Instruments Vision Assistant software 2009.

The aim of the experience was lettuce growers recommend using LED lighting particularly effective in producing seedlings.

Key words: *lettuce, LED, growing.*

SWEET CORN GROWING PERIOD AND MORPHOLOGICAL PROPERTIES IN WET YEAR

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Abstract

Experiment aims to investigate shortening of sweet corn growing period with application of some technological elements: propagation time, propagation method, floating row cover. The chosen variety was a conventional sweet corn hybrid, very early ripening 'Spirit'. The following growing technologies were compared: 1. Plants transplantation with floating row cover, 2. direct sowing of plants with floating row cover, 3. direct sowing of plants with no row cover (regarded as control).

The transplanted plants had shorter growing period by 13 days, compared to direct sowed covered treatment and were 17 days earlier harvested than control. Interaction of growing technology and plants covering had also favourable effect on some important morphological properties of ears such as weight of husked and unhusked ears, ear length, ear diameter, length of kernel and number of kernels.

Key words: *earliness, sweet corn, transplantation, fleece covering.*

USE OF VARIOUS YEAST STRAINS TO IMPROVE THE AROMATIC PROFILE OF CHARDONNAY WINES

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Abstract

Chardonnay is a versatile variety which can lead to various styles of wines. Several yeasts are available in the market for the production of varietal wines, some of them designed especially for the fermentation of this cultivar. However, one of the nowadays trends is to produce new styles of wine, in order to attract new consumers. Chardonnay must from Murfatlar vineyard, 2012 vintage, was fermented with 9 commercially available yeasts, among which some recommended for other grape cultivars than Chardonnay. Control wines obtained based on spontaneous fermentations were also produced. Sensory analysis was performed on the resulted wines, by using the standardized methodology of aromatic profiling with a human panel. In parallel, a dual column GC electronic nose was also used to compare and discriminate among the aromatic profiles of wines. Based on the examination of the aromatic profiles given by the human panel and the volatile profiles discriminations achieved by the electronic nose, it was concluded that some of the yeasts did induce important changes in the wine aroma, but the aromatic characteristics of the cultivar are not completely masked by any of the yeasts used. In accordance, it was possible to obtain a consensus profile of the Chardonnay wines of Murfatlar vineyard, irrespective of the yeast strain used.

Keywords: *wine, aromatic profile, sensory analysis, electronic nose.*

SEED YIELD OF BIRDSFOOT TREFOIL (*LOTUS CORNICULATUS* L.) CULTIVARS IN THE YEAR OF ESTABLISHMENT

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Abstract

Production of sufficient quantities of forage is a prerequisite for the development of livestock production. In South-East Europe in less favorable growing conditions especially in terms of climate and soil, in order to produce sufficient quantities of forage, a special attention is given to the cultivation of the birdsfoot trefoil (*Lotus corniculatus* L.). One of the solutions for improvement of birdsfoot trefoil production is the production of the sufficient quantity of quality seeds. Field trial was established in 2012, on soil type cambisol in a randomized block design with three replications. Cultivars of birdsfoot trefoil (K-37, Rocco and Zora) were sown at a inter row spacing of 20 cm, using 10 kg ha⁻¹ of seeds. The aim of the study was to analyze in the year of establishment seed yield and yield components: number of stems m⁻², number of flowers per stem, number of inflorescences m⁻², number of flowers per inflorescence, number of pods per inflorescence, number of seeds per pod and thousand grains weight. Cultivar Rocco had significantly higher seed yield (408.6 kg ha⁻¹) in relation to the cultivars K-37 and Zora (85 kg ha⁻¹ and 54 kg ha⁻¹ respectively), which arises from the significantly higher number of flowers per stem and inflorescence m⁻² in relation to the other cultivars. Cultivar Rocco had also a significantly higher number of pods per inflorescence than the K-37 cultivar. Number of flowers per stem, number of inflorescences m⁻² and number of pods per inflorescence were significantly positively correlated with the seed yield.

Key words: *birdsfoot trefoil, seed yield, yield components.*

MALFORMATIONS OF REPRODUCTIVE ORGANS IN WALNUT (*JUGLANS REGIA* L.)

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Abstract

In this research, which was conducted in *native walnut population*, during 2000-2011 years in the region of Kraljevo (central Serbia), more than 2000 *walnut* seedling trees were observed. In some trees unusual phenomena in the structure and function of reproductive organs were expressed, such as: second and successive flowering, mixed inflorescences with female flowers at its base and male flowers at the top, hermaphrodite flowers, “V” shaped catkins, spurs only with catkins, flowers and fruits fusion, irregular shell and kernel segmentation and *incomplete involucre*s. Certain of these malformations occur in some trees every year, while in some cases they represent a sporadic phenomenon, probably caused by environmental factors. In this paper all these phenomena are described in detail and documented by photographs.

Keywords: *walnut, reproductiveorgans, malformations.*

PHENOLOGY AND YIELD OF NINE SOUR CHERRY CULTIVARS UNDER CENTRAL SERBIA CONDITIONS

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Abstract

Phenological properties (beginning of flowering, full flowering, end of flowering, beginning of fruit colouring and harvest date) and yield of nine sour cherry cultivars, grafted on *Prunus avium* seedling rootstock, were studied in the region of Kraljevo (central Serbia), during a ten – year period (2000-2010). The mean date of beginning of flowering was 12 April, full flowering 17 April, and the end of flowering April 23. Flowering lasted, on the average, 11 days. Difference in flowering dates of the earliest and the latest flowering cultivars was 10 days, and the time span between years was 18 days. Early flowering was observed in cultivars ‘Richmorency’, ‘Oblačinska’, ‘Heimanns Rubinweichsel’ and ‘Čačanski Rubin’, followed by ‘Heimanns Konservenweichsel’, ‘Kelleriis 16’ and ‘Rexelle’, while late flowering was observed in ‘Schattenmorelle’ and ‘Kelleriis 14’. The time span between the cultivars of the earliest and the latest average fruit ripening was approximately 16 days, and the biggest difference between years with the earliest and the latest average fruit ripening was 22 days. ‘Richmorency’ and ‘Oblačinska’ are characterized by middle-early ripening (25-30 June), followed by medium late cultivars, such as ‘Čačanski Rubin’, ‘Heimanns Rubinweichsel’, ‘Rexelle’, ‘Kelleriis 16’ and ‘Heimanns Konservenweichsel’ (1-2 July). ‘Schattenmorelle’ and ‘Kelleriis 14’ proved to be late maturing (8-9 July). The average annual yield per tree amounted to 14-28 kg. The highest cumulative yield per tree was recorded in ‘Rexelle’ (224 kg), and the lowest in ‘Kelleriis 16’ and ‘Schattenmorelle’ (113.2 kg).

Keywords: *sour cherry, cultivars, flowering, fruit maturation, yield.*

MORPHOLOGICAL AND PRODUCTION CHARACTERISTICS OF SPELT WHEAT ON THE CHERNOZEM AND DEGRADED SOIL

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Abstract

The effect of agro-ecological conditions on morphological and production characteristics of the first domestic spelt wheat cultivar - *Nirvana* was studied. *Nirvana* was selected by the Institute of Field and Vegetable Crops from Novi Sad. It is a winter cultivar, very tolerant to frost. In the period 2011-2013, field micro experiments were set up on two locations - on an experimental field of the "Tamis" Institute on a carbonated (micellar) chernozem soil formed on the loess terrace, and on a field in the vicinity of the Thermal Power Plants "Nikola Tesla" on a degraded soil, formed on a coal-mine dumping ground and uncultivated for more than 15 years. The agro-ecological conditions on these two locations affected the growth and productivity of the spelt wheat. Although average weather conditions on both locations were relatively favourable, growth and development were more intensive in the second year of research. The effect of soil conditions on morphological characteristics was highly statistically significant. The plants grown on the chernozem had 45% higher stems, 46% longer spikes and about 6.4% more spikelets per spike. The quality of soil also had significant effect on yield indicators, so the plants grown on the chernozem had 16.23% more grains per spike and 19.8% larger grain weight per spike. The two-year average yield of dehulled grains obtained on the chernozem was 3010 kg ha⁻¹, 35% higher than the yield obtained on the degraded soil. Despite all the indicators of the plants grown on the degraded soil were significantly lower, yet it can be concluded this type of wheat achieved satisfying grain yield.

Key words: *spelt wheat, morphological and production characteristics, yield data, soil type.*

THE INFLUENCE OF METEOROLOGICAL PARAMETERS ON FRUIT DOUBLING IN STONE FRUIT SPECIES

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Abstract

Exposure of stone fruit species to high temperatures during flower-bud differentiation leads to the occurrence of double pistils, which results in the development of double fruits. In order to analyze this phenomenon in our ecological conditions, tests were carried out during the three-year period (2011-2013) in the collection orchards of the Experimental farm "Radmilovac" of the Faculty of Agriculture in Belgrade. The influence of air temperature and rainfall on fruit doubling was studied in 16 cultivars of peaches and nectarines, 15 cultivars of apricot and 10 cultivars of plum.

The average percentage of double fruits in a three-year period was the highest in peach (20.0%), followed by plum (10.9%) and apricot (4.1%). In peach and nectarine cultivars the average percentage of double fruits was the highest in 2013 (38.8%), and it was more than three times higher comparing with other two years. In plum cultivars the average percentage of double fruits was also the highest in 2013 (13.7%). In apricot cultivars the percentage of double fruits was the lowest in 2013 due to very low fruit set because of unfavorable weather conditions for pollination.

Key words: *peach, plum, apricot, double fruits, temperature, rainfall.*

EFFECT OF SHOOT HEADING DATE ON SYLLEPSIS AND SYLLEPTIC SHOOT TRAITS IN PLUMČAČANSKA LEPOTICA

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Abstract

Apart from frequent spontaneous syllepsis, sylleptic shoot development in plums can be induced by diverse practices, most notably plant hormone application and shoot tip removal. Research was conducted in 2008 and 2009 to evaluate the effect of summer pruning heading date on the degree of sylleptic branching and major morphological and anatomical properties of sylleptic shoots in plum 'Čačanska Lepotica' grafted on Myrobalan (*Prunus cerasifera* Ehrh.) seedling rootstock. Shoots were cut back to 4-5 buds above the base at 5 dates (T₁ – 20 May, T₂ – 5 June, T₃ – 20 June, T₄ – 5 July and T₅ – 20 July). At the end of dormancy, sylleptic shoots were subjected to morphological measurement: sylleptic shoot length and diameter (cm), number of nodes, internode length (cm), number of vegetative buds, number of flower buds, and anatomical analysis: primary xylem length (µm), number of tracheae per mm² and trachea width (µm). Results showed that at the late heading dates (T₄ and T₅) sylleptic branching was absent in a large percentage of shoots (81.59% at T₄ and 94.10% at T₅). In contrast, the highest positive response was observed for dates T₂ and T₃ which led to sylleptic shoots reaching moderate length (T₂ = 52.79 cm, T₃ = 22.09 cm), with a very good vegetative to flower buds ratio (at T₂ - 1:0.43, and at T₃ 1:0.98). The sylleptic shoots emerging at dates T₂ and T₃ had the following anatomical properties: primary xylem width 94.79 µm and 70.43 µm; number of tracheae per mm² 141.18 and 134.88, and trachea width 3.09 µm and 3.07 µm, respectively. Data suggest that 5-20 June, or T₂ and T₃ as used in this study, is the most suitable date to cut back shoots in plum 'Čačanska Lepotica' for sylleptic branching.

Keywords: plum, sylleptic shoots, morphological and anatomical properties, shoot heading.

THE COMPETITIVENESS OF AZOTOBACTER, PSEUDOMONAS AND BACILLUS APPLIED AS A MIXTURE INOCULUM IN RHIZOSPHERE OF FIVE MAIZE GENOTYPES ASSESSED BY GENOTYPING AND PHENOTYPING METHODS

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Abstract

The rhizosphere contain a different compounds produced by the plant roots. The plant growth-promoting rhizobacteria (PGPR) can colonize plant root and promote plant growth and some of them can reduce the incidence of soil-borne diseases. PGPRs are beneficial for agriculture and often used as biocontrol or biofertilizer inoculants. However, the variation in bacterial colonization and survival within the rhizosphere (rhizosphere competence) can cause inconsistency of the field results. In this study, the mixture of the selected bacteria (*Azotobacter*, *Pseudomonas* and *Bacillus*) has been used as inoculum to assess the competitiveness and effects on plant growth and yield of different maize genotypes. Rep-PCR using (GTG)₅ primer for BOX elements were applied. Phenotypic and PGP traits as well as persistence of inoculated strains in the total number of bacteria have been evaluated. The obtained results assessed by a combination of genotyping and phenotyping methods showed that mixture of strains (*Azotobacter*, *Pseudomonas* PS2 and *Bacillus* Q7) had better competitiveness to indigenous bacteria in the rhizosphere of all maize genotypes. Inoculation increased the total number of microorganisms by 61%, the number of N₂-fixing bacteria by 49% and the number of azotobacters by 5% compared to the non-inoculated control i.e. indigenous bacterial population. PGP traits of *Azotobacter*, *Pseudomonas* PS2 and *Bacillus* Q7 influenced a growth and quality of maize.

Key words: *Plant growth-promoting rhizobacteria (PGPR); rhizosphere competence; Azotobacter; Pseudomonas; Bacillus.*

COMBINING ABILITY ANALYSIS OF ZP MAIZE INBRED LINES FOR GRAIN YIELD AND YIELD COMPONENTS

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Abstract

A half diallel cross was used to evaluate combining abilities of six maize inbred lines and their hybrid combinations for grain yield, ear length, number of kernel rows per ear and number of kernels per row. Analysis was done using Griffing's formula (1956), method 2, mathematic model I. General and specific combining ability (GCA and SCA) mean squares were significant for all traits. GCA/SCA ratios revealed that additive gene effects had larger importance in inheritance of all of investigated traits than non-additive effects. Furthermore, obtained results showed that inbred lines L4 and L5 had the best GCA effects for grain yield, while inbred line L4 had the highest GCA values for ear length and number of kernels per row. Inbred line L6 was the best general combiner for number of kernel rows per ear. The hybrid combinations those exhibited significant SCA effects involved low x high, average x high and high x high GCA parents. According to obtained results, we could be concluded that inbred lines L4, L5 and L6 have high frequency of favorable alleles for most of the investigated traits and can be used in further breeding programs for new hybrids development.

Key words: *maize, general and specific combining abilities, yield.*

THE INFLUENCE OF MANY YEARS LIMING AND FERTILIZING TO CHANGING OF ADSORPTIVE COMPLEX COMPOSITION OF PSEUDOGLEY SOIL

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Abstract

Composition and characteristics of soil adsorptive complex are very important to understand physicals and chemical processes which affect soil fertility and nutrients availability to plants. The paper deals with influence of many years ameliorative application of lime, manure and mineral fertilizers on adsorptive complex composition of pseudogley soil in Kraljevo valley. Soil belongs to group of extremely acid soil pseudogley type. Two – field crop rotation wheat – maize was applied. Soil samples were taken from opened profiles and numbered 1 (unfertilized variant – control), 2 (NPK) and 3 (NPK+CaCO₃+manure). Arable lands, pseudogley type, have a high degree of dealkalinization of eluvial, -Ah and Eg-, layers and B₁tg layer, too. Capacity value of cations exchange and saturation degree of exchangeable – adsorbed alkaline cations (Ca²⁺, Mg²⁺ and H⁺(+Al) ions) varied considerable. Their composition and content, especially at -Ah and Eg layers, were unsatisfactory, mainly. According to noticed V – values (< 50%), analyzed soil belongs to group of "moderately unsaturated" soils. Many years, periodically, application of pedo–ameliorative treatments as: liming, phosphatization and humification, influenced increase of degree of alkali saturation (V%) and capacity of cations exchange (T) at Ah layer for more than 40% and 10 m.ekv./100 g soil, respectively. Part of alkaline cations (Ca²⁺ and Mg²⁺) was increased, averagely, for 10 m.ekv./100 g soil or about 14.25% in relation with T values. Content of exchangeable – adsorbed K⁺, Na⁺, Ca²⁺ and Mg²⁺ ions at eluvial horizons (Ah and Eg) was rather low, at analyzed soil profiles. Calcification caused increase of content of exchangeable Ca²⁺, Mg²⁺ and K⁺ in adsorptive complex of analyzed soil.

Key words: *adsorptive complex, fertilization, liming, pseudogley, soil.*

CURRENT PROPAGATION OPTIONS FOR *MISCANTHUS GIGANTEUS* IN THE REPUBLIC OF SERBIA

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Abstract

The key Republic of Serbia (RS) government's strategy for energy development is to expand the supply of home grown biomass and facilitate the development and competitiveness of a sustainable supply chain. Analysis of the potential supply chain suggests that this can partially be achieved by growing agroenergy crops. *Miscanthus giganteus* was chosen because of the potentially high productivity and cultivation on degraded soil.

This study aims to present the knowledge by which plant propagules (propagation) of *Miscanthus giganteus*, for the biomass supply chain, can be produced at minimum cost. Because *Miscanthus giganteus* is sterile, it can only be propagated by vegetative division.

The method of field experiments followed the potential of production of viable rhizomes on soils with variable fertility. Monitoring was done on 6 parameters of the rhizome growth and planting survival rate. The results indicate that the production of viable rhizomes is affected mainly by age of mother plants and biotic effects of the weed vegetation. A much smaller effect is shown through size of rhizomes and nursery fertilization.

The work reported here focuses on the available knowledge regarding the potential routes by which *Miscanthus* material could be mass produced for high density planting established to maximize yields. Vegetative clonal plant propagation is required to deliver uniform crops. Rhizome production and division is slow, but currently does not limit increase in production because the Serbian industry uptake is currently small.

At present the establishment rate of *Miscanthus* is slow and this appears to be limited by economics; evidence suggests that the cost of plant propagules is one factor that prevents widespread planting.

Key words: *agroenergy crops, Miscanthus giganteus, ecoremediation.*

WATER USE EFFICIENCY OF TOMATO AND POTATO IN THE CONDITIONS OF SOUTHERN SERBIA

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Abstract

Water is a limited agricultural resource, so this study has been related to rational use of water in the intensive tomato and potato growing technology. By setting irrigation at different values of SWP (soil water potential), it have been studied their effects on yield, evapotranspiration and water use efficiency (WUE) of tomato and potato in the conditions of southern Serbia. The four-year investigation was carried out by a biological procedure – through field trials in the conditions with irrigation of tomato hybrid Amati F₁ and potato cultivar Kennebec, on alluvium soil type, in the river valley of Southern Morava, near Niš. Local coordinates of the studied area were the following: latitude 43° 19', longitude 21° 54', and altitude 194 m. The experimental field consisted of three treatments with irrigation (SWP of 20, 30 and 40 kPa), as well as unirrigated control. Tensiometers were installed at the depth of 20 cm within root system zone, and were read twice a day at 8⁰⁰ and 18⁰⁰. Irrigation was applied when a lower value than predetermined was read on the vacuummeter. The highest value of WUE in tomato (112.68 kg ha⁻¹ mm⁻¹) was observed in 2006 at the variant with SWP of 30 kPa, while the lowest one (77.27 kg ha⁻¹ mm⁻¹) was observed in 2007 at the variant with SWP of 40 kPa. Water use efficiency of potato during the studied period ranged from 81.23 to 98.21 kg ha⁻¹ mm⁻¹.

Key words: *soil water potential, tomato, potato, irrigation, water use efficiency.*

THE POSSIBILITIES OF USE OF NITROGEN HARVEST INDEX IN WHEAT BREEDING IN TERM OF ECOLOGICAL AGRICULTURE

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Abstract

The topic of nitrogen wheat nutrition was becoming very actually during last decades of last century because of many reasons: fertilizers price, energetic crises, environmental protection, ecological agriculture. Despite the detrimental impacts, the use of fertilizers (N in particular) in agriculture, together with an improvement in cropping systems, mainly in developed countries, have provided a food supply sufficient for both animal and human consumption. Therefore, the challenge for the next decades, with an expanding world population, will be to develop a highly productive agriculture, whilst at the same time preserving the quality of the environment. A multidisciplinary approach to breeding winter wheat and include physiological indicators of nitrogen nutrition efficiency could help in achieving this goal. Consequently, this paper deals with physiological indicator as nitrogen harvest index, its connection with grain yield, heritability and variance and evaluation of Serbian winter wheat genotypes in term of this indicator. The best values of nitrogen harvest index were registered at KG 165/2, Pobeda and Bujna. Emphasized genotypes, selected as superior in term of this indicator, could be considered as carriers of desirable traits in terms of wheat breeding theory, improvement of production efficiency, environmental protection and development of ecological agriculture.

Key words: *breeding, ecological agriculture, nitrogen harvest index, wheat.*

YIELD AND QUALITY OF DUAL-PURPOSE BARLEY AND TRITICALE IN A SEMI-ARID ENVIRONMENT IN TUNISIA

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Abstract

Semi-arid region of Tunisia is characterized by a low and erratic rainfall. This makes year-round maintenance of pasture and forage production under non-irrigated conditions both costly and difficult. In order to fill deficit period, some cereals can be used as dual purpose by cutting or by animal grazing during early stage of growth and then allowed to recover to produce grain. This study aimed at evaluating agronomic performances and grain quality of two dual-purposes cereal crops, Barley and Triticale, cut at the pseudo stem erect stage (C30). The trail was conducted during 2010-2011 season and results have showed that barley yielded more forage crop than triticale without being statistically different, also crude protein in the plant was higher in barley (18.6%) compared to triticale (17.7%). Defoliation has caused a significant grain yield reduction for both cereals and was about 23% for triticale and 33% for barley. Clipping at stem erect stage has a variable effect on different yield components. Thus, higher number of tillers and number of spikes in defoliated compared to undefoliated plants were noted. In the other hand, both number of grains per spike and total kernel weight was negatively affected by clipping.

Grain protein was significantly higher after clipping for barley (11,35% for dual purpose and 10.17% for grain production only) and was not affected for triticale (9.42 % versus 9,57 %).

Under Tunisian semi-arid environment, triticale and barley have comparable yields with a small superiority for barley in forage yield production and higher plant and grain protein contents in triticale.

Key words: *Triticale, Barley, Forage, Dual purpose, semi-Aride, Tunisia.*

**THE EFFECT OF AIR -ASSISTED ON DIFFERENT DOSE
APPLICATIONS AGAINST SUNN PEST (*EURYGASTER* SPP.
HEMIPTERA: SCUTELLERIDAE) CONTROL**

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Abstract

During chemical applications against plant diseases and pests while some of the pesticides are drifted to non-target area by wind or suspended in the air, the other part drops into non-target sources of water and the ground. As a result of this, negative impacts such as low biological efficiency, high cost and environmental pollution are occurred.

In Turkey between 2000-2012 which are the years of epidemics, chemical applications were made against sunn pest at area of approximately 11-18 million ha.. Sunn pest control was conducted by both aerial and ground sprayers until 2002. Since then these applications have been turned into only ground applications gradually. This situation has accelerated national studies that work on increasing the spraying efficiency by reducing spray losses.

The objective of this study was to develop an air-assisted sprayer that is domestic production and suitable for purchasing power of Turkish farmer. This sprayer was evaluated in terms of biological efficiency and distribution uniformity at a domestic wheat variety. The tests were carried out in two stages. Spraying characteristics were determined in the first step. Trials of biological efficiency in which was used Alphacypermethrin EC (100 g/l) at dose of 15.0, 12.5 and 10.0 ml/da against the sunn pest were conducted in the second step. Thus, efficiency of the air-assisted against sunn pest was brought up to compare with the conventional application and reduction of pesticide use with lower dose application was evaluated. As a result of the study, high biological efficiency was achieved at low doses with air-assisted sprayer.

Key words: *Air-assisted, sprayer, sunn pest, dose.*

THE ADAPTATION OF SOME PERENNIAL RYEGRASS CULTIVARS USED AS TURFGRASS UNDER ANKARA AND ISPARTA CONDITIONS

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Abstract

The efficient use of turf for establishing lawns requires field evaluation of the existing cultivars, especially in the central part of Anatolia with dry climate. Our research was aimed at evaluating the adaptability of the newly introduced and popular perennial ryegrass cultivars in central part of Turkey (Ankara) and in transitional zone of Anatolia to Mediterranean (Isparta). Six perennial ryegrass cultivars (Lucius, Libranco, Lifrance, Eterlou, Taya and Sakini) were seeded with 3 replications in randomized block design in both sites in 2007. Emergency power, establishment potential, winter resistance, cover ratio, leaf texture, leaf color, regrowth potential, tiller number, general appearance, weed invasion and density of each cultivar were evaluated by using a visual score. At the result, there were no really much differences among the cultivars in both sides even that they showed some differences on some parameters in Ankara. All cultivars performed better in summer and autumn than during winter and spring in Ankara. However they were better in spring, summer and autumn in Isparta than during winter period. All of these perennial ryegrass cultivars showed excellent growing, covering, colour, and regrowth after cutting and density in both locations. They were found recommendable for Central Anatolia and transitional zone of Anatolia.

Key words: *Perennial ryegrass, Lolium perenne, Ankara, Isparta, turfgrass, adaptation.*

QUALITY OF ROTARY MOWER SIP RK 135 MOWING PROCESS IN MOUNTAINOUS AREA

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Abstract

The paper presents research results of tractor rotary mowers SIP RK 135 in cutting the first swath in natural landmeadow. The average yield of green mass was 20.66 t/ha. The aim of this research was to determine the productivity, quality of work and losses using the tractor rotary mower in cutting the first cut landmeadow. In the first experiment tractor operated at an average speed of 5.89 km/h achieving performance of 0.69 ha/h. In the second experiment the tractor operated at an average speed of 9.29 km/h achieving a performance of 1.01 ha/h. At a given speed, efficiency of work operations ranged from 0.78 to 0.93, averaging 0.86 in the first version and 0.70 to 0.93, averaging 0.81 in the second version. With the increasing speed of operation it has been observed an increase in the average height of cut by 1.35 cm and also increase in total losses of 2.73 % to a maximum of 4.45 % of the total yield.

Keywords: *rotary mower, mowing, operational productivity, cutting height, losses.*

BREEDING FOR CROP IMPROVEMENT

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Abstract

In a frame of plant breeding are developed different methodologies directed towards genotypes improvement. Thousand years ago, a man practiced selection through domestication, cultivation and production plants that have more desirable traits than wild plants. Cultivated crop species selected from wild populations are called a landrace. Creation of new cultivars has been done by using of simply plants selection techniques choosing desirable characteristics for propagation, to more complex molecular techniques. Conventional breeding is based on homologous recombination between chromosomes to generate genetic diversity. Also, breeders may use a number of *in vitro* techniques such as protoplast fusion, embryo rescue or mutagenesis to generate diversity and produce hybrid plants that does not exist in nature. Breeders have the task to incorporate into crop plants improved traits: quality and yield, tolerance to salinity, extreme temperatures, drought, resistance to viruses, fungi and bacteria, increased tolerance to insect pests and herbicides. The most cultivars are created by crossing two parents. Created cultivars have changes of architecture, ripening time, productivity. Soil moisture is the most limiting factor in dry land agriculture. It is lost as evaporation from the soil surface and as transpiration from the plant surfaces. Technology growing and soil fertilization related to productivity of plants. The evaporation losses can be reduced by mulches, antitranspirants, wind breaks, weed control. In the coming future with climatic changes are necessary protected wild relative species and other existing genetic resources in nature and gene bank for successful breeding.

Keywords: *Breeding, crop, productivity, genetic resources, improving adaptability.*

IMPACT OF PERENNIAL APPLICATION OF NPK FERTILIZERS ON SOIL PROPERTIES OF VERTISOL SOIL TYPE

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Abstract

The study was conducted in conditions of two-fields experiment (wheat-maize), formed in the year 1978, at the Vertisol soil type in the vicinity of Kragujevac. Vertisol at the beginning of the study was characterized by acidic pH, low content of available phosphorus, medium content humus, and high content of available potassium. The aim of this study was to determine influence of NPK fertilizers after 33 years of continuous application, on the basic elements of fertility (pH, humus, total N, available P₂O₅ and available K₂O). Nitrogen, phosphorus and potassium have been applied in two doses of 9 combinations, as: nitrogen in quantities of 80 and 120 kg/ha (N₈₀ and N₁₂₀), and phosphorus and potassium in quantities of 60 and 100 kg/ha (P₆₀, P₁₀₀ and K₆₀, K₁₀₀). Analyzes of chemical properties have been done in the year 2010, by the standard methods. The results indicate that after 33 years of application of NPK, with the exception of pH, it has taken to the improvement of all measured parameters of fertility. The biggest changes have been recorded in the content of available phosphorus. The content of this nutrient has been significantly increased even in the conditions of acid soil reaction. Increase in the content of available P₂O₅ has been noted in the combinations of which it has been applied both individually and in combination with nitrogen and potassium. Application of higher doses of fertilizers have significantly increased content of Mn i Zn.

Key words: *Vertisol, perennial application of fertilizers, NPK, manganese, zinc.*

THE IMPACT OF DIFFERENT TECHNOLOGIES OF PRODUCTION OF RED WINES ON THE ORGANOLEPTIC SCORE IN THE POPULATION OF YOUNG WINEMAKERS

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Abstract

The value of wine is determined by a number of parameters, and besides physical - chemical and organoleptic parameters, which are influenced by the quality of grapes and wine, important role has tradition, marketing and consumer trends in wine. The aim is to show the trends and preferences of future wine experts who will form the styles of wine, and who are themselves educated wine consumers. The experiment was conducted in a teaching facility of University of applied sciences in Požega. In a study students from the second and third year of professional study Vineyards - Wine – Fruit growing participated. Students were randomly selected and divided into three commissions of five members. Assessed the wine Pinot Noir, Merlot, Cabernet Sauvignon and Syrah. Harvest of each cultivar was carried out on the same day so that the parameters of grapes for each wine the same whether it is a wine produced in a stainless steel bowl or barriques. Wines produced exclusively in stainless steel containers retain more varietal characteristics and fruitiness and are fresher than the wine from barrique barrels. All samples of wine vintages are 2012th. Sensory evaluation of wines was carried out using 100 positive points (OIV). All results were statistically analyzed. Wines in barriques with Pinot Noir, Merlot and Cabernet Sauvignon achieved better grades.

Keywords: *Barrique, organoleptic, red wine, young.*

MORPHOGENETIC FEATURES OF UNIVERSITY LEGUMES COLLECTION

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Abstract

This study has been conducted to highlight the outputs of 2011-12 crop rotation under mountain and steppe (plain) zones in Almaty Region. Principal morphogenetic properties have been studied across the collection of common bean, *Phaseolus vulgaris* L. (Kazakhstani, American, Chinese, Czech, Polish, Russian, and Turkish collections) from different soil and climate areas under mountain and steppe zone conditions of Almaty Region. A number of useful genetic stocks for major economically valuable traits has been identified.

Stock varietal resources have been studied on morphogenetic features. It has been shown that cv. "Luna" from Czech collection would be the earliest by ripening (80 days from the onset of ontogenesis to complete technical ripeness). Other varieties could reach the same state 10-12 days later. Using local "Aktatti" line the effect of new domestic bioorganomineral fertilizer has been shown on morphogenetic traits of common bean plants.

Basic catalogue of stock common bean resources including nearly 40 parental common bean and related cultivars of diverse geographic origin has been compiled to be completed this year by 6 French cultivars of bush and liana common beans (Argus, Coco nain blanc precoce, Triomphe de Farcy, Merveille de Venise, Mistica, and Phenomene manufactured by Truffaut and Vilmorin Ltd.). Investigation on growing domestic collection of cultivars and lines is also in progress.

Keywords: *common bean, catalogue of stock resources.*

EXAMINATION OF SOME DUTCH RED SKIN POTATO VARIETIES IN DIFFERENT AGRO-ECOLOGICAL CONDITIONS OF MONTENEGRO

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Abstract

The paper presents results of productivity research of six potato red skin varieties in three different locations in the mountainous regions of Montenegro: Nikšić (800 meters of altitude), Kolašin (900 meters of altitude) and Žabljak (1450 meters of altitude). The study took place during 2010 and 2011, and following varieties were tested: Kondor, Kuroda, Aladin, Roko, Desiree and Rudolph.

The highest tuber yield in two-year average had variety Rudolph (32.8 t.ha⁻¹), while the lowest yield was measured in the crop of Kuroda variety (25.4 t.ha⁻¹). As the agro-ecological conditions in the studied area varied, the varieties reaction differentiated as well. Highest productivity was in Žabljak (29.1 t.ha⁻¹), while the lowest was in Nikšić (28 t.ha⁻¹).

Higher potato yields were obtained in 2010 (28.9 t.ha⁻¹) as the result of the higher total amount of rainfall during the potato vegetation period and slightly better monthly distribution.

Nevertheless, interactions location x year, variety x year and variety x location x year resulted in statistically significant difference in yield.

Key words: *red skin potato varieties, agro-ecological conditions, productivity.*

HONEY PLANTS OF FOREST LANDS IN THE NORTH-WEST RUSSIA

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Abstract

The total area of Russia forest resources is more than 900 thousand hectares and half of those resources are suitable for the organization of forest apiaries. The studied objects were covered and uncovered with forest stand lands in the ecological condition of North-West Russia. Results of the researching shows that the number of species, their occurrence and projective cover in different land categories are significantly unequal. Biodiversity of the uncovered forest lands is always richer than under the canopy of the forest stands of any type, any structure and any crop density. Our research also shows that the species composition of honey plants depends first of all on the growth conditions and category of forest land.

Keywords: *honey , honey plants,, apiculture, bee products.*

STUDY FOR DETERMINATION OF CLIMATIC SIMILIARITES TO DIFFERENT AGRO-ECOLOGICAL ZONES OF THE ALBANIA TERRITORY

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Abstract

In the environment where applied agricultural activity, the climate is a complex specific environmental, whose study is important for the stability and sustainability of agricultural production. The studies in agro-ecology, under the conditions of agricultural orientation of Albania make necessary the climate classification of agricultural areas, based on the suitability of agricultural plant groups, whose productivity level and sustainability depend on the performance and fluctuations of climatic elements. The introduction of new cultivation technologies of plants with low environmental impact requires the recognition of environmental features and in particular the climate one with the intention of satisfying the needs of each plant cultivated which is cultivated and spread in that area. To be more precise, the characterization and climatic zoning of the territory is considered to a valuable study in order to determine the most appropriate ecological zones in the country. For purposes of characterization of similar climate zones in the Albanian territory have been taken the historical series of climate data, which have been digitized and processed by applying the method "*Cluster analysis*" with the view to distinguishing their climate features, which will serve to distinguish the closely-related ecological areas and designing appropriate technologies for cultivation of plants based on such data, to increase the sustainability of agro-ecosystems.

Key words: *temperature, precipitation, relative humidity, climatic zones, agro-ecological zones.*

SAGE IN ALBANIA

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Abstract

Sage has been the medicinal and aromatic plants, naturally more widely spread in Albania, and now also the most cultivated plant. It is a plant widely used in the kitchen, in the pharmaceuticals and the cosmetics. It is widely spread everywhere in Albania and the Albanian lands, from 150m to 1200m above sea level. This plant represents a typical Albanian production. Over 50% of the sage that is used in U S A is the Albanian, and about 80% of world production of sage essence is produced by Albanian sage. At the sage herbs are been found 32 chemical compounds with great medicinal value. The most widespread species in Albania are: the common sage (*Salvia officinalis*), the viscous sage (*salvia glutinosa* L.), the whorl sage (*Salvia verticellata* L.).

The larger surface and the more dense vegetation is represented by common sage, with over 90% of natyral production and 100% of cultivated production. Given these indicators, is taken the study for imparting of sage in Albania, by counties and districts.

Keywords: *sage, essence, medicinal, aromatic, fresh, harvesting.*

PROPAGATION SAGE (*SALVIA OFFICINALIS* L.) AND ROSEMARY (*ROSMARINUS OFFICINALIS* L.) WITH GREEN CUTTINGS

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Abstract

Successful breeding is one of the most important tasks of plant producers. Vegetative propagation of medicinal and aromatic plants are mainly used when the seed germination is low, less than 50%. The aim of this study was to determine the effect of commercial agents (Rhizopon I) containing auxin IBA on rooting green cuttings of sage (*Salvia officinalis* L.) and rosemary (*Rosmarinus officinalis* L.). The study was conducted in the greenhouse of the Faculty of Agricultural, University of Banja Luka during the period April - July 2012th year. The experiment consisted of 60 cuttings of sage and 60 cuttings of rosmaria, of whom 30 cuttings treated with hormones for rooting and 30 cuttings were planted directly into the substrate and served as a control option. During the test are recorded morphological parameters of growth and development of plants like plant height (cm) and number of leaves, while on the end of the experiment recorded root length (cm), fresh weight (g) and dry weight of plants (g). Statistical analysis shows that plants treated with the agent for rooting (Rhizopon I) have significantly higher values of all parameters of growth and development in relation to the control of the same plant.

Key words: *propagation, Rhizopon, Salvia officinalis* L., *Rosmarinus officinalis* L.

TOTAL AND ORGANIC PHOSPHORUS STATUS IN SOILS OF EASTERN CROATIA

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Abstract

Far as is known there is no relevant information about the status of total and organic phosphorus in Croatian soils, so aim of this study was to determine the total and organic phosphorus in soils of the eastern Croatia. In total were collected 94 soil samples and the soil pH, organic matter as well as the total phosphorus content and organic phosphorus content were analyzed. All samples were grouped according to soil pH and organic matter in two groups ($\text{pH}_{\text{KCl}} < 6$, $\text{pH}_{\text{KCl}} > 6$, organic matter $< 2\%$, organic matter $> 2\%$). Analyzed samples showed significant amounts of total phosphorus with minimal content of $329.84 \text{ mg P}_2\text{O}_5 \text{ kg}^{-1}$, while the maximum value determined by the total phosphorus was $1732.19 \text{ mg P}_2\text{O}_5 \text{ kg}^{-1}$ with an average of $713.03 \text{ mg P}_2\text{O}_5 \text{ kg}^{-1}$. The content of organic phosphorus in soils ranged from $14.89 \text{ mg P}_2\text{O}_5 \text{ kg}^{-1}$ to $1119.81 \text{ mg P}_2\text{O}_5 \text{ kg}^{-1}$, with the portion of organic phosphorus in total phosphorus from 0.54% to 78.29%. Seen from the humus content in the soil, very low humic soil had an average of 12.0% of organic phosphorus, while fairly humic soil had an average of 7.1% organic phosphorus. Also, the results showed that the minimum (0.54%) and maximum (78.29%) portion of organic phosphorus in total phosphorus soils recorded within broad categories humic poor soils. Although it was expected, there was no significant differences between the amount of organic phosphorus in soil and organic matter content, but large influence of organic matter content to the correlation of certain fractions of phosphorus in the soil were determined ($r = 0.89$).

Key words: *soil, total phosphorus, organic phosphorus, portion.*

EFFECT OF SLOW-RELEASE NITROGEN FERTILIZERS ON MAIZE PLANTS GROWN ON NEW RECLAIMED SOIL

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Abstract

A field experiments was done in summer 2009 season at private farm, located at El-Sadat district, Minufiya Governorate (Egypt) to evaluate the effect of ureaform or urea+humic acid as slow release nitrogen fertilizers at a rate of 60 and 100 kg fed-1 compared to urea at rate of 120 kg fed-1 on maize (*Zea mays L.*) (Single-cross 10) grown on sandy soil. The obtained results indicated that ear length, plant high, 100-grain weight, shoot and grain yields and biological yield were markedly significantly higher when application of ureaform at rate of 100 kg N/fed followed urea at rate of 100 kg N/fed + humic acid. Application of ureaform at high rate increased the values of nitrogen uptake by both shoot and grain of maize plant, while urea at high rate + humic acid induced the highest values of both phosphorus and potassium uptake for the same mentioned organs. Also, the results indicated that, maize plants received urea+humic acid or ureaform registered the highest values of fertilizer use efficiency, i.e., highest Agronomic efficiency and Apparent N recovery were obtained due to application of 60 kg N/fed urea+humic acid, while ureaform at rate of 100 kg N/fed gave the highest value of Physiological efficiency.

Keywords: *Nitrogen fertilizers, maize, reclaimed soil*

REUSE OF TREATED WASTEWATER FOR CULTIVATION OF ROSES FOR DECORATION ONLY AND NOT FOR FOOD INDUSTRIES

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Abstract

Open field experiment was carried out during 2010-2011 and 2011-2012 seasons at El-Gabal El-Asfar, El-Kalubiobia Governorate, Egypt. The seedlings of *Rosa chinensis* (pygmy rose, China rose), two year age, were planting at the first week of December. Physical and chemical analysis of soil and treated wastewater were determined. The aim of this work was to study the effect of three factors, the first is drought stress (100, 75 and 50% from irrigation requirements (IR), the second is fertilizer rate (FR) (100, 75 and 50%) from NPK recommended doses and their interaction. Also to study the effect of AgNO₃ nanoparticles as a preservative solution for *Rosa* cut flowers. The results indicated that all growth parameters of rose plant increased by increasing drought stress, fertilizer rate and their interaction. The values of statistical analysis indicated that no significant differences between the values of growth parameters and longevity of flower under condition of (100% IR and 100% FR), (100% IR and 75% FR) and (75% IR and 50% FR). The previous mentioned treatments combined with 0.8 ppm and /or 1.7 ppm AgNO₃ nanoparticles recorded the highest values for vase life of flowers. These application may be recommended that for getting three benefits (saving water, fertilizer and longevity of *Rosa* cutflower, we have to use the application (75%IR+50% FR and/or AgNO₃ nanoparticles).

Key words: *Rosa*, Vase life, wastewater, Fertilizer, irrigation, AgNO₃ nanoparticles.

INVESTIGATION THE EFFECTS OF BIOFERTILIZERS ON VEGETATIVE GROWTH PARAMETERS OF MEDICINAL PLANT OFTARRAGON(*ARTEMISIA DRACUNCULUS*)

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Abstract

In order to investigate the effects of plant growth promoting Rhizobacteria (PGPR) inoculation on themorphological traits ofTarragon (*Artemisia dracunculus*) a factorial pot experiment based on completely randomized design with four replication were conducted in research field of Horticulture Department of Mohaghegh Ardabili University in 2011. Experimental treatments includeinoculation with three species of rhizobacteria namely *Azotobacter*, *Azosperillium*, *Pseudomonas* suspension in single and combination application and control (without inoculation with bacter), which applied as rhizome inoculation and foliar spraying. Result revealed thatinoculation of tarragon plants with plant growth promoting Rhizobacteria had significant effect on growth parameters. The highest value for traits such as the number of stem branches and rhizome and leaf number were obtained by foliar application of *Azosperillium*– *Pseudomonas* combination and combined form of three mentioned *Rhizobacteria*.Rhizome inoculation of *Azotobacter*-*Azosperillium* combination caused increases in plant height and rhizome dry weight in comparison to control. In general results of this investigation indicated that inoculation with plant growth promoting *Rhizobacteria* leds to increases in growth indices of tarragon plants by enhancing root growth and development by supplying favorable condition for plant growth with respect to supplying better condition for water and nutritional elements absorption from soils.

Keywords: *Biofertilizer, Plant growth promoting Rhizobacteria, Tarragon, medicinal plant.*

AN EFFICIENT METHOD OF PROTOPLASTS ISOLATION AND VIABILITY FROM CALLUS OF *FRITILLARIA IMPERIALIS*

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Abstract

Protoplast includes all cell components except the cell wall. Protoplasts is useful in genetic studies, cell physiology, and plasma membrane. Also, protoplasts are important in production of new genotypes in flowers, ornamental plants, somatic hybridization and somachlonal variation. In this study, an efficient protocol to isolate the protoplast from callus culture of *Fritillaria imperialis* was developed. A range of parameters which influence the isolation of *F. imperialis* protoplasts were investigated. The results revealed that callus fresh weight (FW) of 0.4 g produced the highest number of viable protoplasts (1.12×10^5 protoplasts/g FW). Analysis of variance indicated that concentration, time and three-way interaction of cellulase, pectinase and time were significant at $P < 0.01$. The highest amount of viable protoplasts (1.01×10^5 protoplasts/g FW) was obtained when the mannitol concentration was maintained at 9% mannitol. The optimum enzyme concentration was found to be 2% (w/v) of cellulose in which 1.3×10^5 protoplasts/g FW were isolated. Pectinase at 0.1% gave the highest numbers of protoplast. Meanwhile, an incubation period of 8 h with enzyme solution 2% (w/v) of cellulose and 0.1% pectinase with 9% mannitol resulted in the maximum yield of protoplasts (7.8×10^5 protoplasts/g FW). It's concluded that, the best treatment for isolation of *Fritillaria imperialis* protoplast was 2% cellulase and 0.1% pectinase with 9% mannitol for 8 h.

Key words: callus, *Fritillaria imperialis*, protoplast, viability.

DEVELOPMENT OF PISTILLATE FLOWERS IN 'GEISENHEIM-286' WALNUT CULTIVAR (JUGLANS REGIA L.)

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Abstract

Research was conducted during years 2009 and 2010 on 'Geisenheim-286' walnut cultivar in the ecological conditions of Čačak (Western Serbia). The first evidence of the shoot apex flattening was found during the second week of June, and the pistillate flower initiation in the terminal buds was noted a week later. During the summer, the development of female flowers slowed down, so that they entered into a period of dormancy without differentiated involucre. The involucre differentiation started in the second half of February next year, which continues throughout March. In late March and early April four sepals primordia are arised from the floral apex as protrusions next to involucre. Until mid-April two carpel are formed, and by the end of April, ovule was fully developed. In the year 2011 the Full bloom occurred in early May.

Keywords: *walnut, pistillate flower, development, 'Geisenheim-286'.*

A STUDY OF DIFFERENT GERMINATION MEDIA FOR THE 'ŠAMPION' WALNUT CULTIVAR POLLEN

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Abstract

Different culture media were tested in an attempt to improve the knowledge of the most suitable germination media for studying the *in vitro pollen germination capacity* of 'Šampion', a Serbian walnut cultivar. The research was conducted on agar media, as a four-factorial experiment, with different concentrations of agar (0.6%, 0.8% and 1%), sucrose (10%, 15% and 20%), H₃BO₃ (0 ppm, 200 ppm and 400 ppm) and CaCl₂ (0 and 50 ppm). Pollen germination was maximized (39%) when the germination medium contained 0.8% agar, 15% sucrose, 400 ppm H₃BO₃ and 50 ppm CaCl₂. Large and significant differences in pollen germination were observed in response to changing concentrations of agar, sucrose, boric acid and calcium chloride, and strong interaction was identified between all substances used.

Keywords: *walnut, pollen, germination medium.*

WILD CHERRY (PRUNUS AVIUM L.) - IMPROVEMENT OF STANDS AND TREES

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Abstract

The possibilities of conservation and improvement of the state of wild cherry in Serbia by planting material production and by the establishment of plantations by different technological procedures are investigated. This paper presents the basic biological, technological and economic parameters of production of this highly valuable tree species. Wild cherry is a significant autochthonous species in our forests and as such it represents the initial material for the creation of numerous cherry varieties in fruit growing, serving as the stock for grafting cherry and sour cherry varieties. Cherry wood is evaluated as veneer wood in furniture industry, so its significance is increasing, taking into account also its fast increment. As an admixed species in coniferous forests, it improves the soil conditions since it accelerates needle decomposition and decreases soil acidity. It is the interest of forestry profession to start cherry selection and breeding for the production of planting material capable of the production of good-quality wood, fast-growing, resistant to diseases and pests, planting material which will be used as rootstock for grafting cherry and sour cherry varieties (i.e. the material with strong and branched root, compatible with the scion) and as the selected good-quality seed aimed at the establishment of intensive plantations.

Key words: *wild cherry, selection, breeding, plantations.*

EFFECT OF VINEYARD FLOOR MANAGEMENT ON YIELD AND GRAPE QUALITY OF CV. CABERNET SAUVIGNON (*VITIS VINIFERA* L)

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Abstract

Correct floor management is a vital factor in modern viticulture, due to the influence of the water balance of the vineyard, grape yield and grape quality. Two variantes of floor management were applied: V1 - completely bare soil maintained by mechanical cultivation, and V2 - partially covered soil, using a special mixture ofgrasses for perennial plantations between rows with a regular mowing regime. Investigations were carried out on cultivar Cabernet Sauvignon in central Serbian vinegrowing region. The latitude is 44° 25'47" North, longitude is 20° 02'43" East. Altitude is 163m. Average annual air temperature is 10,8 °C, mean vegetation temperature 16,6 °C and total annual amount of precipitation 600 – 700 mm. The two-year results of experiment clearly indicate that covering the soil between rows with grass vegetation with regular mowing reduce vine vigor and yield. The winter pruned shoot weight decreased from 1,15 kg (V1) to 0.5 kg (V2) per vine and grape yield from 1.8 kg to 1.6 kg per vine. Partially floor cover increased content of total dry matter in must (from 24.7 to 26.1 Brix %), total anthocyanins content in berry skin (from 10.4 to 11.45 mg g⁻¹ FW) and total phenols (from 1010.5 to 1075.0 mg l⁻¹ GAE). Content of total acid in must was slightly reduced from 6.4 to 6.1 g l⁻¹. Using a special mixture ofgrassesbetween rows is a powerful tool for controlling vegetative growth of grapevines in moderate temperate climate, wherethere is smallpossibility of drought during flowering and berry set.

Key words: *completely bare soil, partially covered soil, soluble solids, anthocyanins, total phenols.*

EVALUATION OF SOIL ORGANIC MATTER MODELS USING DATASET FROM A LONG-TERM EXPERIMENT ON CHENOZEM

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Abstract

Soil organic carbon models (RothC, CENTURY, DNDC and ICBM) were evaluated using the three datasets from long-term experiment “*Plodoredi*”. Datasets consisted of a different cropping systems (monoculture, 2-year rotation and 3-year rotation) in a temperate climatic condition on Chernozem soil. The performance of each model in simulating each dataset is discussed in a long-term period (> 10 years). Model simulations were evaluated against the measured data of topsoil organic carbon and the results of the models were compared both qualitatively and quantitatively. All models consider carbon input with plant residues as major decomposable pool of carbon. Therefore yield performance significantly contributes to soil carbon change. However, variation from the computed value may be attributed to the effects of environmental stress or pest, diseases and weed effects on yield. A comparison of the models overall performance across datasets reveals better applicability within the 3-year rotation. On the basis of our results, it can be concluded that RothC model and ICBM are the most suitable for the estimation of soil organic carbon change and can be used for the modeling of carbon changes on the Chernozem soils within similar agroecological conditions. With anticipated dependence of yield on increase in mean temperatures and precipitation soil carbon balance will be sufficiently sensitive to crop management. Consequently, anticipation of soil carbon with models will become increasingly important in the preservation of soil organic matter.

Key words: *soil organic carbon, chernozem, yield, crop residue, climate.*

GENETIC ESTIMATIONS OF SOME VINE VARIETIES IN KOSOVO BASED ON MOLECULAR MARKERS AND AGRONOMIC DATA' S

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Abstract

Paper aims at definition of some typical autochthonous and regional cultivars with good harvest features and high adaptation in climatic and ground conditions in Kosovo region.

The biggest viticulture area is located through Drini i Bardhe valley 340 – 600 meters above the sea level. The most of vineyards are in hills areas and in valley slopes and well exposed to sunny beams, with annual rainfall of 743 mm and average monthly temperatures above 10 °C in 208 days.

Although grape cultivation exists for a long time, this area is converted to very high productive area through years. The intensive agriculture improved agrobiologic characteristics of grape cultivars and modification of environmental parameters related with pedology / microclimate conditions and further more had great impact on economic development of area. The definition of grape vine variety according to ampelographic study and definition of variety studied according to IPGRI (The International Plant Genetic Resources Institute) are given.

Biological material is collected from the field, fresh leaves and twigs for incubation. From all cultivars from all studied vineyard zones are taken 10 parallel genotypes for extraction of DNA. In total, 1 vineyard zone x 3 locations x 5 cultivars x 10 parallels amounted to number of 150 extractions. The extraction method used was based on use of CTAB (cetyl trimethyl ammonium bromide) customized for grape plants. The estimation of amount and quality of DNA extracted is based on protocols given by Sambrook (1998). The amount and quality of collected DNA resulted to the measurement report OD 260/280 nm between 1.6 – 1.8 , well reasonably for molecular estimation.

Key words: *Vine varieties, environmental conditions, biological materials, Kosovo.*

2. PLANT PROTECTION AND FOOD SAFETY

RESISTANCE RISK ANALYSIS FOR PLANT PROTECTION PRODUCTS

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Abstract

Resistance is the naturally occurring, inheritable adjustment in the ability of individuals in a population to survive a plant protection product treatment that would normally give effective control. Although resistance can be demonstrated in the laboratory, this does not mean that pest control in the field is reduced. The importance of resistance depends on the target pest(s) and crop(s), and on the relevance of the product among the available control measures. For this reason, resistance must be determined by using standard test methods and monitor for key pests. Resistance can be seen for insecticides, fungicides and herbicides. Detection of resistance, monitoring and assessment of resistance risk are interrelated. The aim of resistance risk analysis is to describe how the risk of resistance to plant protection products can be assessed and systems for risk management can be proposed in the context of official registration of plant protection products. Resistance risk analysis is a two-stage process, composed of resistance risk assessment and resistance risk management.

Keywords: *Resistance, risk assessment, risk management, pests, plant protection products.*

CONTROL OF *PENICILLIUM EXPANSUM* BY COMBINING *BACILLUS SUBTILIS* AND SODIUM BICARBONATE

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Abstract

In the recent years, biological control has been explored as an alternative to the use of synthetic fungicides for managing postharvest decay. Some exogenous substances, such as chitosan, amino acids, carbohydrates, carbonate and bicarbonate salts have been studied to enhance biocontrol capability of antagonists against fungal pathogens. Simultaneous application of chemicals and biocontrol agents could provide more effective means of control and consistent results than that of one approach alone. The objective of the present study was to evaluate and compare the biocontrol efficacy of *Bacillus subtilis* (CFBP 4228) with and without sodium bicarbonate (SBC) against *Penicillium expansum* on apple fruits. The addition of 3% (w/v) SBC in the suspension of *B. subtilis* completely inhibited spore germination of *P. expansum* in potato dextrose broth medium. In combination with *B. subtilis*, SBC exhibited a consistent ability to enhance the biocontrol performance of antagonist against *P. expansum*. Lesion diameter of apple fruits treated with mixture of *B. subtilis* and SBC was significantly reduced, in contrast to inoculation with *B. subtilis* alone. The results of this study show that combination of *B. subtilis* and SCB provided a more effective control on *P. expansum* than applying the antagonist or SBC alone, and can be used as a non-chemical alternative treatment against blue mold on apple fruits.

Keywords: *Penicillium expansum*, postharvest decay, *Bacillus subtilis*, sodium bicarbonate.

CORRELATIVE DEPENDENCIES BETWEEN THE DENSITY AND GROWTH PARAMETERS OF *SINAPIS ARVENSIS* (L)

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Abstract

Pot trials were performed in a glasshouse of Institute, during 2011 and 2012. The experiment included five variants with different density of *Sinapis arvensis* L. (1, 3, 6 and 9 plants per plot) with four replicates. The weed height, fresh weight, dry weight and leaf area were determined on 5th, 15th, 25th, 35th days after seed germination. The dependence between the number of *Sinapis arvensis* and growth parameters his is summarized by the coefficient of correlation (r^2).

It was established that the main parameters determining intraspecific competitive relations in the weed are height, fresh weight, dry weight, leaf area. The growth parameters of *Sinapis arvensis* progressively decreased as the number of weed from 3 to 9 per pot increased. Results of investigation showed that between density of the weed and growth and development his correlative negative dependencies was found. The coefficients of correlation (r^2) were very high during the period of studies 5-35 days after germination in all parameters. Marked negative correlations are significant. Height, fresh weight, dry weight, leaf area of weed plants significantly decreased with increasing density of *Sinapis arvensis*. The density of this weeds is one the factors which govern its growth, development and seed production.

Intraspecific competitive relation and correlative negative dependencies between the density of *Sinapis arvensis* and its growth parameters could be useful for examining the biological control of weeds and prediction of yield loss in crop.

Key words: *Sinapis arvensis*, density, growth parameters, coefficient of correlation.

PESTS OF APPLE LEAF AND FLOWER BUDS IN THE REGION OF EAST SARAJEVO

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Abstract

Insect species that feed with leaf and flower buds of apple are significant pests in all areas where this kind of fruit-trees are cultivated. Feeding with buds as imago and/or larvae of these insects do, make damages manifesting in buds drying, disturbing normal development of leaves and flowers, reduction in the yield and quality of fruits.

Exeminations were carried out in apple orchards in three locations on the region of East Sarajevo. Two extensive plantations over 40 years old were situated in the localities of Kasindo and Pale, while one intensive and youngish orchard with sorts Idared, Jonagold and Gold Delicious, was in the locality of Kula. Presence and harmfulness of buds pests was observed in the period of 2007-2008.

Seven species of harmful insects have been reared and determined on apple leaf and flower buds. Six Lepidopterous species were from the families Tortricidae and Geometridae, and one Coleopterous species was from the family of Curculionidae. Tortricidae was represented with four species: *Hedya nubiferana* Haworth, *Spilonota (Tmetocera) ocellana* Fab., *Archips podana* Scopoli and *Pandemis heperana* Den.et Schiff. Two Geometrid species were *Hibernia defoliaria* Clerck and *Cheimatobia brummata* Linne. Only one beetle from the family Curculionidae was *Anthonomus pomorum* Linne.

In extensive plantations the most numerous species on leaf buds during both years was *Ch. brummata*, but on flower buds it was *A. pomorum*. In intensive plantation on a leaf buds existed 3 species, but two of them (*P. heperana* and *H. defoliaria*) were more numerous, while on a flower buds dominated *A. pomorum* with almost equal representation in all sorts and in both years.

Keywords: *insect pests, leaf buds, flower buds, apple, East Sarajevo.*

AGRICULTURAL PRODUCTION CONTRACTS AND FOOD SAFETY

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Abstract

Food safety is currently one of the most urgent issues in both EU's and global agriculture. One of its basis tool might be the cultivation contract that is strictly related with the process of production and supply in agriculture.

The contract in question has numerous functions, which are modified along with the technological progress. However, it should still be seen as the main stem of the system supplying raw materials for the agri-food industry. The contract plays a huge role in the agro-logistics chain. It covers such elements as planning, gathering, controlling and flow of the materials that are directed to the processing or sell. Besides, it should be perceive as a legal instrument limiting broadly understood risk in agricultural production.

The aim of the article is an attempt to indicate the role of the production contract in providing the food safety. The article also aims to answer the question what safety issues might be covered by such a contract to fulfill the general safety standards.

Keywords: *agricultural production contracts, production risk, food safety, agri-food industry, food chain.*

RESIDUES FOLPET IN GRAPE ŽILAVKA AND BLATINA VARIETIES FROM PLANTATION CULTIVATION AND IN THE SMALL VINEYARD

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Abstract

The application of pesticides is a necessary measure in the cultivation of grapevine. Fungicides, in comparison to other pesticides, are the most often used in vineyards due to the sensitivity of grapevine on the most common diseases caused by pathogenic fungi (*Plasmopara viticola*, *Uncinula necator* and *Botrytis cinerea*), which reduce the yield and quality of grapes. Frequent use and misuse regardless respecting of preharvest period, causes accumulation of fungicide active substances in grapes, and then their transfer into the wine. In this paper the results of the residues of folpet in two most frequently grown varieties of wine grape (Žilavka and Blatina) from plantation cultivation and in the small vineyard are presented. The device GC/MS Agilent 7890A/5975C and analysis method UNI EN 15662:2009 QuEChERS was used for determination of residues of folpet. Determined concentrations of residues of folpet in grapes of Žilavka and Blatina grown in 2011 in two plantations and in the small family vineyard were below the MRL value (Maximum Residue Levels) determined for folpet with Regulation (EC) No. 396/2005, which for wine grapes is 5 mg / kg as well with Regulations on the quantities of pesticides and the other toxic substances, hormones, antibiotics and mycotoxins that may be present in food ("Official gazette of SFRJ", No. 59/83 and 79/87) that for folpet is 2 mg/kg.

Key words: grapes, folpet, MRL, Žilavka, Blatina.

EFFECT OF SOWING DATE ON SPECIES COMPOSITION OF INSECT PESTS ON WINTER TRITICALE DURING THE SPRING AND SUMMER IN BULGARIA

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Abstract

The effect of sowing date of winter triticale on the species composition of insect pests on the crop during the spring and summer growth stages was evaluated in Kostinbrod (Bulgaria) for the period 2009 - 2013. Forty-two damaging insect species belonging to six orders: Orthoptera, Thysanoptera, Hemiptera, Coleoptera, Hymenoptera and Diptera, were identified. In early spring (during the growth stages of tillering and stem elongation) the most damaging species for early winter sowings (sown during the last decades of September) were stem boring pests. Their complex included adults of Hemiptera, and larvae of Coleoptera and Diptera, among which *Opomyza florum* and *Phorbia fumigata* were the most important species. Damages caused by *O. florum* were prevalent in early sowings, while those caused by *P. fumigata* were more pronounced in late triticale sowings (sown in the second and third decade of October).

In late spring and early summer (during the growth stages of heading – ripening of winter triticale) the most damaging insects were sap-sucking species from the orders Thysanoptera and Hemiptera, and family Cecidomyiidae (Diptera). The wheat thrips *Haplothrips tritici* was the most abundant. Twenty five species of Hemiptera from the families Aphididae (3 species), Aphrophoridae (1 species), Cicadellidae (9 species), Delphacidae (1 species), Miridae (5 species), Pentatomidae (4 species) and Scutelleridae (2 species) were found to damage the leaves, spike and grains of winter triticale. The dominant species were *Aelia rostrata* and *Eurygaster maura*. Insect pests from the genera *Dolerus* and *Cephus* were of insignificant importance.

Keywords: *growth stages of winter triticale, insect pests, sowing date, damages.*

USE OF PHEROMONES FOR MONITORING AND CONTROL OF MAIN PESTS OF APPLE IN BULGARIA

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Abstract

The trials were carried out in Bulgaria in the years 2006-2008. The possibilities for reducing the number of treatments with chemical insecticides against pests in apple orchards of Bulgaria, by use of synthetic sex pheromones have been studied. In some species this reduction may be due solely to an adequate monitoring strategy implemented by pheromone traps, indicating the most appropriate time for treatment, thus avoiding inappropriate sprays. The pests that may be successfully controlled using this strategy are leaf miners, apple sawfly, San Jose scale, apple clearwing and leopard moth borer. The key pest of apple – codling moth (CM), *Cydia pomonella* L., which has shown the high resistance to most chemical insecticides used, can be successfully controlled using the method of mating disruption (MD), consisting in disorientation of males, by dispersion of the synthetic pheromone over an orchard lot. A significant reduction of population density of this pest is possible through a combination of mating disruption with application of virus insecticides. The present review paper contains a summary of the selected, most important results of investigations on use of sex pheromones for management of apple pests, carried out by the authors in Bulgaria.

Keywords: *apple pests, codling moth, sex pheromones, flight monitoring, mating disruption, Bulgaria.*

VEGARD – BOTANICAL FUNGICIDE

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Abstract

Powdery mildew, caused by the fungus *Sphaerotheca pannosa* var. *rosae*, appears as a white powdery growth on rose leaves, stems, buds, or flowers.. We studied the development of *S. pannosa* var. *rosae* in roses in Serbia and protection with Vegard 0.5% AS. The trials were set according to the instructions of methods PP1/152(2)(EPPO, 1997) and PP1/104(2). Phytotoxicity was estimated by PP 1/135(2)(EPPO, 1997). The differences of the disease intensity were evaluated by the analysis of variance and LSD-test. The results of the research have demonstrated that there is no statistically significant difference between mid-treatments of other variances and all other treatments, and the differences are incidental. The summary of meteorological data and intensity of infection during the experiment are controlled.

Key words: *Vegard*, *Sphaerotheca pannosa* var. *rosae*, roses, efficacy

**CHEMICAL CONTROL OF *CURCULIO NUCUM* L.
(COLEOPTERA:CURCULIONIDAE)WITH KNAPSACK SPRAYERS
EQUIPPED WITH AIR-ASSISTED ROTARY DISC NOZZLES**

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Abstract

The hazelnut is one of Turkey's most important agricultural exports. The nut weevil *Curculio nucum* L. is the most dangerous pest of hazelnut trees. In this study, we used knapsack sprayers with air-assisted rotary disc nozzles for the chemical control of the nut weevil in hazelnut orchards. The study was conducted in the province of Samsun between 2008 and 2009, in an orchard with planting distances of 4 x 4.5 m between the trees, and an average tree height of 4.5-5 m. During the study, insecticide applications were performed at different doses. Important pulverization characteristics (volume median diameter, residue etc.) were determined by performing trace residue studies. The food dye, tartrazine, was used in trace residue studies. Biological effectiveness studies were also performed by using Carbosulfan insecticide. During the studies, the hazelnut trees were divided horizontally (lower, middle, upper) and vertically (external, middle, central) into different zones, and the consistency of insecticide distribution, insecticide penetration, residue and pesticide loss were determined. It was observed that the residue varied depending on different zones of the hazelnut trees. Based on the trace residue studies, the highest quantities of residue were identified in the middle and lower zones of trees. Biological effectiveness studies were conducted by performing cage and parcel tests. Based on these tests, the number of dead, alive, and paralyzed mature nut weevils was determined. During the study, the insecticide was applied at 1/1 dose, 3/4 dose, 1/2 dose, and at a standard dose of 20 l/da. The biological effectiveness value in the cage studies was 97.34% at full dose, 93.55% at 3/4 dose, and 90.67% at 1/2 dose. The biological effectiveness value in the parcel studies was 97.25% at 1/1 dose, 91.03% at 3/4 dose, and 80.27% at 1/2 dose. Based on the results of the study, it can be concluded that effective chemical control against nut weevils can be achieved with insecticide applications performed at 1/1 dose, at 3/4 dose, and at a standard dose of 20 l/da.

Keywords: Hazelnut, *Curculio nucum*, sprayer, residue.

CONTROL OF EARLY BROWN ROT - BLOSSOM BLIGHT IN SOUR CHERRY CAUSED BY *MONILIA LAXA*

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Abstract

Early brown rot (*Monilia laxa*) in stone fruit species is an economically important fungal disease. Infection and spread occur during flowering. The infected blossoms, young leaves and shoots become necrotic and die. Cool and humid weather creates favourable conditions for early infection causing loss of flowers and great reduction of yield.

The aim of the present study was to follow out the efficiency of different fungicides applied for control of blossom blight caused by *Monilia laxa* at crucial phenological stages of sour cherry development.

Observations on *Monilia laxa* development and spread were carried out in the period 2008-2012, in a sour cherry orchard with three cultivars: 'Oblachinska', 'Schattenmorelle' and 'Heimanns Rubin, in the region of Hisar town. In 2008 a treatment with thiophanate-methyl /Topsin M/ at the rate of 150 g/dka was applied at the flowering stage. The infection rate of *Monilia laxa*, reported after flowering, was 32% in 'Oblachinska' cv., 17 % in 'Schattenmorelle' and 8% in 'Heimanns Rubin, respectively. In untreated trees of the same cultivars, the infection rate was 97%, 54% and 21%, respectively. In the next years 2009-2012, different fungicides were applied at the white button phenological stage, followed by spraying during flowering stage. After flowering stage, reporting the injuries caused by *Monilia laxa* showed that the infection rate was decreased and in 2012 disease development ceased.

Key words: *early brown rot, Monilia laxa, sour cherry.*

EFFECT OF FERTILIZER RATES ON THE INCIDENCE OF INSECT PESTS OF *SORGHUM BICOLOR* (L) MOENCH IN THE NORTHERN REGION OF GHANA

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Abstract

Physiological susceptibility of crops to insect pests may be affected by the form and level of fertilizer used. The study was to identify the insect pests of some newly improved varieties of sorghum and evaluate the effect of different fertilizer rates of inorganic fertilizer on the pests in northern region of Ghana. The experiment was undertaken within the Yendi and Savelugu-Nanton Municipalities of the region in a split plot design with four replicates at each site. Fertilizer levels served as the main plots and varieties as the subplots. Three varieties of sorghum namely, Kapaala(improved variety), Dorado(improved variety) and Kadaga(farmer variety) were used. Three fertilizer rates were also used. These were higher rate (250 kg NPK +250 kg SA/ha) recommended rate (250 kg NPK +125 kg SA/ha) and no fertilizer (as control). Data was collected fortnightly throughout the growing season of the crop and the insect pests and their numbers were recorded. Insects identified on the sorghum crops within both Yendi and Savelugu districts were grasshoppers, stem borers, leafminers, headbugs, midges, spittle bugs and others such as beetles and planthoppers. There were significant differences in the effects of the three fertilizer rates on the incidence of the different insects identified. However considering a particular insect species the fertilizer rates did not show marked differences in their effects. Midges and headbugs highly infested Kapaala and Dorado varieties than the Kadaga variety. The observation was attributed to the relatively compact heads of Kapaala and Dorado varieties which favours oviposition of the insects.

Keywords: *Sorghum, insect pests, Ghana, fertilizer rates, improved varieties.*

ASSESSMENT OF THE SANITARY STATUS OF POME FRUIT CROPS IN KOSOVO, WITH PARTICULAR EMPHASIS TO VIRUS, VIROID AND BACTERIAL DISEASES

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Abstract

Pome fruits represent very important fruit crops in Kosovo, covering around 50% of the total fruit production. In order to understand the phytosanitary status of pome fruits crops in the Kosovo assessment was carried out for detecting 4 viruses (ACLSV, ASGV, ApMV, ASPV), 3 viroids (ADFVd, ASSVd, PBCVd) and 3 bacteria (*Erwinia amylovora*, *Pseudomonas syringae* pv. *syringae*, *Pseudomonas syringae* pv. *papulans*) on apple and pear. For detection of viruses and viroids serological (ELISA) and molecular techniques (RT-PCR) were used. Concerning bacteria, morphological, biochemical (LOPAT test) and molecular (rep-PCR) tests were performed. This survey showed that ASPV, ACLSV, ASGV and ApMV were detected in the main apple producing areas in Kosovo, while no pear trees were found infected by these viruses. ADFVd was also detected on apple. Moreover, *Erwinia amylovora* was widely distributed on apple and pear in different cultivated areas.

Key words: *Kosovo, pome fruits, viruses, viroids, bacteria.*

MONITORING RESULTS FOR *SCAPHOIDEUS TITANUS* BALL (HEMIPTERA: CICADELLIDAE) IN GRAPE-GROWING REGION OF PODGORICA IN 2012

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Abstract

After the first record of the leafhopper *Scaphoideus titanus* Ball (Hemiptera: Cicadellidae) presence in the vineyards of Montenegro in 2008, in the vicinity of the city of Podgorica, situated in the largest wine-growing region in Montenegro (Podgorički subregion), during the following years it has mostly spreaded to new localities adjacent to the first detection site.

In the 2012, monitoring was conducted on three localities within the Podgorički subregion (Šušunja, Lješkolje and Beri). In all inspected vineyards dominant variety of grapevine was black variety Vranac and, in a lesser extent, black variety Kratošija.

In order to detect presence and the beginning of *S. titanus* nymph emergence, lower side of the oldest grapevine leaves were visually inspected from mid-May to mid-June, while adults were collected from the beginning of July to the end of August. In each locality 10 rows were checked per vineyard. For nymph presence, ten plants in each row were inspected and adults were collected by sweeping with entomological net (10 bits per row). Presence of *S. titanus* eggs were checked in two and three year-old grapevine shoots. In January 2013, in each locality, 50 shoots per vineyard were collected and examined in laboratory.

Results of monitoring showed presence of first nymphal instars during the end of May in localities Šušunja and Beri, and first adults in the second half of July. In both localities population density was low and resulted in 4-9 detected nymphs on the grapevine leaves per vineyard, and 1-10 captured adults. The number of *S. titanus* overwintering eggs, laid on the bark of two and three year-old grapevine wood, were also low in both localities.

Presence of *S. titanus* was not detected in locality Lješkolje.

Key words: *Scaphoideus titanus*, monitoring, grape-growing region, Podgorica.

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS SYSTEM OPTIMIZATION IN A GLUCOSE SYRUP FACTORY

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Abstract

The glucose syrup is a product obtained from starch slurry through hydrolysis processes. The hazard analysis and critical control points is a management system which aims to assure the safety of the food products by the identification, controlling and prevention of microbiological, chemical and physical hazards. Even if the production process of the glucose syrup is aggressive and unfavourable to the multiplication of microorganisms, the food safety hazards still exist. This paper aims to review the international literature and the general guidelines of food safety assurance in order to optimize the HACCP system already implemented in a glucose syrup factory. Several control and critical control points were identified and for each one the specific monitoring procedure was elaborated. Also, several preliminary programs were identified and centralized in order to prevent the occurrence of hazards.

Key words: *glucose syrup, HACCP, food safety.*

LATE BLIGHT ASSESSMENT OF POTATO CULTIVARS USING A NEW EXPRESS METHOD

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Abstract

The proposed assessment method makes it possible to evaluate the level of the foliage/tuber susceptibility of potato cultivars to late blight, caused by *Phytophthora infestans* (Mont.) de Bary, under field and laboratory conditions using a mathematical simulation approach.

Key words: *Phytophthora infestans*, late blight, potato resistance.

CHANGES IN PHENOTYPIC CHARACTERISTICS OF THE MOSCOW *PHYTOPHTHORA INFESTANS* POPULATION IN THE PERIOD OF 2000-2011

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Abstract

A long-term monitoring of the Moscow population of *Phytophthora infestans* (Mont.) De Bary, a causal agent of the late blight disease of potato, was performed in the period from 2000 to 2011. A total of 1097 isolates has been assessed for changes in phenotypic characteristics such as the virulence pattern, mating type and metalaxyl resistance. A trend toward an increase in the percentage of the A2 mating type was observed in the first half of the period surveyed. During the whole period, metalaxyl-sensitive isolates remained dominant in the population. In recent years the frequency of the virulence gene 2 began to sharply decrease, whereas the frequency of the gene 10 increased. Among rare virulence genes (genes 5, 6 and 9), the gene 9, which has not been revealed in the Moscow *Ph. infestans* population before 2000, has been stably observed since 2006. Thus, the current *Ph. infestans* population of the Moscow region includes all 11 virulence genes. During the whole period of the study, the *Ph. infestans* population was presented mainly by complex races that include 5-11 virulence genes; the fraction of such complex races makes 50-70%. The most complex race, including all 11 virulence genes, was observed in period 2008 to 2011.

Key words: *Phytophthora infestans*, potato, virulence, metalaxyl resistance, mating type.

CORRELATION OF PHENOLIC COMPONENTS IN RED AND PURPLE TOMATOES

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Abstract

Different parts of plants (roots, leaves, flowers, fruit, stem, bark) have been successfully used to treat numerous diseases. Tomato is known for its medicinal properties. The components that affect its activity are different phenolic compounds.

In this paper, we compared the content of phenolic compounds between the Russian Black Prince variety, type were tested, which is with high content of anthocyanins with hybrid Sidra F₁ selections Institute of Vegetable S.Palanka. In the phase of technological maturity, the selection of sample produce for the purpose of chemical analysis has been performed. The object of the paper has been to define and establish the correlation between the total phenolic compounds and their antioxidant activity in the ethanol extracts of tomato .

Key words: *phenolic components, antimicrobial properties, tomato, extract.*

ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF LETTUCE

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Abstract

In recent years, lettuce has been increasingly used in human diet throughout the year because of its nutritional and medicinal properties. In this research, lettuce *Lactuca sativa* L. var. *romana* (marula) was used. The content of the antioxidant compounds (phenolic compounds, L-ascorbic acid, β -carotene and lycopene) and the antioxidant activity were determined in ethanolic extracts of the lettuce by means of spectrophotometric methods. A high content of phenolic components provides favourable antioxidant properties found in the examined lettuce. According to the results, the lettuce extract displays the antioxidant activity, with the total antioxidant capacity of 78.98 ± 0.25 μg of ascorbic acid/g and 50% inhibition concentration values of 26.95 ± 0.99 $\mu\text{g}/\text{mL}$ for 2,2-diphenyl-1-picrylhydrazyl free radical scavenging activity, and 98.88 ± 0.94 $\mu\text{g}/\text{mL}$ for hydroxyl radical scavenging activity.

The antimicrobial activity of the lettuce extract, was tested with bacteria from clean cultures *Staphylococcus aureus* ATCC 25923, *Klebsiella pneumoniae* ATCC13883, *Escherichia coli* ATCC 25922, *Proteus vulgaris* ATCC13315, *Proteus mirabilis* ATCC14153, *Bacillus subtilis* ATCC6633, and fungi *Candida albicans* ATCC10231 and *Aspergillus niger* ATCC16404. The antimicrobial activity was determined by microdilution method (MIC). The smallest susceptibility to the ethanolic extract of lettuce was exhibited by the bacteria *Staphylococcus aureus* and *Proteus vulgaris* (MIC=78,125 $\mu\text{g}/\text{ml}$), while the other selected bacteria and fungi showed higher susceptibility (MIC=39,1 $\mu\text{g}/\text{ml}$).

Keywords: lettuce, antioxidant activity, antimicrobial activity.

SENSORY AND CHEMICAL EVALUATION OF PLUM, APRICOT AND PEAR DISTILLATES

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Abstract

This study was conducted to evaluate the sensory properties and certain parameters of the chemical composition of twelve samples of alcoholic beverages. The test samples included: six samples of plum distillates produced in different years (1985., 1997., 2000., 2004., 2007 and 2010), three samples of apricot distillates and three samples of pear distillates produced in the years 2004., 2007. and 2010. All samples were collected in the region of Čačak. The sensory properties analysed were: colour, smell, taste, clarity and typicality. The following chemical characteristics were evaluated: ethanol content, total acidity, volatile acids, nonvolatile acids and esters. The quality of the distillates analysed depended both on the type of fruit used to obtain the distillate and year. The analyses showed that the 1985 plum distillate exhibited the best sensory properties (total score 19.30) as well as the highest values for both the alcohol content (55% v/v) and total acidity (2.76 g/l). Volatile acids, nonvolatile acids and esters in the sample were found at 1.992 g/l, 0.768 g/l and 1520 mg/laa, respectively.

Key words: *alcoholic beverages, chemical composition, sensory properties.*

ALLELOPATHIC EFFECT OF *XANTHIUM STRUMARIUM*L. AND *ABUTHILON THEOPHRASTI* MED. EXTRACTS ON GERMINATION OF MAIZE AND SOYBEAN SEED

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Abstract

During 2012 allelopathic effects of *Xanthium strumarium*L. and *Abutilon theophrasti* Med. extracts to germination and initial development of maize (*Zea mays* L.), and soybean (*Glycine max* L.) were studied in laboratory conditions. In addition to the Water extracts out of dry mass of the tested weed species, extracts made by use of hexane, ethyl acetate and methanol in different concentrations were also used. The applied concentrations were 10, 20, 30 and 40 g/l of dry matter made out of weed species in the 3-4 leaf stage of development. Inhibiting effect of water extract from dry matter of *Xanthium strumarium*(L.) and methanol extract from which methanol part was evaporated to maize seed epicotyls and hypocotyls length was established. In comparison to the control, the maximum concentration of 40 g / l of the extract made from Water solution of *Abutilon theophrasti* Med. showed inhibitory effect on soybean seed epicotyls and hypocotyls length. The study was conducted in a randomized block design with 4 replications during which 25 seeds of maize and soybean were laid into Petri dishes. The applied extracts made out of dry matter of the both of the studied weed species *Xanthium strumarium*(L.) and *Abutilon theophrasti* Med. reduced maize seed germination for 14.8-26.83% and soybean seed germination for 18.5-35.82%, in comparison to the control in which it was 95% and 92%, respectively. After germination in a climate chamber, epicotyls' and hypocotyls' length of maize and soybean seeds was measured three, six and ten days following spraying by extracts.

Key words: *allelopathy, extraction, maize, soybean, seed.*

POSSIBILITY OF CHEMICAL WEED CONTROL IN SPRING RAPESEED

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Abstract

Possibility to chemically control, annual and perennial broad-leaf and narrow-leaf, weeds in spring rapeseed has been tested in the experimental station of Rimski Šančevi (locality: Novi Sad). The following herbicides (a.i.) were tested: trifluralin, clomazone, quizalofop-p-ethyl and clopyralid. Simultaneously we tested the effect of the herbicides on hectoliter weight of seed, as well as oil and protein content in seed. In Novi Sad, the location predominated by annual broadleaf weeds, the performance of these herbicides was much better. The tested herbicides differed significantly in their effect on the quantity and quality on yield parameters of spring rapeseed. Of all the tested herbicides only the application of Gamit (clomazone) showed phytotoxicity that was expressed on plants.

Key words: *spring rapeseed, weeds, herbicides.*

FIRST REPORT OF *RHIZOCTONIA ZEA* CAUSING STUNTING AND ROOT ROT ON WHEAT IN TURKEY

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Abstract

Rhizoctonia is a destructive soilborne pathogen with a wide host range in the world. It is one of the main causal agents of dryland root rot on wheat in Turkey. Wheat is widely planted in the Central Anatolia Region in Turkey. In order to identify species of *Rhizoctonia*, surveys of wheat fields in the Konya, Ankara, Eskisehir, Yozgat and Kırıkkale (provinces in the Central Anatolia Regions) were undertaken. Three of the *Rhizoctonia* isolates collected from necrotic lesions on the root and crown were identified as *Rhizoctonia zea* (teleomorph: *Waitea circinata* var. *zea*), as well four of the isolates from rhizosphere soils. Species identification were done according to the basis of hyphal and colony morphology, anastomosis reaction with known tester isolates and comparing sequences of Internal Transcribed Spacer (ITS) region. Colonies growth on PDA were orange when young and became salmon colored with age. Sclerotia were uniform and nearly spherical, mostly 0.2 to 0.5 mm in diameter, initially orange and turned brown during time. The number of nucleus in each hypha cell was 4 to 8. The resulting sequences were compared to other sequences and were 82 to 95% identical to other *R. zea* sequences in GenBank.

First pathogenicity test was conducted with agar-plate assay with all isolates and then it was tested on seedlings grown in pots the most virulent isolate on susceptible wheat cultivar. Test was done in the greenhouse conditions at 23 ± 2 °C, with a 12-h photoperiod and 50–60% RH. Average disease severity value was determined as 81%. Pathogenicity tests revealed that *Rhizoctonia zea* caused significant reduction of emergence, stunting, reduction in the number of seminal roots and superficial discoloration on the hypocotyls and roots on wheat. Non-inoculated plants remained healthy.

This is the first report of *R. zea* isolated from wheat plants and rhizosphere soils in Turkey.

Keywords: *Rhizoctonia zea*, first report wheat, Turkey.

COLEOPTERAN PESTS INTERCEPTED ON IMPORTED FOREST PRODUCTS IN TURKEY

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Abstract

Five species of pests were intercepted in timbers imported to Turkey. All of them had plant quarantine importance which were determined by Plant Protection Central Research Institute in Ankara. Intercepted pests were identified by an entomologists and taxonomists. These pests were identified as *Scolytus multistriatus* (Marsham, 1802) and *Scolytus ratzeburgi* (Janson, 1856) (Coleoptera: Curculionidae: Scolytinae) and were intercepted from Ukraine in 2009. Another pest was identified as *Trichoferus campestris* (Faldermann) (Col.: Cerambycidae). It was intercepted on timber imported from Russia in 2011. The other pest *Monachamus galliprovincialis* (Olivier) (Col.: Cerambycidae) was intercepted on industrial wood imported from Ukraine in 2011. The last one *Ips acuminatus* Gyllendal (Col.: Scolytidae) was imported from Ukraine in 2012. According to these results, quarantine inspectors at the checkpoints of the plants and plant products entrance gates must be careful during inspections of imported forest products in Turkey. In this study, hosts, damage, geographical distribution, pathways, pest significance and phytosanitary measures were evaluated with regards to these pests.

Key words: *Coleoptera, Forest product, Interception, Quarantine, Turkey.*

OCCURRENCE OF *VIBRIO SPP.* IN BIVALVE MOLLUSCS HARVESTED FROM BUTRINTI LAGOON, ALBANIA

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Abstract

The main production of molluscs in Albania consists in the cultivation of *Mytilus galloprovincialis*, which takes place in Butrinti lagoon. All the positive cases of *Vibrio* spp. were isolated between June-September, which is related to the fact that *Vibrio* species prefer high water temperatures. By analyzing the physical and chemical indicators of water it was observed that the above mentioned species of *Vibrio* were isolated in the average temperature of 26.2 °C, average pH of 8.42 and average salinity 28.97 ‰. Based on the results obtained from this study, *Vibrio* species isolated from Butrinti lagoon molluscs were adapted to the following physical-chemical water conditions: temperature intervals of 23.6-28 °C, pH of 8.15 to 8.8 and salinity of 22.1-33.7 ‰.

Key words:*Bivalve molluscs, Butrinti lagoon, Vibrio spp.*

EFFICIENT PEST CONTROL IN OILSEED RAPE AND POSSIBILITIES FOR PROTECTING THE NATURAL POLLINATORS AND HONEY BEES

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Abstract

Oilseed rape is attacked by a number of pests, which could compromise the yield and quality of the produce. Losses caused by them could be reduced by applying a broad spectrum of pesticides (insecticides and fungicides) that often have a negative effect on the natural pollinators and honey bees.

Studies were carried out in the period 2010-2013 in the Training-and-Experimental Fields of the Agricultural University – Plovdiv and in industrial production areas in the regions of Pazardzhik and Plovdiv.

Phenological development of oilseed rape and the accompanying phytopathological and entomological problems enabled us to develop a plant protection model. The established critical period at the stages of buttoning – flowering – fruit set, includes the choice of applying the plant protection chemical and the time for realizing efficient control, combined with the possibilities for protecting the pollinators of oilseed rape.

Key words: *oilseed rape, pests, chemical control, pollinators.*

FIVE YEARS AFTER THE FIRST RECORD OF *TUTA ABSOLUTA* (MEYRICK) IN ALGERIA, WHAT DO WE EXPECT FROM ITS NATIVE NATURAL ENEMIES?

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Abstract

Since its first record in the vicinity of Mostaganem (Northwestern Algeria) in spring 2008, the tomato leaf miner *Tuta absoluta* Meyrick has established as a key pest of tomato crops. It is the most important pest devastating tomato crop throughout the year.

The development of approaches to manage *T. absoluta* in Mediterranean countries is depending of several factors. Many works were initiated on its control and much still remains to be done.

With the aim of gathering more information about practices, we monitored *T. absoluta* infestation in greenhouses. The list of its native enemies is in expansion, reaching nowadays over 10 native species. The mainly species of predators belong to the Miridae family (*Macrolophus pygmaeus*, *Nesidiocoris tenuis* and *Dyciphus tamanii*) and the most important parasitoid species belong to the Eulophidae family with three dominant species (*Necremnus arthynes*, *Stenomesus* sp and *Neochrysocharis formosa*). The first parasitoid species is found through the country while the second was more recorded in the South part of Algeria. When farmers adopt spontaneously chemical control because not having enough understanding about side effects of pesticides on beneficial organisms there are difficulties in doing available work on biological control. On the other hand unfortunately some native enemies are recorded under a misidentification. Indirect interactions were found have been neglected to explain the parasitism rate.

We are trying to explain what we have to do encouraging acceptable results in greenhouses and open fields. This way seems to us to be necessary because we are in constant suspense between enthusiasm and discouragement.

Keywords: *Tuta absoluta*, biological control, native natural enemies, integrated pest management.

AN EXAMPLE OF CROATIAN LABELING FOR PROTECTION OF AGRICULTURAL FOOD PRODUCTS

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Abstract

Food markets are saturated with highly competitive products that often do not possess the adequate quality. For this reason, consumers are uncertain about the quality and origin of the food products that they intend to buy. European Commission recognizes this problem and in 1992 created labels for protection of agricultural food products, known as “Protected Designation of Origin” (PDO), “Protected Geographical Indications” (PGI) and “Traditional Specialty Guarantee” (TSG). Croatia adopted these labels in 1995, since then, 4 products are registered with PDO label, 8 products with PGI label and one product is under the process of getting PDO label. At the beginning of 2012 the project aimed to protect the geographical origin of “Vrgorac strawberries” was initiated by strawberry producers’ association. The aim of project is to enhance production, increase competitiveness and quality of strawberries from area of Vrgorac. In the survey entire producing area of “Vrgorac strawberry” was involved, including the fields Rastok, Kotezi, Kokorici, Prapatnica, Jezero and Pojezerje. Furthermore, in this project, supported by the Ministry of Agriculture of Croatia, the production processes and the production range were standardized, and the most important chemical, morphological and organoleptic characteristics of the strawberries from that area were described. Based on the obtained results, a specification of “Vrgorac strawberry” will be drafted and submitted to the procedure for getting the protection of geographical indications label.

Keywords: *labels, protection of food products, protected geographical indications, evaluation, strawberry.*

EFFECT OF SEED TREATMENT WITH PLANT EXTRACT , BIOLOGICAL AND CHEMICAL AGENTS IN CONTROLLING FUNGI CAUSING COWPEAS DAMPING - OFF AND ROOT ROT

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Abstract

This study was conducted at the College of Education, University of Mosul – Iraq, to evaluate the control effectiveness of root rot and damping-off disease of cowpeas caused by *Fusarium heterosporum*, *Macrophomina phaseolina*, *F.solani*, *Pythium aphanidermatum*, and *Rhizoctonia solani*. Seeds are treated with aqueous and alcoholic extracts of neem (*Melia azedarach*), as well as biocontrol agents *Trichoderma viride* and the bacterium *Bacillus thuringiensis* and with fungicide Dithane M-45. Results indicate the superiority of Dithane M-45 than all biological treatments in decreasing infection percentage of pre-emergence and post-emergence and disease severity (2.96% , 3.51 % and 0.14 respectively) followed by alcoholic extract of neem leaves (4.44% , 5.18 % and 0.15 % respectively) which doesn't differ with the fungal biocontrol agent *T.viride*. Moreover, it treatments have increased each of seedling length of shoot, root and dry weight .

Keywords: *Plant extracts, Biocontrol, Seed treatment, Damping-off, Root rot, Cowpea.*

INFLUENCE OF LACTATE ON THE SUSTAINABILITY OF BEEF MINCED MEAT PACKAGED IN MAP

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Abstract

The aim of this study was to determine the influence of lactate on the sustainability of minced beef, stored in different temperature conditions. As test material were used fresh ground beef. Immediately after grinding, meat is treated with lactate packaged in modified atmosphere and stored at 2°C and 6°C. During storage the color of meat and pH value were measured, and sensory characteristics were studied.

Based on the performed investigation it was found that the meat treated with lactate and stored at 2°C and 6°C are characterized by greater sustainability.

Key words: *beef minced meat, lactate, MAP, pH value.*

DEHYDRINS FROM ARABIDOPSIS THALIANA EXPRESSED IN E. COLI PROTECT MEMBRANES DURING FREEZING

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Abstract

As the name dehydrins implies, these proteins are typically expressed in response to dehydration which can be caused by drought, osmotic stress or freezing temperatures. In general, dehydrins occur in plants as multi-gene families. Arabidopsis dehydrins (LTI29, ERD14, COR47 and RAB18) have been tested for protection of thylakoid membranes during freeze thaw cycle in vitro. Our results show that dehydrins LTI29, ERD14, COR47 protect thylakoid membranes at low temperatures. Results show correlation between level of cryoprotective activity and protein concentration. Our preliminary results indicate possible mechanism of cryoprotection in plants.

Keywords: *Arabidopsis thaliana, dehydrins, freezing tolerance, thylakoid, cold acclimation.*

ACCESSION OF MONTENEGRO TO THE EUROPEAN UNION: STATE AND CHALLENGES IN THE PHYTOSANITARY POLICY

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Abstract

In this paper are presented summarized challenges that Montenegro faced in the accession phase in the phytosanitary policy. The EU Member States recognized the independence of Montenegro in June 2006, and Montenegro became a potential candidate for EU membership. The Stabilization and Association Agreement signed on the same date between Montenegro and the EU, entered into force in 2010, abiding Montenegro to all the commitments related to the harmonization of national legislation in line with the EU *acquis*. This paper explores several key issues: administering the *acquis*, establishment of efficient institutional mechanisms and capacities in the phytosanitary area and development of the most acceptable administrative system for the establishment of the framework for the European course in field of protection of human, plant and animal life and health and protection of the environment. Coping with all these requirements was burdened with creation of a favorable economic prosperity and improvement of living standards, taking into account all specifics of Montenegro as a small country with limited human resources. This approach was enabled with strong links between all participants in phytosanitary area and common aim of strengthening and establishing relations in phytosanitary policy based on reciprocity and shared interests. Benefits of reforms depicted through continued improvement and expansion of relations between Montenegro the Union and other Member States. Progress of reforms is summarized in the European Commission's Opinion stating good level of harmonization of the *acquis* and well demonstrated and comprehensive understanding of the legislation and deficiencies that must be overcome until the accession date. Key points missing in investigated field are drafting of strategy for implementation, transposition and entering into force of EU *acquis*, plans for development of administrative capacities, assessment of financial resources and development of action plans.

Key words: *European Union, Montenegro, accession, phytosanitary policy.*

PRACTICAL IMPLEMENTATION OF THE MONITORING RESULTS OF CUTWORMS ON SELECTED PLANTATIONS OF SUGAR BEET IN POLAND

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Abstract

Cutworms damage to potatoes or beets are serious problem not only to farmers but also to the processing industry e.g sugar industry. Damage to potato tubers and beet roots can result in serious economic losses for producers (about 50-70%). Cultural practices such as crop rotation have been recognized as a strategy to keep pest populations under control..The aim of the of monitoring tests with Pfeifer & Langen Poland Company was to create a system for advisory services and raw beet growers in making decisions about the use of insecticidal treatment for the control against cutworms. Therefore, we compared two forecasting models determine time of chemical control, according to the signal and based on the determined sum of heat and sum of effective temperature for the developmental stage of larvae. The monitoring conducted in 2009-2012 by the Institute of Plant Protection - National Research Institute, and Pfeifer & Langen Poland SA, in selected plantations of sugar beet in the Wielkopolska and Dolnośląskie region by deployed light traps for catching moths was done. Observations on catches of adults of the *Agrotis segetum* (Schiff.) and *A. exclamatoris* (L.) was carried out 1-2 times a week, from early May to late July. As a result of growing trials established the beginning date and the maximum number of outlets of the pest in the plantations were established. Also compared the usefulness of its monitoring of catches cutworms with a systematic control of the plantation, since the finding of mass flight of moths. The audit objective was to observe: the beginning of egg laying, hatching the beginning of the first larvae, reaching the 10-12 mm size caterpillars and fix a date treatment of chemical control of cutworm. As a result of the observation period beginning set of moths and the total number of pest in plantations. In the study years insecticidal treatments against cutworms by signaling set between 29 and 40 days from the date indicating the start of a mass flight of moth. The treatments were determined by phenological method give the total heat in the range of 428°C to 565°C, and total effective temperature of 120°C to 260°C.

Key words: *monitoring, sugar beet, cutworms, Poland.*

HERBICIDE RESISTANCE OF CERTAIN WEED SPECIES

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Abstract

Development of weed resistance to herbicides is serious and growing problem in numerous agricultural systems all over the world. Herbicide use on farms provides safeness in solving of weed distribution problem, due to which other weed control measures have become of secondary importance and in great extension reduced. Herbicide resistance is an example of fast adaptation of weeds to human activity and therefore research efforts should be directed toward development of economically available strategies for environmental protection and resistance monitoring. Total number of 400 resistant biotypes in the world represents 217 different species, of which 129 are dicotyledonous and 88 monocotyledonous weeds. Evolved weed herbicide resistance has been established for 21 of 25 known herbicide action mechanisms, to 148 herbicides. The most important herbicide resistant weed species in the world are: *Lolium rigidum* Gaud., *Avena fatua* L., *Amaranthus retroflexus* L., *Chenopodium album* L., *Setaria viridis* (L) Beauv., *Echinochloa crus-galli* (L) Beauv., *Eleusine indica* Gaertn., *Kochia scorpia* Schrad., *Conyza canadensis* L. and *Amaranthus hybridus* L. In our country, so far six weed species resistant to different mechanisms of herbicide action have been identified, and these are: *Abutilon theophrasti* Medic., *Amaranthus retroflexus* L., *Chenopodium hybridum* L., *Echinochloa crus-galli* L. and *Setaria viridis* (L) Beauv. In laboratory tests resistance of weed species *Amaranthus retroflexus* L. and *Chenopodium album* L. was established to the herbicide nicosulfuron belonging to the group of ALS inhibitors.

Key words: *resistance, Amaranthus retroflexus L., Chenopodium album L., nicosulfuron.*

METHOD DEVELOPMENT FOR DETERMINATION OF HMF IN HONEY BY HPLC: A COMPARISON WITH SPECTROPHOTOMETRIC WINKLER METHOD

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Abstract

Hydroxymethylfurfural (HMF) is an organic compound derived from dehydration of certain sugars. Elevated concentrations of HMF in honey provide an indication of overheating, storage in poor conditions or age of the honey. Due to potentially toxic effect, HMF is essential to evaluate the conformity of honey. The current European and Slovene legislation established that its concentration in honey usually should not exceed 80 or 40 mg/kg, respectively. The International Honey Commission recommends three methods to determine HMF in honey (spectrophotometric methods after White and Winkler and HPLC method). The aim of the study at Central laboratories of Agricultural Institute of Slovenia was developing two methods for determination of hydroxymethylfurfural in honey (HPLC and spectrophotometric Winkler method). The HPLC method comprises dissolution of honey in distilled water, precipitation of proteins, filtration and quantitative determination by high performance liquid chromatography. Winkler's method determines the reaction between HMF, barbituric acid and p-toluidine which results to the red dyed complex, measured spectrophotometrically at 550 nm. We validated both methods and compared the results of measurements on different sorts of honey samples. The results of measurements indicated lower results using HPLC method.

Key words: *Honey, HMF, HPLC, Winkler, comparison.*

OCHRATOXIN A AND OCHRATOXIGENIC FUNGI IN TUNISIAN GRAPES AND WINE

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Abstract

This work summarizes the results of a large study on the occurrence of ochratoxigenic fungi and Ochratoxin A (= OTA) from wine and table grapes in Tunisia.

Black aspergilli were the dominant genus among the filamentous fungi isolated from grapes and were the only potential OTA-producing fungi found. The most abundant species were member of *Aspergillus niger* aggregate (63%) and *Aspergillus carbonarius* (36%). Uniseriate aspergilli were rarely present (1%). Of the *A. carbonarius* isolates, 97% were OTA positive but only 3% of the *A. niger* aggregate isolates produce this toxin. During grape maturation, the frequency of black aspergilli increased due to increase of the number of *A. carbonarius*.

Thereafter musts produced from mature grapes were analysed for their OTA content. More than the half of the samples contained detectable levels of OTA, (between 0.01 and 5.85 $\mu\text{g OTA l}^{-1}$). The most contaminated musts were obtained from the region of Raf-Raf located in the North-Est and characterized by a humid climate, however, musts obtained from the region of Regueb located in the center, which is a new area for the grapevine cultivation and characterized with an arid climate were rarely contaminated.

For the contamination of tunisian wine, OTA was detected 85% of the analyzed samples. The results show OTA levels ranged between 0.09 and 1.5 $\mu\text{g/L}$. Neither of the studied samples shown levels above the European regulatory limit (2 $\mu\text{g/L}$).

Keywords: *Black aspergilli, grape, HPLC, Ochratoxin A; Tunisian wine.*

COMPOST, COMPOST EXTRACTS AND BACTERIAL SUPPRESSIVE ACTION ON *PYTHIUM APHANIDERMATUM* IN TOMATO.

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Abstract

Effects of three composts prepared from Solid Olive Mill wastes (SOMW), *Posidonia oceanica* (Po) and Poultry Droppings (PD), at different proportions, were tested on *Pythiumaphanidermatum*. To evaluate the fungal pathogen inhibition, in vitro and in vivo tests were investigated. In vitro tests aimed to study the inhibitive effect of pure compost extracts and of the antagonist bacteria isolated. For the bioassays, drench and root deep inoculations were made on tomato seedlings. Pure extracts inhibited the fungal pathogen growth and inhibition rates were ranged between 14,5% and 22,8%. Isolated bacteria showed also an antagonist action on the mycelial growth of *P. aphanidermatum* and the 16sRNA identification of strains having more than 30% of inhibition showed that *Bacillus subtilis* and *B. thuringiensis* had the highest inhibition with 38% and 37% respectively. *Pseudomonas pseudoalcaligenes* and *P. fluorescens* inhibited of a 35% the mycelial growth and *Acromobacter xylocoxidans* of 34%. In vivo tests showed that drench inoculated seedlings stand of tomato sown in substrates with composts were between 55% and 80%. Root deep inoculated seedlings had a better growth in substrates mixed with composts. Furthermore seedlings in C₃ mixed substrate were higher than non inoculated control. Results showed that tested composts acted by their chemical composition and their microorganisms and at appropriate proportions they could be used as biological fertilizers.

Key words: Compost, Bacteria, *Pythium aphanidermatum*, antagonist effect.

**POTENTIAL OF ENTOMOPATHOGENIC NEMATODES
APPLICATION AGAINST *LIRIOMYZA HUIDOBRENSIS*
*BLANCHARD IN LEBANON***

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Abstract

Liriomyza huidobrensis Blanchard, the pea leafminer, started to be threaten for vegetable products in Lebanon since the beginning of 1990s. This study addresses the potential of applying a biological control agent, entomopathogenic nematode against *L. huidobrensis* *in vitro*. Entomopathogenic nematodes (EPNs) are parasites of soil-dwelling insects that occur in natural and agricultural soils around the world. Thanks to their entomotoxicity, EPNs are good tools for biological control in agriculture almost everywhere in the world. In the current study, one indigenous strain of EPNs, *Heterorhabditis indica*, was sampled on the coastal area in Lebanon and tested against *L. huidobrensis* pupae *in vitro*. Assays consisted of placing Petri dishes containing sterilized soil and entomopathogenic nematode solution in contact with the pupae of the pea leafminer. While previous studies used larval stages, in the current study, pathogenicity of EPNs is tested *in vitro* against *L. huidobrensis* pupae stage for the first time. Out of 150 pupae used during the experiment, $16 \pm 1.5\%$ of the pupae emerged into adults of *L. huidobrensis* and $21 \pm 2.5\%$ of the pupae were parasitized by another *Liriomyza* natural pathogene - *Diglyphus isaea* Walker. Results showed the mortality of $53 \pm 1.5\%$ for the *L. huidobrensis* pupae following the application of entomopathogenic nematodes without any emergence of infestive juveniles nematodes, one month following the infestation. The control tests showed that percentage of emergence from pupae were $79 \pm 2\%$. Comparison with the control tests indicates that $53 \pm 1.5\%$ of the *L. huidobrensis* pupae are potentially parasitized by *H. indica*. The indigenous strain in Lebanon, *H. indica* can therefore be considered as potential agent in biological control regarding its capability to cause pupae mortality *in vitro* and being isolated in favorable environmental conditions to the presence of *L. huidobrensis* pupae which could prevent field trial failures in further studies.

Keywords: *Liriomyza huidobrensis*, biological control, Lebanon.

3. ORGANIC AGRICULTURE

GRAIN QUALITY IN ORGANIC AND ECOLOGICAL CROPPING SYSTEMS

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Abstract

Ecological cropping includes combination of different crops at the same field and application of organic and mineral fertilizers, according to plant requirements. Organic cropping includes application of allowed organic fertilizers.

Trial was conducted during 2012. In ecological production maize and soybean were grown as: single crops (SC), in alternating rows (AR) and alternating strips (3 rows of each crop - AS). Fertilization regimes included: urea, Ofert (organic fertilizer), Uniker (microbiological fertilizer) and control. Organic production in trial included spelt, soybean and maize. Fertilization regimes were: DCM EKO-MIX 1 (F1), DIX 10 N (F2) and control. After harvest, grain yield, mass of 1000 grains, and content of phenolics, glutathione, phytate and β -carotene were determined in grain.

In ecological production the highest yields and 1000 grain weight were obtained in Uniker treatment, as well as with AR cropping in both crops, with two times higher values in soybean, in relation to control. Generally, soybean grain had higher levels of phytate, phenolics and β -carotene, compared to maize. In organic production differences in yield parameters were insignificant. Uniker show the highest impact on phytate and β -carotene accumulation in grain of both crops in ecological production, and the same trend was noticed in F1 treatment in organic production. The content of phenolics and glutathione varied among fertilization treatments, but the highest values were obtained in AR cropping. Lower level of phytate and higher level of β -carotene achieved in crops from organic production indicated higher nutritional quality of crops produced in this system.

Key words: *antioxidants, cropping systems, fertilization, grain, composition.*

ALBANIAN CONSUMER ATTITUDE AND BEHAVIOUR TOWARD ETHICAL VALUES OF AGRO-FOOD PRODUCTS

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Abstract

It is of paramount importance to know consumers' behavior and attitude toward specific values linked to agro-food products. In fact, there is a constant increase of consumer concern on and interest in products bearing ethical values. The study aims at exploring Albanian consumer knowledge of and attitude toward agro-food products with ethical values such as organic, fair-trade and typical/traditional ones. The work is based on primary and secondary data. Primary information was collected by face-to-face interviews with 311 adult Albanian consumers concentrated mainly in the central, south-eastern, south-western and northern part of Albania. Respondents were contacted randomly mainly in markets and other shopping areas. Questions dealt mainly with sources of information, knowledge and attitude toward agro-food products with ethical values, including reasons and motivations for buying them, purchasing channels, as well as opinion about prices and willingness to pay. Results obtained show that Albanian consumers have positive attitude toward organic products. About 82% of the interviewees buy organic products because they link the term "organic" with products acquisition directly from farms or in farmers' market. Most of interviewed Albanian consumers (68%) are aware that their consuming behavior generates environmental, economic and social impacts. In the meantime, the main motivation for buying organic and typical products is that they are considered safer, healthier and tastier. Higher price and low market availability are the main obstacles that should be overcome in order to increase sales of agro-food products with ethical values, which will bring sustainable benefits to Albanian rural areas and consumers.

Keywords: *consumer, agro-food, ethical values, Albania.*

THE PHYSICO-CHEMICAL PROPERTIES AND FATTY ACID COMPOSITION OF THREE DIFFERENT HAZELNUT VARIETIES COLLECTED AT THE DIFFERENT HARVEST PERIODS

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Abstract

The objective of current study was to determine the chemical properties of hazelnuts collected at the different harvest periods from Giresun province in Turkey. The oil contents of the first harvest period ranged from 12.3% to 6.51%. The moisture contents of nuts were found low in the same period. The oil contents of hazelnuts harvested at the last harvest period were ranged between 53.40% (sharp) to 66.11 (black). In general, palmitic, stearic, oleic, linoleic acid were identified as dominant fatty acids. Depending on the cultivar and harvest, the oleic acid have been identified at the highest rate and have been partial differences among the varieties. The oleic acid contents of varieties were determined between 74.79% to 85.58% depending on harvest period. Linoleic acid content was ranged from 5.70 to 15.64 %, palmitic acid content ranged from 4.92% to 7.31%. As other fatty acids was found at the minor level. The highest palmitic, oleic and linoleic acid contents have been identified respectively in Tonbul (II.harvest), Black (II.harvest) and Tonbul (I.harvest) varieties. The optimum harvesting time as depending on the physico-chemical properties of the all hazelnut varieties is understood to be August and September month.

Key words: *hazelnut, varieties, harvest periods, proximate, fatty aci,d composition.*

EFFECT OF FOLIAR NUTRITION ON MORPHOLOGICAL CHARACTERISTICS AND SOYBEAN YIELD IN ORGANIC CROPPING SYSTEM

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Abstract

Investigation was conducted with the aim of soybean grain productivity determining in the organic cropping systems on parcel of the Institute of Field and Vegetable Crops, Backi Petrovac (ϕ N45°20', λ E19° 40' 89msl). The study object was the Galina variety, 0 maturity group. The effect of foliar nutrition on morphological characteristics and soybean yield was studied. The experiment included two variants: variant without fertilizing (control) and fertilized variant (Slavol was used in fertilized variant).

The average soybean yield in the organic cropping system was 4,622 kg/ha. 1,000 grain weight averaged 173 g. The yield was higher by 258 kg/ha or 5.74% in the fertilized variant and 1,000 grain weight was higher by 13.2 g or 7.9% compared with the control.

The plants height in the treated variant was significantly higher compared with the control ($p < 0.5$). The plants had on an average 81.94 cm stem height and average plant weight was 16.00 g.

Foliar nutrition showed to be a feasible method of soybean productivity improving in organic cropping system.

Key words: *Glycine max*, organic cropping, morphological characteristics, yield, foliar nutrition.

PARTICIPATORY PROCESSES OF AGROECOLOGICAL INNOVATION IN ORGANIC CEREAL BREEDING: A CASE STUDY FROM ITALY

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Abstract

The growing interest towards organic and low input agriculture in Europe has highlighted the lack of cereal breeds suitable for these farming systems and their markets. To overcome this problem, new approaches to cereal breeding have been proposed, known as Participatory Varietal Selection and Participatory Plant Breeding. Based on the adoption of cereal's landraces and old varieties, these methods involve farmers, researchers and food processors with a participatory method. In this article we analyse the reasons and the implications of this approach, interpreting it as a case of open innovation, allowing access to, absorption and exploitation of external knowledge, with liberation of expertise for other members of the cereal supply chain. Emphasis is given to the important social signalling value and the general implications of this practice: the democratisation of the food system. Another consequence of this approach is the establishment of new organizational structures of innovation processes in agriculture, which can also be applied to other breeding methods. The next step could be the inclusion of consumers into the cereal breeding practice, in order to include their preferences and customs right from the beginning of the process. The article is completed by a case study of an organic cereal farm in Italy, part of the European project SOLIBAM, which is aimed at developing new strategies for organic and low-input integrated breeding. The case study is analysed within the framework of AE and open innovation paradigms, in order to understand participatory breeding practices and the consequences of their diffusion.

Keywords: *plant breeding, organic cereals, agroecology, participatory approach, open innovation.*

INFLUENCE OF FOLIAR APPLICATION OF GUANO ON GRAIN YIELD OF DIFFERENT CORN HYBRIDS IN ORGANIC PRODUCTION

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Abstract

Studies were performed during 2011 and 2012 on experimental field of the Institute for Vegetable and Field Crops, In Department for Organic production and biodiversity in Bački Petrovac. The experiment was set up on certified plot, as two-factorial according to split plot design with four corn hybrids: ZP 555su, NS 620k, NS 609b and NS 6030 and two fertilization systems: foliar fertilization with organic fertilizer guano with increasing concentrations and treatment of seed corn variety by *Azotobacter chroococcum* strain also with three different concentrations. The aim of the study was to determine whether different concentrations of *Azotobacter chroococcum* strain with which the corn seed was treated and increasing concentrations of organic fertilizer guano, foliar applied through two fertilizations, affect the yield and quality of corn grain.

The results of two years lasting studies of joint action of foliar application of increasing guano concentrations and decreasing concentration of *Azotobacter* strain in hybrids NS 620k and hybrid NS-6030, significantly increased corn grain yield in comparison to the unfertilized control variant. In the treatment with the highest applied concentration of guano in fertilization, and the lowest concentration of *Azotobacter chroococcum* for popping corn seed treatment, statistically higher yield was achieved in comparison to the treatments with lower concentrations of the applied fertilizer and bacterium strain. Statistically, higher yield of hybrid NS 620k was achieved in 2011, at all treatments with joint action of guano and *Azotobacter*, in relation to the treatments only by *Azotobacter chroococcum*.

Key words: *organic farming, guano, Azotobacter chroococcum, corn yield.*

EFFECT OF MICROBIOLOGICAL FERTILIZERS AND ZEOLITE ON YIELD OF WINTER RYE UNDER HIGH ALTITUDE CONDITION

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Abstract

Effect of microbiological fertilizers (Uniker and Slavol) and soil additive, zeolite on winter rye yield was investigated in this paper. Trial was set up in Akmadžići village in agroecological conditions of Zlatar mountain on altitude of 1065m, during two-year period 2010/11 and 2011/12. A randomized complete block design with three replications was employed. In organic cropping system three variants of microbiological fertilizer with zeolite were used prior to sowing (Zeolite, Uniker and Zeolite+Uniker). Half of each plot was treated with foliar microbiological fertilizer Slavol during crop growing period.

On the basis of two-year results it is obvious that meteorological conditions have very significant influence on winter rye yield. The big difference between temperature and precipitation has effect on significant differences between yield in two seasons. The second season, 2011/12 had weather pattern less favorable for the rye production due to severe drought. Different combinations of the microbiological fertilizers and the soil additive gave positive results specially in the first year of the trial. The best combination in organic cropping system was Uniker + Zeolite with foliar application of microbiological fertilizer Slavol, which resulted with the greatest yield of winter rye and this treatment can be recommended to producers. Winter rye performed very well under limited conditions of acidic soil on high altitude in organic cropping system and it can be recommended as very suitable crop for organic producers.

Key words: *winter rye, microbiological fertilizer, soil additive, organic cropping system, grain yield.*

AGROSYSTEMS PROTECTION AS HERITAGE ELEMENTS: CULTURAL LANDSCAPES

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Abstract

Transformations in agriculture during the last decades have generated a type of industrial intensive farming based on big inputs of energy and agrochemicals, which is considered a major cause of environmental imbalances. Moreover, historical cultures are generally sustainable, provide biological and landscape diversity, and often beauty. Frequently they form valuable heritage spaces. The human need for subsistence food production has kept them alive to this day in many places around the world.

Traditional crops are not natural: they need constant human action for maintenance. But the negative impact in the environment is much lower than in industrial agriculture. Many traditional agrosystems are properly Cultural Landscapes. These areas are being abandoned widespread in developed countries, and simultaneously with the spaces also the traditional social relations system. There are legal protection figures from heritage perspective, as UNESCO World Heritage, Landscape European Convention, or local legislation that can help in the aim to safeguard these ancient places.

We studied the Palmeral de Elche (Spain). It constitutes a representative example of this typology, which has been included in the World Heritage List. There we had a prospect over general aspects of degradation in a present urban transformed environment. It is a major item for conservation to understand his significance and strategic value. We are not only losing elements of the agrosystem, but also the ancestral culture associated with its maintenance and operation. We afford some ideas to evaluate landscape values and to understand essential nuances and places to preserve.

Keywords: *Agrosystem protection, Sustainability, Cultural Landscape, World Heritage, Palmeral de Elche.*

PRINCIPLES OF ORGANIC VITICULTURE APPLIED IN MURFATLAR VINEYARD, ROMANIA

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Abstract

The paper describes the particularities of the organic viticulture technology applied in Murfatlar vineyard. The research was conducted during 2011 and 2012, for two romanian varieties: Columna, for white wines and Feteasca Neagra, for red wines. The main climatic indexes were determined: the real heliothermic index (IHr), the bioclimatic index (I.B.V.), the oenoclimatic aptitude index (IAOe) and the aridity index (Martonne), as well as the soil hydric regime and the dynamics of some physiological processes (stomatal conductance and chlorophyll index).

Due to the climate warming and water deficit, the phytosanitary status of plant were good but the timing of full maturity was advanced by 5 - 6 days in 2012 compared to 2011.

After evaluating the harvest quality, it was found that during the studied years the conditions were favorable for obtaining quality wines - DOC (about 200 g/l sugar and 6-7 g/l tartaric acid in grape must).

Keywords: *Murfatlar vineyard, organic viticulture, addapted technology, harvest quality.*

THE INFLUENCE OF CONVENTIONAL AND BIOLOGICAL SYSTEMS CULTIVATION OF PLANTS ON EDAFIC BIODIVERSITY

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Abstract

One of the main goals of biological agriculture is to maintain the agro-ecosystemic balance, mitigation of negative impacts and improve environmental qualities. The realization of this objective is associated with agronomic aspects of soil fertility management, the dynamics of organic matter and the presence of edafic fauna in the sub-soil layer. The keeping of a good level of soil fertility, which supports long-term productivity of agro-eco-system, depends on the choice of cultural techniques. Dynamics of organic matter in soil is influenced by many factors, among which the presence of micro-flora and micro-fauna of the land. The diversity of species of micro-organisms present in the soil performs important keys functions in the eco-systemic recycling organic matter, transformation of nutrients and environmental qualities of agro-eco-systems. The diversity of microorganisms presents in soil depending on the system of cultivation, the type of soil, plant species and other organisms present in agro-eco-system. Conventional agriculture, through cultural techniques that use, poor soil biodiversity, in particular that rizzo-spherical, changes structural balance of microbial populations. The study analyzes the levels of terrestrial biodiversity in the two types of agro-eco-systems (biological and conventional), planted with the same crops (five crops), through the study of the connections between plants, soil and microorganisms, in order to define the differences between them and impact on fertility of soil and biological diversity.

Key-words: *soil biodiversity, micro-fauna, edafic fauna, agro-eco-system.*

THE EFFECTS OF BIOSTIMULATORS AND REDUCED FERTILIZATION ON STRAWBERRY FRUIT QUALITY

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Abstract

Functional food such as fruits and vegetables, gained much interest due to beneficial impact on human's health - reduced risk of chronic, degenerative and of oxidative stress mediated diseases, such as cancer, cardiovascular and neurodegenerative diseases. The strawberry (*Fragaria x ananassa* Duch.) fruit generally possesses a high level of antioxidant activity that can be related to total phenols content, to high vitamin C content or both. In this research the effects of biostimulators (Viva and Megafol) and reduced fertilization level on the productivity and fruit quality of soilless grown strawberry cultivar Elsanta have been investigated, during two fruitbearing seasons. The tested fruit quality parameters were the total antioxidant capacity (TAC), total ascorbic acid (AA), total anthocyanins (AC), total phenolics (PHE) and nitrates (NO₃) content. Our results indicated a stimulating effect of a combination of biostimulators but only in the second year of fruitbearing (the spring experiment), where plants treated with both Viva and Megafol gained the highest yield. In the first year of fruitbearing (the fall experiment), at reduced rate of fertilization, total phenolics content in strawberry fruits was significantly higher while nitrates content was significantly lower which is of particular importance for its nutritional value.

Key words: *strawberry, biostimulators, reduced fertilization, antioxidant capacity, nitrates.*

ORGANIC FARMING: PROSPECTS AND CONSTRAINTS

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Abstract

The present study was undertaken in Haryana state (India) and one hundred twenty farmers were interviewed. The study revealed that more than three fourth of growers of organic farming perceived it as more bright level of prospects .However, the few of them were perceived it as somewhat bright level prospect .

The finding regarding farmers' perception about input constraints in adoption of organic farming show that 'lack of knowledge and demand of bio pesticides' (90.8%) was ranked first, the results regarding perception about technical constraints in adopting of organic farming reveals that 'non availability of improved organic production technology' and 'lack of knowledge about weed management practices in organic farming' were ranked first (94.2 percent), the finding regarding farmers perception about marketing and economic constraints in adoption of organic farming show that 'no separate market for organic produces' and 'weak marketing network /sale point' both were ranked first with highest weight mean score (360).100 percent of the respondents had perceived it as most serious constraint in organic farming, the results show that transfer of technology constraints in adoption of organic farming namely, 'data bank not available about consumers and demand' was ranked first with highest weight mean score (2.98), moreover 98.3 percent of the farmers had perceived it as most serious constraint in organic farming and the finding regarding farmers' perception of certification constraints in organic farming shows that 'complicated process of organic certification' was ranked first constraint (67.5 percent).

Keywords: *Organic farming, prospects, constraints and sustainability.*

THE ROLE AND CHARACTERISTICS OF PLANT CULTIVAR AND CERTIFIED SEED IN ORGANIC AGRICULTURE

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Abstract

Plant cultivars well adapted to low input organic production systems are needed in order to improve the success of organic farming. In this respect initiation of organic plant breeding programs is an up to date necessity. In organic plant breeding the conventional breeding techniques and methods are mainly used. The implementation of biotech methods, especially GNOs are strictly restricted. Yield and yield stability are important breeding objectives, but special attention is paid to quality and functional diversity along with resistance to biotic and abiotic stresses. Landraces and old cultivars well adapted to low inputs are of particular interest for organic farming and the conception of conservation varieties might contribute to this issue. The ultimate aim of organic agriculture is to use organic seed. If such seed is not available from the database of reproductive material maintained by each country, seed derived from the conversion period or from conventional production are acceptable, provided it is not treated in the way not allowed in organic agriculture. The status of the seed produced by organic farmers for their own use (farm saved seed) is much less restricted in organic as opposed to conventional agriculture.

Key words: *organic agriculture, organic plant breeding, organic cultivar, organic seed.*

DETERMINANTS OF ORGANIC FOOD PRODUCTION IN SERBIA

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Abstract

This study presents the determinants of the organic food production in Serbia. The concept of organic agriculture was considered in the function of the organic food production. The principal characteristics of adjustment of cropping practices and procedures of establishing and realisation of the organic food production are pointed out. The paper explores and analyzes the relevant economic issues of the sustainable use of natural resources and possibilities of improvement of agriculture in the Republic of Serbia, as well as the representation of the basic natural resources (climate, agricultural land, water resources, biodiversity, etc.) and their ecological and economic characteristics. It also analyzes the characteristics and current limiting factors in the use of agricultural resources and capabilities of various countries to promote and develop agriculture. In particular it highlights the environmental consequences of pollution and degradation of natural resources and the possibility of their rehabilitation in development of methods and application of sustainable agricultural development. Fundamental procedures of biological control in organic agriculture are related to providing quality of soil, water resources and feed. Moreover, the alternative forms of crop protection products are indicated. Specificities of alternative programmes are studied with the aim to produce organic food.

Keywords: *organic production, organic food, natural resources, sustainable development.*

BIOLOGICAL CONTROL OF FUSARIUM CROWN AND ROOT ROT OF TOMATO

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Abstract

Tomato culture under greenhouses is usually confronted to attacks of several pathogens. Caused by *Fusarium oxysporum* f. sp. *radicis-lycopersici* (FORL), Fusarium crown and root rot of tomato is a recent damaging disease of greenhouse crops in Tunisia. No or some effective chemical fungicides are available to control this pathogen. Therefore, alternative measures such as biological control are urgently required. In this study, the efficacy of some antagonists and bio-fungicides to suppress FORL was evaluated in growth chamber and under greenhouse conditions. The use of antagonists locally isolated such as *Trichoderma harzianum* and *T. viride* revealed that these latest have significantly reduced disease incidence. Reduction was more important (disease incidence < 17%) when antagonists were applied to the substrate one week before inoculation with the pathogen or, at lesser degree, at the same time. Besides of their direct effects on FORL, these antagonists have an indirect action on this pathogen by inducing systemic resistance in treated plants. Indeed, light micrograph of samples from tomato roots treated with *Trichoderma* spp. showed elaboration of structural barriers in regions situated within striking distance of the pathogen penetration, formation of wall thickenings and occlusion of intercellular spaces by a densely stained material. Using bio-fungicides based on *Bacillus subtilis*, *Ascophyllum nodosum* or plants extracts to suppress FORL demonstrated that these products have reduced the development of this pathogen in vitro as well as in vivo. Indeed, under growth chamber trials, the efficacy of all bio-fungicides was more significant when they were added to the substrate one week before inoculation with FORL compared to a simultaneous or delayed input. Under greenhouse conditions the use of these bio-fungicides, for controlling FORL, reduces the percentage of dead plants by more than 7% and this during a whole crop season. Furthermore, tomato plants treated with this bio-fungicide produced more and have had better fruits compared to those treated with fungicide, Hymexazol.

Key words: Biological control, fusarium crown, disease incidence

INVESTIGATIONS ON THE EFFECTS OF TWO DIFFERENT PLANT EXTRACTS ON THE GREEN PEACH APHID [(MYZUS (N.) PERSICAE SULZER) (HEMIPTERA: APHIDIDAE)]

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Abstract

Green peach aphid (*Myzus N. persicae* Sulzer) (Hem: Aphididae) is a very important pest worldwide, causing serious damage to vegetables, flowers and fruit crops. In recent years broad spectrum insecticides have been used to control this pest in Turkey. Control is difficult mainly due to resistance to conventional pesticides. The use of plant extracts as alternative pesticides for control of insects is becoming important. A great deal of research has been carried out in this area in recent years. The efficacy of pesticides extracted from two different plants such as *Hypericum calycinum* L. and *Melia azederach* L. were tested as alternative insecticides.

The effects of extracts with ethanol obtained from two different plants on *M. (N.) persicae* were investigated. Bioassays were tested by two different methods determine the effects of varying concentrations. Experiments were performed using 3cm diameter leaf disk from unsprayed *Raphanus sativus* L. The effects of four concentrations of extract % 1, 3, 6, 12 were studied. All of experiments were repeated 10 times.

As a result of the investigation, in leaf dipping method; the extract of *M. azederach* 12% concentration showed the highest mortality in nymph and adult stages. The mortality of nymphs and adults at the same concentrations were 94.00% and 91.00%, respectively. The mortality of nymphs and adults were 57.00 and 60.00% respectively within the same concentration extract of *H. calycinum*. There was no significant difference on the mortality between leaf dipping and direct leaf spraying method when compared.

Key words: *Insecticide effect, Hypericum calycinum L., Melia azederach L Extract, Green peach aphid.*

4. ENVIRONMENT PROTECTION AND NATURAL RESOURCES MANAGEMENT

CONSERVATION OF BIODIVERSITY IN ECOSYSTEMS OF THE BOREAL FORESTS

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Abstract

Biodiversity in forest ecosystems is the main indicator of the stability and sustainability of the system. It is also a sign of ecological community orientation to a state of stable fluctuated equilibrium - homeostatic state. Implementation of any forest management activities must be accompanied by the trend of natural systems tending to a stable state. In Russia forest resources are mostly relates to a commercial forest (intended for logging). Important element of biodiversity conservation program in forest ecosystems is the preservation of the natural gene pool during all management activities. Long-term studies on stationary objects (since 1929) in the North-West Russia indicate that during harvesting with preservation of young retained undergrowth at the same time we preserve not only the undergrowth but the understory and ground cover also. Quantitative changes of biodiversity in forest ecosystems, as a consequence of any management activities, are just some of the intermediate indicator of changes in forest biogeocenosis, but do not explain their dynamics. Only perennial detailed observations of the dynamics of vegetation changes, at different stages of succession, provide a complete picture of nature and process of returning the system to homeostatic state.

Keywords: *biodiversity, homeostasis, forest ecosystems, forest management activities, experimental objects with long-term observations.*

LEGISLATION IN SERBIA IN THE FIELD OF COLLECTING MEDICINAL AND AROMATIC PLANTS

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Abstract

According to the international criteria of the International Union for Conservation of Nature (IUCN) and the World Conservation Monitoring Centre (WCMC), Serbia together with the mountain areas in Bulgaria is one of six European and 153 world centers of biodiversity. In this region it has been recorded the presence of a high percentage of rare, sparse or endangered plant and animal species, of which 1,600 have the status of internationally important ones for the global preservation of genetic fund and biodiversity. Protection of the medicinal and aromatic plants' resources in our country is under strict legal control, which preceded by the ratification of appropriate international conventions (Agenda 21 - Rio Declaration, United Nations 1992, Bern Conventions 1982, Council Regulation No. 338/97 - 1996). The Government of the Republic of Serbia by the legal and regulatory regulations has prescribed different levels of protection for medicinal herbs and authorized the Institute for Nature Protection of Serbia to establish by the open competition the contingents of medicinal herbs that can be collected in the current year. Complete legislation has been passed by the Government of the Republic of Serbia, and they take effect upon their publication in the Official Gazette of the Republic of Serbia. The collection of wild flora and fauna is allowed upon getting a permit for collection of protected species in the permitted quantities as well as in the prescribed periods. The SEED study (2003) on the situation of herbal sector in Serbia and Montenegro has shown that despite the great wealth of natural resources in medicinal and aromatic plants (MAP) (hence the significant export potentials), a number of species and many populations, depending on the region, require special attention as they face pressures of excessive and/or improper exploitation.

Key words: *medicinal and aromatic plants, protection of resources, legal documents, permits.*

THE ANALYSIS OF ENVIRONMENTAL COSTS IN THE FOODS RETAIL

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Abstract

This paper, considering the meaning of the problem treated, deals with research of determinants of dynamics and specificities of the environmental cost structure-ecological costs, as well as their influence on performances in the food retail. Three significant categories of the environmental costs in the food retail are as follows: energy consumption, carbon dioxide emission, and water consumption. For purpose of optimization of influence of all, above stated, the most possible control is required.

Key words: *Renewable energy, greenhouse effect gas emission, water, supply chain.*

OBSERVED CHANGES IN GRAPEVINE PHENOLOGY IN THE REGION OF SREMSKI KARLOVCI, SERBIA

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Abstract

An analysis of recent-past changes in grapevine phenology in the region of Sremski Karlovci was performed. The study was based on 26 years of observations (1986–2011) on beginning of budburst, beginning of flowering, beginning of veraison and harvest for 21 different vine cultivars. The study revealed a trend toward earlier occurrence of phenological events for all cultivars. However not all the phenological events responded to changes in the environment to the same extent and with the same level of significance. Trends of -0.4 , -0.7 and -0.6 days/year were detected for the phenological dates averaged over all examined cultivars for the beginning of flowering, beginning of veraison, and harvest dates, respectively. Beginning of budburst exhibited no significant trend during studied period. The trend comparison between cultivars revealed that harvest dates of early and middle ripening cultivars were advancing somewhat more than dates of late ripening cultivars.

Key words: *grapevine, phenology, Sremski Karlovci, Serbia.*

TRENDS IN CLIMATICALLY RELEVANT TEMPERATURE INDICES FOR GRAPEVINE GROWING IN THE REGION OF SREMSKI KARLOVCI, SERBIA

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Abstract

The study aimed to evaluate the structure, variability and trends of climate parameters important for grapevine growing in Sremski Karlovci for the period 1981–2007. A number of average and extreme temperature indices were calculated for annual, growing season and different growth intervals of grapevine. Results showed significant trends in: annual mean, maximum and minimum temperatures (0.06, 0.06 and 0.05°C/year, respectively); growing season mean, maximum and minimum temperatures (0.04, 0.05 and 0.05°C/year, respectively); growing degree days (10.7°C/year); annual number of days with minimum temperature higher than 90th percentile (1.0 days/year); annual number of days with maximum temperature higher than 90th percentile (0.9 days/year); the number of days with maximum temperatures above 30°C (0.7 days/year) and the number of days with maximum temperatures above 35°C (0.2 days/year); the number of tropical nights (0.6 days/year); the number of days with minimum temperatures below –2.5°C (–0.5 days/year). The most pronounced changes in climatic variables examined were recorded during the period from flowering to veraison.

Key words: *grapevine, temperature indices, trends, Sremski Karlovci, Serbia.*

DETERMINATION OF RADIOCAESIUM IN BLUEBERRIES

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Abstract

In forest ecosystems, radionuclides are deposited in surface organic layers of the trees and other plants like grass, berries moss and lichen. From artificial radionuclides, ^{137}Cs is one of the most important fission product and it is of particular concern in the natural environment due to a long half-life ($T_{1/2} = 30$ years), easy migration in the tropic chains and great bioavailability. Because of that, this artificial radionuclide is presents in environment especially in food samples, even 20 years after Chernobyl accident.

This paper presents the results of measurement the activity concentration of ^{137}Cs in blueberries (42 samples) for the period August 2011 to December 2012, which were imported in Serbia from different countries. Measurements were performed in Radiation and Environmental Protection Department in the Vinča Institute of Nuclear Sciences. Concentrations of ^{137}Cs were determined by gamma spectrometry using a HPGe detector.

The obtained results show that the activity concentration of ^{137}Cs in blueberries ranged from MDC (minimum detectable concentration) to 404 Bq kg^{-1} . Recommended level of activity concentration for ^{137}Cs in blueberries in Serbia is 150 Bq kg^{-1} (Official Gazette of the Republic of Serbia, 2011). Out of tested samples, 79 % of blueberries met the defined criteria of radiological safety.

Based on the obtained results for activity concentration of ^{137}Cs , the annual effective dose due to ingestion of blueberries for adults was calculated.

Keywords: *Radiocaesium, blueberries, gamma spectrometry, annual effective dose.*

DRAINAGE IMPACT ON STRUCTURAL COMPOSITION PSEUDOGLEY SOILS IN REPUBLIC OF SERBIA

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Abstract

Pseudogley soils (as per WBR, 2006 classification, Stagnosol) cover significant agricultural areas within the Republic of Serbia. This type of soils are of great importance for agricultural production due to their potential fertility, as well as the fact that occur mainly on flat areas suitable for the application of mechanized agriculture. Many years of intensive crop production lead to changes that reduce soil's productive capacity and lead to structural changes in the soil composition. The aim of this study was to examine the extent to which arable farming affect changes in the structure of pseudogley soils in drained and un-drained plots. The study was conducted in the experimental drainage field at Varna Institute of Soil Science, ten years after the installation of drainage systems. The soil waterlogging on the part of the experimental field, in which the control is derived horizontal pipe drainage led to elevated processes of structure deterioration, the formation of crumbly aggregates, as well as the decrease in water stability of structural aggregates.

Key words: *soil structure, soil aggregates, drainage, pseudogley.*

ECONOMIC EVALUATION OF BIOMASS AS A SOURCE OF ENERGY IN VOJVODINA

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Abstract

World trends in the area of utilization of renewable energy sources indicate that all developed countries are rapidly orienting towards intensive utilization of the renewable energy sources. The fact that Serbia has relatively high rate of growth of energy consumption (6 – 7% annually) and that our reserves of primary energy are six times weaker in relation to the world's average, strongly directs us to rational utilization of even the smallest volumes of disposable fuels. According to the way in which the biomass has been utilized so far in Vojvodina, it was estimated that 30 - 50% of the total biomass volumes can be used for energy purposes. During the previous period, the biggest part of this potential was being burned, other part was used as a floor covering in livestock production and insignificant part was ploughed in. Utilization for other purposes is quite rare. This potential of the biomass can be exploited for the production of thermal and electric energy, as well as for the insulation in civil engineering, and other purposes as well.

Key words: *biomass, crop production, potentials.*

INTERACTION OF BENZYLAMINOPURINE (BAP) AND INDOL BUTIRIC ACID (IBA) ON ROOT INDUCTION IN OLEA EUROPEA L.

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Abstract

Olive var. “*Kokërr Madhi i Beratit*” is an important table variety for Albania despite major difficulties with respect to vegetative propagation from leafy stem cuttings. Leafy stem cuttings were obtained from 1-year-old olive shoots sampled on 25 April 2012 during the growing season. The shoots were collected at the same height of tree crown to avoid the effect of juvenility on root induction. To improve the rooting of olive cuttings, different concentrations of BAP (6-Benzyl aminopurine), 100ppm, 150ppm, 200ppm and 250ppm were tested in combination with IBA (Indol Butiric Acid) 4000ppm. After treatments the stem cuttings were planted in greenhouse equipped with an automatic mist system. Fifty days after the beginning of rooting treatments, cuttings were scored for the presence of callus, percentage of rooted cuttings, root number per cutting and root length. BAP inhibits adventitious root formation, but adding it to IBA in a small ratio (1:30-1:40) improved the rooting. The combination of IBA 4000ppm + 100ppm (40:1) and IBA 4000ppm+150ppm BAP modified significantly higher rooting of cuttings. Those combinations of growth stimulators induce also a higher number of roots per cutting in comparison with those treated with IBA alone.

Key words: *olive, root, shoot, Benzylaminopurine, Indol Butyric Acid.*

QUANTITATIVE EVALUATION OF ERODED SEDIMENTS IN THE UPPER IBRAHIM RIVER WATERSHED, LEBANON

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Abstract

Soil erosion is one of the major problems facing the mountainous agricultural lands in Lebanon. Sediments carried in the river water are a criterion of pollution. In order to determine the quantity and acting factors of soil erosion, a study was conducted in the Upper watershed of Ibrahim river. Thus, seven localities were investigated on the two major streams feeding the river, located between 808 m and 1488 m in altitude. These localities are connected to sub-basins representing 88.9% of the river watershed (312.7 km²). Water samples were collected during the spring season in April, May and June 2013. Suspended sediments were determined by decantation. Simultaneously bed load samples were taken in order to determine their texture as well as their mineral composition. Water flow and sediments load were the highest in April, in all sub-basins. Sediments load reached 713.72 mg L⁻¹ and 298.60 mg L⁻¹ for the localities 2 and 3 in April and decreased to 61.77 mg L⁻¹ and 25.94 mg L⁻¹ in May. The monthly eroded soil reached 704 tons during April in location 2 and 662 tons in location 6. Within each sub-basin the land cover, slope length and gradient influenced water sediments load. Where orchards are predominant, such as in the upper watershed, high soil erosion was found. The sub-basin predominated by grassland (52.64% of area) and stable bare rocks (45.11% of area) generated lower sediments load.

Key words: *Ibrahim river, snow melting, erosion, land cover, sediments.*

SOIL EROSION OF THE CUVERAK RIVERBASIN(WEST SERBIA)

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Abstract

Various factors of erosion, natural and anthropogenic, and general conditions of the area of Cuverak torrential flow contribute to the understanding of the intensity of basin soil erosion. Midterm amount of erosion sediments is $W_{\text{year}} 646.05 \text{ m}^3/\text{year}$. The value of the specific total annual erosion sediments at the mouth of the Cuverak in Kamenica ($G_{\text{yr/sp}}$), is $171.48 \text{ m}^3/\text{km}^2/\text{year}$.

Key words: *soil, erosion, river basin, sediment production.*

AMPELOGRAPHIC AND AMPELOMETRIC CHARACTERISATION OF GRAPES OF VITIS VINIFERA L. NATIVE OF ALGERIA

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Abstract

Algeria has many indigenous varieties of vine that their valorization still remains to be undertaken. Homonyms and synonyms have been highlighted in studies of molecular characterization. Our study is part the objective of the ampelographic characterization of 15 cultivars of vines belonging to the collection of the regional station *with* Benchicao (Area of Medea), for identification and determination of the relationships between them and grouped according their similarities. This study is conducted using 112 quantitative descriptors and 14 qualitative descriptors established by the OIV. A statistical study was conducted to highlight the most discriminant parameters, namely, angles, depth of sinuses in relation to the lengths of veins. However, the principal component analysis and hierarchical classification have permits to group the varieties in 4 Groups more or less distinct, which we brought out the presence of clones among the individuals analyzed. This diversity of native varieties put to a severe test, risk extinction if their preservation is not undertaken immediately.

Keywords: *diversity, Vitis vinifera L, varieties indigenous, valorization, characterization ampelographic, Ampélogétrie.*

EFFECT OF ALTITUDE ON THE WATER BALANCE OF LAND AREA OF SARAJEVO

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Abstract

This paper examined the impact of altitude on the water balance of the land area of Sarajevo (weather station Bjelave and weather station Bjelasnica) for the period 1991-2010 for the average, driest and rainiest hydrological year. The average annual potential evapotranspiration (ETP) in the weather station Bjelave was 529 mm, while in the weather station Bjelašnica potential evapotranspiration (ETP) value was much lower, amounting to 54 mm.

In the area of weather station Bjelave, the mean annual precipitation (P) for an average hydrological year amounted to 1.144 mm, potential evapotranspiration (ETP) 595 mm, and actual evapotranspiration (ETR) to 522 mm. Water shortages in the area covered by the weather station appeared in the summer months (July and August), total of water of 158 mm, whereas the excess water in the soil, due to its water saturation occurred in the winter months (December, January, February) and in March and April, its total of 389 mm.

In the area of weather station Bjelašnica, the annual precipitation means (P) for an average hydrological year amounted to 955 mm, potential evapotranspiration (ETP) 70 mm, and actual evapotranspiration (ETR) 68 mm. Shortages of water were not present in a single month, and excess water might occur during all the months except October, in the amount of 719 mm.

Key words: *altitude, evapotranspiration, water balance, lack of water, excess water.*

EFFECT OF DIFFERENT LAND USE ON MAIN SOIL PROPERTIES

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Abstract

Intensive agriculture throughout a long period is likely to cause soil degradation. Therefore, monitoring of soil quality in agricultural regions is essential for food quality and food safety. The present study is conducted in the agricultural region of Croatia (Osijek-Baranja County) where 74 samples were collected from forest land (21) and agricultural land (53). The study investigates differences between forest soils and agricultural soils (arable land and pasture) in regard of main soil properties such as pH, soil organic carbon (SOC), bulk density (BD), total nitrogen (Tot-N), available phosphorous (AL-P) and available potassium (AL-K). In addition to main soil properties, total concentrations of several micronutrients (Fe, Mn and Zn) have been observed as well. The aim of this study is to identify potential soil degradation of particular soil property. The significant differences ($p < 0.001$) have been observed for all above mention soil properties (with exception of micronutrients). However, negative effect of agricultural practice has been observed only for SOC, Tot-N and BD, suggesting degradation of these soil properties. As mentioned earlier, total concentrations of micronutrients (Fe, Mn and Zn) showed no significant difference between land use, therefore there is no soil degradation due to agricultural practice with regard of these three micronutrients. However, availability of these micronutrients is largely dependent on soil properties (pH and SOC).

Keywords: *agriculture, forestry, soil quality, soil properties.*

HUMUS COMPOSITION OF CHERNOZEM, EUTRIC CAMBISOL AND LUVISOL IN CONTINENTAL CROATIA

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Abstract

The aim of this study was to determine humus composition in the surface layer of Chernozem, Eutric Cambisol and Luvisol, major soil types used for crop production in continental Croatia. The study was conducted on 36 soil samples collected at 12 locations, of which 4 in each soil type. Humus content was determined by modified Walkey-Black method (1934) and the humus composition was analyzed by the version of Schnitzer method (1982) using a mixture of 0.1M NaOH and Na₄P₂O₇. UV-VIS spectroscopic characterization of humic acid and fulvic acids was performed at wavelengths 465 and 665 nm. Average humus content decreased in the following order: Chernozem (2.99%) > Eutric Cambisols (2.23%) > Luvisols (1.71%). The average carbon content in humic acids decreased from 32.7% (Chernozem) to 14.72% (Luvisols), while in fulvic acids ranged from 15.97% (Chernozem) to 24.91% (Luvisols). The average ratio of humic acid and fulvic acids (Ch/Cf) decreased from 2.05 established in Chernozem to 0.60 in Luvisols. Structures of higher aromaticity – humic acids prevail in Chernozem and Eutric Cambisols, whereas aliphatic structures characteristic of fulvic acids are prevalent in Luvisols. The average ratio of optical densities (E₄:E₆) ranged from 2.4 (Chernozem) to 6.02 (Luvisols). Data obtained by the non-invasive - spectroscopic method are in agreement with data of carbon content in humic acid and fulvic acids obtained using the modified Schnitzer method.

Key words: *humic acid, fulvic acid, Ch/Cf, E₄:E₆*

LAND SUITABILITY FOR OLIVE IRRIGATION. CASE STUDY: POSTIRA ON THE ISLAND OF BRAČ

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Abstract

The most relevant method to improve olive production in Mediterranean climate conditions is irrigation. The aim of this study was to evaluate the land suitability for olive irrigation in an area of 482 ha located in the northern part of island of Brač (Postira municipality). Olive trees have been sparsely planted without irrigation with densities of traditional groves between 70 and 150 tree/ha, and the soil periodically tilled. Evaluation of land suitability was based on detailed soil surveys and analyses of natural characteristics (terrain, climate, geology, hydrology and land use) according to FAO concept. In the research area dominant soil type is Terra rossa formed on the Cretaceous limestone and dolomites, partly terraced on steep slopes. The factors influencing the land suitability for irrigation were: physical soil properties (texture, soil depth/rooting depth), stoniness, rockiness that determine permeability and available water capacity, slope and possibility of using mechanized tillage. Integration, processing and analysis of soil and terrain parameters were performed in the GIS environment. This research has shown a wide range of land suitability for olive irrigation. Land suitable for olive irrigation covers area of 139.0 hectares (28.5% of total area). Moderately suitable, temporarily and permanently not suitable land covers 105.3 ha or 21.8% of total area. The largest area (237.7 ha or 49.3%) covers permanently not suitable land for olive irrigation. Conducted qualitative assessment of land suitability for olive irrigation is a good basis for decision-making and individual farmers in planning the development of olive production.

Key words: *land, suitability, irrigation, olives.*

ASSESSMENT OF THE SOIL SUITABILITY OF ZELINA VINEYARD AREA FOR GROVING GRAPES

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Abstract

Zelina vineyard area belongs to, according to winegrowing regionalization, north-western part of the Croatian winegrowing, sub region Prigorje-Bilogora, and is important wine growing region in Croatia. Even though there are various possibilities of using land for the purpose of this study attention is focused only on assessment the suitability of the land in Zelina vineyard area for the cultivation for grape growing. Evaluation of soil suitability for Zelina vineyard area was carried out according to the modified FAO method (Brinkman R., Smith, A.I., 1973, Vidaček, Ž., 1976).

In the area of Zelina vineyard 14 pedosystematic units from the division of automorphic and hydromorphic soils were determined. Zelina vineyard area has a total of 31,9 ha of soil suitable for viticulture (class P-1), soil with moderately suitability (class P-2) occupy 3180,8 ha of surface, soil with restricted suitability (class P-3) occupy 1287,0 ha of surface, while permanently unsuitable soils (class N-2) occupy 508,5 hectares of surface. There are no temporarily unsuitable soils (class N-2).

According to the degree of suitability and possibility of usage the most suitable soils for viticulture are eutric brown soil on marl and rendzina on marl and soft limestone with southern, south-western and south-eastern exposure, and on altitude of 150-400 m. The dominant constraints for other units are related to frost, exposure and inclination of the terrain and the some properties of soil. The study shows the hydro and agro melioration measures necessary to implement for individual units of soils to improve their use value.

Keywords: *land evaluation, Zelina vineyard area, land reclamation.*

THE STUDY OF LAND USE CHANGES AND THEIR IMPACT ON RUNOFF IN THE PUNKVA CATCHMENT

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Abstract

Use of the landscape has a high influence on the water retention capacity of the soil. Water retention is important in terms of surface runoff formation. Identification of areas with increased surface runoff leads to proposals of flood protection of a catchment. The work focuses on the evaluation of factors influencing water retention in the landscape, depending on land use, based on the assessment of runoff conditions at a site in 4 periods strategically influenced by political and economic decisions leading to fundamental changes in the landscape in terms of water retention. Years evaluated were 1954, 1971, 1996, and 2009, and the site is the Punkva catchment. The area of the entire model territory, which extends into 16 cadastral areas, is 50.18 km². The site is located in the central part of Moravia, Czech Republic.

The analysis used the existing evidence of the Czech Hydrometeorological Institute, information database on soils and aerial photos of the area. Simulation of the runoff was created in the HydroCAD model. It has been proved that the land use changes have affected the runoff. Suitable use of the landscape can reduce surface runoff from the catchment.

Keywords: *runoff, flood protection, land use, catchment, water retention.*

AGRICULTURAL UTILIZATION OF SEWAGE SLUDGE - APPLICATION TO WHEAT

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Abstract

In a soil classified as Typic Xerochrept located in Larissa area, central Greece a field experiment was conducted to study the influence of municipal sewage sludge application on wheat yield and soil quality. The experimental design was complete randomized blocks with five treatments (control, no sewage sludge, no inorganic fertilizers-C; inorganic fertilization, no sewage sludge-IF; sewage sludge application at a rate 10 ton dry SS/ha-SS1; and 15 ton/ha-SS2) each replicated 3 times. Sewage sludge was applied at the middle of November 2009 by using an appropriate spreader. In the treatment with inorganic fertilization the conventional rates of N and P were applied (100 kg N/ha and 80 kg P₂O₅/ha respectively). Sewage sludge and fertilizers were incorporated in a depth 25 cm with ploughing. Wheat (*Triticum vulgare*, var. Mavragani) showing (180 kg/ha) became ten days after SS application. Wheat germination started 18 days after showing. Wheat was harvested at the middle of June, next year. Soil sampling was carried out at the showing date and at the end of July next year. The results showed that SS application increased wheat yield compared to control (from 3.78 ton/ha to 44.93 and 4.78 ton/ha in the treatments SS1 and SS2 respectively). The treatment included inorganic fertilization obtained the highest yield (5.75 ton/ha). Soil pH decreased significantly (from 8.23 in the C to 8.02 in the treatment SS2). Available P was significantly increased in the treatment SS2 (from 9.7 in C to 16 mg/kg in the SS2) but exchangeable K was not significantly affected. Nitrates concentration after the harvest was higher in the treatment SS2. No significant differences were observed in total concentrations of Zn, Pb, Ni, and Cr. It was concluded that SS application at rates 10 or 15 ton/ha may completely substitute inorganic fertilization.

Key words: *Sewage sludge, wheat, soil quality.*

COCCIDIOSTATS IN POULTRY MANURE – A POTENTIAL THREAT TO BENEFICIAL SOIL INVERTEBRATES

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Abstract

Monensin and lasalocid are polyether ionophore antibiotics used in veterinary medicine for prevention and treatment of coccidiosis in poultry. They are extensively used in the poultry industry throughout Europe. Both substances are excreted with the faeces mostly in their active form. The use of manure from treated animals on agricultural soil results in contamination that could pose a threat to soil organisms and thereby reduce the production potential of farmlands. Their degradation rates in manure and soil, as well as their effects on non-target soil organisms are mostly unknown. We conducted several studies to measure the degradation of lasalocid and monensin in broiler manure and after application to soil. Ecotoxicological studies were also performed to obtain concentrations at which these coccidiostats are harmful to soil invertebrates, namely earthworms and woodlice. Degradation rates in manure and compost depend mostly on moisture levels and temperature. Half-lives in compost are significantly shorter than if manure is aged in a pile with no treatment. Avoidance of the test animals was the most sensitive endpoint in the ecotoxicity tests. On the basis of our results, we recommend that poultry manure from treated animals be stored for at least one month before application to soil.

Keywords: *coccidiostats, lasalocid, monensin, manure, agricultural soil*

GEOMORPHOLOGICAL MAPPING OF GLACIAL FEATURES IN THE DURMITOR MOUNTAINS (MONTENEGRO) AND IMPLICATIONS FOR PALAEOCLIMATES

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Abstract

The study area (47 km²) covers the northeastern part of the Durmitor Mountains and the surrounding plateau Jezerska Površ (Dinaric Alps, Montenegro). The geomorphological setting of the area consists of Mesozoic limestone rocks which are chemically attacked and physically deformed by Quaternary glacial and periglacial activity. The study fits in the context of Quaternary research in Mediterranean mountain ranges to form a comprehensive overview of its glacial-interglacial geomorphological impact. A glacio-geomorphological map is prepared from an intensive fieldwork campaign, remote sensing analysis and applied GIS techniques. The basic components of the legend are the processes/genesis, materials, morphometry/morphography, hydrology, vegetation and anthropogenic features. Furthermore, the glacial sedimentary environment is characterized through (i) measurements of the volumetric stone content and by (ii) analysis of the particle size distribution of fine earth (<2mm). The measurements of the volumetric stone content show, as hypothesized, that smaller rocks are more abundant at more remote distances, while the opposite applies to larger boulders. This confirms a relationship between the distance of the glacial deposits to the former cirque and the internal compositions of the materials. The result of the granulometric analysis is that fine earth dominantly consists of coarser sand fractions. On this scale-level, the glacial materials are more alike to each than on the scale-level of the volumetric stone content measurements. To conclude, the map and the characterization of the glacial sedimentary environment serve as valuable tools for Quaternary research in the Durmitor Mountains and in addition in the mountains of the Western Balkan.

Keywords: *Dinaric Alps, Durmitor Mountains, large-scale geomorphological map, volumetric measurements, particle size distribution analysis, Digital Elevation Model*

**EFFECT OF LAND USE DISTRIBUTION PATTERNS ON
NITROGEN CONCENTRATION IN RIVER WATERS IN
AGRICULTURAL CATCHMENTS,
WESTERN HOKKAIDO, JAPAN**

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Abstract

In this study, the relationship between the land uses for croplands and forests in 32 small-scale catchments in western Hokkaido, JAPAN was examined. The purpose of the study is to determine what land use distribution is beneficial for the maintenance of agricultural production and the conservation of river water quality.

River water sampling was done on 32 rivers in June, August and October 2011 and 2012, and nitrogen concentration was measured. Land-use analysis was done by using GIS, and the proportion of cropland to forestland, the spatial continuity (SC) of cropland and that of forestland, and the land use of riparian areas were obtained.

In catchments where the proportion of cropland is high, the nitrogen concentration in the river water is high. It was estimated that the area of current cropland would need to be reduced by up to 20% to reduce the nitrogen concentration of the river water to 1 mg/L. However, it was also clarified that decreases in the nitrogen concentration of the river water would be possible even without considerable reduction in the proportion of cropland, if the distribution of land uses was changed. Increasing the continuity of forests or changing croplands in the riparian zone to forests was found to be effective.

Key words:*Nitrogen, River water, Upland field, Forest, Land use distribution pattern*

AGROFORESTRY - POSSIBILITIES OF MULTIFUNCTIONAL LAND USE

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Abstract

The paper aims to point out the importance of applying the methods and technologies of agroforestry in the countries of the region. This is a practice that has been used with great success throughout the world, in different climatic zones. The advantages are numerous – besides increased crop production, benefits from properly designed and managed agroforestry practices include: economic gain, healthier environment, soil conservation and improved soil quality, sequestration of atmospheric carbon, increased biodiversity, improved landscape and many others. Though the possibilities for multifunctional land use are numerous, benefits large and quality of plants grown in association with trees often improved, in Serbia and other countries in this region agroforestry is not implemented enough. Some of the agroforestry components are separately applied in some parts of the region, e.g. wind protection belts, planting of soybeans or corn in the poplar plantations of E.A. cultivars, pig's nutrition in the forests of oak or beech. Methods and technologies of agroforestry that can be applied in temperate regions are much more numerous and this paper discusses some of them.

Key words: *agroforestry, land, multifunctional use, benefits.*

THE QUALITY OF SPRING WATERS OF FRUSKA GORA (VOJVODINA)

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Abstract

During the period from September 2011 to February 2012, the monitoring of spring, surface and groundwaters of Fruska Gora on 8 permanent and 15 temporary points for sampling was carried out. The water points on the three sources in the Old Ledinci and Sremski Karlovci were selected for sampling. The spring waters were established to have increased contents of: orthophosphates (0.27-0.5 mg/l), phenols (0003-0118 mg/l) and boron (0.5 mg/l). These parameters were above the MAC (regulated by law) for the use of water for drinking, bottling as well as in the production of consumable fish ponds. The samples were taken in Sremski Karlovci in the period from 2003 to 2012.

Keywords: *orthophosphates, phenols, springs.*

EFFECT OF HEAVY METALS ON THE MICROBIAL ACTIVITY OF SOILS UNDER RED CLOVER

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Abstract

Heavy metals reach the environment, primarily soils, mostly through human activities. They enter certain biological links in nutrient and energy cycles, thus becoming a source of many environmental problems and health issues in both people and animals. Microorganisms as an important link in the cycling process can serve as indicators of both soil pollution and potential toxicity to other biological systems.

The objective of this study was to evaluate the effect of different concentrations of lead (60; 120; 250 mg kg⁻¹ soil) and mercury (1,0; 2,0; 4,0 mg kg⁻¹ soil) on total microbial count and Azotobacter in two soils, a Vertisol and an alluvium under red clover cultivation in three growing seasons. The experiment was conducted under greenhouse conditions at the Faculty of Agronomy, Čačak.

Numbers of the microorganisms tested were determined by indirect counting methods involving plating out a soil suspension onto appropriate selective culture media.

Depending on the type and concentration involved, heavy metals had a significant effect on soil microbial count in the alluvium and vertisol during the red clover growing season. Low concentrations of lead and mercury (60 mg kg⁻¹ and 1 mg kg⁻¹ soil, respectively) did not lead to significant changes in total microbial and Azotobacter counts. At 250 mg kg⁻¹ soil, lead induced a decrease in total microbial and Azotobacter counts. Mercury had a markedly higher depressive effect on soil microorganisms, with concentrations of 2 and 4 mg kg⁻¹ soil significantly reducing the total microbial and Azotobacter counts.

Keywords: *heavy metals, microorganisms, plant, soil.*

ANALYSIS OF REVENUE STRUCTURE IN FINANCING NATIONAL PARKS IN SERBIA

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Abstract

Financing of protected areas in Serbia is one of the important issues in the system of nature protection. Protected areas covers ~5,89 % of territory of Serbia while national parks involve ~30,57% of this land. Their importance is very significant since they include nature ecosystems, landscape and cultural features and this area is intended for protection of existing natural resources as well as for protection of landscapes, geological and biological features. Their usages are also oriented toward scientific, educational, cultural and tourism needs. This paper analyses different revenue structures in managing this type of natural resource as well as approaches in the financing in the region and abroad. The objective of the article is the structure of revenues in the financing five national parks in Serbia. Territorial framework of the research is the Republic of Serbia with the autonomous provinces. In order to determine the structure of revenues in the financing, statistical techniques based on analysis of time series is used. Non-reactive method is used for collection of data's. Results are showing that most revenues are coming from sales and services and least from government revenue allocation. The best average exponential trend has national park "Fruška gora" while national park "Đerdap" has negative exponential trend. Based on this, in all national parks, on revenue structure mostly influence revenues from sales of goods and fees.

Key words: *nature protection, national park, revenue structure, financing, trends.*

WATER POTENTIAL OF BEECH FORESTS IN SERBIA

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Abstract

Hill-mountain Serbian area includes the greatest part of beech forests. They differ from each other in growth, age and structure, located alone or consisted of other trees species. The most important management goal is to produce as much as possible woody mass, but, on the other hand, generally some useful forest functions are neglected. There is not so well-known aspect of hydrological forest function that emphasizes the importance of beech for water existence. It attracts a big attention especially in the time when supplies of water are lacking so much. Some modern researches predict increasing that role of beech forests, because some big supplies of high quality water will be located in forests region, especially in its beech parts . There is analyze based on available dates (distribution of forests depending on heights, rainfalls depending on zones, coefficient of water running, etc.) that is performed in the scientific paper in order to evaluate benefit of useful waters from forest ecosystems that belong to mountain-hill area of Serbia.

Key words:*hydrological function, water, natural supplies, beech forests, benefit of useful waters.*

NATURAL RESOURCES AND THE ENVIRONMENT OF UPPER DANUBE

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Abstract

The Upper Danube area is in the northwest of Backa of Serbia along the left bank of the Danube on the border with Croatia and Hungary. This is very specific and unique complex of wetlands and floodplains in the Danube area. The area was declared a special nature reserve because of the great biodiversity which was established here. Upper Danube is the subject of strategic documents at national and international level, particularly delineated and implemented measures for the protection and conservation of biodiversity of these ecosystems is also emphasis on individual forest species, bird species and fish stocks. The aim of this paper is to analyze the environmental situation of the region with special emphasis on the individual municipalities that are related to this area. According to the available data were analyzed indicators related to the state of the forests in this area and highlighted the importance of preserving natural resources and the principles of sustainable development, which are the potential of the area in terms of tourism and economic development.

Keywords: *Upper Danube, biodiversity, forests, sustainable development.*

WASTEWATER TREATMENT AND ITS INFLUENCE ON SURFACE WATER IN UPPER PARTS OF JIZERA MOUNTAINS

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Abstract

Jizera Mountains in the north part of Bohemia (Czech Republic) are increasingly the destination for visitors and tourists, who find here fun, movement and relaxation not only in summer but also in winter. Most of the visitors find some accommodation just in the center of Jizera Mountains. Therefore most of historical buildings in this area are rebuilt on recreational facilities. These objects are usually quite far from bigger village or towns, so they are not connected onto the public sewerage and they deal with their wastewater treatment individually.

This paper is focused on two locations: Smědava Cottage and settlement Jizerka, which are both in the heart of the mountains and deal with wastewater treatment in a similar way, but each with different results. The influences of surface water by this are monitored above and below the place, where the treated waste water is let out. This influence is monitored with measurement of physicochemical indexes of water quality both in terrain with the portable meter and in laboratory with spectrophotometry method. Readings are compared with legislation in force in Czech Republic. This project has started in March this year, so the results are not completed yet. But it is already possible to state that in settlement Jizerka the wastewater treatment is more effective and influence water quality less than in cottage Smědá.

Key words: *wastewater treatment, surface water, recreation facilities, water quality.*

EFFECT ON PH, EC AND OM OF THE USE OF URBAN WASTEWATER IN IRRIGATION LINE IN THE PADDIES IN ALBUFERA OF VALENCIA (SPAIN)

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Abstract

This study attempts to establish the effects of urban waste water irrigation on the cultivation of rice through pH development, organic matter and electrical conductivity along an irrigation line evaluating nine plots.

The main source of water is of urban origin (sewage) that was combined with water from irrigation ditches (several sources: agricultural, urban and industrial). This study will help determine to what extent affects the soil-water-plant systems and the surrounding environment. Study results suggest through the process of analysis of the water, of agricultural soils the impact of different types of water will have on the crops and environment. The unique aspect of this study with respect to prior studies on the reuse of urban wastewater in agriculture and their effects on crops and the environment is just how to follow the linear evolution (spatial) of the chemical parameters of flooded soils for growing rice. In the analysis not only does this consider the spatial evolution but also the temporal, comparing the results obtained from samples taken before and after harvest of rice cultivation for several campaigns. The aim is to get an overview of the effects caused by these three chemical parameters in the wastewater on rice crops, waters and agricultural soils, under the conditions of the experiment, basic soils and Mediterranean conditions.

Keywords: *rice, irrigation, soils, urban wastewater.*

THE NEED OF SUSTAINABLE WATER USE IN TURKISH AGRICULTURE

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Abstract

Water scarcity has been deeply influencing agricultural production over years. Continuously increasing world population and pressure on natural resources, global warming, inefficient management, and similar factors have caused individuals and governmental authorities to put more emphasis on sustainable use of natural resources, water in this case. Although the population of the world and water being used for irrigation are continuously increasing, water potential in the earth remains constant. This means per capita water consumption will diminish in the future and people will have to find out new strategies for sustainable use of water resources. Because of the sufficient surface and ground water resources in Turkey, an immediate water scarcity problem doesn't appear. However, Turkey is not counted as a water-rich country either. For this reason, the available water resources must carefully be used to provide sustainability for the future generations. The primary purpose of this paper is to develop strategies for sustainable use of water resources in Turkey. The paper is first intended to give basic information about agricultural and water resources. Then irrigation possibilities, irrigation methods, and policies will be discussed. Within the framework of the present policies and applications, recommendations for sustainable use of water resources will be developed.

Keywords;*water sources, irrigation, sustainability, Turkey.*

COCCIDIOSTATS IN POULTRY MANURE - A POTENTIAL IMPACT ON METAL ACCUMULATION IN BENEFICIAL SOIL INVERTEBRATES

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Abstract

Carboxylic ionophore antibiotics are used in veterinary medicine for prevention and treatment of coccidiosis in poultry. The most frequently used coccidiostats in Slovenia and in northern Europe are natural ionophores monensin, salinomycin, and lasalocid. As these substances are only partially metabolised in treated animals, the major part of coccidiostats consumed are excreted in active form. When poultry manure is used as fertiliser, part of the coccidiostats ends up in the environment. Ionophores act as cation transporters across cell membranes, so they can potentially also impact metal transport, especially in metal-burdened environments. We studied the bioaccumulation of copper in earthworms (*Eisenia andrei*) and isopods (*Porcellio scaber*) when concurrently exposed to monensin and Cu-contaminated artificial soil. Copper predominantly enters agricultural soils by use of Cu-based herbicides and manure from pig farms where it is used as a growth promoter. In the present study, animals were exposed for 14 or 28 days to environmentally realistic concentrations of Cu (80 and 160 mg/kg dry soil) and monensin (25 mg/kg dry soil). We found that monensin increases the uptake and accumulation of Cu in earthworms, while no impacts on isopods were observed. Thus we may conclude that in Cu-burdened environments like vineyards, Cu intake could decrease the toxicity threshold if monensin-contaminated manure from poultry farms was used frequently.

Keywords: *ionophore, monensin, bioaccumulation, earthworms, woodlice.*

ECONOMIC VALUE AND PRICING OF WATER IN IRRIGATION IN SERBIA

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Abstract

Several factors (technical, economics and social) have major influence on the price of water for irrigation. In addition to these factors and the calculation method of irrigation water prices has an impact on the amount of the same.

For regional subsystem "Srem", which covers about 1.700 ha of arable land, different approaches of water price were investigated. Cost, benefit and marginal principle formation for irrigation of suggested agricultural plants were chosen. These methods proved that the water price is in the function of selected factors, as well as the ways of calculating the price of water for irrigation. Each of these principles enables water price calculation, which consists of water price on intake and price of water for distribution on specific farm depending on irrigation requirement.

The cost of irrigation in this case amounted to 353-689 €/ha depending from financing conditions. Economic selling price of 1 m³ water for irrigation (ILRIC method) ranged from 0,29-0,52 €/m³ depending from amount the discount rate (0-10%).

The obtained water price data are included in the economic analysis for individual agricultural crops on this area. It has been calculated how many tons per hectare covers the costs of irrigation. Using the binomial tariff total costs for irrigation, for the whole subsystem, are assigned to individual crops as follows: fixed irrigation costs are allocated according to the sown area (€/ha) and variable costs according to expected water consumption (€/m³). Thus farmers, which will be supplied with water for irrigation from this subsystem, will know in advance approximately the expected water price for irrigation.

The application of this methodology requires a complete monitoring by the regional subsystem, as well as the register of all users and their mutual obligations.

Key words: *water price, irrigation, crops, distribution.*

USE OF ECOLOGICAL CHARACTERISTIC OF SOIL FOR MAKING THE SUITABILITY MAPS FOR GROWTH AND CULTIVATION OF SPECIES OF THE GENUS *VACCINIUM* USING GIS TOOLS

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Abstract

Basis for understanding the spatial distribution of specific plant species is in the knowledge of the specific pedoclimatic and orographic demands certain plants.

In this paper authors prepared suitability map for the growth and cultivation of species of the genus *Vaccinium* in the Canton Srednja Bosna using GIS tools. In paper, as the major limitations for growth and cultivation species of the genus *Vaccinium*, it's used pH value of the soil (source: Basic Soil Map of Bosnia and Herzegovina (BiH), 1:50 000), elevation and aspect (source: DTM of BiH). Map as the end result allows the user to get answers to questions related to the cultivation of and growth of species of the genus *Vaccinium* in the Canton Srednja Bosna.

Keywords: *analysis, GIS, limiting factors, Vaccinium.*

DYNAMICS OF THE WATER CONTENT IN THE SOIL DURING THE PERIODS WITHOUT PRECIPITATION IN THE BOCEGAJ SUBCATCHMENT IN 2009 AND 2010

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Abstract

The decrease trend of volumetric soil water content was observed during the dry season of 30 days with the rainfall up to 3 mm in 2009 and 2010; 8.9.-8.10.2009 (30 days) and 23.6.-22.7.2010 (29 days) in Bocegaj subcatchment, Slovakia. The dynamics vary between the observation places and depth. The highest decrease was up to 300 mm depth, the lowest in depth 1000 mm. The differences were mainly up to 10 percent of volume (average 4.3 % vol.) in 2009 and over 15 percent of volume (average 13.3 % vol.) in 2010. Higher temperature, soil type and texture, and different crops influenced the recession of the soil moisture in 2010.

Key words: *soil drought, volumetric soil water content, dynamics of soil water content.*

THE VIEW OF AGRICULTURAL PRODUCERS ON THE LOSS OF AGRICULTURAL LAND IN THE PROCESS OF HYDROPOWER PLANT CONSTRUCTION IN SLOVENIA

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Abstract

On the one hand the demands for energy are rising, and on the other hand agricultural production and food self-sufficiency have been emphasised. In our study we analysed the views of agricultural producers on the loss of productive agricultural land due to the Brežice and Mokrice hydropower plant (HPP) construction on the lower Sava river in Slovenia and eastern highway construction within HPP Mokrice construction. The study included socio-economic analysis (semi-structured interviews with farmers and land owners) and spatial analysis of the available natural resources in the study area, using geographic information system (GIS). In total 188 questionnaires were analysed, 51 (Brežice), 102 (Mokrice), and 35 (eastern highway-HPP Mokrice). Socio-economic analysis revealed that agricultural producers have low interest in protecting their agricultural land. Based on the available information, we expect that the combination of purchase and replacement of agricultural land will allow those farms for which farming is an important source of revenue in the study area to focus in more development-oriented farming in the future. Therefore the development of appropriate agricultural and rural development programs is necessary.

Keywords: *Agricultural land management, GIS analysis, hydropower plant construction, food self-sufficiency, natural resource protection.*

THE LEVEL OF POLLUTION FROM NUTRIENTS AND HUMAN EFFECTS ON DURRES BAY

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Abstract

The purpose of the study is to assess the pollution of the water in the Bay of Durres from wastewater discharges, including the one generated from livestock units. Monitoring expeditions were carried out in the coast line of Durres Bay. There were appointed 2 sampling points, the first point named Currila in the north suburb of the city of Durres and the second point named Plepa in the estuary of the wastewater and livestock water discharges, in the south of Durres city and were analysed physic-chemical indicators in May and August 2011.

The results of the analysis showed evident differences compared to the reference parameters of EU for the bathing water quality.

Specifically *Streptococcus Faecalis* resulted 3.1×10^3 and 9.3×10^3 MPN/100 ml water (May/August) in the Currila point, versus 3.5×10^4 and 9.8×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 2×10^3 MPN/100 ml water.

Specifically *Escherichia coli* resulted 1.5×10^3 and 3.4×10^3 MPN/100 ml water (May/August) in the Currila point, versus 2.3×10^5 and 9.3×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 1×10^4 MPN/100 ml water.

As observed, among others, the seasonal and livestock units effects are evident

Authors conclude that, to control pollution, is important to treated wastewater and the water that is generated from the livestock units before discharge them in the sea water, because they are a risk factor of pollution.

Keywords: *water, quality, pollution, analysis, samples, treatment.*

INFLUENCE OF CLIMATIC FACTORS OF FIG TREE AS A VERY IMPORTED ISSUE FOR THE ADAPTION OF THE VARIETIES TO DIFFERENT CONDITIONS

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Abstract

Study has been focus to evaluate the effect of different climatic condition on fig quality and exploration of the adaption of the varieties to different conditions. Study is realized in varieties same, one varieties in two different site such is Roshnik variety in Tirana zones and Berati zones, Cingell in Kruja zones in Tirana zones, Cipull in Tirana zones and Berati zones, Bradashesh in Tirana zones and Berati zones, shkronjs in Tepelena zones and Berati zones. Climatic parameters for each locality were registration during 2011,2012,2013. For each cultivars in different zones are registrates parameters such is: trunk diameters, fig production (kg/plant and number/plant, final fruit size (mm) and weight (g) and % of sugar. Fruits parameter are continuous, maturity, productivity, color fruit. At all parameters showed difference between two some varieties in different zones with different climatic. Climatic influence is very important factor for quality fruits and product, solar intense have influence in maturity time and increased of sugar %, high summer temperature (ranging between 25-39° C).At all the parameters evaluated showed differences between character, adaptation of the varieties to different condition is mainly condition, this was study objective.

Keywords: *climatic, diversity, adaption, parameters, resource.*

USE OMW AS FERTILIZER TO PROTECT THE ENVIRONMENT

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Abstract

In Algeria especially in Kabylia, olive oil mills produce a liquid effluent referred to as olive mill wastewater (OMW). Pressing olives also poses serious environmental damage. Indeed, thousands of cubic meters of this biomass is dumped into the environment especially hydrographic network, thus constituting a real threat to the flora, fauna and groundwater. The by-products of olive can be used to improve agricultural production while protecting the environment. Thus, the environmental problems of its by-products remains intact in our country. It was therefore necessary to find how to value these byproducts in other sectors, particularly agriculture. The objective is to study the impact of the contribution of different doses of vegetable on the physical, chemical and biological soil properties in an olive grove in the region of Sidi Aich northern Algeria. The studied soil is a Calcosol textured silty clay and sand. Slightly to moderately alkaline pH, low electrical conductivity, the total rate of limestone and high active calcium, a deficiency of organic carbon, total nitrogen and phosphorus. Given the results of this study, the contribution of the dose of olive mill wastewater 100 m³/ha is best suited for improving phosphate and chemical properties of soils. In addition, the abundance of some important soil macro invertebrates such as annelids and gastropods, considered bioindicators tells us about the effect of enriching the food potential of these soils.

Keywords: *OMW, fertilization, bioindicators, soil, olive.*

ENVIRONMENTAL CHANGES THROUGHOUT THE TWENTIETH CENTURY IN MONTENEGRO

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Abstract

Ghent University and the University of Montenegro carry out joint geomorphological research in Montenegro and western Serbia (<http://geoweb.ugent.be/physical-geography/research/western-balkans>). To study the magnitude of land degradation, desertification or resilience in Montenegro throughout the 20th and early 21st century, we re-photographed the landscapes pictured on 65 historical photographs dating back to periods between 1890 and 1985, and analysed in a semi-quantitative way the land use and cover changes that occurred through an expert rating system (six correspondents). Time series of hydrology and population density were analysed for the period since 1948, and compared to the changes observed through repeat photography. Overall, vegetation cover has strongly increased and barren areas occupy less space. The industrialisation that expanded in the 1950s led to strong urbanisation. Despite steadily increasing population (with the notable exception of the Mountain region), the vegetation cover has increased strongly and everywhere. This denser vegetation has led to higher infiltration of rainfall. Partitioning of infiltration water led on one hand to deep infiltration and better low flows and on the other hand to increased evapotranspiration at the boundary layer, leading to decreased total runoff coefficients. In the Mountain region, runoff coefficients have increased, which may be related to earlier snowmelt. Overall, the findings of this study are in line with observations elsewhere in the former SFR of Yugoslavia that, as a result of erosion control and significant vegetation regrowth, the changes observed over a century point to land resilience and not to desertification.

Key words: *Geomorphology, Land degradation, Forest transition, Repeat photography, Runoff coefficient.*

REGIONAL GEOMORPHOLOGICAL MAPPING OF MONTENEGRO: LANDFORM GENESIS AND PRESENT PROCESSES

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Abstract

As a contribution to the joint geomorphological research carried out by Ghent University and the University of Montenegro (<http://geoweb.ugent.be/physical-geography/research/western-balkans>) the main geomorphological features of Montenegro will be characterized and mapped. The main geomorphological regions were identified based on past research in the different geomorphological regions. A polje (Njeguši), a canyon (Kanjon Starobarske rijeke) and a debris fan and fluvial terraces (Morača - Podgorica) will be mapped in detail using GPS measurements, topographic maps (1:25 000) and GIS software. Additionally, a large-scale geomorphological map of the Montenegrin territory will be created using existing literature, DEM, GIS software and soil samples. Homogeneous geomorphic units will be mapped using the geomorphon approach. Another aspect of this research concerns the formation of Skadar Lake (Skadarsko jezero), since existing literature shows contradictory theories: tectonic subsidence, a rias coast that was isolated by the Bojana alluvial deposits, or a combination of both. Therefore, this region (including Bojana river alluvial plain and Ulcinj coastal dunes) will be subjected to sedimentological research. The resulting maps and sedimentological data will be used to fully understand the different formation processes of the present-day geomorphology. Furthermore, measurements and photographs will be used to assess the influence of land use changes on gully erosion.

Keywords: *Montenegro, geomorphological mapping, geomorphon, landform genesis, gully erosion, land use changes.*

ENVIRONMENTAL AND ECONOMIC EFFECTS OF FUEL ADDITIVES

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Abstract

In today's public transportation still actively uses buses with outdated diesel engines that require significant investment for renovation and upgrading to facilitate modern filters. Possible solution is found in using additives based on saponifiednaphthenic acids, aliphatic hydrocarbons and copper. Utilizing these additives accelerates the engine's combustion process, reducing carbon and other exhaust gasses emission, carbon monoxide and particulate matter as well as fuel consumption, resulting in increased fuel economy.

Author's primary goal was to determine effects of additive utilization on fossil fuel combustion, emission of exhaust gases along with possible effects on fuel economy. Research was conducted in two cycles on public transport buses, one of an older type and one of the newer type. Data on fuel consumption was collected without additives for the first bus and with fuel additives on another one. Authors determined that the fuel consumption on bus number one was reduced by 8,25%, on the second by 1,7%. Exhaust gases were significantly reduced on bus No. 1, while on the bus No. 2 it remained on the similar level. This lead to the conclusion that utilization of fuel additives has an important economic and environmental justification; thereby advising for fuel additives to be incorporated in the public transportation routine.

Keywords: *environmental-economic effects, additives, exhaust gases, saving, frugality.*

CLIMATE CHANGE: IMPACT ON AGRICULTURE

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Abstract

The exploding populations in recent years burdened on Agriculture heavily, therefore, to meet the consumption needs, farmers have to really depend upon the inorganic fertilizers. No doubt, these inorganic fertilizers have increased the production of almost all the crops on one hand, but harmful effects have also been reported on the other hand. Apart from this, chemical based intensive agricultural practices are contributing significantly for the production of Greenhouse gases and thus degrade the environment.

However, Agriculture is often considered a victim of climate change while its contribution to green house gas emissions has largely been overlooked. At global level, farming is contributing 14% of greenhouse gases and thus creating hazardous effect on environment and considered for global warming.

While in India, farming contributes 28% of the national GHGs emissions. Indeed, agriculture is the primary source of methane (from livestock) and nitrous oxide (from inorganic fertilizers), and mechanization of agricultural activities responsible for emission of carbon dioxide and thus the farm sector offers significant opportunities for carbon sequestration and emissions.

Carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) concentration in the atmosphere have increases by approximately 35%, 155%, and 18% respectively, since 1750.

More over emission of N₂O from cropped and grazed soils, CH₄ emission from ruminant livestock production & rice cultivation and livestock wastes create both CH₄ and N₂O.

Further, zero tillage, tree restoration, reduced tillage, organically cultivation, change crop mixes and crop rotations, agro forestry, anaerobic composting, social forestry, conservation agriculture, mulching, intercropping, multi-cropping may decrease the green house gases emission and thus enthuse sustainable lives on the earth.

Key Words: *Sustainability, Climate change, Farming practices, Healthy Agriculture, Clean Environment.*

WATER MANAGEMENT AND SUSTAINABLE DEVELOPMENT: FROM THEORY TO PRACTICE

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Abstract

At the present and future time, in the view of on-going climate variability and change, land and water management issues are becoming increasingly important. Hence, many areas in the Mediterranean and other neighboring regions are in the process of adoption and implementation of the modern tools and technologies for integrated water and land management. These tools support the implementation of new policies on water, designed and promoted during the last decade, which acknowledge integrated water management strategies, based on the concept of sustainability and on a complex and multiple interaction and interdependency among various sectors and water subsystems.

The modern technologies and tools presented in this work represent the results of the projects following the long-term national and regional strategies for the management and planning of land and water resources and implemented by CIHEAM – Mediterranean Agronomic Institute of Bari. The GIS database of weather, soil, water and land-use characteristics represents a solid starting point for many activities and programmes including the water balance modelling at local and regional scale and aiming to comprehend both supply and demand side of land and water management. The use of GIS and spatially referenced databases along with efficient monitoring and forecasting system supports faster and easier exchange and integration of information and interaction of geo-referenced data, models and decision support tools. Moreover, these databases represent a first step towards the Supervisory Control and Data Acquisition (SCADA) systems providing remotely real-time measurement of water availability in surface and underground accumulations and reservoirs as well as the soil water content in the agricultural fields. Certainly, this could enable remotely operation of water distribution network, a better scheduling of irrigation at on-farm scale and a more efficient land and water management.

Keywords: *GIS, innovative technologies, monitoring and decision support systems, soil-water balance modelling, real-time water management.*

PRIMARY PRODUCTION IN ACCUMULATION “STREZEVO” IN THE REPUBLIC OF MACEDONIA

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Abstract

During the period from March until October 2009 the level and dynamics of the primary production in acumulation “Strezevo” were investigated. Based on the obtained results, the level of the primary production in the accumulation varies and indicates clear seasonal fluctuations. The highest level of the primary production was 9.29 mg/l water and was observed during the summer on the first investigated locality, where the river Shemnica flows into the accumulation, and the lower level was near the floodgate and was from 3.62 to 6.45 mg/l. During the autumn the primary production level was high in all profiles, mainly at the beginning of the accumulation and was 12.49 mg/l.

Key words: *accumulation “Strezevo”, primary production, water quality.*

SELENIUM AND ITS IMPORTANCE IN THE NUTRITION OF FISH

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Abstract

Selenium is a microelement necessary for normal growth, development and reproduction. In research on carp at intensive breeding, authors followed up the effects of selenium supplementation on the activity of the selenoenzyme glutathione peroxidase (in erythrocytes and in liver) and type I deiodinase (in serum).

The experiments were performed in experimental pools in the fish farm "Boshava" during 2010, by introduction of inorganic (sodium selenate) and organic selenium (selenium starter) in supplemental food for young carps (0+). That way, at the end of the experiment a statistically significant length and weight growth was noticed in the youngsters' groups fed with selenium supplemented food, compared to the control group fed without selenium supplement.

Low mortality in the pools where selenium enriched food was implemented must be particularly pointed out. Mortality in the control group was 17.5%, in the group with inorganic selenium supplement 12.3%, and in the group with organic selenium supplement only 0.7%.

In laboratory conditions we followed up the influence of cadmium in water (1.5 mg/l) on the activity of the enzyme glutathione-S-transferase, an enzyme important in the biotransformation of various pollutants. The activity of this enzyme is in correlation with the activity of the selenium-dependent enzyme, glutathione peroxidase. In relation to the control group, in the groups supplemented with selenium an increase of glutathione peroxidase activity in erythrocytes and liver was found, with simultaneous decrease of glutathione-S-transferase activity in carps' plasma and liver.

Key words: *selenium, nutrition of fish, activity of enzymes.*

WATER MANAGEMENT UNDER CLIMATE CHANGE

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Abstract

The recent statistics show a clear downward trend in global and per capita availabilities of water due in particular to climate change. In addition to the recurring droughts that the country experienced during the last two decades, this tendency is accentuated by an unceasingly increasing demand, in particular under the effect of the demographic pressure and the economic development. In a context of scarcity and a limitation of potential resources not yet mobilized, Morocco is confronted with the need of changing its supply policy to a demand management one. The implementation of such policy requires the adoption of new management instruments and new institutional forms of organization. Accordingly, the present study proposes a tool of modeling and decision-making support which integrates the economic, institutional, hydrological and agronomic aspects. The proposed approach is based on optimization techniques and positive mathematical programming to calibrate an empirical model. Using climate change impact simulations, this model is tested for the basin of Souss-Massa. These simulations included changes in water availability and economic conditions, as well as demand management policy. The study results show that the demand management policy at the river basin level should take into account the regional specificities. The basin's water resources are substitutable and water management policy cannot ignore this aspect and should integrate surface and underground water resources at the same time. In drought conditions, the water marginal value increases considerably such that water pricing policy alone cannot result in a rational and a durable use of the resource.

Key words: *water, climate change, Souss-Massa, simulations, model, optimisation, positive mathematical programming, drought.*

CLIMATE CHANGE AWARENESS AND SMALL SCALE MAIZE FARMERS IN MPUMALANGA, PROVINCE, SOUTH AFRICA

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Abstract

Climate change is possibly the greatest environmental challenge facing the world this century. The impact of climate change is a reality and it cuts across all climate-sensitive sectors including the Agriculture sector. It was well documented by several scientists, Intergovernmental Panel on Climate Change and other experts that climate change threatens sustainable economic development and the totality of human existence. This study was conducted in Nkangala District, Mpumalanga province. Mpumalanga province remains the largest production region for forestry and the majority of the people living in Mpumalanga are farmers and they have contributed immensely to promote food security. However, due to the impacts and threaten by climate variability and change which resulted into shortage of food production and changes in the rainfall pattern. It was noted that there is a need for climate change awareness across the agriculture sector including farmers. Random sampling technique was used to select two hundred and fifty one farmers to be interviewed. The questionnaire was administered to farmers and included matters relating to climate change awareness and agronomic practices including maize production. Data was captured and analysed using software package for social science (SPSS version 20). Descriptive analysis was used to describe data and Univariate regression analysis was conducted to demonstrate the relationship and association of variables. It was noted that the majority of farmers in this province need capacity building and also climate change awareness initiatives which would assist these farmers to build the adaptive capacity, increase resilience and reduce vulnerability.

Keywords: *Climate Change awareness, Nkangala District Mpumalanga Province South Africa, Small Scale Farmers and Maize Production.*

VIRTUAL WATER BALANCE ESTIMATION IN AN IRRIGATED AREA IN NORTH-EASTERN TUNISIA

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Abstract

The virtual water concept, defined by Allan (1997), as the amount of water needed to generate a product of both natural and artificial origin, this concept establish a similarity between product marketing and water trade. Virtual Water trade can alleviate, in arid countries, the problem of water scarcity, increasing imports of products with high virtual water content and so, it can allocate scarce resources to higher priority uses.

Given the influence of water in food production, virtual water studies focus generally on food products. At a global scale, the influence of these product's markets with water management was not seen. Influence has appreciated only by analyzing water-scarce countries, but at the detail level, should be increased, as most studies consider a country as a single geographical point, leading to considerable inaccuracies. For this reason, we consider the value of exploring virtual water strategy at smaller scales such as an irrigated area.

The main objective of this work is the estimation of virtual water balance of strategic irrigated crops (fruit trees, cereals and vegetables) in Zaghuan (Semi-arid area in the North-Eastern Tunisia) to determine their influence on the water resources management and to establish patterns for improving it. The virtual water balance was performed basing on farmer's surveys, crop and meteorological data, irrigation management and regional statistics.

Keywords: *Virtual Water, North-Eastern Tunisia, Irrigated Crops, Water Management.*

WATER AND ENERGY MANAGEMENT IN AN AUTOMATED IRRIGATION DISTRICT

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Abstract

Over the last years, telecontrol systems have been incorporated into the majority of modern collective pressurized irrigation networks in Spain. This type of infrastructure provides many opportunities for the improvement of irrigation system management. The large possibilities of modernized systems and the need to amortize have promoted large area under crops with higher economic margins and therefore increase the irrigation water demand. Therefore it is necessary to provide for these Water Use Associations tools to support decision making and to manage their irrigations based on useful data provided by the telecontrol systems. The Almodévar Irrigation District (AID) is located in north-eastern Spain and has a total area of 3744 ha. The irrigation district was transformed in pressurized irrigation in 2010 and was equipped with a telecontrolled irrigation system permitting the management of the 2200 irrigation blocks from the district office. With the telecontrol data, we studied the temporal evolution of irrigation water and energy demands in 2011 irrigation season, as well as the adequacy of the energy demand with the contracted electric power. This study only includes the months of peak water demand and the adequacy of the energy demands of the contracted power. As an important result, there is an infra-use of the contracted power in all management areas of AID especially during expensive tariff periods. The possibility of adjusting the power contracting in order to decrease the total cost in AID has been identified. These adjustments should be considered in the irrigation organization. The availability of real time irrigation consumption data provided by the telecontrol, and the possibility of analyzing future demands, allow a distribution of irrigation demands in accordance with the power contracting possibilities, with tariff period of the electric bill and the irrigation network limitations.

Key words: *Irrigation Telecontrol, modernization, sprinkler, energetic efficiency.*

5. ANIMAL HUSBANDRY

PASTORAL DYNAMICS IN THE REGION OF DIFFA (NIGER): A DESCRIPTIVE ANALYSIS OF LIVESTOCK CAPITAL

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Abstract

Located between the desert zone in the North and the Sahelian zone in the South, the Region of Diffa is a pastoral area par excellence in Niger. Breeding, with a highly diversified livestock, is the dominant economic activity in the region. It occupied 95% of the population and contributes annually to 55% in the formation of the region gross domestic production (1). For understanding the pastoral dynamic a survey of 300 households (150 households with herd sedentary and 150 with herd mobile) was conducted during the first semester of 2012. The data analysis is performed from a herd of 15,618 animal heads consisting mainly of small ruminants for both sedentary (72%) and mobile (52%). The herd structure (sedentary and mobile) by age and sex shows on the one hand, the males are early and systematically exploited, all species including, and the reproduction is carried out by a core of female spawners more or less stable and dominated by young females, on the other hand. Comparative analysis of compositions and structures of the livestock by agro-ecological zone (Pastoral bowls zone; Komadougou River and Lake Chad zones) reveals zonal disparities particularly in the sedentary livestock system.

Keywords: *Livestock, Pastoral economy, livestock system, Diffa, Niger.*

INFLUENCE OF GENISTEIN AND ZEARALENONE ON BOAR SPERMATOZOA MOTILITY *IN VITRO*

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Abstract

Genistein (GEN) belongs among soya phytoestrogens, while zearalenone (ZEA) is a metabolite of the fungi *Fusarium spp.* Both compounds can bind to estrogen receptors, so they can mimic the functions of endogenous estrogens. Pigs very often come into contact with these substances through feeding. The aim of this study was to evaluate the influence of GEN and ZEA on the motility of porcine spermatozoa by the CASA system (computer assisted sperm analysis). The effects of GEN and ZEA, concentration range 0,5 – 20 μM , on the model of boar diluted semen were tested during 2- and 4-hour incubation at 38°C. The data obtained show that GEN and ZEA negatively affect sperm velocity parameters (VCL, VAP, VSL) in a dose and incubation period dependent manner. A significant decrease in sperm velocity parameters was recorded after addition of all the GEN or ZEA concentrations tested. A temporary increase in value was observed in the case of VSL only - after 2 hours of incubation with 0,5 – 10 μM ZEA. Also, a dose dependent increase of immotile spermatozoa corresponded to changes of the sperm velocity. In conclusion, even relatively low doses of the substances tested can negatively affect pig fertility.

Keywords: *Pig, sperm, genistein, zearalenone, CASA*

INFLUENCE OF DAIDZEIN ON MEIOTIC MATURATION OF PIG OOCYTES

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Abstract

Daidzein is ranked among phytoestrogens, natural substances which influence an organism due to their binding to estrogen receptors, similarly to endocrine disruptors. For that reason, their effects are manifested especially in the field of reproduction. One of the important presumptions of female reproduction is a physiological course of meiotic maturation of oocytes. The high portion of soya in a pig's diet predetermines this species for the possible influence of daidzein on reproductive functions. The aim of this study was to determine the effects of an increasing concentrations of daidzein on the meiotic maturation progress of porcine oocytes under *in vitro* conditions. The oocytes were exposed to different concentrations of daidzein (10, 20, 40, 50µg/ml). After 24 hours cultivation the stage of nuclear maturation and the area of cumulus – oocyte complexes reached as a detector of cumular cell expansion were evaluated. The high level of daidzein's solubility was determined by the HPLC method.

The effects of daidzein on oocytes were already manifested at the lowest concentration used. Nuclear maturation was inhibited in a dose dependent manner. The maximum effects were observed in the concentration of 20µg/ml, and inhibitory effects of higher concentrations were determined at the same intensity. Daidzein suppressed the expansion of cumular cells as well. The lowest (10µg/ml) and highest (50µg/ml) concentrations had the strongest effects on cumular expansion. In conclusion, daidzein negatively influences the meiotic maturation of porcine oocytes, whereas the expansion of cumular cells reacts more sensitively than nuclear maturation of oocytes to this soya phytoestrogen.

Keywords: *phytoestrogen, daidzein, pig, meiosis, oocyte.*

INFLUENCE OF LDL ADDITION ON CRYOPROTECTIVE PROPERTIES OF BOVINE SEMEN EXTENDERS

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Abstract

The cryopreservation process and subsequent thawing of insemination doses (ID) can impair spermatozoon structures, especially sperm acrosome, nucleus and plasma membrane. These alterations affect post-thaw sperm motility, which is considered as the most important indicator in terms of fertilization capability (quality) of ID. The above-mentioned changes can be minimized through the usage of an appropriate cryoprotective compound in semen extender. Generally effective egg yolk has a number of disadvantages. Nevertheless, low density lipoprotein (LDL) - responsible for its cryoprotective effects - could improve the properties of the currently used non-yolk extenders.

The objective of this work was to evaluate the effect of the combination of LDL, processed from egg yolk plasma, with the commercially produced extender Andromed® (Minitübe, Germany) containing plant phospholipids. LDL was added to the extender at concentrations of 4%, 6 %, 8 %. Sperm motility was assessed using the selected Computer Assisted Sperm Analysis parameters (VCL, VAP, VSL) after 2 hours of incubation at 37 °C. After addition of LDL, the evaluated parameters reached significantly higher values compared with the control samples before cryopreservation and post-thawing as well. However, no differences were found among added LDL concentrations.

It can be concluded that the addition of LDL to an extender with plant phospholipids can have positive effects on sperm motility.

Keywords: *LDL, spermatozoa, motility.*

SCORING SYSTEM AND IDENTIFICATION OF MASTITIS RISKS IN CATTLE FARMS

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Abstract

The aim of this study was: the quantitative evaluation of data assessment in farm management through the use of institutional instruments such as questionnaire and system of points (Scoring system) and their comparison with the laboratory analyses of milk, in a “X” farm situated in Ndroq, Tirana. The intention was to rank critical points during cattle breeding and their redress. For these purposes were conducted two surveys, by 8 months time frame, associated with quantitative evaluation of farm husbandry practices and milk samples. The breeding-quantitative quotation (milking, lactation, calving, etc.) was performed by point evaluation of specific practices. The smallest score point was 1 and the biggest was considered from 4 to 10. For each file were calculated the total points and then the average score. According to LS (Linear Score), maximal average number of points for each file should not exceed 4.5 to 4.9 points. At this point level Somatic Cells are 300-400 for SG 000/milk ml (Zecconi 2010). Total aerobic and somatic cells were analyzed as raw milk indicators. In the first survey the results for somatic cell were: 580 ± 50 for 10^3 /ml and for total aerobic cells were: 1430 ± 157 for CFU (Colony Forming Units) / milk ml. At the second survey the somatic cells were 290 ± 40 while total aerobics 138 ± 58 , versus 400 and <1000 that are mark respective rates, due this to rearing management corrections, which reflect directly to average scores. During this study it was concluded that the most critical point during milking was the teat disinfection (before and after milking), practices which were not carried out correctly or were performed by inefficient pharmaceutical substances. Our suggestions that are in concordance with the farmers association, led to the correction of many farming practices, where the most indicative was the decreasing by 10 points to the score 1 point in milking file schedule during the second survey, which was also reflected in hygienic status of milk.

Key words: *Udder health, Somatic cells, Total Aerobic indicators, Milking*

THE INFLUENCE OF DIFFERENT INTENSITIES OF FEEDING ON THE GROWTH OF JUVENILE RAINBOW TROUT (*ONCORHYNCHUS MYKISS* WAL.)

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Abstract

The paper presents the results of the research influence of different intensities of feeding on the growth of juvenile rainbow trout (*Oncorhynchus mykiss* Wal.) with an average initial weight and body length (\pm SD) 2.71 \pm 0.87 g - 6.30 \pm 0.72 cm, 2.55 \pm 0.75 g - 6.18 \pm 0.58 cm and 2.66 \pm 0.82 g - 6.32 \pm 0.60 cm. The experiment is realized in the laboratory of Fisheries, Faculty of Agriculture in Banja Luka. The experimental rainbow trout fingerlings divided into three groups; feeding every day (EXPG_C), a group without feeding on sunday (EXPG_{Sun}) and the group without feeding on wednesdays and sundays (EXPG_{Wed-Sun}). After 42 days of average weight and body length (\pm SD) was in EXPG_C 9.93 \pm 3.85 g - 9.60 \pm 1.26 cm, EXPG_{Sun} 8.95 \pm 2.82 g - 9.29 \pm 0.95 cm and EXPG_{Wed-Sun} 7.96 \pm 2.79 g - 8.97 \pm 1:00 cm. Significant differences ($P < 0.05$), average body weight were found between the experimental group EXPG_C and EXPG_{Wed-Sun}. Specific growth ratio (SGR) and thermal-unit growth coefficient (TGC) have a tendency to decrease in proportion food intake, and feed conversion ratio (FCR) has the reverse trend, with the lowest EXPG_{Wed-Sun}, followed EXPG_{Sun} and EXPG_C.

Key words: *rainbow trout, feeding intensity, growth.*

THE SITUATION OF PRODUCTION AND PURCHASE OF RAW MILK IN BOSNIA AND HERZEGOVINA

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Abstract

This paper analyzes the production of milk as one of the most important branches of agriculture, which has been and should remain the backbone of its further development. The structure of agricultural production in Bosnia and Herzegovina is unfavorable. Share of livestock production in the value of total agricultural production is about 40%. The main problems that face livestock and animal production in Bosnia and Herzegovina are small production, excessive imports, unfavorable structure of production, and low price of milk purchased and a very low standard of producers who are on the edge of existence.

Milk production in BiH, unfortunately, is still underdeveloped, disorganized and often does not meet the needs of industrial dairy processing capacity. Only 5% of milk producers with produced the quantity and quality of milk is fitting with their results in the requirements of market economy. Larger quantities of produced cow's milk do not meet the criteria of quality, particularly hygienic criteria in accordance with the requirements of international standards and quality regulations. Milk processing (and the market) and the consumption of milk and dairy products is the consequence of the unfavorable economic situation, decreasing living standards and purchasing power, and insufficient education of consumers about the importance of milk and milk products in the daily diet. Dominant production system are small farms (1-3 cows) dealing with mixed livestock production, with the primary goal of self-sufficiency.

The data used in the paper were derived from statistical agencies, as well as his own research in the 6 largest milk processors in BiH (purchase and processing about 85% of total milk purchased in BiH). Number of dairy farmers of these 6 is 15,311, who own a total of 42,364 dairy cows. Average per cooperant is 2.77 cows. Average milk production per dairy cow is 4.081 liter.

Milk quality in accordance with Milk quality decree is unsatisfactory. E-class quality of the milk is only 42%, and worrying data is constant increase the milk quantity which, in accordance with the Decree, puts the raw milk outside of the class (2012th year 26%).

Keywords: *milk, purchase, production.*

VARIABILITY OF THE PRODUCTION CHARACTERISTICS OF THE ISOLATED TRAITS OF THE HONEY BEE IN THE AREA OF TREBINJE

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Abstract

To obtain high yield in beekeeping and to exploit potential of the honeybee pasture in the region of the Republic of Srpska it is necessary to use carefully chosen honeybee queens with a good biological potential. Protection of the local subpopulations of the honeybees in order to preserve biodiversity of this kind in the Republic of Srpska is the second important factor for the choice of the honeybees mother queens and their further selection. In the paper we have examined 4 bee traits situated in the selection centre nearby Trebinje. This area is on the border of BH, Montenegro and Croatia in the zone of Mediterranean climate and it is additionally interesting for the isolation of the honeybee traits in order to have new honeybee queens in the earlier phases of beekeeping seasons than in other areas of the RS. The amount of bees, brood, honey, pollen, brood quality and behaviour was investigated in two spring and one autumn survey. All data have been carefully collected, statistically processed and analysed. Trait V2 had the biggest amount of bees in the first and second spring examination (2.26 and 4.84 frames) and statistically it is importantly different from other traits by this characteristic ($P < 0.01$). The same trait had the biggest amount of brood in spring examinations and it was importantly different from the other traits ($P < 0.01$). The best brood quality (mark 3) in all 3 examinations during the year had traits V2 and G2. All examined traits showed variability that provides successful improvement of wanted characteristics and selection of suitable mother queens in order to get high productivity in beekeeping.

Keywords: *honeybee, trait, production characteristics, selection.*

EFFECT OF BODY WEIGHT HENS ON REPRODUCTIVE TRAITS OF BROILER BREEDERS

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Abstract

Investigation of the effect of body weight on reproductive performance of hens of broiler breeders was conducted in the hybrid Ross 308 and Cobb 500. At the beginning of the production cycle (24 weeks old) with hybrids Ross 308 determined the average body weight of hens 2680.40 g and 2697.80 g Cobb 500. After 42 weeks of age (mid-production cycle) weight hens was 3565.10 g (Ross 308) and 3599.05 g (Cobb 500), while at the end of the production cycle (61 weeks old) weight layers in the hybrid Ross 308 was 3841.50 g, and Cobb 500 3850.00 g. The differences found in body weight of laying hens (17:40 g, 33.95 g 8:50 g) in certain periods of the production cycle, and the difference in body weight of hens for full production cycle (23:26 g) were not statistically significant ($P > 0.05$). Specifically assess the influence of body weight on reproductive performance of hens of broiler breeders was determined by calculating the coefficient of phenotypic correlation between the studied parameters. Thus, the association between body weight and most hens reproductive indices of broiler breeders was positive statistically significant ($P < 0.001$) correlation coefficient of phenotypic correlation, while the association between body weight and percentage hen chicken hatching of fertilized eggs defined negative correlation coefficients that were not statistically significant ($P > 0.05$), and between the layers of body weight and relative weight loss of eggs, but statistically significant ($P < 0.001$).

Key words: *hens, body weight, reproductive traits, broiler parents.*

THE PELLETING PROCESS OF DIFFERENT MATERIALS AND IMPACT ON ENERGY CONSUMPTION

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Abstract

The paper presents effects of moisture methods of different raw materials process and influence on energy compounds in pelleting process. There are many benefits to pelleting of food. Improving feed conversation in animal, easier handling of feed and storage, balanced diet of animal, less wastage of food and many other benefits. The experimental materials involved maize wheat and barley. The raw materials was ground throught a 3 mm hammer mill. Condition materials was with cold procedure. Moisture of materials were 14, 16, 18, 20, and 22%. Moisture is important step in high quality pellet production. The experimental materials (maize, wheat and barley) were brought to temperature of 70 ° C. The pelleting process were done in Metalac-Ostojic, pellettizing produced in Obrenovac – Srbija capacity 2-2.5 t/h. Important consideration in feed industry is per tone of pellet production. One factor is to reduce input such is energy consumption. In peper is present different moisture and getting appropriate parameters can influence on the amount of power consumption in maze, wheat and barley. The test materials (maize, wheat and barley) before milling processes humidity was 13 percent. The relationship between parameters of moisture and energy consumption in this process analyzed statistical procedures analysis of Varansa (ANOVA). One of the primary objectives of all commercial feed manufactures is to economically produce the best pellet quality possible. There are numerous factor that affect pellet quality, cost pellet and many are inter-related.

Key words: *energy, pelleting, moisture.*

NON-GENETIC FACTORS AFFECTING BIRTH WEIGHT OF GOAT KIDS

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Abstract

The aim of the study was to determine paragenetic factors and effect of environmental (year) on body mass of goat kids at birth.

The goats included in this research were representatives of three breed groups – group A (Bulgarian White Dairy goat), group B (Bulgarian White Dairy goat x Toggenburg) and group C (Bulgarian White Dairy x Anglo-Nubian).

Average body mass at birth of male kids was heavier than that of females and the difference is not statistically significant ($P > 0.05$). Exceptions are observed only in 2010 at Bulgarian White Dairy goat, where females are heavier than male kids – 3.66 ± 0.29 to 3.40 ± 0.17 , as this is probably due to the age of the goats.

The singles were heavier than twins and triplet kids and the differences are statistically significant ($P < 0.05$). For the three groups average trend in singles, twins and triplets, is respectively: 2009 – 3.25 ± 0.49 and 3.12 ± 0.15 ; 2010 – 3.60 ± 0.20 , 3.55 ± 0.09 and 3.26 ± 0.13 ; 2011 – 3.68 ± 0.19 ; 3.46 ± 0.07 and 3.33 ± 0.18 ; 2012 – 3.97 ± 0.14 ; 3.70 ± 0.09 and 3.14 ± 0.28 .

Key words: *goat, kids, sex of kids, birth weight, non-genetic factors.*

SEROTYPE AND BIOTYPE PREVALENCE OF AVIAN PATHOGENIC *ESCHERICHIA COLI* IN ALBANIAN POULTRY INDUSTRY

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Abstract

A total of 104 *Escherichia coli* strains isolated from affected and apparently different poultry species, bred within the Albanian territory were serotyped and biotyped. Although *E. coli* is normally present in the microflora of the poultry intestinal tract, certain subsets of *extraintestinal E. coli* strains termed as *avian pathogenic Escherichia coli* possess specific virulence factors that in previous studies have been associated with the avian colisepticaemia. Eight different serotypes were identified, where O86 resulted the most prevalent serogroup 15, 4%. Eleven biotypes were identified by the fermentation of five different sugar mediums by *E. coli* isolates. The most prevalent biotype was B31 (28, 84%). Various serobiotypes were identified, 98, 8% of *E. coli* strains were positive to rhamnose fermentation. This study objective was the comparison of the main characteristics of APEC isolated strains with the avian faecal *Escherichia coli*, in order to ascertain whether APEC or AFEC are distinct. The results obtained from the two groups reveal a major and fundamental difference which is reflected clinically.

Key words: Colisepticaemia, *E. coli*, APEC, Biotype, Serogrouping.

INFLUENCE OF SEX AND LITTER SIZE OF BIRTH WEIGHT AND INCREASE LAMBS SJENICA IMPROVED TUFT SHEEP IN INTENSIVE BREEDIN SYSTEM

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Abstract

In the two years on the family farm in the vicinity of Visoko, were monitored parameters in 35 animals of Sjenicka pramenka. The sheep were kept in intensive farming systems. During the year the stock has been held for at least 10 months in a barn (in stable breeding). Annually, a minimum of seven to eight months of basic diet of sheep is corn silage. The aim of this study was to determine the influence of litter size and sex on birth weight and weight gain of lambs to weaning (90 days). The average birth weight of male singles was 5,61 kg and was significantly ($P < 0,05$) higher compared with women singles (5,03 kg).

Male twins are sought after lambing and 4,74 kg also significantly ($P < 0,05$) were heavier than female twins (4,05 kg). Overall, singles of lambing had a mass of 5,24 kg and 4,32 kg twins. The difference was statistically significant ($P < 0,05$). Final weight (90 days) of male singles amounted to 42,17 kg and 32,75 kg female. On average, singles at three months weighed 36,06 kg and 28,91 kg twins. In both cases the differences were compared values were statistically significant ($P < 0,05$). The average weight gain of male singles in the period from 0 to 90 days was 406,24 g and 306,75 g female. The highest increase in male singles achieved in the first 15 days (420,67 g), and female, between 0 to 30 days of age (329,57 g). Sex differences in the biggest and average increment between singles were significant ($P < 0,05$). Male twins are the largest gain (324,22 g) were between 60 and 90 days and the female (314,02 g) from 30 to 60 days of age. Differences in the biggest gain of male and female twins, were not statistically significant ($P > 0,05$). The average weight gain of male twins at the age of three months was 289,65 g and 250,08 g female. Differences in the average gain of male and female twins were significant ($P < 0,05$). The biggest daily gain (354,69 g) singles are achieved from 0 to 30 days of age, the twins from 0 to 90 days (271,39 g). Average daily gains singles during the test period was 344,06 g and 271,39 g twins mentioned.

Keywords: *sjenicka sheep, birth weight, weight gain, intensive farming*

ENERGY FROM DAIRY FARMS

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Abstract

In the future we'll have a problems with amount and manipulation of manure from farms. Aim of paper is to present the potential of producing electric and thermal energy from cattle manure in Republika of Srpska and solve problems.

Today, energy is wealth, and because of the increasing number of modern devices on the farm, occupies a significant role in the total costs of cattle production.

Dairy farmers have problems how to reduce the cost of milk production and this is way how to help them to provide a new sources of income. On the other hand, increasing the number of animals on farms, leading to problems with increasing amounts of manure and its proper storage. In front of us is adoption of relevant EU directives, which regulate this field, it will mean additional costs to agricultural producers who comply with these conditions.

Research the possibilities of energy production, at the cattle farm in Republika of Srpska, it was found that can produce about 0.6 GWh of electrical energy and 0.97 GWh of thermal energy per day if we used all manure.

This can represent significant revenue for the farm, but also a significant contribution to the preservation of the environment. We need to change legislation in these subjects and provide a same price like in other country.

A problem is because a legislative treats looked on this projects like energy plants, not the agricultural aspect, which significantly increases the price of building these plants.

As a conclusion we can say that we are finally reconciled ecology and food production who are often controversial.

Key words: *biogas, ecology, energy, manure.*

THE WEIGHT STRUCTURE OF *PHOXINELLUS PSEUDALEPIDOTUS* (CYPRINIDAE) FROM THE MOSTARSKO BLATO (NERETVA RIVER BASIN, BOSNIA AND HERZEGOVINA)

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Abstract

In this paper, the weight structure of endemic fish species *Phoxinelluspseudalepidotus* from the Mostarsko blato (Neretva River basin, Bosnia and Herzegovina) is presented. Specimens were collected monthly from January to December 2009 by gill nets (7 m length and 0.7 m height, with a 7 mm mesh size). The minimum recorded body weight is 0.1 g and maximum recorded weight is 15.0 g. Average of the total weight for the population is 3.1 ± 1.2 g. Maximum and minimum weight was recorded for females. The average weight for females was 3.3 ± 1.4 and for males 2.9 ± 0.9 with the proviso that the range between the minimum and maximum values is higher in females (0.1 to 15.0 g) than in males (0.2 to 8.0 g). It was found that females have a higher body weight than males.

Key words: *endemic species, Phoxinellus pseudalepidotus, weight structure, Mostarsko blato.*

SLAUGHTER CHARACTERISTICS OF DOMESTIC RABBIT OF CALIFORNIAN BREED

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Abstract

The aim of this study was to determine the slaughter characteristics of domestic rabbits from Californian breed. For this purpose were examined 18 domestic rabbits from Californian breed, divided into two groups according to gender. The domestic rabbits were grown at home conditions by an individual farmer of the region of Bitola.

They were fed usually with hay, alfalfa and grains, without use of concentrated feed. Slaughter was performed at the age of 150 days.

The average body mass of male individuals was 2776.89g, and 2767.89g, of female individuals. Achieved an average daily increase in male domestic rabbits was 18.10g, and 18.10g in female individuals.

Yield of cold carcass without head and internal organs in male individuals was 49.49% and 49.82% in female individuals.

The losses that occur during thermal processing by roast in male individuals were 15.49% and 25.02% in females. The losses that occurred during heat treatment by boiling were 23.07% in male individuals and 18.79% in females.

It was found that the participation of bones separated by manual separation of carcasses in female individuals was 19.22%, and 20.41% in males.

The participation of meat separated with manual separation in female carcasses of rabbits was 80.78%, and respectively 79.59 in male individuals.

Key words: *slaughter characteristics, domestic rabbits, Californian breed, meat yield.*

MONITORING BEHAVIOR OF PIGS IN ONE PIG FARM

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Abstract

Ethology is the study of animal behavior, which was founded back in 1936. Animal behavior is their adaptation to the effects of different external stimuli and internal factors, such as: housing, living or proctor; warmth and the sound; supply of food and water, fear etc.

Animal senses such as hearing, smell, sight and touch, cause different forms of animal behavior. Modern ethology recognizes three ways.

1. Studying the behavior of observing and describing.
2. Research and behavioral reactions using biochemical methods.
3. Genetics of behavior, including the evolution of behavior.

Classical ethology as part of biology served principled strictly define didactics of natural sciences. Serious ethologist starts from recurring observation and attempts to derive a principle. All observations are intended gain more accurate information on the conduct. When observation is important that the observer affects the observed object in this case it's a pig. The observer may also use the camera and then be repeatedly looked at the footage to better perceived misconduct animals. In our study we followed the behavior of pigs in a large pig farm with a capacity of 1450 sow herd home. On the farm next to sows and 40 boars were used for artificial insemination. The farm is closed, which means that the breeding material and pigs for fattening provided from the main herd of their own. In this paper, we followed the following behaviors:

- Behavior-pigs in thermoregulation,
- Behaviour of sows and boars during sexual activity,
- Behavior-before farrowing, during and after farrowing,
- Behavior of sows and piglets during the suckling period,
- Social behavior of pigs,
- Formation of changes in behavior of pigs and finding of the causes of behavior change.

Key words: *etology, animal behavior, pigs.*

SAFETY OF BEESWAX PRODUCTIONS

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Abstract

Beeswax is the second most important product in beekeeping industry. It secreted from four pairs of wax glands on the ventral (lower) side of the abdomen (belly) of the workers. The secretion occurs in bees that are about two week old and resulting reduction of sugar synthesis of digestive origin. The aim of this paper was to determine the chemical, physical, and organoleptic properties of beeswax, which could affect on its safety. Beeswax is a very stable substance under normal conditions and retains its characteristics, but under certain circumstances, it may still have some modifications and defects may occur. Due to high demand and low production in some countries, there is the rising need for import and counterfeiting of beeswax. Increased production of beeswax becomes important, as well as the production of honey and have implemented modern technology for wax. Technology of wax includes annual replacement of old honey combs, carefully collecting all laterals, construction and building material amputation, carefully collecting scrap of wax from the hive floor coverings, regeneration frames. In terms of safety beeswax explored the factors that influence on the quality and quantity of beeswax, the way of purification combs, beet, industrial processing of wax. Safety of beeswax often threatens wax pests.

Key words: *beeswax, wax glands, technology acquisition.*

ECONOMIC ANALYSIS OF FEED INGREDIENTS IN DAIRY COW RATION

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Abstract

Cow diet may largely affect the financial outcome of milk production. Ration formulation necessitates the satisfaction of nutrient requirements in terms of both animal metabolism and production-related needs to ensure expected milk yield per cow. Practice shows that feeding costs can be reduced if concentrate is replaced by good quality roughage whenever possible, with care taken to make sure that compound feeds have sufficient amounts of minerals and vitamins. Rations well-balanced in terms of the type, amount and price of the feed ingredients used can lead to positive economic performance in milk production.

The objective of this study was to analyse the effect of certain feed ingredients in dairy cow ration on the amount and price of milk produced. Research was conducted at a commercial dairy farm in Central Serbia. The test cows were fed two diets, one of which contained brewers' grains. The study involved economic analysis of ration per dairy cow, and monitoring of the average milk yield per cow and milk purchase price.

Key words: *costs, cow diet, prices.*

THE QUALITY OF FOOD FOR BEES OBTAINED BY SUCROSE INVERSION WITH HONEY AS CATALYST

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Abstract

Beekeepers often prepare food for the bees performing the inversion of sucrose with some organic acid. During the acid-catalyzed dehydration of hexose at elevated temperatures is created hydroxymethylfurfural (HMF). Hydroxymethylfurfural is toxic for bees when the content is higher than 15 mgkg⁻¹. Inversion of sucrose by the enzyme invertase has the advantage. Conditions of enzyme reaction are more favorable, thus avoiding the formation of HMF. In the absence of commercial invertase, it can be used honey as a catalyst, since it naturally contains this enzyme. In this work were investigated the influence of temperature and time of sucrose inversion with acacia honey on invert syrup quality. Inversion was monitored 48 hours at three different temperatures: 35, 45 and 58° C. It was found that the highest content of reducing sugars 26.1% is after 48 hours of inversion at a temperature 35° C. Content of HMF was determined with HPLC. Limit of detection (LOD) was 0,49 mgL⁻¹ and limit of quantitation (LOQ) was 1,62 mgL⁻¹. Content of HMF in all samples was lower than LOQ.

Key words: *invert syrup, temperature, time, HMF.*

THE INFLUENCE OF TEMPERATURE HUMIDITY INDEX OF THE QUALITY OF COW'S MILK

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Abstract

Centuries long experience has shown, and decades-long measurements have confirmed that there was no significant difference in the quality of milk on the farm during the year. These variations are correlated with a number of factors. Some of them are biological (are related to characteristics of breeds and individual cows), but a large number of groups are abiotic (Ambient conditions). With regard to biological factors difficult and slow to change, the aim of this study was to investigate the influence of environment conditions on the quality of milk on selected farms.

The farm "Stari Tamis" near Belgrade was chosen. There are daily milked 200 cows to 220. About 95% of cows are the Holstein-Friesian and Simmental remained. Over 35% of cows in first lactation, and less than 5% had previously had five lactations. Analyzed samples of milk were taken once a week in the early morning hours, just after the morning milking. Analysis of milk was made at the Faculty of Agriculture in Zemun, in the laboratory for milk and milk products. Studies were performed using standard methods for determining the total amount of: fat, protein and dry matter. Analyzing the obtained results, it was found that with increasing temperature of the wet index values, there is a decrease in the quantity of dry matter in milk. Thus, at the lowest interval index of up to 74, the percentage of dry matter in milk was 12.26%, while the highest interval index of over 84, the percentage of dry matter was reduced to 11.81%.

The increase of the index will result in declining of the amount of fat. In the days when it was the lowest interval when heat stress was hardly any, the amount of milk fat was 3.45%, while on days with extremely strong and heat stress the index value was over 84, fat dropped to 3.18%.

The increase of the index humidity temperature value, led to a decline in the amount of protein in milk. Thus, at the lowest interval index of up to 74, the amount of protein in milk was 3.30%, while the highest interval index of over 84, the amount of protein was reduced to 3.21%.

Key words: cows, temperature humidity index, stress, quality of cow's milk.

PRESERVATION AND CARE OF INDIGENOUS SJENICA CHEESE DURING RIPENING PROCESS

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Abstract

Sjenica cheese is one of our best types of cheese from the group of white cheese in brine. It is produced by indigenous technology in the area of Sjenica-Pešter plateau. The process of production takes place at individual farms. The raw material for the production of cheese is fresh, whole sheep and cow milk, which process of making cheese starts immediately after milking, without thermal treatment. Studies were performed over a wide area Sjenica-Pešter plateau, by a method of survey. The survey was conducted in forty households, and it included questions related to raw materials, the very method of making cheese and process of production. Special emphasis is given to the conditions of storage, ripening and to the system of preserving cheese. The results showed that microclimate conditions have an important role in the system of storage and preserving cheese in the places for storing and ripening. This is especially important during the summer months, when high temperatures can cause serious defects and deficiencies of cheese, such as increased acidity, porosity, poor structure and rheological properties of cheese. Sjenica cheese is kept in a salt-brine whey which is released by the cheese, or it can be added. Taking care of cheese is consisted of regular cleaning of cheese surface and the inner walls of tubs, control of levels of brine and regular replacement of the same. Critical period of preservation are the first 15-20 days after the process of production, and its washing and cleaning is done twice a week. If necessary, regular process and control of level of brine and its replacement, are done twice of week, too.

Key words:*Sjenica cheese, storage, ripening care.*

SPRING DEVELOPMENT OF BEE COLONIES IN THE AGRO- ECOLOGICAL CONDITIONS OF THE WESTERN BOSNIA AND HERZEGOVINA

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Abstract

The aim of this study was to investigate the effect of fruit flow on commercial beekeeping using several pastures in western Bosnia and Herzegovina (BH) moving bees to different altitudes and different honey plants.

The experiment was carried out on the half-stationary apiary of Rade Bauk near by Drvar on the 460 m of height above sea level. The aim of the paper was to examine influence of the fruit pasture on commercial beekeeping using a few pastures in west BH by moving bees to different heights above sea level and to different melliferous plants. Bees spend winter in Drvar where the apiary is located in winter where they use fruit-developing pasture, and in Rore at 950 m above sea level bees use meadow and heather pasture, and in autumn bees are moved again to Drvar in the winter station. All colonies were carefully examined, prepared for wintering, and meteorological parameters are carefully analyzed including critical points for bees.

Bee colonies, which were prepared for winter with plenty of pollen were stable wintered and developed in the spring faster, regardless of the input of pollen from early blossoming plant species. Fruit pasture is irreplaceable developing pasture with a big influence on development of brood nest as well as quantity of honey in the next bee pasture. Bee colonies can take advantage of meadow and heather pasture if we continue stimulated feeding and introduction of two-queen way of beekeeping.

Key words: bee colonies, spring development, brood.

IMPACT OF HONEY BEES ON POLLINATION OF SOME PLUM VARIETIES

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Abstract

Under the project No.31063, which was funded by the Ministry of Education, Science and Technology Development of the Republic of Serbia, a study was conducted on the Experimental Field *Radmilovac* of the Faculty of Agriculture, University of Belgrade. Pollination of different plum varieties was observed, including: *Toper*, *Lorida*, *Avalon* and *Čačanska rodna*. The aim of this study was to determine the impact of honey bees on the rate of pollination, fruit setting and yield of the known and new plum varieties.

Three plum trees of each variety were selected, and three budding branches on each tree were isolated. Three types of pollination were planned and executed: by wind - anemophily, where branches were isolated by tulle bags; self-pollination, where branches were isolated by pergament paper; and entomophily by honeybees, where the branches with buds and flowers were naturally pollinated. During the spring, there was a continual counting of flowers, set fruit, fruits remaining after drop and at the time of picking (when ripe). The recorded data were then statistically analyzed.

For *Čačanska rodna*, it was found that in case of self-pollination, the number of fruit on trees just before the June fruit drop was 20% and 10% at the time of picking; when anemophily was applied, 49% remained before the fruit drop and 15% at time of picking; in case of entomophily, the rate of remaining fruit before drop was 44% and 28% were finally picked. For *Toper* variety the results were the following: self-pollination – before fruit drop 20% remained, and 3% were picked; anemophily - 14% before the drop and 8% were picked; entomophily by honeybees - 33% before the drop and 26% at the time of picking. The picking rate for *Avalon* was: 1.2% in case of self-pollination, 7% where anemophily was used, and 28% in case of entomophily. *Lorida* variety showed the following picking rates: self-pollination - 13%, anemophily - 53%, and pollination by bees - 25%.

Key words: plum, pollination, *Čačanska rodna*, new varieties.

6. RURAL DEVELOPMENT AND AGROECONOMY

AN AGRO-ECONOMIC CHARACTERIZATION OF THE NIGER HOUSEHOLD: CASE OF TAHOUA

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Abstract

Since the big drought of 1984, the department of Tahoua in the Republic of Niger is very vulnerable to structural and temporal disruptions. The food vulnerability is defined as “*the analysis of coping strategies and reactions faced with the structural or/and temporary shocks, if the coping strategies are not effective, the people are in a temporary or structural situation of food vulnerability*” (Andres and Lebailly, 2011a; Andres, 2012). The environment is much degraded by the wind and water erosion. Despite many opportunities to develop the rural sector, the region of Tahoua has a structural problem because the income is not very high and the major part of the population is poor. This paper analyzes the characteristics of households in function of the food system. The target is to classify the population in relation to the food agricultural systems. A global description is defined and characterized for the agricultural system. The paper is based on a survey realized during 2010 and 2011. The investigators have interviewed 420 heads of household. The results are analyzed by Excel and SPSS software. The statistical analysis is a comparison of averages and the descriptive statistics. The results show a difference between the north (pastoral) and the south (agricultural) of the region of Tahoua, especially, for the production of cowpea, the number of tropical livestock units, the number of fields. Furthermore, the systemic view is very important to identify the specific constraints and opportunities of each food system.

Key words: *Characterization, agro-economy, Niger, Tahoua.*

QUANTITATIVE AND QUALITATIVE EFFECTS OF PROTECTING TRADITIONAL AGRO-FOOD PRODUCTS BY GEOGRAPHICAL INDICATIONS

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Abstract

Geographical Indications are protected names of products deriving from a limited geographic area, produced throughout history in a traditional unique way, by using local specific resources. They are much more than simple trademarks and today are considered as a model of rural areas development. The aim of this review paper is to emphasise the effects of agricultural products protection by Geographical Indications, in qualitative (*e.g.* improvement of rural population living quality) as in quantitative terms (*e.g.* added value that these products gain in agricultural market). Geographical Indications (GI) overcome the dimension of pure economic benefit for producers and expand the range of effects to consumers, rural areas, and to entire regions and countries. It is estimated that on global level more than 10,000 products are protected with GI. The sales value of GI products registered in EU-27 was estimated at €54.3 billion in 2010 at wholesale stage in the region of production. The whole value premium rate in EU-27 for GI products was estimated at 2.23, which means that GI products were sold 2.23 times as high as non-GI products. A growing body of evidence shows that typical and traditional products protection by the means of geographical indications has brought about multifaceted benefits to rural communities living in the areas of origin and contributed to improving their livelihoods and quality of life.

Keywords: *Geographical Indications, sales value, premium rate.*

GOVERNANCE OF AGRICULTURE AND RURAL DEVELOPMENT IN EGYPT

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Abstract

Agriculture is a major economic issue in Egypt, although its contribution to the GDP is gradually diminishing. It is evident that rural and agriculture growth is the key element towards reducing poverty, achieving food security and increasing demands for labor.

Egypt is facing great challenges regarding its economy in general, and agriculture and rural development (ARD) in particular, such as food shortage, water insufficiency for agricultural purposes, the extreme poverty among small-scale farmers, lack of coordination and integration between various stakeholders, complicated local administration system and centralization, and declined governmental investments in the agriculture sector.

Though, all these challenges require restructuring Egypt's governance in agriculture and rural development and institutional reform. Therefore the current study aims at identifying agriculture and rural development policies and strategies in Egypt, public stakeholders involved in designing, implementing and evaluating ARD, besides analyzing the relationships and linkages between these actors. Additionally the paper provides an overview of the main international organizations dealing with ARD (*e.g.* UNDP, JICA, and FAO) and implemented projects.

Various analytical tools were used in order to give comprehensive overview about ARD in Egypt, including quantitative and qualitative methods. SWOT analysis was used to verify the gaps in the current flow of ARD strategy.

ARD strategy in Egypt needs to be re-structured and based upon coordination and integration between various sectors and stakeholders either national or international to avoid duplication and fulfill ARD goals and objectives that will eventually lead to "true" development, food security and poverty alleviation.

Keywords: *Agriculture, Rural Development, Governance, Egypt.*

IMPROVING MAIZE SEED ACCESS AND CULTIVATION PRACTICES OF SUBSISTENCE FARMERS IN NUSA TENGGARA TIMUR, INDONESIA

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Abstract

Access to quality seeds and technical know-how markedly increased maize productivity of subsistence farming communities, contributing to increased food security for at least 18,000 households in 2012. The paper aims to describe how to improve maize cultivation practices for subsistence and poor farmers by introducing quality seed and improving capacity of extension staff in Timor Tengah Utara (TTU) District of Nusa Tenggara Timur, Indonesia. A cooperative approach between national and sub-national Indonesian Government agencies, and the Australian Government's aid agency (AusAID) was the main key to achieve these. Firstly, the Indonesian Government's National Seed Reserve Program (CBN) distributed 198 tons of Open-Pollinated-Variety (OPV) seed to 427 farmer groups in 106 villages across TTU district. Secondly, recognizing the limitations of district agricultural services to disseminate knowledge and understanding of better farming practices, the AusAID supported the District Government and NGOs to undertake an intervention in 2011/2012 to improve the effectiveness of the CBN Program, thereby increasing food security for small-holders farm communities. The results of the intervention showed that the use of the OPV seed improved maize productivity by 36% (from 2.6 t/ha to 3.5 t/ha) or increased by between 52-86% when cultivation was managed through Demonstrations Plots compared to local varieties used by farmers. Capacity building of field facilitators (Public Extension and NGO's staff) to help disseminate knowledge and an understanding of the improved technologies was provided through Training of Trainers and a number of other knowledge-sharing exercises.

Keywords: *Maize, food security, capacity building, sustainability, Indonesia.*

CONDITIONS AND PERSPECTIVES OF FINANCIAL LENDING IN MACEDONIAN AGRICULTURE AND RURAL DEVELOPMENT

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Abstract

Agriculture is a fundamental economic activity in Macedonia. It constituted 10% of GDP over the past decade. Adding related processing industry increases this share to approximately 15%-16%. During the last period of economic restructuring, agriculture played a critical role in the social and economic stability of the country. As a generator of growth of income and employment (19% of the total employment) agriculture needs a steady stream of funds to increase the competitiveness of the farmers by improving the technological and market infrastructure as well improving quality of life of rural population. Besides the state financial support of agriculture and rural development, the commercial financing - through lending is from utmost importance as well. The pressure for acceleration process for developing competitive and sustainable agriculture and sustainable rural communities requires better access to the funds by farmers. In this regards, the purpose of the research is to explore the existing situation in the lending system in agriculture and further provide analysis and recommendations for improving the commercial form of financing to farmers. Therefore, the desk work and field research through questionnaire and interviews have been conducted in order to collect information about needs and problems of the key actors in the field of lending in the agriculture and rural development. The results have been communicated with the stakeholders at panel discussion and, furthermore, upgraded and distributed to the relevant institutions and organisations. Findings demonstrate that the lending system in agriculture does not operate in an ideal environment and is facing numerous problems and obstacles.

Key words: *lending, agriculture and rural development, financial institutions, farmers.*

SUSTAINABLE DEVELOPMENT AND THE ENVIRONMENT PROTECTION PROBLEMS

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Abstract

The environment has been considered as a free good in previous development, so it has been mercilessly exploited, which had left and keep leaving multiple negative consequences. Economic development, based on irresponsible use of natural wealth cannot last forever, and not to jeopardize a capacity of our planet's perseverance. Old development models must quickly change, if we want to provide a long-term integrity of natural systems, which keep life on Earth. In order that economic development move into the future according to the ecological requirements, more and more talks about the necessity of, so called, sustainable development, raising awareness on importance of healthy environment, which enriches its content with ecological, social and other dimensions. This developmental concept is opposite to the previous/existing philosophy and strategy of a fast growth, based on a "wasteful" and "dirty" technology with brutal environment exploitation. The sustainable economic growth has to and must be an engine of the ecological progress. In order to achieve the sustainable economic growth, i.e. the growth adjusted to the nature needs and limitations, we have to provide the connection between the ecological and economic policy on all social levels and in all economy sectors.

Key words: *sustainable development, ecology, competitiveness, socially responsible business.*

NITROGEN FERTILIZERS IN THE MEDITERRANEAN REGION: USE TRENDS AND ENVIRONMENTAL IMPLICATIONS

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Abstract

Humans have caused unprecedented changes to the global nitrogen cycle. The increased use of nitrogen as fertilizer has allowed increasing food production for a growing world population but has had also considerable adverse effects on the environment and human health. The paper aims at analysing nitrogen use trends in the Mediterranean region. The work is mainly based on secondary data from different databases such as the FAOSTAT and the World Development Indicators (WDI). Two main indicators were considered: fertilizer consumption and nitrogen fertilizers use. According to the WDI, nitrogenous, phosphate and potash fertilizers consumption increased in the period 2002-2009 in almost all Southern and Eastern Mediterranean countries. Fertilizer consumption in the Mediterranean ranged in 2009 from 7.8 to 502.8 kg per ha of arable land, in Algeria and Egypt, respectively. However, there was a general decrease of nitrogen fertilizers consumption between 2002 and 2010 in Mediterranean countries with few exceptions (*e.g.* Egypt). Nevertheless, nitrogen use is still high *e.g.* 388.2 kg N/ha of agricultural land in Egypt (2010). High nitrogen use is exacerbated by food waste; which implies the loss of large amounts of resources and inputs, such as fertilizers. About 80% of nitrogen used in food production is lost before consumption and the remainder is lost as human waste. Nitrogen lost to the environment affects water quality, air quality, greenhouse balance, ecosystems and biodiversity, and soil quality. These negative externalities call in question the dominating agricultural development paradigm and food production system sustainability.

Keywords: *nitrogen fertilizers, Mediterranean region, environment.*

INSTITUTIONS AND RURAL DEVELOPMENT IN TRANSITION ECONOMIES WITH SPECIAL EMPHASIS ON THE REPUBLIC OF MACEDONIA

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Abstract

Analysis begins with view of the impact of institutions on economic development in rural community as given in the theoretical concept of the new institutional economics with clearly pointed distinction of the different institutional levels, although both are important for transition economies and the Republic of Macedonia.

The paper emphasizes the importance of embedded institutions for the transformation of the rural economies in the transition countries and identifies and analyses institutional aspects regarding rural development common to the transition countries. It focuses on the institutional dimension of reform policies, i.e. on the institutional economy aspects of the transition process that were decisive for the success or failure of the reforms.

Studying the case of Macedonia shows that reform and transformation of the rural sector are caused inter alia by the failure of previous rural development institutional concept. The new institutional concept developed for establishing new institutions in rural institutional environment and strengthening property rights and expectations for a variety of rural sectors in terms of enhancing their efficiency and competitive position.

Key words: *institutions, rural development, rural community.*

COST EFFECTIVENESS OF RASPBERRIES GROWING IN RURAL AREAS OF NORTH KOSOVO

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Abstract

Leposavic municipality is situated in the farthest north of Kosovo and Metohija, with 72 villages, about 5036 households and 14500 people. Agriculture has always been the main activity in this area. Livestock production is the main agricultural sector, but there are also good conditions for fruit growing especially for berries (raspberries, blackberries, blueberries). In Leposavic municipality raspberries are grown mainly in small rural estates from 10 to 30 acres in hilly and mountainous areas, with the best yield results. In those small estates there is no control over production which does not cover the minimum requirements of the customers. It is necessary to foster specialization of those households and to form associations in order to have full cycle raspberries production with mini-coolers that offer frozen raspberries as a final product. It would be important factor of sustainable rural development in the area of Leposavic municipality.

In order to achieve this goal, intensive raspberry growing is necessary. This paper presents an economic analysis guide to investments required to increase an area under raspberries plantations. An average calculation is given for raspberries growing in Leposavic municipality, as well as the profit and level of economic profitability. It is reasonable to expect that from the planned production, invested assets would be returned after three years which could form the basis for further development of the households, as well as the food processing industry.

Keywords: *raspberry, production, costs, economic importance.*

FINANCING OF AGRICULTURAL EXTENSION SERVICES IN THE WORLD

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Abstract

In modern conditions the role of agricultural extension services (AES), in addition to the transfer of innovation in agricultural production and farmers' education, is more diversified in accordance with the requirements of farmers, local development strategies and defined agricultural policy. Under conditions of limited funding by the state authorities, providing different services requested that AES becomes more complex and makes fertile ground for the transfer of part of the advisory activities to other actors, such as private companies and non-governmental organizations, which results in the change of traditional models of extension service organization. New organizational models and new approach to financing of extension services in agriculture are generated.

In general, there are two main sources of financing of extension services: *the state or the public*, which is implemented mostly from the agricultural budget or through a variety of projects funded by the relevant state institutions, and *private*, which exists particularly in the cases when part of the extension work is provided through private extension organizations, where payment for these services is directly or indirectly transferred to the final users – farmers. However, there are very complex models of financing of extension services in the world, which are most often a combination of these models.

In the paper will be given the analyses of the relationship between models of organizing and financing extension services, then the elements that influence the choice of funding model will be displayed, as well as connections between the objectives and the participation of certain actors in the financing of agricultural extension services. Flow of funds from source to end-users will be shown in public funding model, while in the private funding special attention will be given to the degree of coverage of user of extension services and various topics covered by the work of such organized extension services.

Key words: *agricultural extension service, funding, sources, users.*

ANALYSIS OF PURCHASE AND PLACEMENT OF NON-WOOD FOREST PRODUCTS IN SOUTHERN SERBIA

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Abstract

The long represented viewpoint that forests do not have economic value if it is not used for timber production, takes a new dimension. Namely, the more often mentioned so-called "other" forestry products and services have increasingly important role in market economies of many countries. In light of this, it is possible to single out non-wood forest products (NWFPs) which appear as a raw material for a range of finished products used in the pharmaceutical industry, food industry, etc. The area of Southern Serbia has a wealth of natural resources, but also a long tradition in the collection of wild medicinal herbs, berries and mushrooms. In this way, there is a real basis for the development of NWFPs sector in Southern Serbia. In order to gain insight into the dynamics of NWFPs commercialization in this area was carried out a survey of seven enterprises involved in their purchasing, processing and selling. The aim of the research is focused on monitoring the quantities of purchased and placed NWFPs in the period from 2004 to 2011. The purpose of the research is to indicate the potential for development of entrepreneurship based on NWFPs in Southern Serbia. The main research methods are modeling and trend analysis, while applied techniques are structured interview, SWOT analysis and its hybrid variant so called A'WOT analysis, which is a combination Analytic Hierarchy Process (AHP) and the classic SWOT analysis.

Key words: *non-wood forest products, Southern Serbia, enterprises, trends, SWOT analyses.*

PROBLEMS IN RECORD KEEPING OF PRODUCTION AND ECONOMIC RESULTS OF FAMILY FARMS IN THE REPUBLIC OF SERBIA

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Abstract

In order that agriculture, one of the most important branches of the Serbian economy, can function satisfactorily, appropriate agrarian policies need to be implemented. When setting up agrarian policy measures, it is necessary to have a good information base not only for agricultural economic analysis as a basis for creating appropriate measures, but also for monitoring and evaluation of the implemented measures. Systematic record keeping on family farms is a basis for creating an appropriate agricultural policy in the domain of family farming, as well as for conducting further analysis that can contribute to the successful implementation of the agricultural policy. Looking at the previous developmental period, it can be concluded that most of the problems occurred due to the lack of adequate economic data and indicators of the business of some family farms that have a large share in Serbian agricultural resources and contribute significantly to production of many agricultural products. In line with the reforms undertaken in all industries, and in order to harmonize laws and regulations with those of the EU in the process of EU accession, changes have also been occurred in Serbian agriculture, starting from introduction of systematic record keeping of production and economic performances on selected family farms, which will help in monitoring of basic indicators necessary for proper adoption of agrarian policy measures.

This paper describes the system of record keeping of production and economic business indicators on family farms that has been applied in the EU countries, and has now being introduced in the Republic of Serbia. The paper also gives a review of the dynamics of its introduction together with the analysis of the recently achieved results.

Key words: *business records, information base, family farms, agricultural policy, Republic of Serbia.*

CONTRIBUTION OF VIRTUAL WATER TO IMPROVING WATER SECURITY IN TUNISIA: A CASE STUDY OF WHEAT AND OLIVE GROWING FARMS IN ZAGHOUAN REGION

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Abstract

Virtual water represents all freshwater used in the process of producing a commodity. In the case of agricultural products, many studies have focused on quantifying virtual water flows through international trade products. The concept of virtual water commercialization should be carefully studied as a potential solution for water scarcity, especially in countries facing risks of water shortage in a few years such as in Tunisia.

The main idea of this paper is to optimize water use, by the mean of estimation of virtual water in exported crops which have high water consumption. We also analyze the crops that are imported and therefore, might contribute to save water.

Commonly exported and imported crops are widely cultivated in the region of Zaghouan characterized by diversity of agricultural products. That's why it could represent a good case study from Tunisia. In this study we especially focus on olive oil which is one of the most strategic exported products in Tunisia and on wheat as main imported product.

We attempt to create technical and economic data sheets through monitoring about 40 farmers in this region. These sheets are not only to estimate the gross margin but also to calculate water demand for each crop allowing the estimation of virtual water. We found out that Tunisia may saves 1.13 m³ of water per kilogram of wheat if we import it instead of producing it domestically. In the case of olive trees, for an average yield of 2339 kg per hectare we exports 2.10 m³ of virtual water for every kilogram of exported olive.

Results presented in this study are of essential implications for policy making regarding water use optimization and water security enhancement.

Keywords: *Tunisia, water scarcity, virtual water, international trade, water security.*

COST, RETURN ANALYSIS AND CONSTRAINTS IN LIVESTOCK PRODUCTION AND MARKETING IN HAI DUONG, VIETNAM

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Abstract

The study, using the survey data from 145 livestock production households, showed that livestock contributed significant parts to the households' income. Given a production unit, the high investment in inputs and the considerable experience in production and marketing created higher income for the livestock-based group than that for the non livestock-based group. However, the farmers perceived some constraints relating to both production and marketing. The result from the Garrett's ranking technique presented the ranking position of constraints, respectively included the livestock disease, the limited credit access, the high and rapid increase in feed price, the high volatility of output price, and the insufficiency of market information and weak bargaining power.

Key words: *Livestock, Constraints, Garrett's ranking technique.*

PERSPECTIVES OF RURAL AREAS IN SERBIA

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Abstract

There are one million of unemployed persons in Serbia nowadays. At the same time, every fourth village, of 4,600 villages or 1,200 of them in Serbia is on the way to disappear. One and a half decade from now, only monuments are to stay, as a testimony of their recent existence. And while people are without jobs and villages are disappearing, opportunities for reducing negative trends in Serbian villages and development in rural areas are not exploited. More than half workers, who lost their jobs, could be employed in rural areas in Serbia. And, not only the workers, who lost their jobs due to structural unsuitableness of production, years of sanctions and transition crisis, but the workers who lost their jobs in companies in which they worked before NATO bombardment. All these results lie in the fact that workers are still with one foot in the peasant footwear *Opanak* and the other in a modern shoe. However, the return to rural areas of the country doesn't imply returning to hoes and tractors, but employing workers for agricultural and similar jobs in: forestry, water management, service activities, handcrafting, household industry, infrastructural, small and medium enterprises (there are 220,000 of SMEs, and the aim is 400,000), not harming ecological counterbalance.

Keywords: *village, soil, deagrarianization, lack of perspectives.*

**BIO-ECONOMIC ASSESSMENT OF BARLEY CHAIN:
RELEVANCE AND SMART, SUSTAINABLE, INCLUSIVE TRIGGER
EFFECTS IN THE SHORT CHAIN OF FOOD AND NON-FOOD
PRODUCTS - A PROJECT 'S EXPLANATION**

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Abstract

In the affirmation of the Sustainable Development Strategy, the agricultural production has a crucial role in the success of the bio-economy (Conway and Barbier, 2013).

The European Commission adopted a strategic action plan called: “*Innovate for sustainable growth: a Bio-economy for Europe*” (OECD, 2011). The bio-economy will be one of the basic topics of the Horizon 2020 program. In this sense, very promising results are coming especially for the cycle of barley. Barley is a cultivation with large diffusion all around the world and with high capability of adaptation regarding to climate and soil variation (Asveld *et al.*, 2011).

Last year a University Network of Central Italy built a Research Project of National Interest entitled “Process and product innovation in the barley food chain for the improvement of quality and environmental sustainability of food and beverages”.

The main objective of the Project is to arrange a bioeconomic evaluation of the barley chain with a particular focus on proposals for the supply chain and to boost the role of barley for the initiation of bio-economic development processes at national and European level.

In this sense, the paper represents a first contribution about a specific part of the research project and, moreover, aims to deliver an example at the academic level about the innovative opportunities of bioeconomic research field.

Keywords: *Bio-economy, Barley Production Cycle, Green Economy, Sustainable Development, Innovation.*

IMPACT OF SOCIAL PROTECTION PROGRAMS ON ECONOMIC RESILIENCE OF POOR HOUSEHOLDS IN EASTERN PROVINCE OF RWANDA

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Abstract

This paper analyses the contribution of three programs of poverty reduction in Rwanda. It uses data from different reports and surveys with beneficiary poor households of social protection programs. The activities developed by these programs have allowed the poor in general and the widows of genocide in the Eastern Province of Rwanda in particular to improve their socioeconomic conditions, notably access to education, accommodation and medical care. Moreover, the beneficiaries have developed activities that diversify households' revenues and improve their economic resilience.

Keywords: *Social protection program, economic resilience, poor households, Rwanda.*

INTRODUCTION TO THE DEVELOPMENT OF AN ON-LINE STUDY SUPPORT MATERIAL FOR AGRICULTURAL EDUCATION PROGRAM

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Abstract

This article deals with the teaching model of ESP (English for Specific Purposes) for students of the first year of Viticulture, Oenology and Pomology. The model is based on blended learning to assist students in successfully mastering the course. It is realized as a combination of a face-to-face environment and online learning in the Moodle Learning Management System (LMS) on the B2 level of the Common European Framework of References for Languages. An ESP coursebook has been designed in collaboration with specialist professors, based on a needs analysis with special emphasis on developing the skills needed for mastery in ESP.

Online study support material is focused on the development of agricultural terminology, reading and listening comprehension, grammar activities and work with up-to-date authentic audio-visual materials with the aim of developing students' language competences and support the professional growth of future viticulturists, oenologists and pomologists. Online support material can serve not only the students it was primarily intended for but also the students and academic staff of other polytechnics and universities with similar curriculum.

Key words: *E-learning, English for Specific Purposes, Agriculture, Croatia.*

THE RATIO OF REGIONAL AND RURAL DEVELOPMENT IN MONTENEGRO

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Abstract

This paper suggests a selective basic problem and theoretical framework of regional development of Montenegro as well as development of rural areas. Land area of Montenegro is 13 812 square km with 4800 square km of inner sea. According to the latest census (2011) it has a population of 672 656 inhabitants. The average population density is 48 inhabitants per square km. Montenegro is administratively divided into 22 municipalities. Geographically it can be divided into three regions. In agriculture there are available resources of about 0.80 ha and 0.29 ha of agricultural and arable land per capita, which is significantly above the available resources in most European countries. Montenegro has significant tourism potential in rural areas, and therefore, rural tourism is a strategic priority. Based on in details analyzed attitudes toward handling and the importance of a correlation of regional and rural development, and also the need for planning the development process, integrative planning based on the principles of sustainable development is a conceptual starting point and the assumption of application program. Balanced spatial development does not mean that Montenegro should be regarded as a single territory with the same problems and opportunities, but we need to support spatial development focusing on regional specificities and thus mitigating the differences in development.

Keywords: *region, development, ecology, rural.*

CONNECTING AS A FACTOR OF SUCCESS FOR SME'S FROM THE AGRICOMPLEX IN THE REPUBLIC OF MACEDONIA

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Abstract

Entrepreneurial connecting is an efficient means for achieving a number of development opportunities for enterprises, and it can be motivated by market penetration, connection for market development, facilitation of purchase, sale, research/development, distribution, international trade and export, etc. The aim of this work is to indicate the need for entrepreneurial activities depending on current conditions of SMEs in the field of agri-complex that are the subject of this work. A survey research was conducted followed by data processing and analyses of data. The results obtained indicate that SMEs in the field of agri-complex mainly collaborate with one or a few enterprises, mainly based upon contracts, and they are not involved in a network of enterprises that collaborate; something that leads to weaker competence abilities of SMEs in the agri-complex on the domestic and foreign markets.

Key words: *entrepreneurial connection, small and medium-sized enterprises, confidence, communication.*

STATE OF INTERNATIONALIZATION OF SME's FROM THE AGRI-COMPLEX IN THE REPUBLIC OF MACEDONIA

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Abstract

Internationalization as an expression used the process of involving in and intensifying international operations. It is used to describe the continuum that initiates with the first import activity or extra regional expansion ("domestic internationalization") up to total globalization. It involves activities like export, licensing, franchising, managerial contracts, agreements key-on-hand, contracts for production/international pre-contracts, agreements for industrial cooperation, mergers, acquisitions, strategic alliances, etc.

The aim of this work is to obtain information about the conditions of the internationalization of SMEs in the field of agri-complex in the Republic of Macedonia. With that aim, a survey questionnaire was composed followed by a survey. Obtained raw data were processed and analyzed, which enabled gaining insight in those conditions.

Research data have indicated that SMEs in the agricomplex are in the initial phase of their internationalization.

Key words: *internationalization, SME, agri-complex, cooperation, contracts.*

DETERMINATION OF AGRI-ENVIRONMENTAL SUPPORTING RATES TO PROTECT BIODIVERSITY OF INDIGENOUS SHEEP BREEDS

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Abstract

The main objective of this paper is to determine the supporting rates for indigenous sheep breeds in context of the agri-environmental policy measures in the Republic of Macedonia. Agri-environmental measures can provide different level of preservation of livestock biodiversity, contribute at building higher nature value farming systems and ensure sustainability of low input breeding systems. The method used is based on partial budgeting, as a criterion framework used to compare the costs and the benefits arising from choosing different sheep breeds (three autochthonous sheep breeds: Karakachanian, Sharplaninian and Ovchepolian, as opposed to the usual practise). Thus, all aspects of farm profits, as well as the matching variable and fixed costs that remain unchanged are excluded. This procedure emphasizes the changes in income and costs that result from rearing alternative breed and enables computation of the financial supporting rate, as upper ceiling compensating the economic loss of the farmer. Moreover, the supporting rates for different sheep breeds are adjusted in terms of endangerment gradation and geographical distribution, using fitted coefficients. Support rates differ among breeds and also among output alternatives (cheese finalisation i.e. milk sales). The highest support rate was estimated for Karakachanian sheep (3,675 MKD i.e. 2,610 MKD), followed by Ovchepolian sheep (2,067 MKD i.e. 1,578 MKD) while the lowest rate was noted for Sharplaninian sheep (1,723 MKD i.e. 1,315 MKD). The results and the analysis revealed variations of the supporting rates. These aspects should be taken into consideration for further validation of the agri-environmental measures.

Key words: *agro-environmental measures, Karakachanian, Ovchepolian, Sharplaninian, supporting rates.*

THIEU LITCHI PRODUCTION IN THANH HA DISTRICT (HAI DUONG PROVINCE, VIETNAM): PRODUCERS AND EXTENSION SERVICES STRATEGIES

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Abstract

The Thanh Ha district (Hải Duong province, North-Vietnam) has a long history of traditional Thanh Ha Thieu litchis cultivar production. However, the price paid to the farmers for this traditional cultivation has been reducing significantly for more than 10 years. In this communication, recent evolution of Thanh Ha Thieu litchis production and strategies established by producers in order to face the fall in price are studied and a diagnosis of the agricultural extension services involved in Thanh Ha Thieu litchi production is drawn up. Primary data were collected in 2012 through personal interviews and focus groups with multiple stakeholders, authorities and extension organisms and a survey of producers' households made with semi-structured questionnaires.

Substantial reduction of litchis production participation in total household incomes was revealed. In parallel, Thieu litchis plantations superficies fall down being converted in favor of new fruit species or in favor of other litchis varieties depending on the production area operating a diversification process. Moreover, progressive abandonment of not converted plantations is marked by plantations cares reduction.

In the past five years, all agricultural extension sessions about litchis production have been initiated and organized by the authorities at province and district level collaborating with input supply private companies. Various inefficiency problems are highlighted such as disequilibrium in training session access, relative trainings uselessness or mismatch between producers' training demand and offer.

Key words: *Vietnam, Thieu litchi, Diversification, Extension services, Decentralization.*

ECONOMIC EFFECT, EXPERIENCES AND EXPECTATIONS IN AGRICULTURAL COOPERATION IN THE REPUBLIC OF CROATIA

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Abstract

Cooperatives have significant role in economic development and this paper is affirming cooperative philosophy and other ethical cooperatives values. Family farms in the Republic of Croatia are identified as basic and key factors in agriculture cooperative business. Those farms should recognize advantages, adjust to the market and accept changes and new knowledge. Cooperatives in the Republic of Croatia have a rich and long tradition, but with a very turbulent development. The first cooperatives were established on the Croatian territory more than 150 years ago and in some period they were very important economic institutions (SudariC *et al.*, 2010a; 320). However, different economic and political conditions have redirected this development and have decreased cooperative activities. The aim of this paper is to present cooperative position in the Republic of Croatia and its potential in retrospective to the Ministry of Agriculture and Ministry of Labor and Entrepreneurship program implementation. New law regulation, different kind of subvention as well as cooperative system of global meaning in the Republic of Croatia is on the way to affirming and supporting this kind of business organization. This paper also contains survey research about opinions of agricultural producers about cooperative business as well as importance of cooperatives in joining to European cooperative society.

Key words: *agricultural cooperatives, development, economy, Republic of Croatia.*

ECONOMIC VIABILITY OF SUGAR BEET AND CORN AS ENERGY CROPS VERSUS FOOD AND FEED MARKETS: A CASE STUDY IN SPAIN

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Abstract

In the last years many different events, as reforms of the CAP (Common Agricultural Policy), promotion of biofuels due to the international engagements, new energy objectives, etc., have led to a change in the agricultural sector in the EU and particularly in the Mediterranean countries, affecting to a greater extent those regions where agriculture has a higher economic importance, as it's the case of Castile and Leon (Spain). Thus, farmers have been forced to readapt their productive system to the new exigencies of the markets and the policy frame, focusing on new outputs, as energy crops, which compete in both food/feed and energy markets. While technical viability of growing such crops (*e.g.* corn and sugar beet) has been largely proved by different studies and experiences, nevertheless the economic viability of these market orientations versus food/feed markets is not still sufficiently contrasted. This study is an attempt to determine the economic results for these productions, comparing both possible market outputs, using the methodology set by the Economic Accounts for Agriculture (EAA). Results show that both outputs could be options to be taken into account, though an initial support could be needed depending on the evolution of the international context, due to the opportunity cost which implies the energy option versus food/feed markets.

Keywords: *Energy crops, Sugar beet, Corn, EAA (Economic Accounts for Agriculture).*

CONSTRAINTS ANALYSIS OF FAMILY AGRICULTURE IN KIRUNDO PROVINCE NORTHERN OF BURUNDI

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Abstract

In Burundi, family agriculture occupies more than 90% of the active population. That sector accounts more than 50% of GDP. Before the civil war of 1993, Kirundo province was deemed "breadbasket of the country" because the family farming was market-oriented. Today, this region is the first province in Burundi who accuses a high rate of householders who live in food insecurity. In order to conduct this study, 355 randomly selected farmers were surveyed in all municipalities of the province. This preliminary study revealed that the farmers had as major constraints: the small and land conflicts. The study case had identified 73 farmers among them who had not farmland and/ or land conflicts as constraints of agricultural productivity. Two groups emerged: 42 farmers who were not able to fully exploit their land and another group of 32 farmers with a high agricultural productivity. Results from this study show that the major problems in the first group were: lack of applying soil protection techniques, illiteracy, lack of credit which leads farmers to contract moneylenders, lack of improved seed, etc. Moreover, the main strategy used by the second group to boost their income is the practice of non-agricultural activities which influences whole production system.

Key words: *Family agriculture, rural economy, pluriactivity, Kirundo, Burundi.*

STANDARDIZATION OF PRIMARY AGRICULTURAL PRODUCTION AS A CONDITION OF EU INTEGRATION

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Abstract

The awareness of the importance of the healthy products are awoken and production will not distort the natural balance, respectively it will not endanger wildlife and pollute nature. Health care in modern world has become the priority. The risk of disease caused by problems in food production, the application of new technologies, changed lifestyles and dwindling human resistance, increasing daily.

For these reasons, there is imposed idea of a certain international standards, applying to all producers, which would ensure desirable characteristics of products and services such as quality, environmental concerns, safety, reliability, efficiency and the possibility of exchange, all at economic price.

Standards exist for many years, and their value has been confirmed through a global market leadership in agricultural countries. Guided by the example of these countries, agri – food industry of Bosnia and Herzegovina will be able to successfully develop and characterize global competitiveness.

Key words: *standardization, primary agriculture production, Global G.A.P.*

PREDICTION OF VEGETABLE PRODUCTION IN REPUBLIC OF SRPSKA

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Abstract

The subject of this paper is the prediction of production parameters area, yield and total production for major vegetables in the Republic of Srpska: potato, paprika and tomato. The basis for the assessment of adequate model for the prediction has being derived from the data on production parameters of these vegetables during the period of 1996 - 2011 year. On the basis of estimated models, prediction values of the observed parameters have being derived for the year 2016. The prediction is based on modern quantitative methods, specifically the method of time series analysis and the appropriate ARIMA models. The choice of the form of model is the result of qualitative analysis and statistical criteria. Prediction of the production area shows that there will be changes in the production structure of the observed vegetables in the Republic of Srpska in 2016. year. Areas of potatoes will be reduced by about 600 ha, while the production area for paprika and tomatoes is going to be increased by the same amount. Yields of potatoes and paprika, in the analysed period are characterized by stability, while smaller fluctuations are indicated for yields of tomatoes. Tendencies that characterize the area and yield of crops observed, have a direct influence on their production. Prediction for potato production shows that the total volume of production in 2016 will be lower by about 2,000 tons compared to 2011, what is the result primarily of the reduction of the area under potatoes. Predicted tomato production will increase by about 500 tons. The results of prediction can be used as a basis for qualitative analysis of the production and development of vegetable growing in the Republic of Srpska, as well as for general policy and strategy planning for vegetable production in the future, and design of agricultural policy measures to encourage the development of production, consumption, processing and export of vegetables observed.

Keywords: *vegetable production, forecasting, Republic of Srpska*

INSTRUMENTS OF ECONOMIC MEASURES OF AGRICULTURAL POLICY OF THE REPUBLIC OF SRPSKA

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Summary

The agricultural sector is the most reputable resource in the Republic of Srpska. Development of the agricultural sector, in addition to natural and human resources, is influenced by the action of certain measures of agricultural policy, which essentially represent a strategy of realization of set goals in terms of integration of the agriculture sector in the development of economy. One of the most important groups of agricultural policy measures are economic, which are primarily related to issues of economic problems of the sector. This paper provides an overview of economic measures and its instruments in the framework of agricultural policy of Republic Srpska for period of time 2007 – 2011. By the describing of economic measures and its instruments were used secondary data sources. The findings of this paper implies that economic measures and its instruments did not contribute to improve the competitiveness of agricultural sector of the Republic Srpska.

Keywords: *agriculture, economic measures, instruments, Republic of Srpska.*

STRATEGIC NEXUS OF ECOTOURISM AND ECOLOGICAL FARMING IN FUNCTION OF SUSTAINABLE DEVELOPMENT IN RURAL AREAS OF MONTENEGRO

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Abstract

The demand for eco products grows in every part of life and work. Global ecologic trends are being reflected on tourism as an active component of society. This is how ecotourism became, one of the modern tourism forms that is less destructive than the other. It creates at the same time chance for development of underdeveloped, mostly rural regions. Ecotourism development has a positive effect on complementary branches of economy, agriculture before all. There are multiple positive reflexive ecotourism effects on ecological farming and vice versa. Intensive ecotourism development and its linking to agriculture creates possibility of additional revenue for agricultural households in rural areas which contributes to the quality of life and to suspending of the demographic downfall. Eco agricultural production significantly contributes to the competitiveness of ecotouristic product on one side, while on the other besides creating possibility for producers to directly place their products through ecotourism, also offers the possibility to valorize immaterial elements of offer: knowledge, skill, experience, hospitality, etc. Montenegrin agriculture is characterized by small households, unexploited ground, low usage levels of mineral fertilizers and pesticides, inability to use mechanization, water shortage and undeveloped infrastructure makes it uncompetitive in quantitative sense but presents an excellent base for its transformation from conventional to eco farming. Strategic linking of ecotourism with ecological farming presents real chance for sustainable development of rural areas in Montenegro.

Key words: *ecotourism, ecological farming, sustainable development, rural areas, Montenegro.*

POLICY AND INSTITUTIONAL ANALYSES OF MANGROVE MANAGEMENT IN THE INDUS RIVER DELTA

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Abstract

Evolving concerns over policy and institutions for the management of mangroves in the Indus Delta of Pakistan are being analyzed in this study. Primary and secondary information was collected through document analysis, in-depth interviews and group discussions. Findings of the policy analysis indicated a lack of clear policies focused on the conservation and management of mangroves due primarily to the conventional wisdom of seeing mangroves as economically less valuable resources. This had resulted in the split ownership of mangroves shared by three agencies namely, Port Qasim Authority (PQA), Sindh Forest Department (SFD) and Board of Revenue. While BoR and PQA were lacking any appropriate institutional arrangements for mangroves, SFD established a relatively management system for their mangroves owing to the agency's primary mandate. Broad suggestions have been given to address policy and institutional issues related to the mangroves.

Keywords: *Forestry policies, Indus Delta, Institutional arrangements, Mangroves.*

TYPE OF FARMING AS A FACTOR DIFFERENTIATING THE LEVEL OF FARM SUPPORT UNDER COMMON AGRICULTURAL POLICY IN POLAND

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Abstract

The article presents the differentiation range of the EU support level gained by Polish agricultural farms dealing with different types of farming. An important aspect of the analysis was also to determine the effect of the direct support to the income situation of agricultural producers. Total subsidies on current operations, particularly including direct payments and the subsidies designed for the development of rural areas, were analysed in detail. Their amount was considered in relation to the farm income.

The analysis of payment distribution enabled to show which types of farming in the European Union are being supported in the first place. On this basis an attempt was undertaken to find the answer whether the EU farms support system is effective and justified.

Poland's membership in the EU gives rural farms the opportunity to improve their economic situation. The direct support was the main factor of determining the economic status of farms. However, strong differentiation of the amount of this support, as well as farm income dependent on farm specialization in production was noticed. As a result, there is still large number of small farms in which the revenues received by farmers are not sufficient enough to assure them sufficient life standard. Therefore such farms are not able to both develop and invest. Such opportunity have only economically strong and market oriented farms with high production potential, that in the future will determine the position of Polish agriculture in international markets.

Key words: *type of farming, direct support, farm income, CAP.*

THE STUDY OF FOOD WASTE IMPACT ON THE HOUSEHOLDS' SOCIO - ECONOMIC STATUS IN THE MUNICIPALITY OF VRŠAC

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Abstract

Food waste made by consumers' uneconomical behaviour has negative ecological effects and it also affects households' financial costs. Wasted food, as a consequence of the incomplete use of its edible part, is an important issue and is not sufficiently explored in Serbian science. At a global level it can be claimed that there is a lack of an adequate estimate of the total amount of uneconomically wasted food, a lack of data about food loss' critical stages in the food supply chain, and also about various consequences, that is, possible effects of such waste on ecological, economic and social environment and position of households.

Republic of Serbia is facing increasing problems of such uneconomical food loss (and, thus, resources), although its standard of living does not allow such daily behaviour. In theoretical and methodological terms, there is a problem of quantitative estimates of food waste, made within a household, as well as finding ways for its reduction. The aim of this paper is to analyze the awareness, attitudes, behaviour and ways of treating food and food waste within a household, based on a survey research of a random sample of a one hundred respondents. The results indicate the situation in this field and the patterns of daily behaviour of households in Vrsac municipality, and also estimation of monetary value of the food which is lost hereby. Based on these results, the authors conclude on the relevance of food waste problematic in Serbia and in regards to cultural habits and neglection of economic values of wasted food by surveyed households.

Key words: *food waste, consumers, household, behavior, economic value.*

OPTIMIZATION OF VEGETABLES FOR CONSUME IN FRESH CONDITION PRODUCTION STRUCTURE

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Abstract

Vegetables production has important role in rural development. The real hypothesis for it, are: Production time of vegetables is relatively short, what give opportunity for 2-4 seeds by year; return of the capital is faster; high economic effectiveness and efficiency; vegetables is very important “healthy food”; there are a 20-30 sorts of vegetables for production in our conditions; vegetables production is very intensive.

In this paper the vegetables production structure was optimizing. Only production of vegetables for consume is optimizing. The method of linear programming is applied, by using the LINDO program. In the model for optimization, 26 of sort of vegetables are planned. Depends of vegetables position in the sowing structure, in model was included 55 independent variables, in total. For objective function, the gross margin is used (difference of total value of production, and direct variable costs (material, and external services)).

The standard technologies in irrigation and actual prices of outputs and inputs are used in calculation. In the model are included next grope of constrains: agro-technical, bio-technical constrains, limitations of land capacity (first, second and third sowing), market limitations, while, limitations of manpower and machinery capacity in the months of the intensive works are not included.

The results of optimizing are showed that 41 independent variables are included in optimal structure of production. The index of soil usage is 276 %. Structure of soil usage is next: 100 % in first sowing, 98 % of second sowing, and 78 % of third sowing. Gross margin in that, optimal structure of vegetables production for consume in fresh condition is 37.500 euro per hectare of farm, per year.

Key words: *vegetables, production, optimization.*

ECONOMIC IMPORTANCE AND OF EXPORTS POSSIBILITIES YOUNG POTATO FROM REPUBLIC OF SERBIA

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Abstract

Potato is an important agricultural cultivar that is consumed worldwide. It is a quality vegetables from which they prepare different types of food. Proteins potatoes have a high the nutritive value, and this vegetable uses as an addition to meals a with meat and dairy products, enhances the flavor, reducing energy intake and reducing the cost of food. According to the current estimates, FAO is expected that the global demand for potato in the coming decades to increase by about 35%. Potato production in Serbia meets all the needs of consumers, while the very fertile years, appear and significant market surplus that can not be absorbed by the market. Due to the limited of domestic market and saturation of demand, the development of potato production today, more needs to be based on export orientation. The problem in the realization of market surplus potatoes, may be solved only by structural changes in production, which must adapt to modern trends in the global market through increased competitiveness of supply and changing structures. In this context, market segment deals represents attractive and new potatoes. Demand for these products defines good taste, seasonal character maturities, the freshness of the product, the ability to create different specialties and so on. Good market perspective in the placement of young potatoes, can be achieved through the development of high quality of production at low costs, branding and active advertising appearance at the domestic, regional and international markets.

Key words: *production, young potatoes, development, export.*

SITUATION IN SLOVENIAN RURAL AREAS AND MAIN FACTORS OF THEIR ECONOMIC AND DEVELOPMENT PERFORMANCE

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Abstract

Differences between urban and rural areas, as well as between rural areas, in Slovenia are still pretty large. Slovenian rural areas in general are highly heterogeneous, distinguished by various natural conditions and obstacles and diversified demographic, economic, and social structures. Some rural areas are more successful and more developed as others as a result of different factors. In this paper, we tried to show the differences between urban and rural municipalities and to extract factors on the basis of selected 40 indicators (demographic, economic, social, environmental) using multivariate statistical methods. The results of principal component analysis (PCA) shows that most variability between Slovenian municipalities can be explained with the factors as: productivity, entrepreneurship and investment dynamics, the structure of economic activities, economic power of the population as well as demographic factors such as population growth, educational structure, unemployment, age structure, population density etc. Influenced factors are also remoteness and state of the environment. Using cluster analysis, according to their characteristics, municipalities can be divided into four groups (so-called "typology of economic and development performance of Slovenian municipalities"). Typology can be helpful for the designing and directing of policies and measures for regional and rural development.

Keywords: *rural areas, factors, multivariate statistical methods, municipalities, Slovenia.*

STRAWBERRY PRODUCTION IN CROATIA WITH FOCUS ON VRGORAC AREA

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Abstract

Last decade, we are witnessing increased production of strawberries in the world. In Croatia production is also constantly growing. The main Croatian areas of growing strawberries are the area of Vrgorac, Neretva river delta, surrounding of city of Zagreb, Podravina and county of Vukovar. In Vrgorac, growing strawberries for most of the producers is the semi-professional family business which presents additional family income. In Croatia are planted around 4 million seedlings on area of around 500 ha, of which 95% relates to frigo seedlings and only 5% of green seedlings. Total country production is around 3000t of strawberries yearly. Strawberries are produced on open fields and undercover in higher and smaller greenhouses. Concerning the low input costs and higher market prices it became an interesting fruit for farmers and chance to achieve higher incomes. Largest producers worldwide of strawberries are the United States of America and China. In the Europe, the largest producer is Spain. Biggest share of imported strawberries in Croatia are from Spain. Last five years strawberry production in Croatia has reached a level of self-sufficiency and achieved export potential. The main export of Croatian strawberries went the countries of European Union (EU) and Bosnia and Herzegovina. Agriculture plays an important role in country's total GDP and employment. European Union is the main trading partner, concerning that more than 60% of import and export are from the EU countries. Constraints for strawberry producers in Croatia are the level of production, uneven production techniques and land fragmentation.

Keywords: *strawberry, Croatia, rural development, Vrgoracka jagoda.*

THE UNRESOLVED CASE OF THE OWNERSHIP ON AGRICULTURAL LAND IN ALBANIA- A BARRIER OF DEVELOPMENT

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Abstract

Since 1912, the ownership system regarding the agricultural land in Albania has gone through three main phases. Up to 1945, it was characterized by an extreme bipolarization: most of the surface was owned by a small number of rich families, religious institutions, foreign companies and the state, while most of the village families had a limited land portion or didn't own any land at all. The establishing of communist regime (1945) was immediately accompanied with the implementation of Agrarian Reform (1945-1946), according to which, through confiscation without compensation, the land surface of rich families, religious institutions and foreign companies was diminished and redistributed for free to families owning a small portion of land and to those without land, under to the slogan "the land belongs to the one who cultivates it". In spite of the positive effects, in terms of diminution of socio-financial disparities in the village population, it soon became clear that the reform represented the first step toward the collectivization of agriculture, a process leading to the disappearing of private property, transforming it into group property (agricultural cooperatives and enterprises), entirely under state control. The collapse of communist regime (1991) and the passing from centralized economy to free market economy were accompanied with the return of private property. On July 19th, 1991 the Law 7501 "On the land" was ratified, modifying once again the ownership on agricultural land. Differently from other Southeastern Europe countries, the land was not returned to the former owners, but it was distributed to the families residing in villages up to July 31st, 1991. Obviously, as long as the land has not been returned to the legitimate owner, the case is still considered unresolved. This "odyssey" of the ownership system of agricultural land was accompanied with visible effects in the organization of rural territories and their functional dynamics, especially in the agricultural aspect. The main objective of this paper is analyses of the evolution of land ownership and the impacts in the actual and perspective development of agriculture in Albania.

Key words: *ownership, owner, agricultural land, reform, development.*

AGRICULTURAL EXTENSION AND ADVISORY SERVICES IN ALGERIA AT CROSSROADS: PRESSING PROBLEMS AND INNOVATIVE SOLUTIONS

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Abstract

Algerian farmers mostly use their own knowledge as they lack access to advisory services. Sixty-five percent of farm managers are illiterate and only 2.7% have an agricultural diploma, thus agricultural extension services play an important role in agricultural and rural development. The paper aims at analysing agricultural extension in Algeria providing a qualitative and quantitative assessment of agricultural extension services performance. The paper describes national extension strategies and action plans, analyses used participatory extension approaches and methods (*e.g.* Farmer Field Schools) and explores linkages among training, research and extension components of the agricultural knowledge and information system. Secondary and primary data were used and a survey was carried out in April-June 2012 with 17 farmers in different Provinces(*e.g.* Aïn Defla, Batna, Chlef, Djelfa, El Oued, Ghardaïa, Skikda, Tiaret, Tipasa). A SWOT analysis of the agricultural sector was performed. Most of the interviewed farmers consider information and advice provided by public extension agents very useful. Nevertheless, producers rely also on other information sources such as other farmers and the private sector. The lack of an enabling institutional, legal and political environment - especially the lack of a national extension strategy - is an important gap. Collaboration between researchers and extension agents as well as the involvement of farmers in the development, validation and dissemination of technical and social innovations is highly recommended. Information dissemination and communication based on the interaction between formal and informal networks may be interesting in the current context to meet farmers' needs.

Keywords: *Agricultural extension, Institutional and political environment, Algeria.*

INTEGRAL ICT SOLUTIONS SUPPORTING FARMERS AND FORESTERS, ENVIRONMENTAL CARETAKING AND RURAL DEVELOPMENT

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Abstract

Farmers and foresters – worldwide more than 2 billion people - manage large parts of countries, in some of them 90% of the total area. They produce food/feed/bio-mass and can support environmental caretaking and the management of natural risks and resources; but they need better advice, a precise standardized information, smart ICT technologies and an infrastructure enabling stakeholder cooperation, not only private-private, but also public and private.

PROGIS has been developing and maintaining an object oriented GIS (Geographic information systems) and applications for agriculture, forestry, environment and natural risk-management. Together with partners we provide consultancy for customers within these sectors and developed business models to integrate stakeholders and implement technologies. We call it “SAFER” – Sustainable Agriculture Forestry Environment Risk-management business model. It bases on precise ortho-images such as those available from Microsoft Bing™, GIS based agro-ICT, data from agro-sensor technology and rural area management consulting services.

It is a holistic model to establish an agro-infrastructure throughout a whole country for fostering better agricultural development. The pillars are: Ortho-images, the setup, or the upgrade of an existing land parcel information system (LPIS), the implementation of a farm management system (FMIS) the establishment of farm advisory (extension) services, the installation of logistic systems and agro-sensor networks, precise farming, mobile communication, capacity building including education and training and models for the reinvestment.

Beneficiaries are farm/forest enterprises, incl. smallholders, cooperatives, advisory/extension services, other service providers, affiliated industries, ministries, banks and insurance companies, researchers, rural populations and the public as a whole.

Keywords: *Sustainability, Environmental care-taking, Risk management, Integrated ICT solutions, Agriculture, Forestry.*

INTERACTIONS BETWEEN HUMANS AND PHYSICAL GEOGRAPHY: AN ASSESSMENT IN MONTENEGRO THROUGH INTERVIEW TECHNIQUES

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Abstract

Land use and therefore the view of the landscape has changed a lot in Montenegro throughout the last century. In certain regions important land abandonment with regrowth of natural vegetation took place, while in others the cultivation of the land intensified. Here we report on major land use changes that occurred in different parts of Montenegro and their impact on the physical geography. The agricultural system and de- and reforestation are taken into account as well as changes in people's behavior with regard to land management. Scars in the landscape can be indicators of land degradation (gully erosion) as a result of certain forms of land use, particularly the implementation of agriculture, either on steep land or large domains. This study used a holistic approach since many circumstances influence landscape changes. Therefore, historical and socio-economic contexts have not been neglected. Industrialization, regional war situations, economic crisis, migration flows, changes to political orientation and tourism all have an observable impact. Study areas in the three main geographic regions (the high mountain area in the north, the fertile central depression and the coastline) have been chosen to make a spatial comparison between different trends in the landscape changes. Information about this subject-matter was found through literature, (old) topographical maps, field observation and interviews. Knowledge of the local inhabitants has been gathered through interviews and participatory mapping/GIS. The overall results will be analyzed to understand the underlying processes of landscape changes and the former and current trends in development of the Montenegrin landscape.

Keywords: *land use changes, landscape changes, land abandonment, migration flows, participatory GIS.*

RURAL TOURISM AND FOOD PRODUCTION IN BOSNIA AND HERZEGOVINA

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Abstract

Both industrialized and developing countries exercise a growing trend of care for the rural tourism. It is especially appealing to residents of highly urban areas, also due to increasing differences in lifestyle. Some of the values that attract tourists to rural areas are clean air, water and land, variety of fresh foods, calm and quiet ambience, cultural and historic heritage (monuments, folklore and rural music) as well as natural environment (rivers, lakes, mountains).

Traditional ethno villages are good examples of rural tourism development, but also newly developed ones. Tourist organizations include arrangements to villages and rural areas on a daily or weekend basis and full boarding arrangements.

Percentage of foreign tourists in Bosnia and Herzegovina is on the vicinity of 56%, with 52% in a number of overnight stays and differs by Entity. A research determined that number of foreign tourists in Bosnia and Herzegovina totals around 1.4 million¹. Tourism development in Bosnia and Herzegovina is based on typical products, such as endemic sorts of fruits and vegetables, indigenous breeds of cattle and poultry, as well as native products. Rural tourism can also be based on tourists' direct involvement in the countryside food production process, providing a concept of active vacation.

Keywords: *Rural tourism, Forms, Endemic products, Effects of development.*

¹See Estimating Bosnia and Herzegovina tourist arrivals, USAID CCA Project in Bosnia and Herzegovina, 2008.

http://www.usaidcca.ba/fajlovi/tourism/eng/Estimating_BiH_Tourist-Arrivals-CCA-Feb-08.pdf

THE ROLE OF WOMEN IN EXTENSION EDUCATION AND RURAL DEVELOPMENT IN FINLAND

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Abstract

This paper is to find the larger meaning of Extension according to disseminate the advisory work until usual consumers. The food security is not anymore only the agriculture. The small farmers and the part time farmers are more responsible to food security. As well the industrialized farming has changed the role of extension.

The small farming needs the local advisory work. The women are not responsible of the farming. The food security and food safety belongs to the women. In Finland the voluntary based women organizations take care of disseminate the information of food security to the consumer level to the ordinary families in order to supply the safety food. There are not very small family farms in Finland. The food production has become to the bigger farms. There are less and less farmers in Finland; at the moment about 45 000.

The role of women has risen almost dramatically in food chain. The voluntary based women's organizations have become more important to activate the education about food safety. The obesity is not that severe problem but to distribute the innovations of the healthy food is on the gender program of Extension education.

The ProAgria is called the Finnish national advisory work organization. The Country Women, Maa-ja kotitalousnaiset (45 000 members) is part of ProAgria. The other important voluntary based group of women for the extension education are the Martta's (60 000 members) and Swedish speaking Martha's (20 000 members). The Extension as such is not educate or researched at the university in Finland the colleges and women have become more key persons.

Keywords: *extension, gender, women, rural development, advisory services.*

KNOWLEDGE GAPS AND RURAL DEVELOPMENT IN TAJIKISTAN. AGRICULTURAL ADVISORY SERVICES AS A PANACEA?

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Abstract

In this paper I look at knowledge systems and the local channels of innovation diffusion in rural Tajikistan. In particular I look at agricultural advisory services. After the end of the Soviet Union and the civil war in Tajikistan, the knowledge available to farmers can be described as a mix of, on the one hand, traces and fragments originating in the Soviet agricultural and education system, and on the other hand, western- style knowledge, scientific and otherwise. Western expertise has been imported and partly implemented by development agencies and to a lesser extent by small scale commercial input suppliers. In this context, it is no surprise then that international donor and development organizations, as well as NGOs (usually supported by donors) and Tajik government actors are the key players in agricultural knowledge systems, and hence the transformation of Tajikistan. Regarding agricultural advisory services (AAS), a look at the state of agriculture in different countries tells us that many different models of AAS coexist in the world, each with pro's and con's. However, in order to come up with an appropriate model of agricultural advisory service for Tajikistan, it is not enough to look at existing AAS models and search for 'best practices' that could be copied. What is important is that the model reflects the interplay of the main actors and the local needs. Therefore in the paper I analyze the functioning and interaction of the international donors, NGOs and Tajik government. 'Donors are new actors in the knowledge and development field, but important ones. In the paper i show how under the framework of 'development', i.e. the rhetorics, organization and infrastructure of development, different donors play their own games, some geo-political. At the same time back up and are used by Tajik political actors and sustain local NGOs. From this discussion I derive suggestions on how agricultural advisory service could be organized in Tajikistan, to work on some local weaknesses and build on existing assets, traditions and networks.

Keywords: *knowledge gaps, rural development, Tajikistan, advisory service.*

A CASE STUDY: CAN THE SANDY RIDGES SOILS IN PENINSULAR MALAYSIA USED FOR CROP PRODUCTION?

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Abstract

Sandy ridges soils are a very common site in the coastal plains of East Coast of Peninsular Malaysia. These types of soils cover about 500,000 ha and mostly left idle, and in some areas, tobacco are cultivated. These soils are more than 95% sand, and receives abundant of rainfall (± 3500 mm/yr) hence very low in water and nutrient retention. The landscape is undulating hence poses another challenge, water-logging that often causes flash flood in depression area (swale) due to high rainfall. However, all is not lost, as these sandy soils have *spodic horizon*; this horizon have sufficient amount of soil organic matter ($SOM >2\%$ of C_{org}) and can retain water-nutrient for crop production. However, the challenge it to utilize this layer as it is often found at depth between 50-150 cm. Crop growth often depends on nutrient uptake within 30 cm from topsoil. In line with economic transformation, Malaysia government wants to replace tobacco with kenaf (*Hibiscus cannabinus*, L.) that is tolerant to flooded condition, and to improve the livelihood of the society by creating sustainable development in these rural areas. Hence, with limited information related to sandy soils-crop production-rural development, a preliminary study was conducted 1) to determine the physical and chemical properties of these sandy ridges soils, and 2) to determine the soil-crop suitability for type of crops in these sandy soils. Hence, this study is very useful for rural development and highly justified.

Keywords: *sandy soil fertility, crop production, rural development.*

GROUP DYNAMICS FOR POVERTY ALLEVIATION IN PAKISTAN

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Abstract

Community Organization has been considered as one of the major preconditions for successful poverty alleviation in developing countries. It led the Pakistan poverty Alleviation Fund (PPAF) and 19 of its partner organizations to implement a program to organize about one million households in 50,000 Community Organizations (COs) in 25 poorest districts of the country. The study analyzed these COs for the process of their formation, gender dimension and the readiness of office bearers or developed leadership cadre to mediate the local development that matters to them. A sample of about 5,213 COs with a confidence level of 99 percent and an error margin of ± 2 percent was surveyed using a questionnaire that asked qualitative and quantitative information on the said aspects of community organizations. The findings revealed that the democratic processes in these organizations have yet to be evolved as the office bearers on top ranked positions in almost all COs were selected instead of election process. In away, the gender dimension has been well taken care of during the group formation process as 55 percent of the COs correspond to female, 40 percent to male while the remaining 5 were mixed of both gender. Most of these organizations have reported community savings at the time of survey. However, on average a group of 16 households could not save more than 50 USD – an amount certainly inadequate to start lending operations. Besides, some increase for both males and females members having Computerized National Identity Cards, vote and marriage registration could be attributed to the emergence of COs. About three-fourths of the community organization reported having development plans while one third having linkages with public and private organizations and Village Organization. Nevertheless, only 6 percent of COs joined the Local Support Organizations – networks at sub-district level. Last but not the least, trainings seems to have contributed to smooth functioning and record keeping of COs although the decision regarding the training were mostly done by the Social Organizers of Partner Organization instead of the communities on their own. The study has useful policy implication for the empowerment of poor by organizing them at household, village and Union Council level to build their voice and scale for an effective interface with government and market.

Keywords: *Community Organization, Poverty alleviation, Local Support Organizations, Village Organization, Pakistan Poverty Alleviation Fund.*

PERSPECTIVES OF RURAL TOURIST DESTINATION MOUNTAIN RAJAC I VRANICA

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Abstract

The paper describes a cross-border project, which is funded by the European Union under the Instrument for Pre-Accession Assistance (IPA). The aim of the project is to strengthen the rural economy by supporting the professional development of rural tourism in Serbia and Bosnia.

Landscapes Rajac and Vranica are similar, both in their tourism offers and the growth potential. Both regions have been known tourist attractions, picturesque rural tradition and well-preserved natural resources. The project aimed to create a strong cross-border cooperation between the two regions, and to support the development of rural tourism destinations Rajac and Vranica. The development of tourism in the villages of central Bosnia and Herzegovina, and Serbia has the potential to increase the diversification of the rural economy, particularly the establishment of national cooperation. The main objective of the project is to ensure that the impact will go beyond strictly defined border areas and help the two countries to put into operation and capitalize on all their rural tourism resources.

Keywords: *cross-border cooperation, rural tourism, Instrument for Pre-Accession, Rajac, Vranica.*

THE ECONOMICS OF FORESTRY

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Abstract

Forests around the world contribute significantly to the progress of life on the planet (belonging to different biogeographic regions). Many international organizations and governments promoting sustainable management and the role of forests. Forests have ecological and socio-economic importance. Forests and forest lands cover more than 40% of the land area of the EU. Forests are an important habitat for many plants and animals, play an important role in the protection of water and soil, protect infrastructure from landslides/mudslides in mountainous areas, forests are an important source of timber resources and other products (*e.g.*, herbs, spices and mushrooms, fruit, honey, oils for cosmetic and medical industries, etc.), provide opportunities for tourism, recreation and hunting. Forests provide jobs for employment, particularly in rural areas, which is of great importance, given that about 56% of the EU population lives in rural areas. About 60% of the EU forest land is privately owned, so forests depend on the family farm and/or large estates owned by companies in the industrial wood supply chains. The paper discusses the forest holdings in public ownership, contribution of forest sector to GDP by sector - manufacture of wood and articles in wood, employment by sectors and exports of forest products in the following countries: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Hungary, Italy, Macedonia, Montenegro, Serbia and Slovenia. Italy has the highest employment in all sectors of forestry, while Austria has the highest exports of forest products and contribution of forest sector (manufacture of articles in wood and wood) to GDP. Agriculture and forestry are key to the management of natural resources in rural areas of the EU, as an important area of rural development.

Keywords: *forestry, development, socio-economic objectives.*

THE ROLE AND IMPORTANCE OF THE CENSUS OF AGRICULTURE FOR AGRICULTURAL AND RURAL POLICIES (EXAMPLE OF ONE MUNICIPALITY)

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Abstract

The inventory of agriculture is the basis for the development of agriculture within the country as well as on the level of European Union. To harmonize regulations applicable in the EU which are outlined as prerequisite for applying for European development funds, agricultural census in Serbia has been conducted during 2012. The census was carried out with the help of standard methodology, containing specific and clear protocol that required previous training of candidates for the Census. The first official results were obtained in February 2013. Fully processed data with final results will be published in 2014. Census data included in the strategy development at all levels as well as professional publications, will form the basis for the planned development of agriculture.

Keywords: *census of agriculture, inventory of agriculture, harmonization of regulations, results, development.*

INTERACTIVE CONSULTING SYSTEM FOR MAKE DECISION IN RURAL DEVELOPMENT

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Abstract

The rapid development of information technology promotes continuous sharing of knowledge and information on the market conditions and needs research-based recommendations for their application. Special attention is paid to interactive consulting systems. Create interactive consulting system approach is relevant in the successful rural development. An example of this is the development of an interactive consulting system "CONKA". The system "CONKA" provides adviser with knowledge and interactive help to find answers to the client at any time and at any place. The main role in rural development is playing interactive consulting system and especially its application to the development of rural tourism.

Keywords: *consulting system, decisions, rural development.*

ECONOMIC EFFECTS OF DRIED SOUR CHERRY PRODUCTION IN SERBIA

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Abstract

The fruit processing in the Republic of Serbia is primarily focused on the production of juices, alcoholic beverages, compotes, aromas, jams and marmalades. The potential for dried fruit production is enormous, but minimally exploited. The sole exception is dried plum production, which is very important. Considering a constant increase in dried fruit consumption in the world, it is necessary to seriously take into account the possibilities for dried fruit production in Serbia.

In this paper, various aspects of the cost-effectiveness of dried sour cherry production are analysed. It is about combination of fruit drying technology (osmotic and convective). The research was conducted on a “smaller” dryer with the capacity of 450 kg of raw material per day, which is suitable for the production on family farms.

The raw material, i.e. fresh sour cherry (60.2%), poses a dominant factor in the cost structure. The labour costs were also significant (22.7%), whereas the energy share was surprisingly low (3.5%). The obtained retail price of 792 RSD (7.07 €/kg) is more competitive on the domestic market. This level of selling prices enables the profit of 1,406 € during 15 days of sour cherry production.

Previous research, which included a greater number of fruit species, indicate that the total profit during 135 days of effective dryer operation was approximately 15,200 €. The total investments, which are not high (approximately 30,900 €), are repaid in 1.82 years, which is very acceptable. Considering other success indicators (the efficiency ratio of 1.35 and the production accumulation rate of 26.0%), it is evident that this is a highly cost-effective business.

Key words: *sour cherry drying, combined technology, profitability, comparative analysis*

THE IMPACT OF SERBIAN AGRICULTURE EXPORTS ON ITS TRADE DEFICIT

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Abstract

Exports of agricultural and food products is the consequence of high and efficient domestic production and favorable agro-ecological conditions, but also the proper implementation of agricultural and food policy. There are significant restrictions on trade in agricultural and food products. In recent decades the agricultural protectionism comes to the fore; that has emerged for the protection of agricultural production in developed countries from the extreme competition in the international market. Strong technological progress in many countries encouraged agriculture production that has resulted with the surplus in agricultural products, after long period of recorded deficit. At the same time, exporting countries are trying to increase productivity in order to retain their existing positions in the international market. For these reasons, there is the instability of the world market of agricultural and food products, which particularly affects the economically undeveloped countries.

Serbian agriculture is gradually losing its leading position in the region. From the fact that the agriculture and food industry, with still unused possible resources, have significant impact on the reduction of the current account deficit and because of the necessary adjustments to future European integration, it is expected that they, therefore, have better support from the government. Unfortunately, this is not the case, and as a consequence of this attitude of the state towards agriculture, it achieves significantly lower results in the export than possible. Agriculture budget should be development oriented, to the improvement of agriculture and increase agricultural exports, and not be so often misused as a purely social category.

Key words: *agriculture policy, Serbia, trade deficit, exports.*

DESIGN, IMPLEMENTATION AND COORDINATION OF AGRICULTURAL AND RURAL DEVELOPMENT POLICY IN BOSNIA

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Abstract

Rural economy in Bosnia and Herzegovina (BiH) is increasingly diversified but is still strongly dependent on the primary sector. Governance influences agro-rural development policies impacts on rural livelihoods. Governance analysis focuses on institutions and structures dealing with decisions making and implementation. The paper aims at analysing design, implementation, governance and coordination of agro-rural development policies in the Republika Srpska (RS) and BiH. The paper is based on primary information collected by questionnaires and semi-structured interviews carried out in summer 2010 with representatives of public and civil institutions – including international organisations and donors - dealing with agricultural and rural development at state, entity and municipal levels as well as an extended secondary data analysis. The number of organizations engaged in rural governance is rapidly growing and their role in policy design and delivery is getting increasingly important. Vertical coordination between State level institutions with entities, cantons, regions, municipalities and non-state actors, especially civil society ones, is still particularly challenging in BiH. Coordination between the State Ministry of Foreign Trade; the Ministries of Agriculture of RS and Federation of BiH and the Department for Agriculture of Brcko district is crucial. Participation of civil society organizations in rural development policies design and evaluation should be encouraged. Governance model and arrangement should allow shifting rural development policy paradigm and practice from a sectoral to a multisectoral, territorial and integrated approach that fosters rural livelihoods and economies diversification. Effectiveness of vertical coordination also depends on horizontal coordination at RS and FBiH levels.

Key words: *Rural development, Agriculture, Policy, Governance, Coordination, Bosnia.*

COMMON AGRICULTURAL POLICY OF THE EUROPEAN UNION-MANAGEMENT AND FINANCING AFTER 2013

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Abstract

The Common Agricultural Policy affects implementation of the Strategy Europe 2020, and positioning of the European Union as a global market leader in terms of a smart, sustainable and inclusive economy. In order to achieve the five ambitious targets of the European Union (employment, innovations, education, social inclusion, and climate/energy), like many times before, the Common Agricultural Policy is subject of discussion and reform. The proposal Multiannual Financial Framework (MFF) imposes a challenge of management and financing of the Common Agricultural Policy during the budget period 2014-2020. The question remains open as to how to reform the Common Agricultural Policy after 2013 in order to strengthen competitiveness and sustainability of agriculture, to maintain its presence in all regions, to ensure production of healthy and quality food for European citizens, to protect the environment, and to support rural areas. This question gains particular importance bearing in mind the diversity and abundance of agricultural policies among the EU 28 Member States. The purpose of this work is to collate the previous knowledge and theoretical framework of the Common Agricultural Policy of the European Union, and to define guidelines for its future development after 2013.

Keywords: *agriculture, competitiveness, rural areas, incentives*

ECONOMIC ANALYSIS OF THE WINTER LETTUCE PRODUCTION IN GREENHOUSES USING DIFFERENT CROP MANAGEMENT

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Abstract

Economic efficiency and effectiveness under different ways of production in greenhouse are analysed in this paper. Authors used four different ways of production: V₁) bare soil; V₂) black PE mulch; V₃) covering with agrotexile 17 g; V₄) combination black PE mulch and agrotexile. Research was conducted on the experimental field of the Faculty of Agriculture in East Sarajevo named „Kula“. Comparison is made on the basis of several indicators of economic performance: farm income, profit, economical efficiency, profitability and workforce productivity. Largest farm income was found in the variant V₄ with a value of 858,02 BAM (Bosnian currency) per 100 m² area. According to previous, variant V₄ had the highest profit in amount of 708,02 BAM. This variant had the best results taking into consideration other criteria. Differences between the other variants are much smaller in terms of all parameters.

Key words: *production of salad, greenhouse, economic performance.*

INSURANCE AND SAVING IN RURAL SOUTH-EASTERN BOSNIA

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Abstract

In the past years, governments' focus has been on delivering credit to rural households. However, rural households often value also the availability of appropriate deposit services and business risk management tools, such as insurance.

The paper aims at analysing insurance services use and saving strategies of rural households in south-eastern Bosnia.

The paper is based on secondary data from an extended literature review and primary data collected by a questionnaire survey carried out in February 2013 with 136 rural households from 9 municipalities (Han Pijesak, Sokolac, Milici, Vlasenica, Foca, Rogatica, Bratunac, Sekovici, Zvornik). The questionnaire survey focused on saving purposes; access to various saving means; membership in and management of saving/credit groups; and agriculture-related insurance products use.

The formal and semiformal sectors are currently not meeting the demand for financial services of all rural households. Saving helps rural clients manage emergencies, prepare investments and smooth consumption. Saving means include bank deposits and saving groups. Rural households give the highest priority to security when deciding where and how to save. They value deposit services that are secure, have low transaction costs and simple procedures, and are appropriate to their needs. Many rural people participate in rotating saving and credit groups not only to make easier getting loans and saving money but also to socialize. The use of insurance products such as weather-based crop insurance is still limited.

Easy access of rural households to adequate and tailored saving and insurance services is a prerequisite for creating an enabling environment for fostering Bosnian rural economies diversification.

Keywords: *Rural finance, Saving, Insurance, Bosnia.*

INVOLVEMENT OF STAFF OF THE FACULTY OF AGROBIOLOGY, FOOD AND NATURAL RESOURCES IN DEVELOPMENT COOPERATION IN THE AGRICULTURAL SECTOR OF BOSNIA AND HERZEGOVINA

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Abstract

The Czech Republic (CR) reestablished government foreign aid program in 1995. On the basis of the political negotiations, there were selected so-called program countries, which long-term strategy of cooperation is determined with - among others Bosnia and Herzegovina. Development programs are implemented through the Czech Development Agency (CDA) of the Ministry of Foreign Affairs.

Our team consisting of employees of the Czech Agricultural University in Prague and other agricultural and veterinary specialists from the Czech Republic implemented in BiH agricultural extension project in north-eastern Bosnia fit into the context of other activities of CDA in the region (e.g. delivery of pregnant heifers or milk processing equipment, etc.). Our responsibility was over 100 farms with different numbers of animals. We tried to solve to solve operational problems together with local farmers, such as milk quality, contracts with a dairy, problems with milk collection, feed quality, animal health issues, selection of semen doses or control of reproduction.

Under the CDA support programme improving the quality of higher education in the partner countries, we entered into a partnership with the Faculty of Agriculture in Banja Luka project "Equipment and establishment of workplace for assessment of the quality of semen doses." The aim is to develop scientific research capabilities of the faculty as well as to strengthen expertise in implementation of standard methods of livestock breeding in BiH. Program support of BiH agricultural sector by CDA will undoubtedly continue in the coming period. Our group is ready to further develop the already established cooperation.

Keywords: *Czech Development Agency, agriculture, international aid*

ADDITIONAL ABSTRACTS

INTEGRATED PEST MANAGEMENT FOR THE CONTROL OF APPLE SCAB (*VENTURIA INAEQUALIS* [CKE.] WINT.) IN ALBANIA

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Abstract

Apple scab, caused by *Venturia inaequalis* (Cooke) G.Wint is the most important apple disease, causing significant economic losses in many of the world's apple production areas, particularly in rain fed agricultural areas where intensive fungicide control is necessary for commercial apple production. With the cultivation of susceptible commercial apple cultivars, apple scab control is becoming more difficult, such that losses caused by apple scab would be about 70% if no control measures were taken. Even in Integrated Pest Management systems, scab is currently controlled by up to 15–20 applications of protective and curative fungicides during the growing season, regardless of the presence of ascospores in the orchards.

In a field experiment conducted over two growing seasons in Qerret, Pukë, Albania are chemicals tested: - Armicarb®100 (85% KHCO₃ from Helena Chemical Company, USA), 2- Kresoxim-methyl, from BASF, Belgium), 3- Thiovit jet (80% micronised sulphur, from Syngenta Agro S.A.S., France) and 4- water control.

The objective of this study was to evaluate the effectiveness of bicarbonates used alone or combined with horticultural oils for the control of apple scab in order to develop a successful strategy using environmentally friendly substances compatible with the organic production system.

Keywords: *Apple scab, ascospores, orchards, Integrated Pest Management, fungicides.*

**EFFECTIVENESS OF SOME NATURAL COMPOUNDS IN
CONTROLLING DOWNY MILDEW [*PLASMOPARA VITICOLA*
(BERK. ET CURTIS EX. DE BARY) BERL.] IN ALBANIA**

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Abstract

The investigation was carried out during 2011 seasons in Marikaj in Tirane Capital, Tirane –Durrës desert road under natural infection conditions. The efficacies of Solfato di rame 20%, Algae extract, Clay with Al-sulfate, Algae extract with potassium\Phosphomat and alternate, against downy mildew were studied on grapevine cv. Merlot. All the tested compounds provided protection at different level against downy mildew [*Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] on both leaves and bunch as compared with control which record the highest effect. Solfato di rame 20%, Alternate, Clay with Al-sulfate and Algae extract with potassium\Phosphomat were more effective on leaves and bunch as compared with used in a single treatment.

Key words: *Plasmopara viticola*, Solfato di rame 20%, Algae extract, Clay with Al-sulfate, Algae extract with potassium\Phosphomat.

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