AgriSciMont

International Conference:

ROLE OF RESEARCH IN SUSTAINABLE DEVELOPMENT OF AGRICULTURE AND RURAL AREAS

Podgorica, Montenegro
May 23-26, 2012

Book of Abstracts

UNIVERZITET CRNE GORE

CAPACITIES

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INTRODUCTORY NOTE

We would like to extend a warm welcome to all the participants of the International Conference**: „Role of research in sustainable development of agriculture and rural areas".**

The conference is organized under the scope of FP7 REGPOT 2010-5 Project: "Fostering a Science-based Development of a Sustainable Montenegrin Agriculture - AgriSciMont", which has been successfully implemented by Biotechnical Faculty (University of Montenegro) since June 2010.

To provide a broad vision on how technological transfer and innovation can be a base for faster sustainable development of agricultural sector as a vital part of the rural economy is the main objective of the Conference. We also see the Conference as a good opportunity to exchange ideas, strengthen existing and create new academic links in ERA, to strengthen dialogue between research community, government and practitioners in the light of the global trends in agro-food sector and latest reforms in EU model of its development.

The Conference is focused on five thematic areas**:** Agricultural policy and science in development of agriculture; Sustainable agriculture and modern technologies; Genetic resources in agriculture and forestry; Food safety and quality of agricultural products; and the Traditional food – challenges in promotion and protection.

All program components, such as Plenary sessions, Oral and Poster Presentations, Round table and Excursion will hopefully contribute to the success of the Conference. We expect that the Conference will generate a lot of good ideas, suggestions and conclusions.

Abstract submissions exceeded expectation. Overall, a total of 127 abstracts from 21 countires were accepted and will be presented among the Conference.

We would like to express our sincere appreciation to the invited speakers and to all Conference participants for their active participation. We are very grateful to all the people who have worked hard in preparing the Conference and making it successful. Finally, we would like also to express our gratitude to the sponsors for their support.

President of the Organizing Committee	President of the Program Committee	Dean of the Biotechnical Faculty
Prof. Dr. Nataša Mirecki	Prof. Dr. Milan Marković	Dr. Natalija Perović

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I

AGRICULTURAL POLICY AND SCIENCE IN DEVELOPMENT OF AGRICULTURE

STATUS OF FOREST RESOURCES OF MONTENEGRO

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The data on the state of the forest resources of Montenegro at the national level in the previous period were obtained in different ways (sublimation of information from the forest management plans, general management plans and from the operational plans, etc) and often the data obtained on the forest resources state of Montenegro were not harmonized.The cause for that was in the application of different methodological procedures which were used to provide the specified data at the national level. Also, one of the reasons is the absence of a national forest inventory as the only valid method to be applied to the entire territory and to provide reliable information about the state of forests at the national level.In methodological terms, conducted a national forest inventory of Montenegro is in line with the standards of European countries, and involved the application of a systematic sampling in the form of clusters, distributed in the network of 2 × 2 km on the entire territory of Montenegro, collection of relevant information (description of stands, site description and survey of trees), processing and analyzing data.This paper presents and analyzes the state of forest resources of Montenegro on the basis of data collected by the National Forest Inventory by different qualitative and quantitative indicators such as the forest area, ownerships, the representation of certain tree species, total volume, total increment etc. The results show that, when compared with previous available figures on forests and forest land in Montenegro, the forests occur in a completely new dimension. Forests cover 59.9%, forest land 9.8%, together the forest and forest land cover 69.7% of the territory of Montenegro. This is a significant increase compared to the previously estimated percentage of forest area of 45%. The total volume of wood is estimated at 118 million m³ with growth of 2.8 million m³.

Key words: Montenegro, national forest inventory, forest resources, forest and forest land

ABOUT LINEAR PROGRAMMING FROM THE POINT OF VIEW OF UNIVERSITY TEACHERS OR RESEARCHERS

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Introduction of a stop-gap excel tool for Simplex Methodology (applicable for higher dimensions as well), and the importance of Linear Programming in agriculture and rural development in the framework of teaching it at an agricultural university is presented in this research. This include also introduction of the English version of the teaching assistant program. These tools might be useful for teachers or researchers for handling small or medium dimensional real life or educational LP problems. Collected and shown the methods in agriculture and rural development which use LP providing the example why it is important to solve LP problems with a direct Simplex solver instead of with ready made ones.

Keywords: optimization, linear programming, LP in agriculture, rural development

MEASURING SUSTAINABILITY - INDICATOR BASED APPROACHES FOR FARM LEVEL AND AGRO-FOOD-SUPPLY CHAIN APPLICATION

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Food security for a growing world population, food safety, and efficient and sustainable resource use are widely agreed major challenges for agriculture and agro-food-networks. This will be one of the reasons that the proof of sustainability will become more and more a key indicator for competitiveness of agro-food-supply chains.

Indicator based quantitative systems for sustainability measurement is available for partial segments of respective supply chains. Comprehensive systems for complete supply chains are under development.

In this paper the importance of sustainability concepts in agriculture and agro-food-networks will be discussed: Available indicator systems for application at farm level will be introduced, and strengths, weaknesses, opportunities and threats of such systems will be analyzed. Additionally, results from an expert survey in the year of 2011 will be presented indicating the state of the art of the development of comprehensive indicator based systems for complete supply chains. Finally conclusions will be drawn.

Results of the expert survey indicate that the importance of sustainability considerations will increase significantly. However, over-regulation of agro-food-systems must be avoided. Relevant and feasible indicators can be isolated and find acceptance at all levels of supply chains. Such indicators refer to all three pillars of sustainability. Clear advantages of a comprehensive measurement became obvious. However, it has to be clarified who takes over responsibility for implementation, maintenance and control of such a system.

Key words: sustainability concept, indicator based system, survey, supply chain

BIOMASS AS A DRIVING FORCE FOR RURAL DEVELOPMENT –MISCANTUS BEST PRACTICES

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In most countries, valorization of biomass as a renewable energy is related to the traditional sources such as woody biomass and agricultural residues. Nevertheless, perennial grasses can often produce higher yield of biomass than forest trees, while existing mechanization of forest management units are at disposal. Perennial grasses require only one cultivation activity, preparation for planting, and during 10-20 years of cultivation nitrogen inputs are low.

The reliance of poor rural population on the functions of biomass production is rarely measured and is usually not included in valorization of total household potentials for entrepreneurship, which further leads to development of inappropriate strategies that do not appreciate the role of environmental protection in combating the poverty.

Miscanthus giganteus is a highly productive plant species, which has been cultivated in Europe for 20 years as energy crop. The remarkable adaptability of miscanthus to different environments makes this novel crop suitable for establishment and distribution under a range of European and North American climatic conditions. It produces no seed and its plantations should be established using vegetative method of planting divided rhizome pieces, so there is no treat of natural ecosystems contamination by uncontrolled spreading of this allochtonous species.

In this paper, we shortly review the role of perennial herbaceous crops in meeting the need for sustainable land use and development. Research results from field sample plots of miscanthus, including biomass production potential and heat capacity, are explained with the aim of closer recognizing of environmental contribution and influences and energy efficiency of this energy crop.

Key words: biomass production, *Miscanthus giganteus*, energy efficiency

ORGANIC AGRICULTURE IN THE REPUBLIC OF MACEDONIA: POTENTIAL, GOVERNANCE, POLICY FRAMEWORK AND MARKET

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The first strategic organic agriculture (OA) activities in Macedonia happened around 2000. Despite the country's huge agro-ecological potential only during last decade there was a significant OA development mainly thanks to governmental financial support schemes, market opportunities and an enabling environment. The paper aims at providing an insight into Macedonian organic agriculture with a focus on governance, legal and political framework and market. The work was based mainly on secondary data from the specialised literature: (i) analyses of historical development and potentials and SWOT of Macedonian OA; (ii) examines legal and policy framework (e.g. Strategy for Organic Agriculture) and its alignment with the acquis communautaire; (iii) investigates roles of main public, private and civil society institutions involved in organic policy design and implementation (e.g. ministries; bureaux; agencies; bodies; institutes; Biomak and Biosan federations, associations) as well as international organisations (e.g. FiBL, SIDA, GTZ) and projects they implemented; (iv) presents issues dealing with OA in other national strategies and strategic documents; and (v) analyses Macedonian organic agro-food production - plant and animal production, wild collection and beekeeping – as well as processing, distribution and marketing; mainly linkages with international supply chains, and market actors and their roles.

More than 200,000 ha of collection; more than 1,000 ha of arable land - mainly cereals, vegetables and fruits -; thousands of animal heads – especially dairy cows, sheep, goats and pigs - as well as thousands of beehives are certified organic. The sector is linked to international supply chains and is export-oriented. Domestic market is still quite small.

Macedonia is in an early stage of organic food production, processing, distribution and marketing. Organic production is still not developed sufficiently in volume and diversity. Further growth is expected as a well structured NGO network and a committed national policy push the organic sector.

Key words: organic agriculture, Macedonia, governance, market

DIVERSIFICATION OF RURAL ECONOMY IN THE FUNCTION OF SUSTAINABILITY OF RURAL AREAS

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Key role in the concept of sustainable rural development has agriculture, which is the most represented activity of the rural economy. Fragmented and irrational fragmented holdings, as dominated in the countries of Southeast Europe, do not provide great opportunities for the development of commercial agriculture. The economic dimension of sustainability of these farms is based on the diversification of their basic activities - agricultural production. Diversification of the rural economy is the main mechanism that provides increment of rural employment and increase in total income of rural households. The conventional wisdom is that the B&H agriculture is characterized by a large number of mixed farms, which therefore have a high degree of their 'traditional diversification'. A large number of households in rural areas were forced to find a further source of income because agriculture alone could not provide a sufficient level of income to meet basic needs of their members and meet the costs of the production.

The aim of this study was to determine the degree of diversification of activities of rural households in Bosnia and Herzegovina and their preferences for dealing with non-agricultural activities. The survey was conducted during the 2011 by the survey of 100 households in the area across B&H, which also were the farms. It was found that 51% earns extra income outside the agriculture and the diversified activities account for more than 30% of their working time. Segmentation of the households based on size of land holdings, the small, medium and large, and analyzing results obtained by the questionnaire confirmed that a higher degree of diversification achieved on small and medium-sized farms. The analysis of results obtained according the age of the respondents were unexpected showing that the value of non-agricultural income increases with increasing of age of the farms holder.

Commencement and the development of non-agricultural activities in rural areas, as well as the introduction of higher stages of processing of agricultural products to the agricultural farms often is not a planned process, but a spontaneous consequence of the impossibility of ensuring the existence in the primary activity. One of the reasons is the lack of knowledge and skills of population in rural areas and lack of information about the sources and possible ways of achieving diversified income. Strengthening of extension services and expanding the focus of their work from the agriculture also to the consultations on of the possibilities and conditions for diversification of rural economy, can be a significant contribution in terms of ensuring the sustainability of rural areas.

Key words: rural economy, sustainability, diversification

NON-WOOD FOREST PRODUCTS AS GENERATOR OF DEVELOPMENT OF RURAL AREAS OF SERBIA

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Due to the increasing concentration of population that is existentially dependent on forest ecosystems, the issue of non-timber forest products (NWFP) is gaining importance in the forestry policies of many countries. Excluding a range of economic, social and environmental benefits to society in general, especially emphasizes the importance of NWFP to local communities that rely on them as the only source of income. Taking into account that the revenues from their exploitation are increasingly approaching those achieved by forest product, it is reasonable to consider the potential contribution of NWFP development of rural areas. The main actors in the use of NWFP are usually socially marginalized people who mostly live in poor economic conditions. The view that the NWFP are the ideal basis for generating income for rural people, almost always based on the assumption that these products have relatively constant in Abundance. The availability in nature and low cost launch open access to a large number of small entrepreneurs, which indicates that the NWFP sector development in rural areas in the future could be one of the most important instrument for reducing poverty in these regions. This research was conducted with the purpose of gaining insight into the commercialized quantities of NWFP in Serbia within the companies involved in their purchasing, processing and marketing, where gathered data through surveys and interviews with participants in the chain of value creation NWFP. The applied methodology is based on dynamic analysis and statistical methods which are defined by the movement of quantities purchased and implemented in the past and made projections of future trends. The aim of this paper is that through continued progressive trend which has been recorded in this study, indicate the possibility of developing NWFP sector in rural areas, through the organized collection and provide support to small and micro enterprises, generating income for local people. Entrepreneurship based on the NWFP, through industrialization and job creation, can certainly be a factor essential for the economic development of marginalized areas and rural poverty alleviation.

Key words: non-timber forest products, rural areas, dynamic analysis, Serbia

NEW PROGRAMS IN AGRI-FOOD SECTOR IN FUNCTION OF SUSTAINABILITY OF RURAL REGIONS IN SERBIA

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The concept of food quality is now expanded to production and all other aspects of processing, storage and marketing. On the other hand, in order to ensure sustainability of agriculture and rural areas, the current approach, as sources of cheap food, is changing to them. The company is increasingly focusing on the concept of rural development, based on demographic, natural, socio-economic and cultural basis. Therefore, the main objective of this study is to review the potential and opportunities for the development of new production-food program in order to revitalization of rural regions, economic development at the local level and thus increase the competitiveness of agriculture in Serbia. As an example, to review the situation at the local level, we used the data obtained in Sremska Mitrovica.

Based on data collected on the potential of Sremska Mitrovica, a SWOT analysis of the economy of this municipality was done, and on the basis of the results of that analysis, new programs were to be defined in the agro-food sector in this area. These programs will be focused on higher use of modern technology, advanced knowledge and qualified labor. An integral part of these activities should be technical assistance in establishing companies, in start-up businesses, as well as the information on the use of stimulation fonds and possibilities of products placement in the global market. By creating such programs, the opportunity for new investment projects, higher employment, revitalization of rural regions, agricultural development, and other related activities, therefore the economic sustainability of the local area will be provided.

Keywords: agri-food sector, SWOT, sustainability, development programs,

IMPLEMENTATION OF ECO-MARKETING DURING THE EXPORT OF FOOD PRODUCTS FROM VOJVODINA

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Eco-marketing involves the promotion of products and technologies that are consistent with the concept of sustainable development. A new marketing paradigm will have a crucial role in the coming years in many ways at the global level, as its influence on the companies to adapt their production and business principles of sustainability, and the transfer of consumer concerns in specific parts - the purchase of environmentally friendly products;"Conventional marketing out, eco-marketing in."

The trend in the world and in our nearest environment is a necessity to our country to gradually involve in these processes. In this scientific work is been studied the ecological suitability of local food and application of eco-marketing in the food industry in Vojvodina, which are major export opportunities, and will be carried out by comparing the applied production factors, internal and international environmental norms, standards and recommendations. It will also give a critical overview of the application of eco-standards. The study will first provide an analysis of information of leading food producers in Vojvodina, with appropriate national economic regulations and international eco-standards and principles. Then, there will be given recommendations for opportunities and concrete application of eco-marketing in the respective industry.

Therefore, the main goal of this research is the analysis of information about the knowledge of standards, eco-marketing principles and proper implementation of eco-marketing by leading food producers in Vojvodina, as well as recommendations for its proper use in order to promote exports.

Key words: eco marketing, eco friendly, food industry, Vojvodina

A SUGGESTED DEVELOPMENT MODEL FOR THE GREEK FOREST SECTOR - POLICY AND ECONOMIC MEASURES

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A lot of discussion has been made in Greece over the last years regarding forest policy and economy issues. The main question remains about the sufficiency of the existed forestry strategies and the economical support that applied in the Greek forest sector. On the other hand difficult bureaucratic problems must be resolved rapidly with new policies and legislation based on tested approaches. A theoretical model with future view that could be adopted and used from the policy and decision makers is suggested in this study. Also the economical support from the government is analyzed and proposed reevaluation and measures whenever is needed.

Key words: Greek forest sector, policy, model.

E-CONCEPT OF AGRICULTURAL EXTENSION SERVICE

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Agriculture and agricultural advisory services face different challenges in the current environment and the nearest future, searching for optimal affirmation solutions of the agricultural extension service and the agriculture in Serbia.

The concept of e-agriculture, in line with the idea of the World Summit Information Society (WSIS - *World Summit on the Information Society*), was identified as a need to transfer knowledge and experience in the application of ICT (*Information and Communication Technologies*) in agriculture. Otherwise, the WSIS is supported by the United Nations, and for the full implementation of the concept of e-agriculture the responsibility was assumed by the FAO organization in 2006.

E-Agriculture is an emerging concept, which aims to improve agricultural and rural development using information and telecommunications processes. E-Agriculture involves the conceptualization, design, development, evaluation and application of ICT, especially in agriculture.One of the priorities in the agricultural development of Serbia is raising advisory activities in general, as well as the constitution and affirmation of extension services to its full capacity. The work will show the status of agricultural extension services through legislation, the Agriculture Development Strategy of the Government of the Republic of Serbia, the type and model of its organization, financing, available human resources, the structure of the basic features, all in order of agriculture and rural development in general.

Key words: Agricultural extension, e-agriculture, concepts

LAND RESILIENCE AND HIDROLOGICAL RESPONSE TROUGHOUT THE TWENTIETH CENTURY IN MONTENEGRO

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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 48 historical photographs dating back to periods between 1890 and 1985, and analyzed 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: Discharge, land degradation, population growth, repeat photography, runoff coefficient

APPLICATION OF GEOTHERMAL ENERGY IN AGRICULTURE

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Man, by his activity has significantly changed and still changing the original composition of the atmosphere, hydrosphere and lithosphere, and brought into question the survival of huge number of biological species. Natural resources are used to generate energy, which is a basic prerequisite for the development of human society. During the twentieth century there was a drastic increase in energy consumption, which has resulted in the increase in global pollution. Today, the world gets the most energy from exploitation of fossil fuels - 39%. In order to protect the environment and natural resources for energy in the world it is increasingly advocating the use of unconventional or alternative energy sources. One of the essential ways of using alternative energy sources is geothermal energy, which is produced in the Earth's crust by slow decay of radioactive elements, chemical reactions, or friction in the movement of tectonic masses. The amount of this energy is so large that it can be considered almost inexhaustible, and thus geothermal energy is a renewable energy source. This type of energy has many advantages over traditional sources of energy based on fossil fuels, and the biggest are that is clean and safe for the environment. In addition, geothermal energy is virtually inexhaustible. The simplest and most promising way of utilizing of geothermal energy is the direct use of thermal energy for various purposes in tourism, agriculture, industry and civil heating. The use may be independent or combined. It can be combined with other (conventional) methods of production of thermal energy or the production of electric energy from geothermal sources. World capacities for the direct use of geothermal energy are estimated at 15 GWt installed capacity and 191 PJ of used heat per year. The largest direct application in agriculture is for heating greenhouses, stables and other farm buildings, for use in curing and ponds where the thermal spring is near. Each region has its specific features, depending not only on the geothermal potential but also on many other factors. The paper gives an overview of the technological possibilities of application of geothermal energy in agriculture.

Key words: geothermal energy, agricultural production, technical solutions

MODELLING THE EU CAP REFORM AFTER 2013 WITH AGMEMOD MODELLING TOOL

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In order to meet new challenges for agricultural sector regarding food security, sustainable use of natural resources and environment the EU CAP will be reformed again after 2013. Key aspects of CAP reform are maintenance of food production capacity all over the EU and moving towards "greener" agricultural policy. Reform proposals for budgetary support map out re-distribution of direct payments between member states as well as new instruments including capping of direct support for big farms. To evaluate the complex market effects of policy measures the quantitative methods for policy analysis should be applied.

The objective of this paper is to present the approach developed on common grounds for all member states for modelling of main elements of CAP reform. The methods applied are partial equilibrium model AGMEMOD with the policy harmonized (PH) evaluation approach. PH approach is capable to evaluate the main elements of the reform however some improvements and adjustments for modelling the capping and greening of 1st Pillar direct payments, and extension of approach towards 2nd Pillar less favoured area payments have been developed.

Results show the production and net trade levels for grains, oilseeds, livestock and dairy simulated for EU15 and EU12 for 2 scenarios for period 2014-2020 which is a projections' horizon. In Baseline scenario payments level and their structure remains the same as in 2013. In CAP reform scenario policy proposals for all EU27 countries have been quantified taking into account proposal for 2014-2020 multi-annual EU budget frame. The main conclusions regarding PH approach are that "greening" effects can be evaluated with a help of implementing additional multipliers. CAP reform effects upon production and net trade comparing to baseline is expected bigger for NMS and moderate for OMS, while the complex effect on production is positive.

Key words: CAP reform, agricultural policy, modelling, market

EU ACCESSION POLICY, INSTRUMENTS AND RESEARCH PRIORITIES SUITABLE FOR COOPERATION IN AGRICULTURE AND RURAL DEVELOPMENT

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A territorially balanced development of rural areas in South Eastern European (SEE) countries requires a broad and comprehensive approach encompassing agriculture, forestry, food processing and other income diversification objectives by capitalizing on the relations between the different sectors. The agri-food value chain in South Eastern European (SEE) countries provides the biggest share in employment and business activities dominated by SME's and family farms. It has therefore not only an important role in the overall development of the national economies and regional markets, but has significant impact on rural livelihoods. However, today, although with regional differences, overall low competitive agriculture and food manufacturing sectors, and a loss of the "regionality" of products prevail while at the same time endogenous potentials for innovative, diversified and value added actions are unlocked.

The challenges of the EU's Common Agriculture Policy across Europe for the upcoming programming period 2014 – 2020 for SEE address the need for complementary policy questions, which are centred on measures contributing to stability for the agricultural sector and rural communities in the light of enhanced volatility in the global markets. Looking from a policy view to the upcoming CAP objectives in 2014 - 2020, research priorities need be targeted towards sustainable farm production at large and with special focus on protection and sustainable utilization of natural resources, protection of the environment, organic farming, renewable energy and sustainable food and products with focus on food chains.

In the previous years of EU accession preparations in agriculture and rural development such as for the IPA-RD measures, the systematic role of R&D institutes and universities in applied research were marginal. Yet the logic of the EU programming of investment support measures related to CAP pillar objectives, is one of regular updated and partly standardized baseline research results for which a systematic collaboration with the agricultural administration is required so that in particular smaller farmers and the rural sector as a whole can directly benefit from research.

The R&D and higher educational institutions are important stakeholders for innovative measures between the different actors and among sectors through their high leverage effects. They are often bundled around regional centres and have a great potential for spill over and synergy effects, to network and institutionalise governance in order to increase the competitiveness of peripheral regions in SEE. By taking this as a regional strength relative to other factors, R&D and innovation resources further need to reach a critical mass through regional networking, inter-regional and trans-national cooperation.

Key words: EU, accession policy, agriculture, rural development, research priorities

POSSIBILITY OF SERBIAN SUSTAINABLE AGRICULTURE TOWARDS EU-CHALLENGES AND PERSPECTIVES

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Agriculture is the strongest sector of the world economy. On a worldwide basis more people are involved in agriculture than in any other area of business. Agriculture is the basis for the sound development of society and reflects the stability of each state and its ability to feed its population.

Unlike domestic, the experts from around the world say that industrial or 'modern agriculture' as it is called in Serbia – is not more 'modern'. Its recent success is not based exclusively on mechanization, artificial fertilizers and large estates, but the basic prerequisites which will soon disappear: there will be no more cheap oil and gas, which are the basis of its profitability, and for century's stable climate on Earth are changing dramatically.

As for the lack of competitiveness of small rural households in Serbia and encouraging their competitiveness by importing cheaper food whose production is based on subsidies from higher domestic - this can be explained only by ideological blind faith in "free market" which does not really work in the international food market (because the prices of primary agricultural products are lower than the actual cost of their production).

Key words: agriculture in Serbia, sustainable agricultural development

THE ROLE OF RURAL AREAS IN SUSTAINABLE DEVELOPMENT

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Sustainable development is long term, environmentally sound management of all resources for the benefit of the population and the environment. Moreover, sustainable development is long-term planning and systematic exploitation of such resources, with minimal "losses" that are harmful to flora and fauna. One of the essential components of sustainable development is the conservation of biological diversity which the area of the eastern Adriatic coast has abounds. In Dalmatia area there are currently 61 known varieties of olives, around 130 varieties of various fruits, 82 varieties of grapes and 94 varieties of spices and aromatic herbs.

Large biological diversity of this area is a consequence of the large number of climatic, bio-geographic, social and cultural conditions that prevailed and rule in the area. Turbulent historical upheavals (wars, socio-economic and political relations, policy changes, etc.) during the last century in this region resulted in significant changes in the rural area (population migration from rural to urban areas, leaving agricultural production, demographic changes in the country, aging of the population, etc.). Simultaneously with these changes the introduction of new technologies in agricultural production (mechanization of agriculture, manufacturing and production in the monoculture and genetically modified crops) took place.

The result of these changes and events is the "erosion" of traditionally bred varieties and breeds, and according to our research, one variety of olives is completely gone, and 12 are on the verge of extinction. In traditionally grown varieties of fruit, there is no data for 14 of them, while 31 species are endangered. Agricultural biodiversity of Dalmatia is not well studied, preserved, protected, nor promoted. Therefore, it is not utilized in the selection, nor recognized as economically important in creating original and distinctive high-value agricultural products, which have great tourist potential and are an important tool for preserving the existing Dalmatian environment.

The paper illustrates the changes in the rural areas of Dalmatia, and their impact on the preservation of traditional varieties of fruit and olive trees.

Key words: sustainable development, biological diversity, varieties, breeds, rural area

MONITORING AS A PHASE OF THE AGRICULTURAL INVESTMENT PROJECTS CYCLE

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The project approach in the design and realization of investment projects means that projects need to pass specific phases of so-called project cycle in order to achieve the objectives of the project as successful as possible. This way minimizes the risk that the investment projects bears. The project cycle typically consists of six main phases, namely: Project Identification, Project Preparation, Ex-ante Project Evaluation, Project Implementation, Monitoring of the Project Implementation and Ex-post Project Evaluation.

The fifth stage of the project cycle, Monitoring of Project Implementation, aims to successively monitor and control whether the project is performed under the adopted project documentation (investment project or business plan), states the changed circumstances in the implementation of the plan and in accordance to made changes to the project if the need arises. Monitoring of the project contributes to achieving the project objectives and the targeted spending of the funds. The circumstances under which the project is implemented may be to some extent differ from those envisaged at the time of identification, preparation and evaluation of the project. Monitoring phase serves to adapt project to the new, changed circumstances, if there is a need to undertake such activity.

Monitoring of the project can be defined as a collection of all relevant information about the project and its use by management of the project or independent controllers, with the aim to determine the level of the progress in the project, and on the base of this information to brought timely decisions with aim to implement the project according to the anticipated schedule. Monitoring is an activity that has the task to measure investments (inputs) and the initial results (output) in order to assist to project managers in the decision making process.

Monitoring carried out in practice on the example of apples orchards planting project was analyzed in this paper.

Key words: project cycle, monitoring of project implementation, investments, agriculture, orchard

LINKS BETWEEN PROTECTED AREAS, TURISM AND DEVELOPMENT OF THE COUNTRYSIDE

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Links between protected areas, tourism and development of the countryside were studied in the examples of the Triglav National Park and the Kozjanski Park. 200 local inhabitants were interviewed in each area. According to the results, it can be concluded that the studied protected areas give an opportunity to develop rural tourism. It cannot be claimed that the development of tourism in protected areas is more successful than the development of tourism outside the protected areas. The interviewed inhabitants of the Triglav National Park most support the development of tourism in the area (86.5 %) out of all other industries, whereas this is not true for the interviewed inhabitants of the Kozjanski Park. The latter agree the area should be oriented in agriculture and the development of small business and craft. Nevertheless it is not insignificant that a high share of the interviewed inhabitants of the Kozjanski Park agrees on focusing this area on tourism development (74.5 %). Almost half of the interviewed inhabitants of the Triglav National Park (47 %) and only 15 % of the interviewed inhabitants of the Kozjanski Park agree that the opportunity of the protected area is a better possibility in tourism business. Thus we can conclude that the Triglav National Park offers more opportunities or additional possibilities for business in tourism than the Kozjanski Park. In the protected area, where tourism is more developed (the Triglav National Park), the interviewed inhabitants believe that the nature conservation strategies are less successful and perceive more negative burdens of tourism (traffic and crowds, higher prices). On the contrary, in the protected area, where tourism is less developed (the Kozjanski Park), the interviewed inhabitants observe that nature conservation strategies are more successful and they are less influenced by tourism.

Key words: protected areas, development, tourism, rural areas, Slovenia

II
SUSTAINABLE AGRICULTURE AND MODERN TECHNOLOGIES

PLANNING AND PRODUCTION OF FOREST TREE REPRODUCTIVE MATERIAL FOR THE PURPOSE OF STATE ENTERPRISE FOR FOREST MANAGEMENT "SRBIJAŠUME" BELGRADE

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The State Enterprise (SE) for Forest Management "Srbijašume" manages forests and forest land on an area of 902,087.68 hectares (thereof 763,114.80 ha of land covered by forest and 138,972.88 ha treeless).

The aim of this paper is to determine the required amount of forest seeds and seedlings for afforestation (establishing new forests) and the reforestation during the period 2012 - 2016, the production of seedlings to harmonize with the plans and real needs and to propose a way of improving the production of reproductive material.

The production of good quality forest seeds and seedlings is a priority and a strategic task within SE "Srbijašume". The production of high-quality reproductive material allows the formation of forests of better quality, it shortens the production process, use the habitat potential more efficiently and achieve multiple benefit functions more successfully.

Information on the forest status, forest management plans, needs for seeds and seedlings in seventeen forest areas in (338 management units), have been transferred to the central database, and then analyzed and evaluated.

During the period 2012 – 2016, SE "Srbijašume" is planning afforestation (establishing of new forests) on 4,613.55 ha, reconstruction of degraded high forests on 1,375.02 ha, direct conversion of coppice forests on 3,639.30 ha and filling on 3,550.19 ha, and restoring of burned areas on 164.02 ha. For the production of seedlings required for afforestation and restoration of the planned areas it is necessary to provide 10,071.57 kg of seeds (9,749.75 kg broadleaf and 321.82 kg conifer seeds), and for the forest recovery by seed sowing a quantity of 110,551 kilograms.

According to the data analyzed, the need for reorganization of the nursery and seed production at SE "Srbijašume" has been recognized in order to enhance the reproductive material production.

Key words: planning, production, seed, seedlings, forest

ANNUAL CARAWAY ESSENTIAL OIL COMPOSITION GROWN IN ORGANIC AND CONVENTIONAL GROWING SYSTEM

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Caraway is grown for its essential oil content, that are present in whole plant, but their concentration is highest in fruits. Annual caraway seed (*Carum carvi* L.) grown in different environmental conditions on tree locality in Vojvodina province, Serbia, during 2011 year. Field experiment in randomized block design include: control (without applying fertilizers), organic (Slavol, Bactofil B-10, Royal Ofert biohumus and vermicompost) and conventional (NPK) crop system. Ripe dried seed was crushed and distillated by Clevenger-type apparatus for its essential oil. The oil quality was assessed through analysis by combined gas chromatography and mass spectrometry. Caraway fruit contain 2.7-4.9% essential oils consisting 21 compounds, from which limonene and carvone account from the main portion, above 98%. The highest content of limonene is on field fertilized by vermicompost (57.26%) and smallest on control field (54.14%). Oppositely, the highest content of carvone was on control field (44.31), and smallest on field fertilized by vermicompost (40.78%). From this experiment can be concluded that the relationship between limonene and carvone in negative correlation.

Key words: caraway, essential oil, limonene, carvone.

EVALUATION OF THE EFFECTS OF RANGE MANAGEMENT DESIGN ON THE IMPROVEMENT OF RANGE LANDS IN WEST IRAN – AZERBAIJAN

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In order to survey and assess the range of the management designs affect on the range land improvement, 15 of the Sarhalan and 60 of the Kozerash types of land of Sam city in the west Azerbaijan province, were selected. For the information collected on utilization, the research included the interviews, observation and field study. A questionnaire was used to interview the land beneficaries and natural resources managers. The advantages and defects of different management design were determined by observation and field study based on the parameters such as range of condition, trends, level of the capacity and production which were studied and compared between two communal boundaries. By using the T-test the description such as frequency and percentage and other information were analyzed. The analyses of the results showed:

1- There is a significant relationship between the rangeland condition, type of the management design and the common use of the land.

2- There is a significant relationship between the rangeland production, type of the management design and the common use of the land.

Key words: rangelands, management, West Azerbaijan

THE ASSESSMENT OF TREE SPECIES IN ORDER TO INTRODUCE THE MOST SUITABLE IN THE RANGE OF LAND, BIODIVERSITY AND PERMANENT AGRICULTURAL DEVELOPMENT

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A modern idea originated in water-spread management in order of flooding control and utilization improvement of range of lands. Water resources have very important role in agriculture and development of natural resources. The activities on to provide the information on utilization of flooded areas were performed. The Poldashat flooded area, on 700 ha in 1997 was cultivated with different trees which bear fruit yield or a wood, such as: *Pistacia atlantica*, *Elaeagnus angustifolia*, *Amygdalus comminus*, *Cupressus arizonica* and *Cerasus brachypetala*.

Biological monitoring of the above mentioned species started by measurement of parameters such as trunk diameter, trees height, percentage of survived trees and production of useful trees, in 2005 and 2007. The samples were collected from randomly selected rows and the number of samples was about 30. The study parameters were measured at two times, at the beginning of growth season and the end of growth season.

The results obtained showed that:

The *Pistacia vera and Elaeagnus angustifolia* increased the trunk diameter, tree height, and percentage of live trees was higher in comparison with other species planted. The average of the three-year measurements on the tree survival for *Pistacia vera* was of 90% and *Elaeagnus angustifolia* of 80%. Therefore the *Pistacia vera* and *Elaeagnus angustifolia* showed as the most proper tree species for Poldashat water flooding area.

Key words: Water spreading, Floodwater, useful and unuseful trees, Poldasht, West Azarbaijan

MORPHOLOGICAL CHARACTERS AND YEALD ANALYSIS OF BIANKA AND *GALILEO*- TWO NEWLY INTRODUCED VARIETIES OF RICE (*Oryza sativa L.*) IN MACEDONIA

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In this paper, the results of investigation of two newly introduced Italian rice varieties *bianca* and *galileo* are presented. The new varieties' performances were compared to the standard rice varieties *prima riska* (Macedonian variety) and *R-76/6* (domesticated Italian variety), grown under agroecological conditions of the Kocani region. The research was carried out during 2009 and 2010 by setting-up field trials (randomized block system). The following traits were analyzed: raw rice-paddy yield, biological yield (straw+grain), stem height, panicle lenght and number of productive tillers per m^2. According to the obtained results, the highest average yield of paddy rice was achieved in the variety *galileo* (8548 kg/ha), and the lowest was in the standard variety *R-76/6* (7735 kg/ha). In 2009, the yield of paddy rice of the varieties *bianca* and *galileo* was significally higher (at both levels of probability), compared to standard varieties. The highest average biological yield was achieved in the standard variety *R-76/6* (17166.50 kg/ha), while the lowest was in variety *bianca* (16,125 kg/ha). The introduced rice varieties were characterized by lower average stem height (*bianca*-53.70 cm, *galileo*-58.24 cm) compared to standard varieties (*prima riska*-86,20cm and *R-76/6*-92.40 cm). The average panicle length values obtained for varieties: *bianca* (17.20 cm), *galileo* (16.43 cm) and the standard *R-76/6* (16.27 cm), were lower when compared to the standard variety *prima riska* (19.15 cm). The highest average number of productive tillers per m^2 was determined for the standard variety *R-76/6* (399.83) and the lowest for the variety *bianca* (334.67). In 2009, the significantly largest number of productive tillers per m^2 (for both levels of probability) was estimated for the standard variety *R-76/6* (493.33), since in 2010, for the same character, the significantly highest value was reached in the variety *galileo* (420.33).

Key words: rice, varieties, yield of paddy rice, stem, panicle, productive tillers

SEED AGING OF OIL CROPS

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Changes occurring in seed during storage are very significant in terms of the quality and longevity of seed. The characteristics of composition of oil crops seed are also influenced by the specificity of the processes occurring in seed during storage. The seed of sunflower and soybean genotypes were subjected to accelerated aging test, as well as to the natural aging in controlled and conventional (uncontrolled) conditions for the period of six and 12 months. Seed aging, artificial as well as the natural one has caused its damage, which negatively affected quality and seed germination of the examined soybean and sunflower genotypes. The degree of damage and the ability of seed to resist the negative aging effects have influenced, beside the time of aging, also the type of storage and plant species. The best way of seed storage is the one that had smallest influence on changes of seed biological nature, which can be accomplished by efficient regulation of relative humidity and temperature.

Key words: seed, soybean, sunflower, storage, vigor

ESTIMATION OF EVAPOTRANSPIRATION AND IT'S COMPONENTS IN ALBANIA

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The process known as evapotranspiration (ET) is of great importance in many disciplines, including irrigation system design, irrigation scheduling and hydrologic and drainage studies. In a broad definition, the evapotranspiration is a combined process of both evaporation from soil and plant surfaces and transpiration through plant canopies.

There are various methods applied: direct measurement or observed method, indirect calculating method using empiric formulas, based on meteorological data (like temperature, wind, radiation, humidity, rainfall, etc.), water balance method.

Evapotranspiration is calculated by some methods such as: Turc, Penman, Thornthweit, Penman Monteith, FAO Penman Monteith, Standartized PM, FAO56 Penman-Monteith. In this investigation, is used to estimate ET_o, consisting of meteorological data FAO-56 Penman Monteith. Evapotranspiration values of obtained from FAO-56 PM are compared with values obtained by direct methods located in Lushnja station.

Methods such as Thornthweit, Konstandinov, Water Balance etc. were applied and the pluviometric deficit were estimated the evaluation of real evapotranspiration.

The aim of this paper is an attempt to introduce a general evaluation of the evapotranspiration in the Albanian territory, including Reference evapotranspiration (E_0), Real evapotranspiration, E_r, Deficit evaporation DE, for field, hilly and mountain area.

Key words: evapotranspiration, meteorological data, water balance, FAO 56 PM, direct method

ORGANIC AGRICULTURE WORK FOR SUSTAINABLE DEVELOPMENT IN THE REPUBLIC OF MACEDONIA

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The potential of the natural resources in the Republic of Macedonia for the development of organic agriculture as part of sustainable agricultural practice, and ecological management system of production must be utilized. This is necessary in order of achievement from one side the reasonable relationship of a man toward the surrounding environment and thus to support and strengthen the health of ecosystems, and from the other side to direct the Macedonian agro-food sector in the process of approaching the standards defined by regulations of the EU Common Agricultural Policy which presents the hardest and the most complex chapter in the negotiation process.

Organic agriculture separates as a system which keeps establishing in the last few years on the larger agricultural areas in the Republic of Macedonia. The trend of introducing this system of sustainable agriculture in recent years is increasing and gives the right to expect organic farming to be a bearer and the basis for further development of all other systems of sustainable agriculture in Macedonia.

Common future, towards which are directed the agricultures of the Republic of Macedonia and the EU, is efficient, market-oriented production, occupied with an important issues such as food safety, environmental protection and animal welfare and contributing to the general development of rural society.

Key words: organic agriculture, sustainable agriculture system, Republic of Macedonia

USE OF BIOTECHNOLOGIES METHODS IN MULTIPLICATION OF NATIVE PRUNUS SP. GERMPLASM

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The present study was carried out to investigate the use of "in vitro" methods as an alternative way for propagation on two different *Prunus* germplasm native resources. Shoot tips explants collected in Tirana region were cultured in MS solid medium supplemented with different type of plant growth regulators (ANA, BAP and GA_3) during proliferation and multiplication phases. Results were elaborated with two factorial analyze of variance. During proliferation, apricot explants recorded higher values for shoot length parameter (± 10.6mm) in comparison with plum explants (±6.3 mm). We observed different results for leaf parameters, where plum shoot tips presented higher number of leaves (±8.6) than apricots (±5.2). During subculture, medium composition effect positively on the new plantlets biometry, giving plum plantlets with the highest number of leaves (±16) and apricot new plantlets with the highest value of shoot length (±2.2 cm). The multiplication coefficient recorded for the two *Prunus* plantlets was more than 4 buds/explants. Data recorded suggested that the method used in this study was appropriate for the multiplication of our *Prunus* germpalsm.

Key words: propagation, *Prunus*, germplasm, growth regulators, medium

PHENOLOGICAL PROPERTIES OF PLUMS IN THE CONDITIONS OF NORTHERN MONTENEGRO

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During three-year period phenological characteristics of plum cultivars in the conditions of the northern part of Montenegro were examined. As a material the following varieties: *Stanley, Cacanska lepotica, Valjevka, Cacanska rodna, California blue, Cacanska najbolja, Cacanska rana, Pozegaca, Valerija, Anna Späth and Andjelena,* were used.

The tested varieties blossomed, mainly in the third decade of April. The intensity of flowering was in the range from 1.7 (*Andjelena*) to 4.7 (*Cacanska najbolja* and *Stanley*).

The earliest ripening of fruit in average was *Cacanska rana* variety and latest in *Anna Späth* variety. Different time of ripening allows consumption of fresh fruit of cultivars studied in the period of about two and a half months.

Variety *Andjelena* during three years of testing, although it flourished every year (however the intensity of flowering was low), has never held set fruits, and therefore the determination of ripening period was not possible. Based on this observation, it can be confidently stated that the variety *Andjelena* cannot be grown in the agroecological conditions of Northern Montenegro.

Key words: plum, variety, phenological traits, Northern Montenegro

SELECTION OF HORSES FOR HIPPOTHERAPY IN THE R. OF MACEDONIA

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The main purpose of the paper is to define the selection criteria for horses aimed for hippotherapy, based on their breed, age, type, sex, character, height, gaits and other traits that were appropriate for each patient. By its very nature, therapeutic riding influences the whole person and the effect on all the body's systems can be profound. Any riding program using horse related activities for clients with physical, mental, cognitive, social or behavioral problems is a therapeutic riding program. So, the therapeutic riding in the R. of Macedonia is a new branch into the medical application of the horse in hippotherapy in the Skopje region from 2011.

Key words: horse, hippotherapy, selection, therapeutic riding

DEVELOPMENT OF ORGANIC FOOD MARKET IN SERBIA

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In recent years, Serbia has made efforts to modernize economy and comply with requirements to join the EU. Some of the support measures are producing positive effects and Serbia is expected to become as a candidate EU in the near future. In this context, an area that requires significant changes is the agricultural sector. Common Agricultural Policy - CAP is regulating the European market and mechanisms for many agricultural products. Worldwide, the organic food markets are lead by the same economic principles as well as all other industries. Turnover of organic products in Europe has reached several billion euros and annual growth rates are close to 10%. Demand is growing faster than domestic production. This is a trend that initiates the world economy to start turning to organic food production. With its abundance of agricultural land and long Agro-industrial tradition, Serbia has advantages and opportunities to boost export and strengthen domestic organic food market.

Key words: organic food, organic food market, agricultural products, European organic market

EXAMINATION OF THE EFFECTS OF VARIETY OF TOMATO ON THE YIELD AND QUALITY OF FRUIT

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Selection of varieties of tomato for specific production areas is an essential factor for increasing productivity and yield quality. Achieving adequate quality characteristics of fruits that satisfy consumer and technological properties is a prerequisite for eligibility and scope of future production.

In this paper are given results of examination of biological characteristics of plants (stages of development, length of growing season), morphological characteristics of the fruit (color, shape, weight) and chemical composition of fruits (dry matter, sugars, pH, acids) of two varieties of tomatoes: Novi Sad's Jabučar and Sarajevo's Jabučar (local variety).

Tests were carried out by performing field tests on the site Sarajevo-Butmir during three years (2008, 2009 and 2010). Chemical analyses of fruit were made by appropriate laboratory methods. The yield results by varieties and years of experiments were statistically analyzed.

Examined varieties have the same length of growing seasons with slight variations according to the years of examination (2008 - 126 days; 2009 - 133 days and in 2010 - 132 days).

The results show that the yield of fruit variety Sarajevo's Jabučar is significantly higher (37% in average during three years). Looking per year, yields vary and are significantly higher from 10% (2008) to 57% (2010) compared to the yields of the variety of Novi Sad's Jabučar.

The fruits of variety Novi Sad's Jabučar have more dry matter (5.24%), lower percentage of total sugar content (6.80%), higher pH value (5.36%) and higher content expressed as malic acid (1.21 g in 100 ml of product).

Key words: tomato, variety, yield, quality

THE RATIO BETWEEN THE REAL AND THEORETICALLY NORMAL NUMBER OF TREES IN THE MIXED FORESTS OF FIR, BEECH AND SPRUCE IN THE NATIONAL PARK "BIOGRADSKA GORA"

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Good knowledge of structural elements of stands, apart from having the knowledge of biological-ecological characteristics of species and conditions in habitats, is of a special importance for reviewing the choice of the most appropriate way of forest management.

Forest ecosystems Biogradska Gora without a doubt are among the most important forest structures, due to the extraordinary diversity and high degree of conservation. These ecosystems are due to the lack of impact of human activities, professionally and scientifically interested, and especially grateful for research. In order to manage a forest at a sufficiently high level of biodiversity it is necessary to learn about the development process in virgin forests.

Establishment of a theoretically normal situation means building up a selective forest in order to implement continuous management and a group of all the structural elements defining regular situation is called normality. Normality for concrete forest complex, have been produced based on taxation data for the needs of defining the differences between real and functionally optimal situation in the given conditions in preserve area of the National park “Biogradska Gora” in mixed forest of spruce, fir and beech (*Piceeto-Abieti fagetum*).

Key words: Forest management, Biogradska Gora, mixed forests, structural characteristic

EFFECTS OF CROPPING SYSTEMS ON WEED INFESTATION OF A WINTER WHEAT CROP

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Winter wheat, as a second crop in the sowing structure, is usually cultivated in two cropping systems: continuous cropping and the two crop rotations. Based on these facts, the aim of the present study was to organise permanent crop rotations on the Faculty of Agriculture experimental station "Radmilovac" near Belgrade. Crop rotations with different crops were established in 1992 and have been lasting ever since. Crop rotations, as a cropping practice, are a complex category with broad effects on the soil and crops.

This paper presents results on effects of cropping systems (crop rotation and continuous cropping) on a weed community of a winter wheat crop during two years of investigations (2008/09 and 2009/10). Long-term effects of various cropping systems on weed infestation were observed by the one square meter area method. The floristic composition, number of weed plants per species and fresh biomass were determined in the field and then air-dry biomass of weeds was measured.

Two most important parameters of weed infestation (number of weed plants per species and fresh biomass) were statistically processed by the method of a single factor analysis of variance, while the least significant difference (LSD) test was used for individual comparison of differences between means. The weed community in winter wheat crops was composed of 13, i.e. 15 weed species in the first, i.e. second year of investigation, respectively, with dominancy of terophytes. The annual species: *Stellaria media* (L.) Vill., *Veronica persica* Poir. and *Sonchus oleraceus* L., and the perennial species *Agropyrum repens* (L.) Beauv., *Cirsium arvense* (L.) Scop., *Convolvulus arvensis* L. and *Sorghum halepense* (L.) Pers. prevailed in the weed community. Crop rotations, especially three and two crop rotations were more efficient in suppression of weed plants per species and weed biomass than continuous cropping and six crop rotations.

Key words: weeds, crop rotations, continuous cropping, winter wheat

INFLUENCE OF COMPRESSION DEGREE AND INOCULATION ON CHEMICAL COMPOSITION AND QUALITY OF SILAGE OF DIFFERENT MAIZE HYBRIDES

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The experiment was set up as three-factorial trial according to statistical model 2 × 2 × 2 (2k), where A was the factor of maize hybrid (A_1 = hybrid FAO maturity group 400 and A_2= hybrid FAO maturity group 700), factor B was the degree of compression of silage mass (B1 = 700 g dm^{-3}, B2 = 550 g dm^{-3}) and C was the inoculation of the silage material (C1 =without inoculants; C2 = with inoculants). Ensiling was performed in the experimental containers volume of 60 dm^{-3}. Experimental containers were opened after 56 days and from representative samples the main parameters of the chemical composition and quality of silage were determined.

The chemical analysis in the silages of more compressed material (700 g dm-3) showed the reduction of ammonia nitrogen and acetic acid, and increment of lactic acid ($P < 0.05$). Inoculation of silage material has not significantly improved the basic parameters of silage quality (relative ratio of lactic, acetic and butyric acids), but significant decrease of pH values ($P < 0.05$) was determined. The influence of selected hybrids of silage corn was not significant for most parameters of chemical composition, except for the content of crude fiber and free extract (BEM-a/NFE-a).

Based on the research conducted it can be concluded that the most important measure in the technology of silage feed was the compression degree. Adequate compression shortens the duration of the aerobic phase and limits the activity of proteolytic enzymes. In practice, maximum attention should be paid to the factors on which directly or indirectly depends the degree of compression of ensiling material: the degree of maturity, chop length, choice of the object for silage and/or choosing machines for compression. Factor of inoculation (inoculants based on homo fermentative bacteria of lactic acid) is of a little importance to the corn silage practice. Selection of hybrids factor was not significant for the most important parameter of chemical composition but can be assumed (based on literature review) that is primarily significant for the total dry matter yield, especially in interaction with the factor of sowing density.

Key words: corn silage hybrid, compressed, inoculation, chemical composition, quality

GEO-INFORMATION ANALYSIS OF FRUIT TREES SPECIES IN ALBANIA

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The geographic distribution of some fruit trees species in Albania using a database of 515 geo-referenced observations, including all 20 currently known fruit trees species, was analyzed. Geo-referenced observations of fruit tree species were performed in 11 Districts of Albania, but 54% of the observations were from Elbasan, Tirana and Dibra Districts. A grid of 25 x 25 km cell was used to asses' diversity and richness of species. To include all species at least once, 34 grid cells were selected.

Spatial analysis of species richness clearly shows that Elbasan, Tirana and Dibra districts were areas of high diversity. In these districts the highest number of species (14, 13 and 12 species) was observed. For all grid cells selected, the summarized results on diversity and estimators were: Richness (S) 20, Margalef index 3,043, Menhinick 0,881, Shannon 2,543. Simpson 0,889 and Brillouin index 2,462.

Some species were very rare (*Prunus mahaleb*, *Pyrus amygdaliformis*, *Prunus cerasus*) and some with a high frequency of observation: *Pyrus communis*, *Prunus domestica*, *Malus domestica*.

Area with high diversity (alpha) using GIS analysis was the eastern part of Elbasan district. This area seems to be with high priority for in situ conservation. New alleles were also contributed by additional grid cells: 5 alleles come from Berat district and one new allele from each three other districts: Tirana, Dibra and Gjirokastra.

Key words: GIS, geographic information systems, fruit species, richness, diversity.

SAGE CULTIVATION POSSIBILITIES IN "MALESIA E MADHE", ITS DEVELOPMENT AND PERSPECTIVES

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Malesia e Madhe is extended in the north-west region of Albania. It has a surface of 555 km ^{2}, dominated by high mountains, and only in the south, at close of Shkodra Lake, the relief change into flat area. All this low land has a name, "Pustopoje", which is a Slavic denomination meaning the desert land. Regarding to the structure and thanks to the factors during its formation the layer of 0-60 cm of land is structured with 70-95 % of conglomeration and middle sized stones (Ø 5-200 mm). This land is not productive when referring to the field cultures, and is not under the irrigation system.

Field of Pustopoja is extended 20-550 m above the sea level, with Mediterranean climate and little rainfall during the period April- September. The land is skeletal and with low possibilities of water keeping. The biggest part of the surface has been bare of leafless. In particular "oasis" plants with short vegetative cycle were cultivated. Several years ago many efforts have been done to cultivate medicinal plants, as thymus, lavender, thyme, etc. The firs results were encouraging, but by time these surfaces were damaged by the lack of care, and nowadays they are quite degraded.

During the last years there was a great interest by the rural community of the district and a special attention to the cultivation of sage. During the last five years the surface cultivated with sage increased very fast because the land and climatic conditions are favourable and the market is guaranteed. Actually there are about 700 ha under this plant which can already be nominated as *agricultural culture*.

In our country we use to say that the sage is 'at own home'. Albania has high diversity of this plant, but the ecotype of north region is more requested in the market. The region of Shkodra is the richest area in sage ecotypes notable for their high active compounds. On the other hand those ecotypes, as the one of Shiroka, Velipoja, Hoti etc. have a high adaptability and productivity in the cultivation conditions of Mbishkodra region (Malësia e Madhe, Pustopoja).

The incomes from one ha of sage is about 4-5 000 USD. There are possibilities to cultivate more than 5000 ha, which means an annually income over 20 million USD.

Having in mind the numerous demands from the market (export), and the perspective of this region, as well as in the similar district like Kukes, Gjirokaster etc, there is a need to support strongly this activity (including subvention for the first year), because it brings benefits on engagement of not productive surface and also the possibilities of developments of the rural community.

Keywords: Sage (*Salvia officinalis*), autochthonous ecotypes, essential oil

NANOTEHNOLOGY IN AGRICULTURE: A REVIEW

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Developments during the past decade in biochemistry, physical chemistry, microscopy and engineering have resulted in a tremendous upsurge of interest in the properties of very small particles and their possible application for a wide range of industrial and consumer sectors. The potential of nanotechnology to revolutionize the health care, textile, materials, information and communication technology and energy sectors has been well publicized. In fact, several products enabled by nanotechnology are already in the market. As in other sectors, the advent of nanotechnology promises to revolutionize the development of products and applications in agriculture. Researchers in universities are now investigating possible applications for using nanotechnology in agriculture. This aspect is still in infancy and requires attention of the scientific fraternity for its widespread use to harness its potential benefits. In this paper, a review of the application of nanotechnology in agriculture is presented.

Key words: Nanotechnology, agriculture, application.

INFLUENCE OF HONEYBEE (Apis mellifera L.) ON POLLINATION AND YIELD OF PLUM CULTIVARS

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During its evolution a mutually beneficial relationship between plants and bees, which continues also today, developed. Basically, flowering plants provide nectar and pollen for bees, and they in return made cross pollination of plants. In the process of cross pollination of special interest are the plant species grown by man for his and animal feed or used for the other purposes. There are over a hundred of such plants species.

Farmers and beekeepers want the bees to pollinate crops more efficiently. For this purpose a specially honey bee colonies are prepared, because pollination of most crops falls early in the season, when there is not an abundance of bees in the beehive. A lot of fruit species has enormous significance for the bees and the development of their colonies in early spring (hazel, almond, cornelian cherry, plum...) and for preparation for the main pasture. In our conditions the honey bees participate to over 85% in the pollination of fruit trees, and all the other pollinators of 14-15%.

During two-year trials in plum orchards on two locations in the vicinity of Bijelo Polje, the success of pollination of certain varieties, with and without the bees, was compared. Of course, pollination, with exactly the same cultural practices, in the presence of bees was significantly higher, what reflected to a significantly higher yield.

Key words: Honey bee, plum, pollination, yield

WHEAT: IN SEARCH OF DIVERSE FEATURES TO SUCCESSFULLY COPE WITH A CHANGING WORLD

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The main challenge that agriculture is facing nowadays is related to the issue of agricultural plants' adaption with expected trends of climate change. Likewise, this issue is strongly linked with other concerns such as provision of food security and natural resources management. As predicted by the most up-to-date global climate models, this phenomenon is expected to increase the frequency and magnitude of extreme climatic events. That implies that more intense and prolonged rainy as well as dry periods are likely to strike the globe. Albania is projected to be one of the most affected countries by this phenomenon, as compared to other countries of Europe and Central Asia.

In fact, recently it was faced with such an extreme event, i.e., autumn 2010, when vast arable lands were inundated. Under such conditions, the planting of the wheat culture in the central part of the country was postponed until the beginning of January 2011. It was at exactly that same period when we planted some irradiated wheat varieties with gamma rays aiming at the genetic improvement of such varieties by means of mutation induction approach.

As such, one of the main goals of our study remains the selection of lines that were less influenced by the forced late planting. Following this idea, the grains of the first generation were planted again in the first days of January 2012. In fact, this paper aims at presenting the results of our two-year work with regard to leaves photosynthetic pigments analyzed in the flowering stage by destructive spectrophotometric method as well as the yield indicators in M1 generation, which seem to be evidently higher in all LB-7 irradiated variants as compared to control plants.

Key words: wheat, heavy rainfall, climate change, photosynthetic pigments, yield

EFFECTS OF ORGANIC AND CONVENTIONAL CULTIVATION METHODS ON MICRONUTRIENT CONTENTS IN TOMATO FRUITS

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Three tomato varieties (Robin-F1, Amati-F1 and Elpida-F1) were grown in the greenhouse condition (Northeastern Greece) using organic and conventional cultivation methods. The differences between production systems were in the pest control and fertilizer. We used goat manure (30 t ha^{-1}) in organic system and 400 kg/ha slow release mineral fertilizer NPK 12-12-17 +2MgO + 8S + trace elements in conventional growing system. The objective of this study was to investigate whether there were any differences in the micronutrient contents of K, Ca, Na, Mg, Fe, Zn, Mn, Cu, lycopene, ß-carotene, ascorbic, and citric acids content in organic and conventional tomatoes.

We found significantly greater concentrations of P, K, Ca and Mg in organic tomatoes but in conventionally grown tomato we found greater content of Zn, Fe and Cu. Growing method have no influence on concentrations of B and Mn in tomato fruit. The differences were more dependent on the cultivars than on the production system. The cultivar 'Elpida' had the highest content of micronutrient compared to the two other varieties grown under the same conditions. Tomato fruit from conventional greenhouse production contained on average higher levels of total soluble solid (TSS), sugars and vitamin C, whereas tomatoes grown organically contained on average more lycopene and carotenoids.

This study confirms that the most important variable in the micronutrient content of tomatoes is cultivar; organically grown tomato is no more nutritious than conventionally grown tomato when soil fertility is well managed.

Key words: tomato, production, organic, conventional, micronutrients

SIMULATION OF WINTER WHEAT WATER BALANCE WITH CROPWAT AND ISAREG MODELS

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This paper presents the results of water balance simulations in winter wheat production in the area around Bijelo Polje. Winter wheat production in three years and on two soil types has been simulated with CROPWAT and ISAREG models. The simulated results have approved variations between two models and measured yield. Crop evapotranspiration ranges between 304.5 to 463.3 mm. Relative yield obtained after simulations is very similar to relative yield obtained on a measured basis, except in the season 2008/2009. Net irrigation requirements to obtain maximum yield are higher for 49-116 mm in the simulations with CROPWAT model. Total NIR's to maximize yield range between 84-300 mm depending on season and model. Water use efficiency ranges from 0.82 to 1.28 kg/m^3. The obtained results approved both models as good tools in winter wheat water balance and indicated that winter wheat yield could be improved under irrigation.

Keywords: Winter wheat, CROPWAT, ISAREG, water balance, water use efficiency, net irrigation requirements

RELATIONSHIP BETWEEN DIGESTA PASSAGE RATE AND APPARENT DIGESTIBILITY OF NUTRIENTS IN DAIRY COWS FED DIFFERENT HAY QUALITIES AND CONCENTRATE LEVELS

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Roughage quality, generally defined by its fiber content, is an important factor affecting intake and utilization of forage while reducing concentrate level in ruminant feeds. High fiber content in the diets is usually associated with a low degradation rate and a decrease of passage rate. The effects of diet's fiber content on digestive processes are also confounded by the amount of concentrate in the diet. These interactions are mainly related to the ratio between structural (SC) and non fiber carbohydrates (NFC).

The aimed to investigate the effects of the interactions between the fiber content in the hay and the level of highly degradable concentrate in the diet on passage rate and apparent digestibility of nutrients on dairy cows. The influence of different fiber content of hay and different concentrate level on passage rate and nutrient digestibility were tested on four Holstein cows in late lactation fed restricted up to 13.7 kg DM/d. Passage rate of solid and liquid digest were estimated through marker recovery in the faeces. The apparent digestibility of nutrients was calculated as the difference of their content taken with the diet and their content in the faeces. Feeding a diet of high-fiber (62 % NDF) hay and low concentrate level (20%) decreased solid passage rate and total digestibility of nutrients due to a limited availability of fermentable OM in the hay. Increasing the concentrate level in the diet with 50% improve OM digestibility, whilst a depression of the ruminal fiber digestibility was not entirely avoided. The combined effect of feeding low-fiber (47 % NDF) hay and high concentrate level (50 %) reduced markedly fiber digestibility. Reduction of concentrate level with 30% in the low-fiber hay diet was associated with an increase of ruminal solid passage rate and fiber digestibility.

Key words: Dairy cows, digestibility, digest passage

THE EFFECT OF FEEDING TOTAL MIXED RATIONS ON RUMINAL ENVIRONMENT OF DAIRY COWS

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Total Mixed Rations (TMRs) are increasingly used in the feeding of dairy cows, particularly in large farms with grouped management. TMRs are prepared by complete mixing of all roughage and concentrate components. The homogeneous composition helps to maintain a stable rumen environment through maintaining a high rumen pH that is important for fiber digestion, high production and high milk fat content. Since feeding TMR leads to a better control of the ratio roughage / concentrate in the ration it also stabilize rumen fermentation and decrease the risk for digestive and metabolic disorders. The aim of the study was to evaluate the effects of feeding a TMR compared with separate ingredients feeding mode on rumen fermentation parameters. The diets (TMR and separate ingredients feeding) were tested in four multiparous ruminally cannulated Holstein cows. Feeding TMR did not significantly influence pH levels of both solid and liquid rumens` digest, but the animals feed TMR showed a trend of faster regeneration of pH values five hours after feeding. The trend was supported by the tendency of faster increase of HCO_3^-concentration particularly in liquid digest 5 hours after feeding.

Key words: Dairy cows, feeding, TMR

SUSTAINABLE AGRICULTURE IN THE PRODUCTION OF MEDICINAL PLANTS

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The developmental concept to which modern humans are aiming has to be harmonized and balanced with the capacities of the environment; therefore it has to be sustainable. Sustainable development is most often defined as the development that fulfils the demands of modern living but doesn't question the possibility for the next generations to fulfill their own needs. Failing to fulfill the sustainability concept leads towards increased consumption and the waste of the natural resources. When everything is spent, development stops and it leads to increased consumption and waste of natural resources. Serbia is, thanks to its favourable climate, soil and unpolluted environment, very suitable for the intense growing of medicinal plants and this type of production brings bigger, faster and easier profit when compared to other agricultural productions and as such represents the developmental chance especially for rural areas in Serbia. In Serbia, there are approximately 700 species of medicinal and aromatic plants out of which 420 have been officially registered and 270 are on the market. Sustainable development of natural resources of medicinal and aromatic plants is directly influenced by the application and improvement of the legal framework and standards that have to be harmonized with laws and standards of the EU. Regardless huge possibilities that herbal sector has in the economic system of the country, vast potential, especially concerning the export, later stages of processing and cultivation- growing of medicinal plants (especially based on the principles of organic agriculture), have not yet been exploited.

Key words: medicinal and aromatic plants, sustainable development, legal framework, rural development

PLANT SEED GERMINATION AS MEASURABLE RESPONSE TO ULTRASOUND EFFECT

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The ultrasonication experiment was carried out at frequency of 30-40 kHz on the thermostatic ultrasonic bath (DU-4, Clifton, U.K). Six different crops were treted under ultrasound regarding importance for food producers and consumers as well; old traditional variety lucerne (*Medicago sativa* L.), oat (*Avena sativa* L.) MKD01928 and rye (*Secale cereale* L.), breeding variety triticale malesh, wheat milenka and spring oil rape Ligolly. 5 g seeds were dispersed in 50 mL of tap water (135 *ppm* TDS, Liquatec, Fullerton USA) in 50 mL laboratory glass beaker. The experiment was performed at a power output of 300 W. The solution was processed at a constant temperature of 25 ºC with the sonication for 15 min. Ultrasound showed a stimulating effect on seed germination, development of shoots, roots and general fitness of seedlings. In addition, ultrasound treatment shortens the time of occurrence of shoots and the time of full energy reading is about 3-4 days earlier compared with control. Ultrasonic cavitation facilitates the passage of the water molecules across the cell wall and induced the more intensive metabolic processes in living cells. These effects have a practical benefit, easy applicability and importance for seed producers.

Key words: seed, germination rate, ultrasound effect

GRAFTING TO IMPROVE THE CHARACTERISTICS OF SAPLING OF GRAPEVINE CULTIVARS

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Research conducted in a greenhouse in Tirana, in the years 2009-2011. The cultivars of grapevine; "Shesh I zi" & "Shesh I Bardhe", through our technique applied, are rooted and callus at the same time being grafted with anti phyloxer rootstock; Paulsen 1103. 20 cm long anti phyloxer grafts in 1103 P, were treated with paraffin wax and installed in 500 cc (coconut) substrate in a bench with a temperature of 26 degrees. Afterwards, grafts treated in the basal part for 7 seconds with NAA-1 $2g.l^{-1}$.

The callosity formation in the scion wound and at the base have been significantly affected by applied hormone ($P < 0001$). In cv. "Shesh i bardhë" it has been observed the best regeneration of callus (98%) and significant changes (1:47 LSD. $P = 0.05$). $2g/l^{-1}$ NAA concentration has had a clear improved callus induction, an augmented 27 % radicles' stimulation, which was higher than that of the Control. Meanwhile, this concentration has favored the merismatic activity and the proliferation of vegetative buds.

The obtained results represent an interesting source for the growth of reproduction coefficient and time reduction of sapling preparation.

Key words: cultivar, stimulation, rooting capacity, scion antiphyloxeric, sapling.

SOME CHARACTERISTICS OF *TRITICALE* CULTIVATED IN RURAL AREAS

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The research was conducted in the north of Montenegro, during 2005-2007, studying the possibility of growing of *Triticale* as a relatively new plant species in this area. The effect of the variety, climatic conditions and fertilization on some pheno phases and yield, were investigated. In the experiment, set in randomised block design in four replications on alluvial soil with plot of 10 m^2, two winter varieties of *Triticale* (Favorit and Kg-20) and three doses of nitrogen nutrition were examined.

Experimental results showed considerable variation in yield and its quality depending on the cultivated genotype, meteorological conditions in the years of testing and fertilizer doses.

In both years of experiment on winter *Triticale* variety Kg-20 achieved significantly higher yield (5.99 t ha^{-1}) in relationto varity Favorit (5.16 t ha^{-1}) as well as the value of 1000 graind and test weight. Climatic conditions during the experiment largely influenced the yield, the amount and the quality. Extremely high temperatures, followed by lack of rainfall in the second year, led to shortening of particular pheno phases, which resulted in decrease of yeald and grain quality. The greatest impact on the yield had fertilization with nitrogen, and the optimal dose was 80 kg ha^{-1}.

Since *Triticale* showed adaptability to the climatic conditions and achieve stable yield of sound quality, the area under this crop should be increased.

Key words: *Triticale*, fertilization, yield, weight of 1000 grains, test weight

MYCORRHIZATION AND USE OF SUPER ABSORBENT POLYMERS IN TARGETED PRODUCTION OF PLANTING MATERIAL

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Successful aforestation, plant survival and fast development of seedlings depend on their quality. This is of special importance for Southeastern European (SEE) region, due to prevailing high summer temperatures of air and soil, low humidity and low precipitation during growing season.

Mycorrhization - controlled inoculation of seedlings with chosen mycorrhizal fungi in forest nurseries is known as crucial step in production of high quality seedlings to be used under the unfavorable environmental conditions. It requires development of specific technologies, from pre-selection of mycorrhizal fungi to the methodology development of inoculum production and application. In the programs of controlled mycorrhization in the forest nurseries, fungi from autochthonous population play special importance.

Superabsorbent polymers are applying for stimulation of establishment and growth of seedlings in alleys, shelterbelts and in reforestation of difficult and degraded terrains.

Trials with container coniferous and deciduous seedlings mycorrhization were set in period 2005-2001, in open field conditions in Podgorica. Possibilities for production and use of spores, also as vegetative inoculum of fungi originated from autochthonous populations (10 fungal species) were tested for coniferous (*P. nigra*) mycorrhization. Commercial versicular-arbuscular mycorrhizal inoculums were tested in combination with 5 deciduous species. Different doses in combination with different tree species were tested. Polymers were included in the same trials.

Mycorrhization of forest seedlings in open field conditions in Podgorica, despite the problems due to high summer temperatures and fast drying of substrates, could be treated as successful. Differences between treated and control seedlings depend on plant species and fungal symbiont: from stagnation or decrease in seedling growth in some combinations (*P. nigra* and *Boletus* sp.), to increase of plant size (*Acer dasycarpm* Elm) of 1.5 and in combination with polymers more than 2 times. Optimal application dose for deciduous trees was determined (7.5 ml/seedling), while for coniferous is still under the study. The dose depends on symbiont/fungal species and type of inoculum, and it should be higher from the dose determined as appropriate under the controlled environmental conditions.

Key words: mycorrhization, superabsorbent polymers, *Pinus nigra*, *Acer dasycarpum,* spore and vegetative inoculums.

PCR-BASED DIAGNOSTIC FOR DETECTION OF PHYTOPTHORA SPECIES IN STRAWBERRY AND RASPBERRY

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Up to 13 *Phytophthora* species have been recorded on soft fruits around the world whereas *Phytophthora fragariae* var. *fragariae* and var. *rubi* are the most damaging to strawberry and raspberry crops respectively. There are no fully effective control measures and resistant varieties against these causal agents. Disease-free planting material would provide control measure as land remains free of contaminates. DNA-based diagnostic has enabled the development of rapid and sensitive tools capable of detection very low levels of *Phytophthora* contamination.

In Bosnia and Herzegovina samples of raspberry and strawberry roots and soil were collected in period from 2008 to 2011. Root samples were chopped and homogenised in liquid nitrogen before DNA extraction and purification. Polymerase chain reaction (PCR) detection techniques were used on the basis of DNA sequence differences in the Internal Transcribed Spacer regions of Ribosomal DNA (rDNA). Nested-PCR and PCR-RFLP analyses were performed in order to detect *Phytophthora fragariae* as well as other *Phytophthora* species, respectively. Results using the *Phytophthora* primers will be discussed in the poster.

Key words: molecular analyses, soft fruit, *Phytophthora*

ORGANIC FARMING: TREND IN SOIL FERTILITY IN VOVODINA

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Healthy, fertile soil is a prerequisite for organic arable farming. Most of soils do not have unlimited capacity to supply nutrients, therefore stockless arable farming, dominated in Vojvodina (Serbia), can be challenged by depletion of soil reserves and dependence on nutrient supply from external sources. The aim of this on-farm study is assessment of changes in soil fertility indices from the period 2005/2006 to 2011 on plots in organic and conventional farming in order to recommend agronomic practices that will contribute to maintain or increase soil fertility and consequently crop yield and quality. Soil samples were taken from the surface layer of soil (0-20 cm), and for nitrate N to a depth of 60 cm. For this study we selected four representative farms and within 29 plots (45 composite soil samples). Results of soil analysis indicate high variability in soil fertility indices (particularly P and K), between individual organic plots and between individual sites. Optimum to high soil fertility determined in average for all tested sites in organic production, indicating high natural conditions necessary for successful organic production. Significant differences in soil fertility between organic and conventional farming systems have not been found, neither as between two periods of organic farming.

Key words: soil fertility, organic arable farming, Vojvodina, Serbia

SURVIVAL OF PROBIOTIC BACTERIA FROM CHEESE IN AN *IN VITRO* DIGESTION MODEL- DIGESTION WITH HUMAN GASTRIC AND DUODENUM JUICE

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In recent decades there has been a growing interest in functional foods containing bacteria with beneficial effects. Products containing functional or probiotic bacteria should be, prior to their placement on the market, evaluated for their real health benefits. In the present study the microbial diversity of 16 cheeses supplemented with different combinations of starter cultures and adjuncts was studied. Samples were subjected to in vitro digestion with human gastric and duodenum juices. The two-step digestion assay was used at 37^{o}C, simulating the human upper gastrointestinal tract with human gastric juices at pH 2.5 and human duodenal juices at pH7. As the starter cultures the DL commercial culture, *Lactococcus lactis* spp. *cremoris* INF- Ar-1 or *Lactococcus lactis* spp. *cremoris* INF- Bf-2 were used. As adjunct cultures *Lb. paracasei* INF448, *Lb. paracasei* 15D, Lactobacillus plantarum INF15D, *Lactobacillus rhamnosus* GG, *Propionibacterium freundreischii* ssp. *shermanii* INF P203 and *Propionibacterium jensenii* INF P303 were used in different combinations during cheese making trials. For the detection of survived bacteria, beside conventional microbiological methods, 16SrDNA sequencing was applied coupled with High Resolution Melt (HRM) analysis (RT-PCR). For the typing of survived isolates Rep-PCR method was used. Results showed good survival of both probiotic bacteria used in this study. Significant survival rate of lactococci and lactobacilli was also detected. The analyses reported comprise a comprehensive in vitro testing method for the survival of potential probiotic bacteria in human digestion tract and can be used as an initial prescreen to clinical trials.

Key words: probiotic bacteria, in vitro digestion models, HRM analysis, Rep-PCR.

DROUGHTS AND THEIR IMPACT ON THE ALBANIAN TERRITORY

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The aim of this paper is to give an overview of the agricultural drought indices in current use in Albania, considering the meteorological, climatological, hydrologycal and agrometeorological elements provided by the IGEWE(is a partner in the regional project DMCSEE). The drought is a frequent and common climate phenomenon. It happens almost in all climate zones, with the impact in socio-economical field, as in: agriculture, energy etc.

The meteorological drought indices, the rainfall anomaly and Standard Precipitation Index (SPI) are the most common. To define the meteorological drought there are some indices. The most used and simplest one in the meteorological literature is the Standardized precipitation Index (SPI index)

Agriculture is usually the first economic sector to be affected by drought. Agricultural drought, focusing on precipitation shortages, differences between ET_a and ET_0, soil water deficits, reduced ground water and/or reservoir levels were monitored.

Hydrological drought, associates the effect of periods of precipitation shortfalls on surface or subsurface water supply. The frequency and severity of hydrological drought is often defined on a watershed basin scale. Although climate is a primary contributor to hydrological drought, other factors such as changes in land use, land degradation, and the construction of dams all affect the hydrological characteristics of the basin

The climate change scenario for Albania lead to decrease of precipitation amount about 12.5% up to the year 2100, as a consequence it can be expected that the cases with severe and extremely dry to have the increase tendency.

Keywords: Climatological drought, hydrological drought, agriculture drought, SPI index, climate change scenario

PRODUCTION EXPERIENCES IN CULTIVATION OF AROMATIC, SPICY AND MEDICAL CULTURES IN REPUBLIC OF MACEDONIA

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The utilization of aromatic, spicy and medical plants is very known feature which is described since antique civilizations as China, India and Egypt. Today, there are 1700 plant species, classified in 90 botanical families that can be utilized as aromatic, spicy and medical plants usually because of their essential oils. Today there are different methods for extraction of essential oils as hydrodistillation, extraction and pressing technology. The application of essential oils is very know in different industries as pharmaceutical industry, food preservation and production, cosmetic and chemical industry.

The most important benefits from the cultivation of the aromatic, spicy and medical plants are: increase and unification of herbal production, protection of endangered plant species and their natural habitats, as well as socio-economical impact.

Republic of Macedonia has very favorable geographic position, diversity soil types, and low contamination of the natural resources which fulfill all the conditions for cultivation of aromatic, spicy and medical plants. In Macedonia, there are 900 different plant species that can be cultivated as aromatic, spicy and medical cultures.

In this article, cultivation experience of several species aromatic, spicy and medical plants in Ovče Pole area are described.

Key words: aromatic, spicy, medical, plants, cultivation, Republic of Macedonia

YIELD AND PEPPER QUALITY AS AFFECTED BY LIGHT INTENSITY USING COLOR SHADE NETS

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The yield and quality of pepper were affected by environmental factors and agronomic techniques used. The photo selective netting concept was tested in greenhouse pepper (*Capsicum annuum* 'Cameleon') production under high solar radiation 942 $W \cdot m^{-2}$ (value of photosynthetic photon flux density (PPFD) is about 1600 $\mu mol \cdot m^{-2} \cdot s^{-1}$) in the south part of Serbia (Aleksinac), using four different colored shade-nets (pearl, red, blue and black) with different relative shading (40% and 50% PAR). The shade nets were mounted over the plastic-house and applied at the start of warm weather in middle of June.

Results showed that shading of pepper plants affected both fruit yield and quality. Total and marketable yield increased with 40% shading level and then decreased (with 50% shade). Shading of pepper (40%) may be an option to reduce heat stress conditions and extend the spring-summer season toward September. Although light is not essential for the synthesis of Ascorbic Acid (AA) in plants, the amount and intensity of light during the growing season have a influence on the amount of AA formed. Significantly higher AA content was observed in greenhouse pepper integrated with red shade netting technologies (188.4 $mg \cdot 100g^{-1}$) than in greenhouse pepper without color nets (151.4 $mg \cdot 100g^{-1}$). The results of the present study should provide useful preliminary data for detecting differences among environment variation in quality and light-dispersive color shade nets, us a new multi-benefit tool for crop protection.

Key words: shade, color-nets, pepper, yield, quality

COMPARATIVE ANALYSIS OF FOREST MONITORING IN THE REPUBLIC OF SERBIA IN 2004-2008

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The Report presents the results of the National Focal Centre for forest condition monitoring in the Republic of Serbia on Level I plots – ICP Forests in 2004 - 2008. The total number of the installed sample plots on the area of the Republic of Serbia is 130 sample plots. The Institute of Forestry in collaboration with the Faculty of Forestry and the Institute of Lowland Forestry and Environment performed the monitoring and assessment of forest condition on the territory of Serbia. Based on the ICP Forests Manual, crown condition of forest trees was monitored and the defoliation and discolouration were analysed, based on which the degree of damage of the observed tree species was calculated.

Key words: monitoring, assessment, defoliation, forests, GIS

EFFECT OF PRODUCTION SYSTEM ON CARCASS TRAITS OF ALBANIAN RABBIT LOCAL BREED

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Carcass characteristics of Albanian local rabbit breed farming in two different production systems were compared. The carcasses were measured and retailed according to the norms of the World Rabbit Scientific Association. At 101 days of age, rabbit rearing under condition of tradition system on family farms (n=36) had lower live weight at slaughter (2025 vs 2303 g, $P<0.03$) and dressing out percentage (59.41 vs 60.53%, $P<0.05$) than the animals (n=40) rearing under the conventional production system in commercial farms. Higher proportion of the hind part of the carcass (42.11 vs 36.93%, $P<0.05$) and hind part, two shoulders, (17.5 vs 16.1%) were founded in conventional production system to traditional system. Averages of the pelts are different, 286.5g (traditional system) and 328.2g, (conventional system) ($P<0.01$), while the ratio of pelts to live weight at slaughter are equal. The system of production has not indicated to the percentage of total inedible parts.

In conclusion, local rabbit reared with conventional system showed better carcass characteristics.

Key world: rabbit, local breed, production system, carcass characteristics

RESPONSE REACTIONS OF DIFFERENT CULTIVARS OF *GLYCINE MAX* (L.) MERR. TO MINERAL AND BIOLOGICAL NITROGEN

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One of the basic problems of agriculture today is the optimization of plants nutrition in antropogenically transformed environment. Among agrotechnical methods improving of plants nitrogen nutrition by the use of biological nitrogen is on special importance. Comparative analysis of the response of soybean to mineral and symbiotic nitrogen supply was conducted.

Effect of low (30 kg/ha) and high (180 kg/ga) doses of mineral nitrogen fertilizer in combination with pre-sowing treatment of seeds with bacteria-consisting fertilizer "Rhizohumin" on the level of lipid peroxidation (LP) in leaves of soybean cv. Annushka during ontogenesis were conducted. Efficiency of legume-rhizobial symbiosis in different soybean cultivars (Annushka, Vasylkivska, Maryana) inoculated by strains of *Bradyrhizobium japonicum* 634b, Tn5-mutant, T 66, B1-16, B1-20, was estimated by nitrogen-fixing activity. "Strain-cultivar" compatibility was defined by the level of LP in roots and shoots of soybean.

Obtained data suggests more efficient nutrition of soybean with symbiotic nitrogen than mineral. Excess of nitrogen fertilizer alone and in combination with "Rhizohumin" showed increasing of LP level in leaves that pointed on developing of stress reaction of plants. N_2-fixing activity and level of membrane damage under inoculation of soybean seeds by the same strain of nodule bacteria were cultivar-depended. At the same time different strains of rhizobia, used for one cultivar of soybean, formed symbiotic systems which significantly differed according to these indexes. Thus, the optimal strains, which were the less stressful for plant and favorable for N_2-fixation increasing, were selected for each soybean cultivar.

Use of biological nitrogen increases efficiency of N_2-fixation and did not influence as an additional stress factor for plants in contrast to high dose of mineral fertilizer.

Key words: *Glycine max* (L.), *Bradyrhizobium japonicum*, nitrogen nutrition, lipid peroxidation, N_2-fixation

CHEMICAL PROPERTIES OF EARLY RIPENING SELECTION OF MANDARINE UNSHIU CV. KAWANO WASE

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Mandarin Unshiu (*Citrus unshiu* March.) is a kind of citrus which occupies the northernmost border of citrus growing area, and it is known that citrus fruits are grown mainly between 20° and 40° north and south latitude. Montenegrin coast is located outside this zone (between 41° and 42° north latitude), but in the Mediterranean, which is the reason for mandarin Unshiu to be successfully grown, mainly due to its greater resistance to low temperature (compared to other types of citrus).

The first seedlings of mandarin Unshiu were planted on the Montenegrin coast in 1933, but until 1949 there were no bigger orchards. In the period 1949 to 1963 several large plantations were planted, and great importance in spreading of this culture on the Montenegrin coast had a Station for Southern culture, today's Center for Subtropical Cultures from Bar. However, only since 1982, when it was established a plantation of 32,000 trees in Ulcinj, mandarin Unshiu became the leading citrus species on the Montenegrin coast. Nowadays, it makes about 85% of all types of citrus.

Today, in Montenegro only Chahara variety is grown in a slightly larger scale of very early varieties, a sporadically Wakiyama variety. Fruits of Chahara variety have less flavor and quality, while the trees of Wakiyame are of poor yield and the fruit of insufficient size. It turned out that the Kawano Wase variety (the most present in our region) so far is the best early variety. However, there is no yet the adequate very early variety, whose fruits achieve the highest price in the market. Previous studies have shown that the best way is to do the clone selection of the early variety Kawano Wase with earlier ripening time of standard variety and among them to seek for a replacement of cultivars Chahara and Wakiyama. The objective of this research was set up as a visit of a number of mandarin plantations Unshiu to find trees whose fruits ripen earlier than other trees of the same variety. For these reasons, in the period 2009 – 2011, 16 trees of mandarin Unshiu cv. Kawano Wase, with earlier ripening than the standard variety, were identified, marked and tested. To examine the quality of the fruits chemical analyses were carried out in the laboratory of the Centre for Subtropical Cultures in Bar. These analyses included: water content, dry matter content, content of total acids, mineral matter content, and content directly reducing sugars (glucose and fructose). The dry matter content had a growing trend by year; the average for all selections was 11.53%, while over 13% of dry matter was only in two selections (KWS KWS II/12 and II/15). The average content of total acids of 1.33% and 0.47% of mineral matter showed the slight variation by year. Direct reducing sugars range from 3.02 to 4.12% and the average for all selections was 3.48%. The results of the analyses showed the similar values to the results obtained for standard Kawano Wase variety, though the earlier maturation of these selections may be qualified as potential new and very early varieties, what was the goal of this research.

Key words: Kawano Wase, mandarin, early ripening selection, chemical properties

FEED PROCESSING AS A WAY FOR IMPROVEMENT OF PRODUCTION PARAMETERS OF WEANED PIGLETS

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Feed processing used at non ruminant's animal like pigs and poultry is one of the most studied fields and it has a clear effect on the density and microbial population in different parts of intestinal tract (IT).

The main objective of this study was: to investigate the effects of pellet feed on performance parameters of weaned piglets and to determine the nutrient digestibility like: digestibility of dry matter, crude protein, crude fat and crude fibre. The study factor was: different form of feed processing, studied in two levels: farinose and pellet feed. After 45 days experimental period, the utilization of pellet feed improved Growth Performance (GP): Average Live Weight (ALW) (kg) and Daily Weight Gain (DWG) g/day when compared to the control group. Based on the achieved results in the present investigation, it could be concluded that the utilization of pellet feed lead to an improvement of all of the production parameters and nutrient digestibility also, including crude fibre digestibility.

Keywords: weaned piglets, pellet feed, granulated feed, performance parameters.

INFLUENCE OF POLLEN SUBSTITUTESON BROOD REARING AND HONEY PRODUCTION IN HONEY BEE COLONIES

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The effect of use of two alternative feed supplies on brood rearing and honey production from the bee colonies during the spring season was tested.

In order to perform this trial, two groups of 10 bee colonies each were established, where the control group was fed with *Bee Food,* as a source of energy, while the experiment group was fed with *Feedbee,* as a pollen substitute. The experiment was performed during the February – May period of time. The bee colonies, were almost similar as far as their strength and queen's age (two years old Qeens) and were kept in standard, Langstroth type of beehives.

The following indicators were recorded and monitored: brooding rate, caped brooding cells per frame/per group and the respective honey production as well.

At the end of the trial's period, it was concluded that the use of *Feedbee*, had a remarkable effect on the number of frames with brood, contributing in the strenght of the bee colonies. During the main inspection in Spring, the supremacy of the group fed on *Feedbee,* over the one fed on *Bee Food,* was easily seen (62.18 cm^2 vs. 59.77cm^2) as far as the caped brood area/frame (cm^2), per $P<0.05$.

Feeding the bee colonies with *Feedbee,* starting at the end of winter period, showed a slight effect on the quantity of produced honey/colony (as an average: 630g more honey/colony or 6.6% more).

If the climatic conditions would have been more fovourable, (rainfall during May and temperature over 30° C during June) and the use of Feedbee would have been kept during this critical period of time, the honey production would have been higher.

Key words: Bee food, capped brood area, Feedbee, bees, pollen substitute

SOME CHARACTERISTIC OF WATER THAT SUPPLY THE CULTIVATION PLANT OF TROUT (*ONCORHYNCHUS MYKISS*, WALBAUM, 1792)

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This study is focused in some aspects of intensive cultivation of trout (*Oncorhynchus mykiss*) in plants with concrete canals of type *race ways*. The aim of this study is to analyze some practics of troutculture in Albania focusing in aspects of plants and to interfere over some elements of technology with the scoupe of optimisation of production. The study will propose some teorical solutions which will orientate the control of environmental parameters in systems of treatments of trouts.

The study is realized in the plant of trout cultivation in Verdove (Pogradec), during 2010 and 2011. It has incorporated one cycle of trout treatment for consumption.

The density of stock was 215 of individuals/m³. During the growth cycle was provide a survival from 85%. In the end of cultivation, the average weight of one trout was 250 g.

The values for oxygen-feed ratio signify fluctuation of values from 0.696 kg O2/kg food to 0.899 kg O2/kg food. The minimal value of concentration of ammonia was in January, 48 µg/l, and the maximal value was in May 92 µg/l.

Key words: cultivation, trout, race ways, environmental parameters, production

MONOGENEAN TREMATODES OF CARP (*Cyprinus carpio* L.) FROM THE LAKE DOJRAN

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During the parasitological investigations on the of carp from Macedonian part of Lake Dojran, are found 3 parasite species of the class Monogenea, as follows: *Dactylogyrus extensus* and *Eudiplozoon nipponicum* - in 32,0% each, and *Dactylogyrus minutus* - in 24,0% of carps. Prevalence of infestation in carp is 64,0%, and average intensity of infestation is 2,17. These parasites found have expressive impact on the health and conditional state of the carp. *Dactylogyrus extensus* and *Dactylogyrus minutus* belong to the group specialists (which are met only in one host species), while *Eudiplozoon nipponicum* is generalist (met in many species of hosts - fishes). All found species of monogenean trematods are new to the parasite fauna of the fishes from Lake Dojran and Macedonia.

Key words: Monogenean, carp, Lake Dojran

A COMPARED STUDY ON SOME ALFALFA CULTIVARS IN MIDDLE AND NORTH- EAST ALBANIA CONDITIONS

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Alfalfa is the common and the most important forage plant in Albania. Recently the alfalfa planted area exceeded the area cultivated with wheat or maize. There is a lot commercial alfalfa cultivars present in Albanian agriculture these two last decades. Unfortunately, the most of these cultivars are very little tested for their biomass production stability. This study compare the biomass production in four commercial alfalfa cultivars and an autochthon one, evaluated at two distinct parts of Albanian territory, the central and north-east ones. Different measures of yield stability were calculated for the mean performance of each cultivar. The statistical analyses of two years data show the variations among studied alfalfa cultivars not only in biomass production, but for some other characteristics like height, too. The height biomass production correlation coefficient was positive and very strong at every cutting for all studied cultivars.

Key words: Alfalfa cultivars, biomass, correlation, yield stability

PROBIOTICS AS A WAY TO IMPROVE GROWTH PERFORMANCE OF WEANED PIGLETS

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A combined probiotic preparation of *Lactobacillus plantarum* ATCC 14917 $1x10^{11}$ CFU/kg, *Lactobacillus fermentum* DSM 20016 $1x10^{11}$ CFU/kg and *Enterococcus faecium* ATCC 19434 $1x10^{11}$ CFU/kg was supplemented to a basal ration with 1, 1,5 and 2g/kg feed and the effects on growth performance, on forty weaned piglets (28 days) were studied for six weeks experimental period. The supplementation of combined probiotic improved slightly daily weight gain and feed conversion ratio, kg feed/kg weight gain. Body weight gain was improved with graded levels (1.0 and 1.5g/kg feed) of the probiotic preparation respectively 3.2% and 2.8%, compare to control group without significance. At the end of the experiment, microbiological charge of faeces was measured also. Because of the low dose-response between 1 and 1.5g/kg feed, the level of 1g/kg feed seems to be the optimal dose.

Key words: Combined probiotic, weaned piglets, performance parameters

THE QUALITY OF SEEDLINGS OF DIFFERENT CULTIVARS AND ROOTSTOCKS OF APPLE PRODUCED BY THE"KNIP" METHOD

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Production material of apple seedlings in Kosovo until now mainly was based on traditional production method- one year seedling- material.

Recent years with the intensification of production of fruit trees, increased demands for other ways of production material of apple seedlings. Increased interest had in technology and technique of seedling production with KNIP method.

For this purpose we conducted a field research trial at the experimental didactic farm (EDF) of Faculty of Agriculture in Prishtina. Research materials were two apple cultivars: Golden Delicious and Red Delicious Clone B, grafted with English grafting under the Rootstock M 9 and MM 106.

Experimental trials were random complete block design with for replications (RCBD). In the research are included, 10 seedlings for each treatments of cultivars and rootstock. In such seedlings were investigated vegetative parameters of seedlings development: highest of seedlings (HS), length of the upper branches (LUB), trunk diameter (TD), number of lateral branch (NLB), the total length of lateral branch (TLB) and branch angle (BA).

The obtained results, for data analyses was used ANOVA and LSD-tests, for treatments and investigated parameters, while the observed differences are determined for the level of P0.05 and P0.01 probability according MINITAB-16© software.

Obtained results from our research, were highly significant among different treatments, cultivars and rootstocks.

Key words: Seedlings, cultivars, rootstocks, classification of seedling

POSSIBILITY OF THE APPLICATION OF PHOSPHATE GLASS IN THE PRODUCTION OF PEPPER (*Capsicum annuum* L.)

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This paper presents the results of the application of phosphate glass with the addition of Fe, Mn, Zn and Cu in the production of pepper plants of *Capsicum annuum L.* The experiment was conducted in the greenhouse of the Faculty of Agriculture in Belgrade and in the village of Slankamen during the year of 2011. The plants were produced in polystyrene containers and polypropylene pots. During the production of plant seedlings the following glass doses were used: 0, 1, 2, 3, 4 and 5 g/l. After the transplant on the open field (Slankamen) the effect of the phosphate glass doses on the following properties of pepper plants development: height, leaf number, weight of leaves, number of lateral branches, plant weight, weight and length of root, number of fruits, weight and length of fruits was examined.

Research results indicate that the using phosphate glass in the production of pepper results in plants of good development. The best effect on the examined parameters of the pepper development was found in the phosphate glass dose of 3g/l of substrate. The obtained results indicate a need for further research of the effect of the phosphate glass in the production of different vegetable crops.

Key words: phosphate glass, doses, plants, pepper

NEW POTATO BREEDING LINES OBTAINED FROM MERISTEM TISSUE CULTURE, RESPONSE OF THE MERISTEM CULTURE

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Good quality seed is the first condition for obtaining high yield and production efficiency. Viral diseases are most common cause of degeneration and significant yield losses in potato production. Although there are more than 20 diseases that damage potato, potato virus Y (PVY), potato virus A (PVA), potato virus X (PVX), potato leaf roll virus (PLRV), potato virus M (PVM), potato virus S (PVS) have most significant damage in Turkey. Therefore, the seed potato production must be effective, sustainable and free from viruses. Today, meristem culture is widely used as the rapid cell growth at the ends of exile in the youngest tissues (meristematic region) showes minimal viral infestation.

In this study, 10 selected promising lines obtained from Granola x Huincul hybrid lines in breeding programme (2 MKU, MKU 13, MKU 14, 17 MKU, MKU 18, 19 MKU, MKU 20 MKU 21, MKU 22, MKU 23) are used. Meristem culture of potato breeding lines of sterilized tubers is made. After evoking the eyes on the tubers, shoots will be tested on PYV, PVA, PVX, PLRV, PVS and PVM as well as the growing rate of the selected lines.

Key words: potato, meristem tissue culture, PVY, PVA, PVX, PLRV, PVS, PVM

III
GENETIC RESOURCES IN AGRICULTURE AND FORESTRY

POMEGRANADES OF ALBANIA, THE MOLECULAR EVALUATION OF GENETIC DIVERSITY AND POSSIBLE IN VITRO PROPAGATION OF BEST VARIETIES

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The pomegranate (Punica granatum, Punicaceae) is cultivated over the whole Mediterranean region since ancient times and also present in different areas of Albania. Although considered as a local fruit of low use, compared to other species, during the last years it is much more present in the markets and in the consumers table. While there is enough evidence on the morphological characterization among pomegranate cultivars around the world, the number of studies on molecular analysis of the genetic differences is limited. For this reason, the research on the evaluation of the local pomegranate cultivars and their genetic relationship was conducted. The estimation of genetic relation among 10 local pomegranate varieties was based on 20 RAPD primers, with 187 fragments produced of which 60 were polymorphic. Jaccard's similarity coefficient was used for analyses.

The work conducted on the micropropagation of three local varieties is also presented. The explants of the three pomegranate cultivars were compared, and the differences in shoots number, leaves number and shoot length were observed.

Key words: pomegranate, genetic variability, micropropagation

EVALUATION OF SOME MORPHOLOGICAL CHARACTERISTICS IN MAIZE (*Zea mays* L.)

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Characterisation and evaluation of available maize germplasm is a necessary first step to facilitate breeding efforts. Eighteen maize accessions (labelled as AGB plus number) part of Albanian Gene Bank collection were characterized by agro morphological descriptors. Estimation of 25 morphological traits (14 quantitative and 11 qualitative) was based on the IBPGR Descriptors for maize. Variation of morphological characteristics among accessions ranged from 5.63% for days to tasseling to 24.29% for ear height. Accessions with the highest values of morphological traits were identified: AGB 1021 for days to tasseling (55), AGB 1035 for days to silking (59), AGB 1034 for plant height (265 cm), AGB 1031 for ear height (87 cm), AGB 1032 for number of leaves above the uppermost ear including ear leaf (6.1), ear diameter (3.8 cm), kernel width (0.9 cm) and weight of 1000 kernels (448.9 g), AGB 1038 for number of kernel per row and kernel length. The analysis correlation coefficients among descriptors showed a positive significant association at the level of r =0.9 between days to silking and days to tasseling, also a positive correlation (r =0.83) we observed between number of kernels per row and ear length traits. Morphological relationships among 18 genotypes were clarified on a dendrogram by complete linkage. Results from hierarchical cluster analysis showed that there is significant variation among the 18 genotypes, suggesting that the *Zea mays* germplasm collection of Albanian Gene Bank is a rich source of material with adequate variation for future use in breeding programs.

Key words: accessions, characterization, descriptors, maize (*Zea mays*), germplasm

MORPHOLOGICAL CHARACTERIZATION AND INTERRELATIONSHIPS AMONG DESCRIPTORS IN PHASEOLUS VULGARIS ACCESSIONS

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The aim of this study was the evaluation of genetic diversity in twenty common bean accessions, part of the active collection of Genetic Resources Centre, Agricultural University of Tirana, by using agro morphological traits. Qualitative (19) and quantitative (10) characteristics were recorded following the IBPGR, *Phaseolus vulgaris* Descriptor list. Variation of morphological characteristics among accessions ranged from 4.40% for days to maturity (DTM) to 38.15% for pod beak length (PBL). AGB2719 is identified as the accession with the highest values in quantitative traits like pod length (PL) and PBL, AGB 2746 in traits like DTF and DTM, AGB2748 in traits like DF (duration of flowering) and PW, and AGB2763 is identified with the lowest values in quantitative traits like DTF, PL, DTM, DF, PW and SW (seed width). Positive correlations were observed among descriptors as: bracteole length and size of bracteole (r=0.76), DF and DTM (r=0.74), days to maturity and days to flowering (DTF) - this coefficient was positive at the level r=0.66, and pod width and seed length (r=0.63). The qualitative descriptors correlation coefficient revealed that colour of wings (in terms of values) is highly correlated with colour of standard flower (r=0.9). The divergence between accessions was observed using hierarchical clustering dendrogram, Euclidean distance. Based on this analyse AGB 2715 and AGB 2733 are the nearest neighbour with the lowest divergence levels and AGB 2763 the farthest one.

Key words: characterisation, descriptor, *Phaseolus vulgaris*, hierarchical clustering.

SUSTAINABLE MANAGEMET OF MANDATE GERMPLASM SPECIES IN MONTENEGRO GENEBANK – UNIT BAR

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The results on conservation of genetic resources in Montenegro Gene Bank (MGB) – Unit Bar are presented in this paper. Center for Subtropical cultures in Bar is dominantly oriented on collection and maintenance of germplasm of subtropical species: olive (*Olea europaea L.*), pomegranate (*Punica granatum L.*) and fig (*Ficus carica L.*) During the SEEDNet project implementation the Unit has been equipped, and DNA analysis and tissue cultures techniques were introduced as additional disciplines in accession's characterizations and safety long term storage. The maintenance and protection of collections is the common problem in all plant gene banks, related to the financial support and possibility to have the accessions on a different location to avoid their loss. Each gene bank should develop own model related to their needs and possibility, because universal recipe doesn't exist. After losing of first accessions and other problems at the beginning (thefts, wildfire, etc.), in Unit started to think to establish some other model of maintenance, taking into account sustainability and system longevity. Currently, Unit of MGB in Bar have three field collections of accessions of olive (15 accessions), pomegranate (18 accessions) and fig (12 accessions). For majority of accessions the morphological characterization was done as well as genetic analysis, and accessions were introduced into MGB (www.genebank.btf.ac.me), EURISCO (http://eurisco.ecpgr.org) as well as SEEDNet data base (http://www.seednet.nu).

During 2011 Unit started with „*in vitro*"long term storage of potato and tissue culture on MS media of 52 accessions was established.

Key words: accession, genetic resources, plant gene bank

PRODUCTION POTENTIAL OF DIFFERENT BUCHWEAT POPULATIONS (*Fagopyrum escelentum* L.)

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Buckwheat (Fagopyrum esculentum L.) is old domesticated species, originating from Asia, although known for centuries, in the territory of the Balkans is a relatively small harbor. Buckwheat is most often grown for its fruit and buckwheat flour, which is used for human consumption. Buckwheat is very suitable for organic production, production at higher altitudes, and for double cropping in lowland conditions. This paper presents three-year results of the twelve species and populations of buckwheat, under conditions of dry farming and irrigation. Analyzed traits of buckwheat populations are: length of growing season, fruit yield, fruit size, influence the number of plants per ha yield of, protein content, shelling percentage of fruit, the possibility of chipping. Analyses were performed from 2008 through 2011 on trial field and in laboratories in PSS "Sombor" doo Sombor. The achieved results show a great diversity of populations of buckwheat, collected for the purposes of this research. Results indicate a significant difference in the studied characteristics of buckwheat production, under conditions of dry farming and irrigation.

Key words: buckwheat, population, fruit, yield, irrigation.

STUDDING BASE COLLECTION OF WHEAT GENETIC RESOURCES

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Wheat (*Triticum aestivum* L.), represents a main crop for Albanian agricultural production. In Albania Gene Bank, a rich collection of wheat germplasm is preserved and the study of base collection is one of main purposes of plant genetic resources. For this reason, during the last three years twenty wheat accessions repatriated from Germany have been studied. Field tests took place at the Agricultural University of Tirana. The morphological data were taken and analyzed for characteristic such as: plant height (PH), spikelet for spike (SS), grain weight per spike (GWS), spike weight (SW), 1000 grain weight, days to maturity (DM).

Results indicated the genotypes present significant differences for PH. Four genotypes present heights from 89 to 91 cm, while 16 other genotypes are from 122 to 184 cm; the number of SS is low, but there is a high difference of GWS (1.43-2.91 g per spike).

Considerable differences were noticed in terms of days to maturity (DM 17 days). Some genotypes have high content of proteins (14-16%) and of gluten with an average of 28%. Results taken were analyzed for possible relations between characters in wheat genotypes. Hierarchical Cluster Statistical Method was used to observe relation and distance among genotypes. The results of this study will serve as additional information for Gene Bank and for future plant improvement programs.

Key words: accessions, cluster, genotypes, maturity, spike.

GENETIC AND PHENOTYPE DIVERSITY FOR ACCUMULATION AND DISTRIBUTION OF DRY MATTER IN SOME COMMON BEAN LANDRACE SEEDLINGS AT THE PHASE OF THE COTYLEDONS

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The landraces of common bean are cultivated all over Kosovo, along with maize or as a monoculture in small gardens. Planting area with common beans is 7,505 ha, with average yield 0.9 t/ha, while the annual consumption per capita is 11.53 kg.

The level of genetic and phenotype diversity of common bean landraces *(Phaseolus vulgaris* L.), in Kosovo is still unknown and not enough explored.

The research aim was to evaluate the variability among some common beans landraces according the accumulation and distribution of dry mater in different organs of seedling in early stage of development. The dray mater in root, cotyledon, epicotyls, hypocotyls and leaves, was analysed.

For this purpose the experiment was conducted in the laboratory, random complete block design in three replications (RCBD) during 2011. The experimental model was: 10 landraces x 3 replication x 5 parameters =150 combinations.

Results were analyzed and interpreted by software: MINITAB-16 and Microsoft Excel. For data analyses ANOVA, LSD-test, and Fisher Method-Hsu's MCB were used. Cluster Analysis of Observations, Pearson Distance, Complete Linkage and correlation coefficient.

The obtained results showed a highly significant value for diversity and variability of different common beans landraces in Kosovo and the differences were highly significant on the level $P_{0.01}$ and $P_{0.05}$.

Key words: Common bean**,** landraces, accumulation, diversity, dry matter.

VISIBLE GENETIC PROFILE AND GENETIC DISTANCES OF LOCAL GOAT POPULATIONS IN ALBANIA AND KOSOVO

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Local goats are an important livestock species, in the mountainous area of Albania. The aim of this study was the characterization of Capore (75) Dukati (89), Liqenasi (75), and Kosovo (100) goat populations based on visible genetic profile. A total of 339 randomly sampled animals of both sexes were analyzed to investigate the distribution and allelic frequencies in each population for different morphologic traits (hair length, horns, wattles, beard, and coat color) are used to establish Nei genetic distance and for the construction of NJ consensus tree. Also, different body dimensions were measured like included chestcircumference, body length, height at withers. Average body length ranged from 79.37 kg (Kosovo) to 98.48 (Liqenasi). Average chest circumference ranged from 89.31 cm (Kosovo) to 100.45 cm (Liqenasi) and height at withers ranged from 74.41cm (Dukati) to 79.27 (Liqenasi). The allelic frequencies for wild ear (El^{+}), horn (Ho^{+}), wattle (Wa^{w}), beard (Br^{b}) presence, long hair (Hl^{L}), roan color (Rn^{R}) and brown eumelanin (B^{b}), for the whole goat population were 0.950, 0.955, 0.301, 0.969, 0.07, 0.216 and 0.752. Heterozygosity values at population level ranged from 0.25 (Kosova) to 0.36 (Dukati). The principal component analysis (PCA) was carried out. The populations under the study present great variability. In the future the study has to go further, using molecular markers.

Key words: gene frequency, morphological traits, Nei genetic distance

SECONDARY METABOLITES OF CENTAUREA VLACHORUM

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Centaurea vlachorum is a new species discovered lately in Albania. This plant was thought to be a Greek endemic plant because it was found only in the Pindos Mountain. In Albania it was found at the altitudes between 1600-2000m above sea level, in the Lura Lakes region. This plant can be distinguished from its special form of leaves and it flowers. There are no reports in the literature about the chemical analyses of this plant. The plant was collected during its flowering season, early July. Different parts of the plant, flowers, stems of flowers and the base leaves which do not contain flowers were collected separately. After it was dried in darkness till a constant weigh, plant material was grinded and used as such for hydro distillation with a Clevenger type apparatus according to standard procedures.

In this work the chemical composition of essential oil extracted from the stems of the plant using water distillation is presented, as well as the TLC and GC analyzes. More than 15 organic volatile compounds were identified with masspectroscopy, GC-MS.

Key words: Centaurea vlachorum, endemic plant, essential oil, GC-MS

GENETIC VARIABILITY OF MUZHAKE GOAT, ESTIMATED BY MICROSATELLITE MARKERS

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Goats play an important role for the Albanian farmer community of marginal area. Muzhake is one of local goat breeds distributed in Southeastern part of Albania. Genetic characterization of native breeds is very important in conservation strategy designing. The aim of the present study was to estimate the genetic variability of Muzhake goat breed using microsatellite markers. The genomic DNA from 30 unrelated individuals, was analyzed by typing 30 microsatellite markers. Allele diversity, observed and expected heterozygosities, inbreeding coefficient were calculated. A total of 240 alleles were distinguished. All the microsatellites were highly polymorphic, with mean allelic number of 8, ranging 4-18 per locus. The observed heterozygosity ranged from 0.333 to 0,933, with mean value of 0.692. PIC values ranged from 0.388 to 0.884, with mean of 0.696. It was noticed a low rate of inbreeding within breed (F_{IS} = 0.067). The effective number of alleles varied from 1.467 to 11.538 with a mean 4.691. The value of Shannon information index (I) ranged from 0.774 to 2.487. A bottleneck analysis indicated no bottleneck in Muzhake breed. The results of the study indicate very high level of gene diversity. Most of the loci showed significant deviation from HWE, probably due to Wahlund effect. The set of used markers was highly informative. The results provided here may be useful in developing a national plan and strategy for the conservation of this breed.

Key words: genetic diversity, microsatellite, heterozygosity, bottleneck, local goat breed

THE SITUATION OF CROP WILD RELATIVES IN ALBANIA

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The vascular flora of Albania consists of about 3,250 species. Of these, 27 and 150 species are endemic and sub-endemic, respectively. The Flora of Albania can be divided into four main types – Mediterranean, Balkanic, European and Euro-Asian and about 400 plant species are CWR and considerable proportion of these taxa are crop wild relatives (CWR) in the sense that at least. Crop wild relatives (CWR) and wild harvested plant species (WHP) constitute an important element of a nation's plant genetic resources (PGR) available for utilization. This paper presents the situation of some crops wild relatives in Albania and the collection missions of them. The results suggest that there is an urgent need to identify and effectively conserve crop wild relatives. While increased habitat conservation will be important to conserve most species, those that are predicted to undergo strong range size reductions should be a priority for collection and inclusion in our genebank.

Key words: Crop wild relatives, iventory, Albania

THE DIVERSITY OF ALBANIAN OLIVE GENETIC RESOURCES

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This study for the diversity, were evaluated the genetic variation of 56 autochthonous olive genotypes *Olea europaea* L from Albania. Morphological marker based analysis were performed for olive identity characterization, to determine their localization, and usage limits. The description was done for each olive genotype, of 49 characteristics of tree, leaf; inflorescence, fruit and endocarp were measured during the study. Analysis of variance verified the morphological, technological and physiological distances and showed cultivar classification. Principal component analysis (PCA) was used to compare fruit, pit, leaf and growth habit characteristics between olive resources. Basing on the endocarp characteristics, as an important morphological marker, olive cultivars are clustered in seven groups. According to the oil content, genotypes are clustered in three main groups in low, medium and high oil content. Some of fruit and endocarp features (D, d, D/d, T/E, weight) were highly related to the oil content (R^2=0.871). In general, clustering of cultivars would suggest the existence of a strictly related genetic base with little morphological differences. The diversity is classified in two centres (i) South-West, with diversity and richness coefficient of 3.45 & 89 (ii) Central-West, with 1.41 & 65. Morphological analyses of 56 genotypes hold up the hypothesis for the autochthonous origin of olive resources and in this respect the hypothesis on the evolutionary history of the olive in Albania.

Key Words: Biodiversity, variability, genotype, endocarp, regions, *Olea europaea*

VARIABILITY OF TAXODIUM AS A BASE FOR EVALUATION ITS GENETIC POTENTIAL ON THE ''VELIKO RATNO OSTRVO"AREA

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The genus *Taxodium* Rich. was widely located in Europe and North America in the past. Nowadays there are only three species from the southern parts of North America and Mexico: *Taxodium ascendens* Brogn., *Taxodium distihum* (L.) Rich. and *Taxodium mucronatum* Ten. The natural habitats of taxodium are some temporary wet soils in south-eastern part of the USA, from Lousiana to Florida. In Serbia there is mainly *Taxodium distichum* (L.) Rich. which grows on some wet habitats – there are a number of single trees located on some green surfaces of urban areas. There is a seed plantation in Backa Palanka in the northern part of Serbia. There are some representatives of *Taxodium distichum* (L.) Rich. on the "Veliko ratno ostrvo" area, too, where a great variability of taxodium introduces special genetic potential that includes more than 80 well-adapted genotypes. The evaluation of morphological characteristics variability of branches and needles was measuered on 48 genotypes from the "Veliko ratno ostrvo" area. The chosen genotypes belong to the higher diameter and grow outside the influence of some other trees that take sunlight from them. There is a sample consisted of 100 branches and needles, taken from each genotype, and there were measured length of branches, and length and width of needles, as well. The dates collected on 1440 performed measurements were treated by a computer program Statgraph 6.0, and here was done the overall statistic, variance analyze and LSD-test. The variability of branches length from 69.52 cm to 152.16 cm, then of needles length from 11.64 mm to 16.69 mm, and finally of needles width from 1.00 mm to 1.49 mm, shows that there is a big variability inside the population which introduces a good base for conservation and sustainable using of genetic potential that originates from this rare tree in Serbia.

Key words: taxodium, needles, variability, genetic potential

GENETIC RESOURCES OF POTATO IN MONTENEGRO

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There are no data to which feature belonged firs seed of potato brought in 1786, as well as other seeds continuously brought in Montenegro over a long period of cultivation. Due to constant cultivation on the same locality, influenced by local climatic and soil conditions and specific production technology, over time new local population were procreated. Additionally, during the long history of potato cultivation the potato seeds were brought in Montenegro many times from different parts of the world, numerous local and autochthonous potato population were differentiated.

As the consequence of intensification of agricultural production, based on uncontrolled replacement of varieties and new technologies, significant number of varieties was lost, leading to severe erosion of potato genetic variability. Although some old varieties can still be found in some mostly rural parts of Montenegro, their importance for life of local populations is not as nearly significant as it was until recently.

In Montenegrin plant gene bank 52 local potato populations are conserved. Protection of collected potato material is carried out *ex situ* (field plant gene bank of plant and *in vitro*conservation) and *in situ* storage system (on farm conservation).

Lack of knowledge about material conserved in plant gene banks represents a significant problem of it's usage. For these reasons during 2011 morfological characterisation and DNA evaluation was initiated for conserved potato accestions.

Key words: potato, genetic resources, conservation, characterization, DNA evaluation

LIFETIME PRODUCTION OF ISTRIAN PRAMENKA SHEEP IN SLOVENIA

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The object of the study was to establish the lifetime production in the native Slovenian milk sheep Istrian Pramenka. The analysis were done for 1,120 ewes born between 1994 and 2009. Data were obtained from central database for sheep recording which are collected by the ICAR rules. The lifetime production of number of born lambs, total milk, fat, and protein yield was calculated as the sum of production from the first to the last lambing. Data preparation and statistical analysis were performed using the statistical programme R and Excel. All ewes born to 1999 were culled. They had on average 3.5 lactations in their lifetime. The highest proportion of these ewes was culled in the first (22%) and second (21%) lactation. Culled ewes born after 1999 had on average 3.0 lactations in their lifetime. They were also mostly culled in the first (27%) and second (20%) lactation. The average lifetime lamb production was 4.0 born lambs per culled ewe. Culled ewes born to 1999 had on average 4.4 born lambs, while culled ewes born after 1999 had on average 3.5 born lambs in their lifetime. The total average per ewe in its lifetime was 449 kg of milk yield, 30.3 kg of fat yield, and 24.8 kg of protein yield. As expected, the lifetime milk, fat, and protein yield production was mostly constant for ewes born between 1994 and 2003, while it was decreasing for ewes born after 2003. The reason is that ewes born after 2003 are mostly still alive.

Key words: Istrian Pramenka, lifetime production, milk, litter size

VARIABILITY OF TRAITS AT LUCERNE LOCAL POPULATIONS

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Microclimatic conditions occupy an important place in the occurrence of local adaptations at traditional alfalfa varieties that over time became local characteristic of certain regions. The study included fifteen local blue alfalfa populations originated from different regions of Macedonia. For each trait were analyzed 30 samples. Vegetative and reproductive traits were observed to investigate the extent of variability (length and width of central leaflet at flowering, length and diameter of stem, growth habit, date of flowering, weight of 1000 seed). From the examined morphological traits, there was showed the greatest variability at width of central leaf (20.16%) in most populations (8). Significant differences between populations were determined for trait length and width of the central leaf (P> 0.01). By analyzing the qualitative properties (shape of leaf, tendency to form inflorescence at sowing year, colour of flowering and colour of leaf (>40% at nine populations)) the greatest variation in colour of leaf was determined. The most stable properties and low variability characterized the local population ovchepolska. Although it is considered that local populations which are grown in western and southwestern part of the country and possibly their outcome form is debarska, it must be concluded that qualitative traits showed relatively high variability (>30% at six populations).

Key words: local population, lucerne, trait, description

THE ACHIEVED LEVEL AND FURTHER DIRECTIONS OF IMPROVEMENT OF CEREALS AT THE AGRICULTURAL INSTITUTE OF REPUBLIC OF SRPSKA, BANJA LUKA

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This paper presents the results of many years of breeding work that resulted in the recognition of several varieties of small grains and creation of more promising lines of small grains that are in the process of recognition. In terms of more and more present abiotic stress it is extremely difficult to create any variety of plant species that possesses all the desirable agronomic and technological characteristics. The biggest negative effects of abiotic stresses are manifested in the agriculture and food production.

Creating varieties is additionally difficult in the new conditions with more and more present abiotic stresses, which is particularly reflected in the quality parameters that are influenced by conditions of production. The predicted scenario of climate change will be reflected in significant deviations from average climatic factors perennial values, and a significant reduction in rainfall as their bad distribution, increasing the temperature in spring and autumn, the risk of drought and the land degradation. These facts force the need to the creation of more tolerant varieties of cereal and introduction of corrective factors which associate the variety, technology and production conditions along with good communication of sciences and profession.

Key words: breeding programme, cereals, abiotic stress, quality parameters

GROWTH PERFORMANCES AND CARCASS TRAITS OF BARDOKA SUCKLING LAMBS RAISED IN SEMI EXTENSIVE SYSTEM OF PRODUCTION

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Montenegrin sheep production is characterised by semi extensive system of rearing. Lamb meat is the main product, which together with meat of culled animals participates in total output of sheep production by over 80%. Lambs are usually sold as a category of young lambs, after suckling period with about 90 days age in average, or after fattening period until the age of 6-7 months.

Bardoka is one of the more productive milk sheep breed in Montenegro, which belong to coarse wool group of sheep named Pramenka. Its lambs are usually sold in age about 3 months. During suckling period lambs had at disposal, except of milk, ad libitum hay and some amount of concentrate feed.

Investigation of carcasses traits was done on 10 randomly chosen lambs (5 male and 5 female) with age ranges from 75-102 days.

The following traits were investigated: birth weight, live weight before slaughtering, weight and dressing percentage of warm and chilled carcasses with and without offal, weight and share of edible and non edible by-products of slaughtering and skin.

Average birth weight of lambs were 3.83 kg, average age at slaughter 89.3 day and live weight 24.4 kg. Dressing percentage of warm carcasses 57.8%, dressing percentage of chilled carcasses with head and offal 56.3%, while dressing percentage of chilled carcasses without head and offal 44.73%. Head and edible offal (hart, liver, lung, spleen and kidneys) together participated in live weight before slaughtering by 9.41%, edible byproducts (pre-stomach and small intestines) by 5.89%, non edible byproducts (legs, large intestines and rest of slaughter) by 11.7%, while skin participated by 12.42% in average.

Key words: Bardoka, suckling lambs, carcasses, dressing

WEED VEGETATION OF MAIZE CROP IN KOSOVO

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This study investigates the weed vegetation in maize crop in Kosovo. Along with far-reaching political and socio-economic alterations, agricultural land use has changed in the recent past in the Kosovo. The weed vegetation in maize crop in Kosovo was not studied in details in the past and thus, data are insufficient and incomplete. To increase the knowledge on the weed vegetation in maize crop, we recorded the vegetation of 243 plots with a standard plot size of 25 m². To avoid edge effects, the minimum distance of each plot to the field border was 10 m. The location of each plot was documented with the help of a GPS using the UTM system. The abundance of vascular plants was estimated based on a modified Braun-Blanquet scale. A total number of 140 weed species was documented. The mean species number per plot was 8.4 species. The most frequent species were *Amaranthus retroflexus* (18.6%), *Cirsium arvense* (12.9%), *Echinochloa crus galli* (9.4%), *Chenopodium album* (15.5%), *Convolvulus arvensis* (5.9%), *and Elymus repens* (5.06%). With regard to the life forms of the recorded species, therophytes (61.43%) and geophytes (35.64%) were the most important groups, whereas hemicryptophytes (2.65%) and others (0.28%) were of less importance. The mechanical weed control in the late spring is practiced extensively in the majority of small plots of maize and bean intercropping, but also the use of herbicides in maize monocultures, acting counteracts the formation of species-rich arable weed vegetation. To facilitate the arable weed vegetation in maize crop of Kosovo, measures such as the implementation of wider crop rotations would be most welcome.

Key words: arable weed, weed species, species composition and richness, maize crop

CONSERVATION OF SERBIAN SPRUCE GENETIC RESOURCES APPLYING ENVIROMENTAL MODELING

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Climate change impacts habitat fragmentation due to anthropogenic activities is expected to cause severe stress for many tree species in their native habitats. This poses a special concern for the endangered tree species which usually already have small and/or fragmented habitats. Their survival will depend on their ability to genetically adapt to new conditions, survive through phenotypic plasticity or migrate to more suitable areas. One way to help future conservation efforts of the endangered tree species is by using the RAMAS GIS software. RAMAS GIS is designed to link GIS data with a meta-population model for population viability analysis and extinction risk assessment.

Serbian spruce *(Picea omorika*) is an endemic species of the Balkan Peninsula and a Tertiary relic. Conservation of this species is necessary because of its rarity and vulnerability, but also on the account of its valuable pioneer qualities. Today, only about twenty small populations are registered in Serbia. In the National Park Tara, on an area of 60ha, there are only about one thousand trees in mixed stands with spruce and beech. Due to climate change associated impacts Serbian spruce faces a new threat to its survival. To determine the risk of its extinction we used RAMAS GIS Metapop model to compare different environmental conditions which can be expected due to climate change.

Key words: Serbian spruce, climate change, conservation

VARIABILITY OF SERBIAN WINTER WHEAT GENOTYPES AND THEIR EVALUATION IN TERMS OF SUSTAINABLE AGRICULTURE

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The topic of nitrogen wheat nutrition was becoming very actually during last decades of last century because of many reasons. The most important are energetic crises and escalation of fertilizers price, causing the decrease in profitability of small grains production and adverse impact of excessive use of N fertilizer on ecosystem and production healthy safe food. 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 selection approach to this issue is to identify winter wheat genotypes efficient in absorption and utilization of soil nitrogen which are desirable for either practical production or breeding programs. Consequently, this paper deals with evaluation Serbian winter wheat genotypes in terms of some indicators of their nitrogen absorption and utilization efficiency. Genotypes KG 10, Evropa 90 and Morava were the most efficient in nitrogen accumulation at the aboveground part of plant at anthesis, grain, straw and total nitrogen accumulation at maturity. The best nitrogen partitioning between grain and straw was registered at KG 165/2, Pobeda and Bujna. Prima, Lepenica and Studenica had the most efficient reutilization of nitrogen, accumulated in plant until anthesis, while genotypes KG 200/31, KG 253/4 – 1 and KG 10 expressed the greatest ability to continue nitrogen assimilation during reproductive period. Genotypes, selected as superior in absorption and utilization of nitrogen, are considered as carriers of desirable traits in terms of wheat breeding theory, improvement of production efficiency, environmental protection and development of sustainable agriculture.

Key words: ecosystem, efficiency, genotypes, nitrogen, wheat

YIELD VARIABILITY AS A BASIS FOR CONSERVATION AND DIRECTED UTILIZATION OF EUROPEAN WHITE ELM (*Ulmus effusa* Willd.) GENE POOL AT GREAT WAR ISLAND

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The European White Elm (*Ulmus effusa* Willd.) is a species that belongs to the group of *noble broadleaves*, which are characterized by exceptional characteristics and wood quality. In the forests of Serbia, according to the IUCN categorization, European White Elm belongs to the category of rare and endangered species. The disappearance of wetland habitats is the primary threat to the survival of the White Elm populations and genetic diversity of this species. Draining of wetland habitats for needs of agriculture or cultivation of poplars, leads to dramatic changes in ecosystems where the White Elm is represented. As a result, there was a fragmentation of White Elm populations on small populations, groups of trees and individual trees, which necessarily leads to problems of genetic drift, and therefore, to the ecological instability of this species.

Population of European White Elm in the territory of the Great War Island includes more than fifty trees in three subpopulations which are spatially isolated. The paper presents the results of the analysis of morphometric characteristics of the fruits (width and length) and seeds (width, length, position and germination), which show significant variability within population.

Based on the obtained results, the conservation and directed utilization of White Elm genetic resources will be realized: *in situ* - by selection of rare genotypes within the available gene pool and their involvement in a network of habitat conservation and *ex situ* – the establishment of progeny tests, for further exploring the genetic potential of populations, generative and clonal seed orchards and by seed storage of rare genotypes in the seed bank.

Key words: Great War Island, European White Elm, gene pool, variability, conservation

SIGNIFICANCE OF THE ABSENCE OF SEED DORMANCY IN WHITE BARK PINE GENE POOL CONSERVATION

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The absence of seed dormancy, i.e. the development of seedlings from embryos without dormancy, occurs most frequently in the Paleotropic, Neotropic and Australian floristic regions. In woody plants of the temperate region, this character is most often latent and occurs in unfavourable environmental conditions. The absence of seed dormancy or vivipary is an adaptive strategy which enables the generative or vegetative reproduction of adult trees in the extreme or specific conditions of vegetation in which the rooting period is short due to moisture regime.

A group of 12 trees of white bark pine were analysed 60 years ago, a group of 8 trees 35 years ago, 5 trees 50 years ago, and 2 trees at present (2012) in the Park of the Old Meteorological Observatory in Belgrade using the methods of comparative morphological-anatomical and genetic-physiological analyses of seed and needle samples. The absence of seed dormancy was confirmed in the continuity of 60 years. The studies of this type have both the theoretical and practical significance in the process of white bark pine breeding, as well as in the production of planting stock intended for very steep and dry, southward slopes of the Mediterranean and Submediterranean mountains in Serbia, Montenegro, Herzegovina and Macedonia.

Key words: *Pinus heldreichii* Christ., vivipary, breeding, stabilisation of limestone terrains

PAULOWNIA PLANTATION ESTABLISHMENT IN MEDITERRANEAN AND SUBMEDITERRANEAN REGIONS OF MONTENEGRO IN THE AIM OF SUSTAINABLE ECONOMY DEVELOPMENT

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In the development of sustainable economy and rural areas, very important species are those with higher productivity, resistance to phyto- and entomo-pathogens and air pollution, and also with adaptability to major climate changes. *Paulownia* is one of Asian species that satisfies the above criteria and that has been very successful worldwide over already two centuries.

Plant cultivation outside their natural range depends on their ecological valence within which the species survival is possible. *Paulownia* is characterised by wide ecological amplitude. It is characterised by good vitality and fast growth on different soil types, even on very poor and acid soils. It grows also on degraded terrains and it can be used for the reclamation of the soil loaded with heavy metals. The limiting factors are low temperatures, lack of light and moisture. The latest studies show that *Paulownia* is a halophyte which makes possible the irrigation with saline water. *Paulownia* has an excellent commercial and bio-reclamation significance, because it can reach the height of 4 m in a year, its wood is soft and of good technical quality, and its flowers are fragrant and rich in essential oils, so it is used in traditional Chinese medicine and apiculture.

Based on the comparative and SWAT analyses of site conditions in the Mediterranean and Sub Mediterranean regions of Montenegro, and based on *Paulownia* ecological requirements, suitable zones for the establishment of short rotation mixed forest and agricultural plantations and also pure *Paulownia* plantations were selected.

Depending on the region and standards for the utilisation of natural resources, this paper presents the methods and rules of *Paulownia* plantation establishment, as well as agricultural crops for mixed plantations, aiming at the achievement of the maximal yield of biomass and safe food.

Key words: *Paulownia tomentosa* (Thunb.)Steud., sustainable development, biomass, irrigation.

RESULTS OF IDENTIFICATION AND CHARACTERIZATION OF DONKEY POPULATION IN ALBANIA

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In Albania, particularly in its coastal and hilly areas, donkeys have lived for centuries, helping the man in his fight with rough environment. Very well adapted to the harsh condition, strengths, resistance, modest feed requirements and with very good performances as a work and transport animal, donkey has been preferred comparing to other transport animals, horses and mule in those region. Intensification of agriculture and depopulation of remote rural areas have affected the decreasing of economic importance of donkey. The size of population is also decreasing. Nevertheless, donkey continues to be an animal that is frequently met in rural areas of Albania. The donkey population size estimates approximately to 35.000 to 40.000 animals. To date donkey has not been the object of scientific study. Albanian local donkey is a common breed originated from Nubia. The aim of this study was the identification and phenotypic characterization of Albanian donkey population. Based on the investigation conducted in the different regions, Albanian donkeys are small, colored in grey, black, reddish or purple. Referring to the average of morpho-biometric traits two different types were identified. The types are statistically significantly different ($P<0.05$) according: wither height (98cm, 115cm), chest circumference (116.2cm 131,6cm), body length (104.2cm, 120.6cm), chest depth (43.1cm, 48.2cm), chest width (24,2cm, 28.3cm), tibia circumference (12.5cm, 14.7cm), ear length (21,1cm, 27.7cm), and body weight (97.3 kg, 154.7kg). Differences between male and female were not significant ($P>0.05$). To evaluate the differences between two Albanian donkey types the analysis of polymorphic blood proteins and DAN are necessary.

Key words: donkey, local breed, phenotypic characterization

EDIBLE MUSHROOMS IN THE PERM TERRITORY FORESTS (RUSSIA)

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The Perm Territory is situated on the north-east of the East European Plain and adjacent western sides of the Northern and Medium Ural Mountains. The Territory stretches from the north to the south for approximately 600 km, between 56°06' and 61°39' of latitude north, and from the west to the east for 400 km (between 51°47' and 59°39' of longitude east). The area of the Perm Territory is 160.6 ths sq. km. The climate is moderate continental. The territory belongs to taiga. The population uses edible mushrooms for food. Usually the people pick up about 20 species of mushrooms (5–7 species in the North) that decreases their crop capacity.

The objective of the research is to study species diversity of edible mushrooms. The research methods are route and stationary. The author started studying agarics systematically in 1975. At present 872 species of agarics have been discovered, 307 of them are edible. Generally, they are can be found in the subzone of the southern taiga (266 species). Least of all edible fungi occur in the subzone of the middle taiga (103 species). These are mushrooms from the families *Russulaceae* (98 species), *Tricholomataceae* (63), *Boletaceae* (29) and *Agaricaceae* (24). Mushrooms forming mycorrhiza prevail (211 species). There are many mushrooms growing on the litter (53) and on the wood (44). Strict confinement to the substratum is not found. The mushrooms can belong not only to one, but several ecological groups.

Considering the distribution of the mushrooms in the Perm Territory, 89 species may be recommended to use for food with large fruit bodies and good taste qualities.

Key words: Russia, Perm Territory, taiga, edible mushrooms

YIELD OF DIFFERENT POTATO VARIETES AS AFFECTED BY THE ORIGIN AND SIZE OF SEED TUBERS

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The aim of this study was to determine the impact of origin of planting material and seed tuber size on yield of four potato varieties: Cleopatra, Jaerla, Desiree and Kennebec. Potato seed crop aimed to produce planting material was grown during 2006 and 2007 at two sites with different altitude: plain region at 72 m above sea level (asl) and mountainous region at 1100 m asl. Produced seed tuber with the diameter 35-55mm were calibrated according to the weight 50 ± 5g, 70 ± 5g, 90 ± 5g and 110 ± 5g and stored in dark under conditions (4°C, 95% RH). In the middle of February planting material was placed for sprouting according to the standard European method, and mid of April in both years planted in Badovinci, western of Serbia. Potato crops originating from plain region with lower altitude have formed higher number of: eyes per tuber, a number of sprouts per tuber, a number of above ground stems and a number of tubers per plant in both years, compared to the crop variants planted with tubers originating from higher mountainous region. Large seed fractions (110 ± 5g) have formed a higher number of eyes per tuber, a number of sprouts per tuber, a number of above ground stem per plant, more tubers per plant, the higher yield of marketable tubers and a higher total yield. All cultivars in 2008 have reached a higher yield of marketable tubers and a higher total yield as a consequence of slightly lower air temperature during June, July and August compared to the same period in 2007. The highest yield of marketable tubers was recorded with variety Kennebec, while potato variety Cleopatra planted with seed tubers originating from higher altitude (1100 m a.s.l.) have shown the significantly highest total yield per ha.

Key words: potato, origin, size of tuber, yield

ROLE OF PLANT GENETIC RESOURCES AND BREEDING IN SUSTAINABLE AGRICULTURE

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In the last decades, we are witnessing a dramatic loss of plant biodiversity, a phenomenon also referred to as genetic erosion. In cultivated crops, genetic erosion is mainly due to the replacement of local cultivars and landraces characterizing traditional agro-ecosystems with genetically uniform modern cultivars. The role of plant genetic resources (PGRs) in agriculture is crucial, as they harbour genetic variation essential for species evolution and for breeding purposes, including suitability to sustainable agriculture and improved nutritional values. Furthermore, PGRs also include valuable genotypes for the valorization of local and typical productions.

In order to prevent loss of biodiversity and valorise plant genetic resources (PGRs), it is of utmost importance to collect, preserve, examine and utilize germplasm effectively. Phenotyping was the traditional criteria for germplasm evaluation; however, genomic tools, among which the use molecular markers, represent nowadays effective and cost-efficient methodologies.

In the present paper, an overview of results obtained at the Plant Genetics and Breeding Unit of the University of Bari on the characterization and exploitation of genetic resources of several horticultural species (tomato, pea, melon and onion) is reported. Results regard in particular: i) the characterization of resistance genes to powdery mildew (in tomato and pea) and broomrape (in pea); ii) characterization of tomato and melon large germplasm collections, which has allowed to disentangle cases of homonymy and synonymy; iii) molecular characterization of melon and onion typical productions, which can possibly obtain quality seals.

Key words: PGR, sustainable agriculture, molecular markers

THE CORRELATION BETWEEN MAIN MORPHOLOGICAL TRAITS OF WILD MARJORAM (*Origanum vulgare* L.) UNDER THREE ECOLOGICAL CONDITIONS IN KOSOVO

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In generally the evaluation of genetic resources is an important step in the planning process and their use and especially in medicinal plants. It is known that medical plants are rich with vitamins (leaves), oily and aromatic (seeds), colorful, with insecticides and honey-bearing. In this study the main objectives were to evaluate the correlation between populations for morphological parameters. The experiment was split-plot methods in three ecological conditions in Kosovo (Kaçanik, Hani i Elezit and Istog). For each repetition 50 plants were selected and collected based on random methods, of which 10 plants were chosen for quantitative measured of different parameters. Our results obtained for parameters examined and correlation between them was with significance at two levels of probability. The coefficient of correlation in some cases linked positive and negative values. The studies conducted on the links between some surveyed traits observed strong positive correlation between plant heights with the trading length of the plant, plant height and leaf length. The results for different traits represent different correlations between them, and are interest which can be used in further studies on this plant.

Key words: Origanum, correlation, traits, locality, ecological conditions.

PRODUCTION AND MORPHOLOGICAL CHARACTERISTICS OF LOCAL POPULATIONS OF POPPY (*Papaver somniferum* l.)

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Testing of morphological and production characteristics of local population of poppy was inspired by this facts: poppy is very important row material for food industry in Serbia, the major import of poppy is from naightbouring countries and significant amount of foreign currency is spent, there is no recognized variety in official list of poppy varieties in Serbia. Therefore, the aim of this paper was to present the properties of population collection of seed in PSS „Sombor“. Different characteristics as: plant hight, colour of flower, shape and size of seed case, colour and size of seed, oil content in seed of poppy, duration of vegetation period, cold endurance, disease during vegetation period of this species, were tested during the period from 2008 to 2011, in testing trial field and laboratories of PSS „Sombor“ doo Sombor.

Key words: poppy, seed case, seed, oil content, trial field

SLOW GROWTH *IN VITRO* CONSERVATION OF *ZIZYPHUS JUJUBA* MILL.

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This study was undertaken to develop a protocol for *in vitro* conservation of *Zizyphus jujuba* Mill. using different methods for mid-term storage. This species is very important for the pharmacological values of fruits and leaves, and also has a very common use in food industry and for its fragrance. For this reason, it would be of interest to use a method available for *in vitro* multiplication and medium-term germplasm conservation, which involves strategies to slow plant growth through chemical and environmental manipulation of *in vitro* conditions. Shoot tips, used as primary explants, were cultured onto MS medium supplemented with MS vitamins, BAP (6-benzilaminopurine) 1 mg l^{-1}, IBA (3-indole bytiric acide) 0.05 mg l^{-1}, 3% sucrose and 0,57% agar-agar. The pH value was established in 5.6.

Three different methods of mid-term conservation were examined using *in vitro* grown plant cultures: 1- Effect of reduced sucrose and MS salts concentrations; 2- Combination of low temperature and light regime; 3- Absence of phytohormones or growth regulators in the growth media. Maintenance in these conditions reduced the microcuttings growth. Evaluated were the survival and regeneration rate for different periods. To test the regeneration of the conserved cultures, they were transferred onto fresh culture medium. The examined methods differed significantly in the survival rate of the explants. The effect of low temperature (4^{o}C) combined with reduced light regime was the most effective method of medium term preservation. The optimal time of conservation without subculture on 4^{o}C was 14 months.

Keywords: *In vitro* conservation, low temperature, survival, regeneration, *Zizyphus jujuba* Mill.

CONSERVATION AND SUSTAINABLE USE OF FOREST GENETIC RESOURCES THROUGH AN EXAMPLE OF WETLAND ECOSYSTEMS

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Forest genetic resources represent the genetic diversity contained in thousands of forest tree species on Earth. The conservation of these resources should be seen as efforts to preserve the specific genotypes or populations and the characteristic combination of genes in them. The basis for the conservation of forest genetic resources is the genetic variability of natural populations, which is the result of different genetic processes: mutations, recombination, gene flow, natural selection and genetic drift. The principles of conservation of genetic variation can be considered identical for all living beings. However, the methods used vary depending on the specific goals of conservation, distribution and nature of biological material that is the object of conservation. From the standpoint of preserving genetic variability, we can talk about the different "methods" of conservation. The term "method" is used in the context of a particular concept of conservation of genetic resources: in situ or ex situ, dynamic or static, while the species, ecosystems, populations, individuals or parts of individuals are concerned as an object of conservation.

Principles and methods of conservation are shown through the example of wetlands as is the Great War Island in Belgrade. Given the importance of wetlands and their vulnerability to current climate changes, we believe that this example is up to date. Strategy for genetic conservation of this area is based on the adaptation to improve ecological and evolutionary potential of populations of rare and endangered forest tree species to establish the basis for the controlled production of selected plant material and the surface extension of the genetic resources.

Key words: forest genetic resources, conservation, example, wetlands

THE RELATIONSHIP BETWEEN DISEASES INDEX OF SEPTORIA TRITICI LEAF BLOTCH, LEAF RUST AND YIELD LOSSES IN BREAD WHEAT CULTIVAR IN ALBANIA

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Both grain yield and disease performance are important factors to consider for winter wheat (*Triticum aestivum*) cultivar selection. However, disease index and yield data are often presented separately, making it difficult to compare values across multiple environments. Two-year investigations (2010–2011), in which 8 common wheat lines/genotypes were included to test their susceptibility against wheat leaf rust (LR) *Puccinia triticina* f. sp. *tritici* Roberge ex Desm.), and the Septoria/ Stagonospora leaf blotch complex (SLB) *Septoria tritici* Desm. and *Stagonospora nodorum*). Leaf rust (LR) and Septoria leaf blotch (SLB), relation experiment was carried out in the experimental field of Agriculture Technology Transfer Centre (ATTC) of Lushnje (Albania). The objective of this study was to use a rank-based method to compare cultivars based on yield and disease performance combined across multiple environments. Analysis of variance revealed the presence of an important and significant variability in the experimental materials used to evaluate the susceptibility and the resistance of common wheat lines against (SLB) and (LR). There were high negative correlations between yield - *S. tritici* (-0.6683) and yield - *P. recondita* f. sp. *tritici* (-0.5261). The negative effects of two pathogens have shown 'the parallel'/similar negative influences on yield trait and there was a high positive correlation (0.7631) between *S. tritici* and *P. recondita* f. sp. *tritici*. According to study results the lines Regina x L-776, IKB-P6 and Bullgar 3 x KB 703 have shown good resistance (R) level against *S. tritici* and *P. recondita* f. sp. *Tritici.*

Key words: Wheat, disease index, leaf rust, *Septoria tritici* blotch

RESEARCH STUDY OF THE CENOTIC CHARACTERISTICS OF THE BIOTA OF THE TREE-LIVING FUNGI OF THE PITSUNDA-MUSSER RESERVE PARK OF THE REPUBLIC OF ABKHAZIA

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Community of fungi is a cenotic structure of the forest biogeocenosis. The term "cenotic structure" is determined by three characteristics that describe its structure – morphological (vertical and horizontal), ecological (synusias) and functional (consortiums). The tree-living fungi which are responsible for destruction of biomass accumulated by autotrophs, take the special place in the in the forest biogeocenosis.

The research was made in the oak-cornbeam forests of the Pitsunda-Musser reserve park of the Republic of Abkhazia. The route and the stationary methods were used, the fruit bodies of fungi were gathered, the special structure was determined and the trophic connections of fungi were revealed.

Forty two species of aphyllophoroid fungi were revealed. In the process of the study of the cenotic structure of the microbiota, the special attention is paid to the special structure of the mycocenosis which is characterized by the vertical and horizontal structure. The vertical structure of the community of fungi is made up of different biohorozons. The stem biohorozon where parasites, facultative saprotrophs which cause decay of stems and roots, are of the great importance, and in its turn that promotes weakening and dying off of trees, is typical in distribution of the tree-living fungi.

Fistulina hepatica (Schaeff.) With, *Ganoderma lipsiense* (Batsch) G.F. Atk, *G. lucidum* (M. Grits) P. Karst, *G. resinaceum* Boud, *Laetiporus sulphureus* (Bull.) Murrill, *Stereum hirsutum* (Willd.) Pers, *Inonotus dryadeus* (Pers) Murr. – 7 species (16%) were found in the stem horizon of the mycocenosis on the living trees. *Fistulina hepatica,* that causes brown rot of stems, is a wide-spread fungus.

Dead timber takes the special place in the vertical structure of the forest ecosystem. The species of fungi which present the stump-deadwood micohorizon – the reserve of the biogenic elements that come successively into the cycle, take part in recycling of the dead wood. Thirty five species in total (83%) were revealed.

The functional structure which is determined by the consortiums of fungi is the most important characteristics of the mycocenosis. Parasites, saprotrophs, facultative saprophytes, facultative parasites are marked out among fungi.

The complex of the xylotrophs which damage the growing trees, dead standing trees and deadwood timber, is marked out: *Ganoderma lipsiense*, *G lucidum*, *G. resinaceum*, *Laetiporus sulphureus* and *Stereum hirsutum*. They are in the vertical and horizontal tiers of the structure of mycocenosis and are the transition group that controls the destructive processes and supports the balance in the forest ecosystem.

Key words: ecosystem, micobiota, structure, bio horizon, consortiums

IV
FOOD SAFETY AND QUALITY OF AGRICULTURAL PRODUCTS

EFFECTS OF THE THRESHING HARVESTER DEVICE AND ITS INFLUENCE TO BREAKAGE AND DAMAGE OF THE BUCKWHEAT AND RYE DEPENDING OF PREDEFINED PARAMETERS

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The important parameter of the quality of the application of harvesting device during the harvest is, beside the degree of real losses also the quality of the harvested grain mass. Harvest of the buckwheat and ray depends on many factors: condition of the crop, defining of the relevant parameters, technical fidelity, and skill of the handler. When relevant parameters are not completely harmonized, working quality is significantly influenced and the result is higher loss and amount of impurities, breakage of the damaged grains in harvested mass in the container of the harvester device. The content of broken, damaged grains and impurities is therefore much higher in the seed material as well as in the grain. In the seed material and in the processing material broken and damaged grains hinder cleaning and storage and diminish the quality of the final product. Harvesting device has a significant influence to the quality of the harvested buckwheat and ray. Quality is influenced by different factors: moisture of the crop, distance between drums and sub-drums coupled with the speed of drums. The aim of our research was to, trough the comparative research of two different types of the harvesting devices, determine the working effects and the influence of defined parameters of the harvesting device to the quality of harvested grains of the buckwheat and ray, which will enable the insight into disadvantages or advantages of the applied conception of the harvesting device. At the basis of the obtained results it can be concluded that the highest content of the whole grain of buckwheat and ray in harvested material was in the first harvesting device and it was 96,20 %, while the lowest was in harvesting device B and it was 91,55%. Harvesting device A made less damage to the grain during harvesting since it has had the lowest amount of broken grains- 1,90% in 15^{00}, while the biggest amount of the broken grains was in harvested material in harvesting device B in 9^{00} – 2,98%. The influence of changing the size of the front opening of the harvesting chamber (distance drum-sub-drum) and peripheral speed of the drum to the quality of harvested buckwheat and ray grains is defined as the significant one.

Key words: buckwheat, ray, harvesting device, quality.

QuEChERS METHOD FOR PESTICIDE RESIDUES ANALYSIS IN CHERRIES

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A simple multiresidue method was evaluated for the determination of pesticide residues in cherries using gas chromatography coupled with a triple quadrupole mass analyzer (GC-MS/MS) for the analysis. A modified QuEChERS (quick, easy, cheap, effective, rugged, and safe) method was evaluated in the colored matrix, such as cherries. This extraction method involves sample extraction with acetonitrile for 3 min on vortex mixer and permits the salt-out liquid−liquid partitioning step using magnesium sulfate anhydrous, sodium chloride, trisodium citrate dihydrate and sodium citrate dibasic sesquihydrate. After shaking and centrifugation, the cleanup is done by adding 5 ml of extract to anhydrous $MgSO_4$, PSA, and carbo activatus. After a repeated centrifugation the 2.5 ml of extract was evaporated to dryness, and reconstituted in 2 ml acetone. The optimized analytical conditions were evaluated in terms of recoveries, reproducibility, limits of detection, and matrix effects for 18 pesticides. Some significant matrix effects observed for most of the tested pesticides were eliminated using matrix-matched standards. The linearity was studied in the range of 0.1–2 μg/ml and determination coefficients (R^2) were higher than 0.99. The recovery data were obtained by spiking blank samples at three concentration levels (0.1, 0.2 and 0.5 mg/kg) yielding recoveries in the range of 75–110%. The precision values expressed as a relative standard deviation (RSD) were lower than 20% for the intraday precision. The limits of detection (LODs) and limits of quantification (LOQs) were established as 10 μg/kg, respectively.

Kee words: QuEChERS, pesticide residues, cherries, GC-MS/MS

IN VITRO EFFECTS OF ESSENTIAL OILS ON *COLLETOTRICHUM* SPP.

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Apple production is largely affected by the fungi *Colletotrichum gloeosporioides* and *C. acutatum*, the causal agents of fruit bitter rot. Economic losses account for 30-80%. *Colletotrichum* spp. are the most destructive if the infection occurs after harvest and storage. The disease is managed by fungicide application during the season. Post harvest treatments are rarely applied. Due to increased concern for human health and the environment, as well as to problems with pathogen resistance development, eco-friendly alternatives to chemical control measures, such as essential oils, became the object of many researches. The aim of the study was to investigate which essential oils have a potential to be used as control agents against *Colletotrichum* spp. To test activity of 56 essential oils, cultures of *C. gloeosporioides* and *C. acutatum* were exposed to volatile phase of the oils for seven days. On the seventh day, Petri dishes were ventilated, and the oil concentrations at which no growth was observed were recorded as fungistatic. If no mycelial growth was observed after additional seven days of incubation, the applied concentration of the essential oil was considered to be fungicidal. At concentration of 0.08 µl/ml of air, nine oils showed fungistatic/fungicidal activity against *Colletotrichum* spp. For both fungal species, different oregano oils were fungicidal at rates ranging from 0.02 to 0.04 µl/ml of air. Except various oregano essential oils and one thyme oil, at concentration below 0.08 µl/ml of air, no essential oils showed fungistatic/fungicidal activity. These results indicate that oregano and thyme essential oils have a potential in management of investigated apple pathogens.

Key words: post-harvest diseases, apple, *Colletotrichum* spp., essential oils

TESTING OF NUTRITIONAL VALUES OF GERMINATED BEAN SEEDS OF DOMESTIC VARIETIES IN BOSNIA AND HERZEGOVINA

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Germination of seeds of cultivated plants is usually studied in terms of agricultural quality, but in the last few years also as possible sources of nutritional value of sprouts in the diet. Seedlings seeds of edible plants are recommended as a dietary foods because of the nutritional content of the forms acceptable to the human organism than they are in raw beans. Tests within this study included three local varieties of beans: Bosna, Darko and Igman, where the characteristics of dry grain (grain size, grain weight) and seedlings (stage of development, germination time, seed length, weight of seedlings) were determined. Absorption of water at the stage of swelling, content of dry matter, water, protein, carbohydrate (total sugars, starch) and fats, and their energy value were also defined.

Research results indicate that for a period of four days for seed varieties Bosna and Igman and six days for variety Darko is possible to produce germ of commercial size. The ratio of mass of raw grains and seedlings is different in certain varieties from 1 g of raw beans can be produced 2.7 g of crude seed of variety Bosna, 2.3 g of variety Darko and 2.2 g of variety Igman. Nutritional value of seeds compared to raw seeds for all three varieties change, so in germinated seeds is less content of dry matter (up to 52.48%), total sugar (up to 16.45%), starches (for 81.4%) and fat (up to 45.39%). Exception is that in germinated seeds protein content increases for 29.0%.

Key words: beans, seeds, weight, nutritional and energy values.

THE EUROPEAN COCKCHAFERS *Melolontha melolontha* L. (COLEOPTERA: SCARABAEIDAE) – AN IMPORTANT PEST IN NORTHERN PART OF MONTENEGRO

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The European cockchafers *Melolontha melolontha* L. is considered as very important polyphagous pest, particularly in region of Central Europe. In recent years it appears more in highlands in northern part of Montenegro on meadows and pastures (Durmitor, surrounding of Kolašin, Bijelo Polje and Nikšić). Larva damages root system of numerous plants whilst adult feeds on leaves of many deciduous trees.

The aim of this study was to determine duration of pest development and years when adults flies in areas where is regularly present.

In period from May to October during 2003 to 2011 visual inspections of meadows and pastures were done in area of Durmitor and from 2007 to 2011 on other areas (Kolašin and Bijelo Polje). In term to detect presence of eggs, larvae, pupae and adults of *M. melolontha,* soil samples were taken from infested locations and simultaneously visual observation of deciduous trees positioned in vicinity of infested meadows or pastures were done.

A general conclusion of this study is that development cycle of M. *melolontha* coincided in all inspected locations. Adults begin flying in period from end of April to beginning of May and feeds until mid June, eggs are layed during May and June, whilst larvae are hatched in June and first half of July. Larvae are transformed into pupa in second half of June and during July of the third year of development. Adult developes in September but remains is the soil on 15 to 20 cm deep until next spring. During this study it was also found that every fourth year is flying year for adults, although they are different in different areas. In area of Durmitor and Nikšić last flying year was 2011, in Kolašin 2010, whilst in Bijelo Polje 2009.

Key words: Monetenegro, the European cockchafers, *Melolontha melolontha*, development, damages

COMPARATIVE INDICATORS OF PHYSICAL-CHEMICAL CHARACTERISTICS OF FEED AND STARVED COMMON CARP (*Cyprinus carpio* L.)

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Common carp (*Cyprinus carpio* L., 1758) originated in Europe in rivers around the Black Sea and the Aegean basin, especially the Danube. Common carp (*Cyprinus carpio*) is one of the most cultured fish in the world. In 2008, the world and the European production was 2 987 433 tons and 144 747 tons, respectively (FAO, 2011). It is consumed as a traditional food in central Europe. Carp is an omnivorous species eating plankton and benthos (worms, insects, molluscs) as well as detritus in the natural conditions. Carps are an important food source, especially in countries or regions with lower financial resources.

The aim of the study was to determine and compare some physical – chemical characteristics between fillets of common carp fed with plankton and benthos supplemented by cereals and starved carp.

The samples of five two-year old carps were taken from cyprinid fish pond Žabeni, Bitola, Macedonia. On this farm the production takes place in the semi-intensive system of production with the addition of corn in the diet.

Protein content was determined by Kjeldahl, water content was determined by drying at 103±2ºC to constant weight and for determination of total fat, sample was hydrolyzed with 4M hydrochloric acid and extracted with petroleum ether by Soxhlet apparatus.

We concluded that effects of starvation have influenced on fat, protein and water content in common carp.

Key words: common carp, chemical characteristics, feed

DETERMINATION OF CHLORPYRIFOS IN WATER USED FOR AGRICULTURAL PRODUCTION

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Chlorpyrifos is one of the most frequently used insecticide worldwide and it is more often detected in surface and ground waters compared to other organophosphorus insecticides. Also, chlorpyrifos is one of the most important water pollutants (EU Directive 2008/105/EC).

In this study a solid phase extraction method was developed for determination of chlorpyrifos in surface and ground water, which are used for irrigation in agriculture production.

Samples were prepared by spiking in 500 ml of water (surface and ground) with standard chlorpyrifos solution at rates 0.01-1 µg/ml. Extraction was carried out using ENVI C18 SP disc (47mm; Supelco No. 57171). Prior to extraction, the disc was conditioned with 5 ml of acetonitrile/methanol (50/50, v/v) mixture and 5 ml of deionised water. Chlorpyrifos was eluted from the disc with 6 ml (2x3 ml) of acetonitrile/methanol (50/50, v/v). Eluent was evaporated till dry, than diluted in 2 ml of acetonitrile/methanol (50/50, v/v) and homogenised with ultrasound.

Chlorpyrifos content was analyzed using gas chromatograph (HP 5890 series II) with EC Ni^{63} detector (column SUPELCO 24048, SPB^{TM}-5, 30mx0.32mm, 0.25µm FILM; gas carrier He). Injected volume was 2µl. Determination conditions were – column temperature 190°C, increase of 30°C/min, final temperature 275°C; injector temperature 230°C; detector temperature 300°C.

Linearity of detected response was determined by injecting standard chlorpyrifos solution at rates 0.001-1.0 µg/ml. Correlation coefficient (R^2) was 0.995 %. Limit of detection (LOD) for analyzed chlorpyrifos was estimated from the fortified samples, while the limit of quantification (LOQ) was calculated from LOD. LOD and LOQ were 0.004 µg/ml and 0.01 µg/ml, respectively. Average recoveries of chlorpyrifos detection method in surface water were ranged from 84 % to 89 %, and in groundwater from 87 % to 95 %.

Key words: chlorpyrifos, surface water, groundwater, GC/ECD

THE SITUATION ANALYSIS OF INSPECTED MASHINES FOR PESTICIDES APPLICATION IN REPUBLIC OF SRPSKA

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The invention and application of pesticides has led to a real revolution in plant production, and fall into one of the greatest inventions. Proper use of plant protection technology provides the application of both the efficiency and the economically use of pesticides.

Regular control of machines for the application of pesticides is a necessary measure of modern agricultural production which is characterized by high use of pesticides. Modern agriculture involves the production of certain standards in particular from the point of application of pesticides, meaning production of safe food. Production of safe food, environmental protection, as well as the optimum cost of production can not be ensured without the controlled application of pesticides.

Key words: pesticides, controlled applications, standard, safe food

EFFECT OF MICROBIOLOGICAL FERTILIZER AND SOIL ADDITIVE ON YIELD OF BUCKWHEAT IN ORGANIC CROPPING SYSTEM

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Effect of microbiological fertilizer (Slavol) and soil additive (zeolite and hydrogel) on buckwheat yield was investigated in this paper. Trial was set up in Radijevici village in agroecological conditions of Zlatar mountain during two-year period 2009 and 2010. A randomized complete block design with four replicates was employed. In organic cropping system three combinations of microbiological fertilizer with zeolite and hydrogel were used prior to sowing. 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 metheorological conditions have very significant influence on buckwheat yield. The big difference between temperature has effect on significant differences between yield in two seasons. The second season, 2010 had weather pattern more favorable for the buckwheat production with mild and moist winter and warm but rainy spring and summer.

Combination of different microbiological fertilizer with soil additive gave positive results specially in the second year of trial. The best combination in organic cropping system was slavol+hydrogel with foliar application of microbiological fertilizer, which resulted with the greatest yield of buckwheat and this treatment can be recomended to producers. In variant of control with no fertilizers but with foliar application of microbiological fertilizer we obtain approximately the same yield such as in the best combinations of fertilizers. Soil which was not used for agriculture for long period of time retain fertility and enabled greater crop productivity.

Key words: buckwheat, microbiological fertilizer, soil additive, organic cropping system, grain yield

THE ROLE OF DRYING GRAPES IN EXTRACTION OF ANTHOCYANINS IN THEIR BLACK SKIN

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Anthocyanins are substances biosynthesized in the grape skin, extracted during the maceration and vinification and contributes in wine color. During the aging of wines these substances are converted in their derivates, contributing in wine quality. For this reasons in nowadays there is a big attention on these components study. Starting from 2 grapes variety, one French variety - Cabernet Sauvignon and another autochthonous variety of Albania - Kallmet is been observed the role of drying in extraction and concentration of anthocyanins in black grapes skin. We have used grapes skin from the 2 varieties and one part of them have been extracted fresh (immediately after were removed from grape) and other part have been drying for 2 days after were removed from grape berries. The extraction is made based on (Stanciu et al. 2010) methods, witch has been modified to provide a maximal extraction through dilution with 2 buffer solutions at pH = 1.0 and pH = 4.5. After one hour of sample preparation, the measurement with spectrophotometer UV-VIS (SPECORD version 2.3, WinASPECT) in two waves length 520 nm and 700 nm is done. Content of anthocyanins is expressed as cyanidin-3-glucosid equivalent in mg/100gr fresh product. The results were interesting according the new methods released by us, improving the extraction way of anthocyanins comparatively with other authors.

Keywords: drying, grapes skin, anthocyanins content

1-MPC AND MELON AFTER HARVEST: OPTIMAL APLICATION AND THE INFLUENCE OF DIFFERENT VARIETAS

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The 'Galia'-type melon (*Cucumis melo* L., *reticulates*) is the most important melon produced in Israel. It is characterized by a fine, uniform and thin reticulated rind, a round shape, and green flesh. The fruit is aromatic, with a delicate taste. However, this type of melon has a relatively short shelf-life due to rapid physiological and pathological deterioration, both of which cause considerable economic loss. Treating 'Galia'-type melons with 300 nl l^{-1} 1-MCP (1-methylcyclopropene) results in a delay of ripening during storage, and in extended maintenance of quality during shelf-life. We have now evaluated the effect of temperature and duration of exposure to 1-MCP on storage quality of four netted melon cultivars with different climacteric characteristics. Storage conditions were 15 days at 5°C + 3 days at 20°C (simulation of sea transport and marketing from Israel to Europe), and we measured weight loss, firmness, sugar content (TSS), decay development and chilling injuries. Applying 1-MCP at 20°C for 24 h was more effective in inhibiting ripening and preserving overall quality, including sensory attributes, than application at 10°C or 5°C for 24 h. Application of 1-MCP before waxing was even more effective than applying the compound afterwards. 1-MCP was more effective on melon cultivars with typical climacteric characteristics (cvs. Trooper, Melika and 96) than on a cultivar (cv. Ori) which had a less pronounced climacteric. We conclude that 1-MCP is most effective if applied at 20°C for 24 h before waxing. However, the effectiveness of 1-MCP on melon depends upon the climacteric characteristics of the cultivar.

Key words: postharvest, shelf life, melon

THE IMPACT OF WATER QUALITY OF ERZENI RIVER IN MICROBIAL SAFERY ON THE FRESH VEGETABLES

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Erzeni River flows in a length 109 km, having traversed the regions of Tirana and Durres, with an area 760 km2 and flows into the Adriatic Sea.

In this way, the physical-chemical and biological quality of the water river is present in the agricultural activity of these regions.

Often the agricultural products, as a result of microbial contamination and pathogens in them, have an impact on public health as a result of certain diseases originating from contaminated foods.

The microbial quality of the water used for irrigation in agriculture and especially in fresh vegetables is important to monitor. Poor quality of the Water River used for irrigation is one of the reasons for the presence of microbial pathogens in fresh vegetables as: salad, tomatoes, onion etc. The microorganisms present in these products come mainly from agricultural land and irrigation water. In this paper is analyzed the presence of the microbial pathogens (faceal coliforms) and the influence of physical-chemical factors in seven points along the Erzeni River during 2011. Also, in three of these points is analyzed the influence of the water river used for irrigation in salads. From this, it results that the water river is mostly polluted by fecal coliforms allowed on the international norms. This is because of the untreated water river in these two major regions: Tirana and Durres. Also, it has an impact on the microbial contamination the contaminated soil by misuse of the manure, nitrate, from keeping cattle along the river, pets etc. Consequently, the salad irrigated by the water river result much polluted from microbial pathogens, specifically CF.

The microbial contamination at levels 3-4 times above the permitted levels of urban pollution necessarily requires treatment and continuous monitoring of the water river as one of the immediate tasks with impact in the public health.

Key words: fresh vegetables, microbial safety, coliforms

AN OVERVIEW OF NEWLY INTRODUCED PESTS IN MONTENEGRO IN PERIOD 2003-2010

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In the last ten years trade of plant material (import and export) has been increased in Montenegro. This created conditions for occurence and development of pests which has been unknown in Montenegro, in our region and Europe, as well.

An overview of newly introduced pests which are established in greenhouses, vineyards and olives in last decade is given in this paper.

Presence and pest status in nurseries with ornamental plants, on vegetables in greenhouses, olive nurseries and orchards and vineyards were observed in the period 2003 to 2010. In all surveyed sites, pests and plant samples were taken from infested plants and checked in laboratory.

During period of observations 14 new species were found, out of which 10 are insects and four mites. Pests were detected in the following chronological order: *Metcalfa pruinosa* Say (2003), *Phylloxera quercus* Boyer de Fonsc. (2004), *Prociphilus oleae* Leach ex Risso – olive aphid (2005), *Polyphagotarsonemus latus* Banks – the broad mite and *Liriomyza bryoniae* Klbt. - the agromyzid leaf miner (2006), olive eriophyid mites – *Aceria oleae* Nalepa i *Shevtchenkela barensis* sp. nov. (2007), *Bemisia tabaci* Gennadius – the tobacco whitefly, *Aphis illinoisensis* Shimer - the grapevine aphid and *Scaphoideus titanus* Ball. - the American grapevine leafhopper (2008), *Luperomorpha xanthodera* Fairmaire – flea beetle, *Frankliniella occidentalis* Pergande – the western flower thrips, *Tetranychus cinnabarinus* Boisd. - the carmine spidermite (2009), *Tuta absoluta* Meyrick - the South American tomato moth (2010).

Regarding number of host plants which could infests *M. pruinosa*, *L. xanthodera*, *F. occidentalis*, *B. tabaci*, *L. bryoniae* and *T. cinnabarinus* are considered as highly *polyphagous* whilst other species are monophagous or related with less number of host plants.

Detection of olive eriophyid mite *Sh. barensis* is considered as very important because this species is new for world`s acarofauna and its name derived from name of the city Bar where it was detected for the first time.

Key words: Monetenegro, newly introduced species, host plants, pests

RESIDUE OF THE PESTICIDES IN FRUITS AND VEGETABLES OBTAINED FROM IMPORT AND DEDICATED FOR COMSUMPTION IN KOSOVO

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Residue of the pesticides in the fruits we consume on daily basis, in particular in those food items which are not produced in our country and therefore their production is unknown to us, has been and will remain the biggest challenge for our quality control institutions, responsible for protection of health of our consumers.Taking into account constant increase in use of chemical substances – pesticides, then failure to comply with instructions on use, carenza of each pesticide, overdose caused by producers aiming more successful protection – all of these factors are daily increasing the level of risk for our consumers. Having in mind the situation of agricultural production in the territory of Kosovo with its destroyed post-war economy and considering the fact that our local agricultural production hardly covers 30% of our total consume needs; it is natural that such deficit is being covered with imported goods from abroad.

Key words: Deficit, dose, carenza, consumption, pesticide

THE EFFECT OF MALO-LACTIC FERMENTATION IN THE QUALITY OF ALBANIAN WINES

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Historically, malolactic fermentation *(*MLF) was described as a capricious phenomenon and not fully understood, but of a great importance for the final product. MLF recent studies have expanded knowledge about the complexity of the bacteria causing it, stressing that it is a biological phenomenon and as such, depends on environmental, chemical and physical wine itself conditions. Recognition and study of MLF has provided to wine industry a powerful tool to understand, control and even to predict the results of malolactic fermentations conducted using bacterial strains capable of transforming L-malic acid to L-lactic acid. Study of MLF and the possibility of running it in Albanian wines, was experimented on the autochthonous variety of Shesh i Zi. As a starter culture was used *Leuconostoc Oenos* in different concentrations. The initial bacterial concentration used was appointed 10^6cells/ml. Experimentation was conducted more or less in vitro (in containers with a capacity of 10 liters). The method used for tracking the MLF is chromatography on paper, which is simple and accurate. In the wine samples taken in the study, it was measured L-malic acid concentration and pH after 5, 8, 12 and 15 days. A general decrease of acidity was observed on the fifth day. In the sample inoculated with larger quantities of bacteria, was observed a greater decrease of the L-malic acid concentration. After the fermentation, wine tasting was performed by expert sommeliers who noticed that wine was soother and more harmonious. The survey data are promising and the second step will be the MFL in 'Kantina Bardha' winery in industrial quantities during 2012-2013.

Key words: malolactic fermentation, *Leuconostoc Oenos,* wine

CHANGE OF TOBACCO LEAF PIGMENTS IN PROCESS OF YELLOWING

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Oriental tobacco with its numerous cultivars is the main export tobacco type in Macedonia, which brings in significant income and may utilize low fertility soils.

The initial and most important stage of post-harvest processing of oriental tobacco is yellowing, during which chlorophylls and carotenoids are degraded and most carbohydrates are converted to simple sugars, giving to cured leaves a characteristic aroma. Leaves indicate their ripeness by beginning to yellow, a signal that chlorophyll is beginning to break down. Yellowing leaves have the chemical and physical properties that enable them to be cured and manufactured into tobacco products.

In this study, the changes in the patterns of chlorophylls and carotenoids content and dry weight of leaves in relation to the ripeness and yellowing of leaves in Oriental tobaccos were investigated.

We obtained the extracts from whole leaves of tobacco varieties Prilep P-23, Yaka 125/3, and Djebel 38 grown at the Scientific Tobacco Institute-Prilep in 2009, immediately after harvest and after yellowing in controlled conditions (32°C, RH 80%).

We used extraction technique combined with sonication and spectrophotometric assay to quantitative determination of chlorophyll *a* (Chl *a*), chlorophyll (Chl *b*), and total carotenoids in the same extract of leaves. The amounts of pigments were determined using equations from the literature based on the absorbance data. Values Chl *a+b*, Chl *a/b*, Chl *a+b/car* are estimated mathematically.

Tobacco variety Yaka 125/3 showed the highest content of total chlorophyll in all primings. Concentration of Chl *a* was ranged from 1.44 mg/g to 5.70 mg/g and Chl *b* from 0.49 mg/g to 2.76 mg/g, of dry matter. Content of total carotenoids in leaves of variety Prilep P-23 was ranged from 0.63 mg/g to 3.27 mg/g, of dry matter. Leaf dry weight, chlorophylls and carotenoids contents showed significant decrease during the yellowing.

Key words: tobacco, oriental, chlorophyll *a*, chlorophyll *b,* carotenoids, yellowing

FEED PROCESSING AS A WAY FOR IMPROVEMENT OF PRODUCTION PARAMETERS OF WEANED PIGLETS

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Feed processing used at non ruminant's animal like pigs and poultry is one of the most studied fields and it has a clear effect on the density and microbial population in different part of intestinal tract (IT).

The main objective of this study was: to investigate the effects of pellet feed on performance parameters of weaned piglets and to determine the nutrient digestibility like: digestibility of dry matter, of crude protein, crude fat and crude fibre. The study factor was: different form of feed processing, studied in two levels: farinose and pellet feed. After 45 days experimental period, the utilization of pellet feed improved Growth Performance (GP): Average Live Weight (ALW) (kg) and Daily Weight Gain (DWG) g/day compare to the control group. Based on the achieved results in the present investigation, it could be concluded that the utilization of pellet feed lead to an improvement of totally production parameters and nutrient digestibility also, included crude fibre digestibility.

Keywords: weaned piglets, pellet feed, granulated feed, performance parameters

V
THE TRADITIONAL FOODS – CHALLENGES IN THEIR PROMOTION AND PROTECTION

RISK ASSESSMENT IN TRADITIONAL PRODUCTION OF HERCEGOVINIAN CHEESE FROM THE SHEEPSKIN SACK

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Basis of the new European Union Quality Policy is creation of the system of protection and raising the value of agricultural products and foodstuff with special characteristics which derive from their geographic area, traditional way of preparation and which have so called traditional attributes. Cheese as important foodstuff in human consumption has wider importance, because it represents cultural and traditional mirror of some area or country.

The aim and tasks of research in this paper are focused on risk assesment from contamination in traditional production of Herzegovinian cheese in a sheepskin sack and also on attempt of creating the conditions for standardisation of this product.

Risk assesment for Herzegovinian cheese in a sheepskin sack traditional production is based on microbiological, physical-chemical and sensory results of testing in the Municipality of Nevesinje.

Testing results of cheese in a sheepskin sack on bacteriological, physical-chemical and sensory analysis taken from cheese producers, which have harmonised sanitary-hygienic conditions with European standards, showed satisfying results.

Sensory evaluation classified all tested samples in extra and first class. Water content in tested samples is under 40%, which is in correlation with hard aged cheeses characteristic. Fat content in dry matter is 42-56%, which categorises this product in full-fat cheese, but it also points on non-standardised production.

Production risk is settled in process assesment of Herzegovinian cheese in a sheepskin sack if formal standards of production and marketing are not followed.

On basis of consideration of production conditions, proceeding differences and final results, certain measures of production standardisation are proposed, and they will be helpful by product specification drafting, with reference to registration of Herzegovinian cheese in a sheepskin sack and getting protected sign of geographical indication.

Key words: Risk assesment, Herzegovinian cheese, sheepskin sack

SOME PHYSICO-CHEMICAL AND SENSORY PROPERTIES OF CHEESE HALVA (A TRADITIONAL TURKISH DESSERT) PREPARED WITH DIFERENT LEVELS OF LOR CHEESE

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Cheese halva is a Turkish traditonal dessert obtained from fresh cheese with the addition of flour and sugar. It was also known with different names and different processing technics in Anatolia.

In this research, different levels of lor cheese obtained from whey were added into the fresh cheese (5 %, 10 %, 15% an 20 %) combinedwith different melting salts (0.75 %) for obtaining a final product with smooth structure and enriched nutritional value.The prepared samples were evaluated for their compositional and sensory properties. According to the obtained results of the analysis, addition of lor cheese and melting salts affected the total dry matter, fat, titratable acidity, pH, sugar and starch values, significantly ($p<0.01$). As expected, addition of melting salts facilitated the melting operation. Addition of lor cheese increased the nutritional value of the Cheese Halva. But, additon of the lor cheese more than 5% caused some clear decreases in sensorial quality parameters. Addition of lor cheese and different melting salts into the fresh cheese used for making of Cheese Halva can be considered as an alternative area for whey cheese because of their nutritional value.

Key words: Cheese halva, lor cheese, melting salts

USABILITY OF TRADITIONAL WAYS OF PROCESSING AND USAGE OF WEAT STARCH "NIŠESTA" IN BOSNIA AND HERZEGOVINA

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Production and use of starch in the diet of population is a tradition in some areas of Bosnia and Herzegovina. It is related to the production of wheat starch in households named "nišesta", and such production is retained up to today. The most commonusage of nišesta is in the preparation of traditional sweet dishes as well as their integral part, or in the preparation of rolled dough (jufka).

Tests within this study were carried out in the Bosnian Krajina (sample 1), Tuzla region (sample 2), the region of Banja Luka (sample 3) and the Brčko District BiH (sample 5), where this production is retained. As a control sample (sample 4) manufactured starch called "nišesta" was taken from a producer in Bosnia and Herzegovina. The content of individual nutrients were carried out by appropriate laboratory methods and compared with the prescribed quality characteristics given for wheat starch available on the market.

Samples of "nišesta" from all named sites were analyzed for water content, ash, crude protein, total fat and pH values. In addition, organoleptic indicators of quality of the natural wheat starches (appearance, color, taste) were also defined. The results indicate that the water content did not exceed the prescribed value in any of the tested samples (<14%), ash content was greater than allowable in three test samples (0.26, 0.28 and 0.34%), and total fat content for all homemade samples exceed the allowable values (control 0.04%). The content of total protein was greater than the allowable for all samples, except for industrial starch one (0.24%) and ranged in between 0.69% (sample 2) to 4.25% (sample 5).

Key words: wheat starch, "nišesta", ash, protein, fat

CHICKPEA (*Cicer arietinum* l.) AS TRADITIONAL VALUABLE FOOD IN UPPERLAND DROUGHT AREAS

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Until 20 years ago chickpeas are grown regularly and in quantities that satisfy market demand. Generally could be meet across the region of Kavadarci and Negotino, but today less. As a culture with high protein content in leaves and seeds chickpea was used as animal feed and food for people. But despite the neglect and fewer households, chickpea is still grown for their own needs in small amounts. Mainly in Macedonia are grown two different traditional varieties; large grain and small grain. Chickpea as drought-tolerant, warm-weather crop that is great for upperland areas, ahead of climate change and global warming can be expected to be put in re-actualization. What can be noted is that the traditional recipes for the preparation of chickpeas as food became luxury offered in restaurants, which is a notable trend of interest in people. The trend of traditional crops and food from them is again popular, and it seems with the younger population as well. Through the activities for the protection and preservation of traditional varieties and populations, gene bank has played a crucial role in finding chickpea populations, long-term conservation and encouraging rural populations to continue with cultivation. It seems for this culture that has multiple benefits for soil, livestock, people and the environment time is not completed.

Key words: chick-pea, food value, drought, tradition

BRANDING ORGANIC PRODUCTS IN FUNCTION OF SUSTAINABLE TOURISM DEVELOPMENTIN MONTENEGRO

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This paper focuses on the challenges in enhancing the value of the organic products in Montenegro. One of the challenges facing all stakeholders involved in the process of organic production development is that there is no uniform recipe for the creation of a successful brand. The paper describes the development, structure, organization, and characteristics of the branding process in organic production. One of the main conclusions in case of Montenegro is that organic products could improve the level of tourism product quality which could generate high levels of customer satisfaction. On the other side, tourism is seen as a great opportunity for the further development of organic production in Montenegro, especially in terms of effective and efficient distribution of organic products to the tourists. Appropriate qualitative and quantitative methods are implemented during the preparation of this paper.

Key words: branding, organic products, sustainable tourism, Montenegro

NON-WOOD FOREST PRODUCTS, THE UTILIZATION AND HARVESTING METHODS IN SARDASHT, NORTHWEST IRAN

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Non-wood forest products include foods, food additives, fodder, fibers, and fragrances for perfumes; ornamental pods and seeds, resins, oils, plant and animal products with medicinal value. This kind of products vary significantly from each other in form, size, usage and value. People were using the forest resources over many centuries to fulfill the daily needs. However, only in the last decades non-wood forest products have gained more attention in world trade.

Sardasht region in the Zagros mountain range with a considerable forest cover in the mountain ranges was chosen as a study area. In order to carry out the study, questionnaires were prepaid and distributed among local people, and the results were analyzed. All kind of non-wood production which could be exchanged for money was evaluated.

Different kind of forest by-products were recognized in the area including acorn, foliage leaves, galls, turpentine, pistachio (*Pistacia vera*) nuts, leaves and fruits of roses, cherry elaeagnus (*Elaeagnus edulis*), hawthorn (*Ceratagus spp*), wild plum (*Prunus* sp.), bitter almond (*Amygdalus communis*), walnuts (*Juglans* sp.), a manna of oak trees, wild pear (*Pyrus* sp.), sumac (*Rhus coriaria*). Among all these products, turpentine is the only non-wood forest product which can be export to neighboring countries. Other non-wood forest production has not widely spread in the market, being consumed at local scale for household needs by local people. However, the non-wood products play an important role fulfilling the peoples' needs through both non-market and market means. It is possible to improve the role of non-wood forest products in the daily life of local people with provoding facilities such as better transportation system and marketing.

Key words: non-wood forest products, Sardasht, turpentine, manna of oak

VIRGIN OLIVE OIL PRODUCTION FROM THE MAJOR OLIVE VARIETIES IN ALBANIA

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Republic of Albania is actually running a national scheme on increasing the area of olive plantations and olive oil production. The commercial potential of Olive Oils from the main autochthonous olive varieties is a positive premise for the near future. Olive culture is the only viable agricultural activity in remote arid regions such as Southern Regions and Interior part of the country. Improving the quality of the product is imperative and needs the implementation of the Good Agriculture Practices as well as the Good Manufacture Practices. This can be feasible through appropriate oleo culture, which means cultivation of autochthonous cultivars. Efforts to develop commercial products from varieties '*Kalinjot*', '*Ulli i bardhë Tirana'* (UBT) could increase the incomes for the rural economy and more to the national economy. The study on these cultivars covered the oil content, Fatty Acid composition, the Antioxidant capacity and Total Polyphenol content.

Kalinjoti cultivar actually is most abundant, by 50% of total olive trees. While Ulli i bardhë Tirana cover a small planted area of olives. The oleic acid content varies from 74.59% (Kalinjoti) to 75.62% (Ulli bardhë Tirana). The content of Palmitic acid is relatively low to Kalinjot (9.41%) and UBT (10.71%). The levels of Linoleic acid are considered relatively low to UBT (6.99%) and higher to Kalinjot (9.80%). Total Phenol contents expressed in Gallic acid Equivalents (GAE) in studied olive cultivars vary from 421.30±3.27 GAE mg/kg oil (UBT) and 216.63 ±10.76 GAE mg/kg oil (Kalinjot).

Antioxidant capacity of two cultivars resulted to Kalinjot 1.38±0.02 Trolox (mmol/kg Olive oil); UBT 1.07±0.08 Trolox (mmol/kg Olive oil). The results achieved give indication on the quality of the monovarietal Virgin Olive Oil**s (**VOOs) from these varieties.

Key word: Virgin olive oil, native cultivar, Kalinjot, Ulli i Bardhe Tirana, sustainable agriculture

PRESERVATION OF THE TRADITIONAL PRODUCTION OF ZLATARSKI CHEESE IN THE AIM OF THE PROTECTION OF GEOGRAPHICAL ORIGIN

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In this paper the overview of the production of Zlatarski cheese is presented. It is the result of recording of the traditional production process and interviewing of individual producers in mountain area of the Nova Varoš municipality (mountain Zlatar, Republic of Serbia). The main task of the research was to develop the awareness about the need for the preservation of traditional production, to make it to be more organized and to make the ethnographic treasure of this area more recognizable. The research was conducted within the frame of the national scientific project IIII 46009 that has had its compatibility within the project of the protection of the mark of Zlatar cheese, financed by Swiss Government, and it is implemented by SEEDEEV as a local partner in the cooperation with SO Nova Varoš. Efforts towards protection of the Zlatarski cheese by geographic origin mark are based on recognizable and high quality of the product resulting from tradition that lasts for decades and the experience in its production. High quality sensorial properties are the result of the specificity of the environmental conditions (height, climate, type of the soil, location, and characteristic vegetation), mode of animal growing and animal breeds as well as the expertise of the individual producers. Utilization of the raw milk, fermentation processes based exclusively on the activity of naturally present (indigenous) microflora, natural maturing, and hand crafting are the basic elements of the specificity of Zlatarski cheese, but also the fulfillment of the criteria that meet national and European regulations as the part of the process of the registration geographic origin mark (Official Gazette of Republic of Serbia no.18/10, Regulative EC from 1999 and 2000).

Activities connected to the protection of geographical origin mark for Zlatarski cheese represent the possibility for the placement on the market of the recognizable gastronomic product properties, trough the plentiful touristic offer of Zlatar and thereby making it more competent to the other products with the same name, but still significantly different from the original product. At the same time, it is also the possibility for the rural development of the area with the aim of inclusion of local population into distributive chain as well as the preservation of the traditional cheese production for the next generations. On the other hand, protection of the geographical origin mark represents the benefit for numerous consumers that would, trough this process, get the complete information about the product, accompanied with the specific guarantee that the product is safe, of the uniform quality, but also completely authentic. Therefore, traditional production doesn't mean returning back into past times, but it is the effort to preserve traditional production technology, more organized production, to make ethnographic wealth of that area more recognizable and thereby to make more significant the development of one nation.

Key words: Zlatarski cheese, traditional production, protection of the geographical origin

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