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ECONOMIC EFFICIENCY OF NON-CONVENTIONAL SOIL TILLAGE SYSTEMS IN WINTER BARLEY AND SOYBEAN PRODUCTION

Kovačev Igor*, Košutić Silvio, Čopec Krešimir, Fabijanić Goran

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Abstract. *The paper presents results of the two years experiment in winter barley (*Hordeum vulgare *L.) and soybean (*Glycine max *L.) production. Short-term study of non-conventional soil tillage systems was conducted at the experimental field near Staro Petrovo Selo (45° 10' N, 17° 30' E) on hypogley-vertic type of soil and semi humid climate conditions. The tillage systems and implements used were: CT – mouldboard plough, disc harrow, seed-bed implement, drill, RT 1 - chisel plough, disc harrow, seed-bed implement, drill, RT 2 - chisel plough, rotary harrow integrated with seed drill, RT 3 - mouldboard plough, rotary harrow integrated with seed drill. The highest average yields were obtained by RT 3 in barley production (4.42 t ha^{-1}) and RT 1 system in soybean (3.78 t ha^{-1}) production. The greatest energy and labour savings in soil tillage, among the lowest total cost of production, were achieved by RT 2 system, but due to the significantly lower yields this system has not proved adequate for soybean production, while it could be recommend in barley production due to the highest productivity accompanied with high yields and economic efficiency. The highest economic efficiency of barley production has shown RT 3 system (coefficient of 1.75), while in soybean production the most profitable system was RT 1 (coefficient of 2.16). Regarding the choice of tillage systems, assuming uniform level of yields, the advantage should be given to systems with lower level of tillage intensity, not only to reduce costs but also because of the possibility of simpler production organization due to less machine and labour requirement.*

Key words: *soil tillage, energy consumption, production costs, economic efficiency.*

RESULTS OF TESTING THE VARIOUS SOIL TILLAGE SYSTEMS IN THE PRODUCTION OF WINTER RYE AND MAIZE IN CENTRAL SERBIA

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Abstract. *This paper discusses the results of the presented two-year trials of different tillage systems in the production of winter rye and maize. The trials have been performed in the environmental conditions of central Serbia during the year 2010/2011. The field-lab tests have been conducted at two sites on the soil type Vertisol, referred to the assessment of quality of work, energy consumption and its impact on the yields in three different tillage systems in the production of rye and maize. The aim of this study was to determine the effects of different parameters of soil tillage, which would allow the proper selection of appropriate technology and technical systems and point out the advantages and disadvantages of applied systems of soil tillage. The variant of conventional tillage (CT) expressed the highest consumption of energy, over than 50 L ha^{-1}, and the yield of winter rye was 2.110 kg ha^{-1}, while the variant reduced tillage (RT) it has been recorded the lowest power consumption about 33.04 L ha^{-1} and the highest yields of winter rye of 2.596kg ha^{-1}. The obtained results show that the variant of protective tollage achieved higher yields of rye and maize, with significantly lower energy consumption.*

Key words: *tillage system, fuel consumption, rye, maize, yield.*

INFLUENCE OF COLOR SHADE NET ON THE CLIMATE CONDITION IN PEPPER PRODUCTION

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Abstract. *The goal of the present three-year trail was to evaluate the influence of different colored shade nets on the plant development, yield and quality of fresh harvested pepper. The photoselective netting concept was studied in bell pepper (Capsicum annuum 'Cameleon') cultivation in the South part of Serbia (Aleksinac) under high solar radiation, using commercial cultivation practices, under four different colored shade-nets (pearl, red, blue and black) with different relative shading (40% and 50%), obtained from Polysack Plastics Industries (Nir-Yitzhak, Israel) with exposure to full sunlight used as control. The average air temperature (at 15h middle of July) between different color shade net was 1 °C (pearl and red) and 3.0 °C (black) less in comparison with air temperature in open field (control). Advantages of color-shade net is reflected in temperature control: it improves productivity by moderating extremes of temperatures. Air movement is restricted, thus reducing wind damage to the crop and evaporation of soil moisture. Air beneath the shade cloth stays humid which is of further benefit to the plant. Wind speed inside the screenhouse was reduced by more than 50%.Under high solar radiation conditions (in South Serbia in July and August) value of Photosynthetic photon flux density (PPFD) is about 1600 $\mu mol \cdot m^{-2} \cdot s^{-1}$, so unshaded plants were exposed to high heat stress throughout the growing season. Value for PPFD varied between over1700 $\mu mol \cdot m^{-2} \cdot s^{-1}$ on sunny days and 700 to 920 $\mu mol \cdot m^{-2} \cdot s^{-1}$ when cloudy.*

Key words: *shade, color-nets, microclimate condition.*

INFLUENCE OF FERTILIZER PHYSICAL PROPERTIES ON ITS DISTRIBUTION UNIFORMITY

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Abstract. *Modern agriculture is largely dependent on good technological solutions and new technologies and their appropriate application in the use of fertilizers, insecticides, pesticides and analysis of soil. Proper choice and efficient utilization of various technological-technical application systems still has a significant importance concerning ecology, energy and economy in agriculture. Production of sufficient quantities of food to the existing population and for generations to come is one of the most important tasks of the society. Therefore, the development of agricultural production, its sustainability and continuous improvement is crucial for humanity. The aim of this study was to show how much is important the application of fertilizers in the crop production. In particular, the paper studies the impact of the physical and mechanical properties of mineral fertilizers on the quality of the application, of course interact with certain technological and technical systems implementation.*
Balanced application of different fertilizers vary, all depending on the applied fertilizer and machinery for the application.

Key words: *fertilizers, physical and mechanical properties, fertilizer disk spreaders, distribution uniformity.*

WORKINGPARAMTERS OF THE TRACTOR-MACHINERY TILLAGE SYSTEMS IN FRUIT PLANTATIONS

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Abstract. *Soil tillage is concerned as necessary if good mechanical and structural properties of soil are needed. Together with the other operations it defines plant growth, yield and products quality. Sustainable and profitable production is achieved with the optimal choice of tillage systems. If intensive fruit production is desired than optimal exploitation and working parameter of the mechanized systems must be defined.*
This paper presents energy and exploitation analysis of the working parameters of tractor-machinery systems, in tillage. Based on the results obtained it was possible to define advantages and disadvantages of the tested tillage systems. It was concluded that optimal result in tillage were achieved with the chisel plough.
If fruit production is established in the arid condition that soil tillage must be carried on whole surface. In this way mechanical structure of the soil will enable better water/air regime, easier weed control and better energy, ecology and economy efficiency.

Key words*: tractor-machinery systems, fruit plantations, soil tillage, energy analysis.*

VINEYARD PROTECTION FOR THE PURPOSE OF SPRAYER MOVEMENT VELOCITY AND AIR CURRENT PARAMETERS

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Abstract. *The experiment was carried out in a vineyard using a sprayer, in order to determine the effect of air velocity and aggregate movement velocity on the deposition of protective fluid on the leaf surface. Treatment standard during the experiment was 400 l/ha. Changing the fan capacity by means of a number of rounds of the rotor and blade rotation, air velocities were achieved just in front of the vineyard row: 5.4; 7.8; 10; or 13.2 m/s. Combining the aforementioned air velocities with sprayer movement velocities of 5.8 and 8.5 km/h, eight experiment variations were found. Examination results indicate that increase in the sprayer movement velocity from 5.8 and 8.5 km/h has caused an increase in depositions on the leaf surface up to 25 % on the row side facing the sprayer i.e. about 10% on the oposite side of the row. Based on examination results, we have concluded that the highest deposition on the leaf surface has been achieved at sprayer velocity of 5.8 km/h and air velocity in front of the row from 8 to 10 m/s.*

Key words: *sprayer movement velocity, air current velocity, deposited fluid quantity.*

EXPLOITATION CHARACTERISTICS OF ROTARY MOWER WITH DISCS USED DURING ALFALFA MOWING

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Abstract. *This study presents results of research conducted over rotary mower JF-Stoll SB 200 during the alfalfa mowing process, with average yield of 4,5 t ha^{-1} (without irrigation) and average stem height of 73 cm. The aim of the research is to define technical-technological indicators and work quality of the tested mower at the specific work regime. Working swath per probes ranged from 1.83 m up to 1.89 m, averagely 1.86 m, with average coefficient of working swath utilization up to 0.93. Stem incision height ranged within tolerant values for alfalfa (6-8 cm). The average incision height was 6.84 cm (6.23 cm – 7.31 cm per probes). Aggregate mowing speed was in interval from 9.20 km h^{-1} to 12.35 km h^{-1}, averagely 10.80 km h^{-1}. The average total losses were 2.90 % of yields. Losses caused by the incision height were 1.55 %, whereas the losses caused by crushing were around 1.35 % of yields. Specific fuel consumption ranged in interval from 2.58 up to 2.64 l ha^{-1}. Bearing in mind the working swath and mowing speed, the tested mower has made the average production output of 1.72 ha h^{-1} at average working speed of 10.80 km ha^{-1}.*

Key words: *mower, incision height, losses, production output.*

EFFECTS OF INTERCROPPING ON MICRO ELEMENT CONTENTS OF GREEN BEANS UNDER GREENHOUSE CONDITIONS

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Abstract. *It is one of the techniques that increase total yield and income to cultivate compatible vegetables on the same field at the same time and this is called intercropping. This study, in which beans were cultivated between the rows of tomato, was conducted for three successive growing periods, two in spring (2007 and 2008) and one in autumn (2007) in a research glasshouse at the campus of Akdeniz University. As vegetable species, tomato (Solanum lycopersicon cv.* Selin F1*) and dwarf bean (Phaseolus vulgaris* cv. Gina*) were used and also bean plants were grown alone as a control group. Having been conducted with the aim of determining the effects of intercropping, this study is focused on the micro element contents of the pods of bean. As a result of the statistical evaluations, the differences in results were found to be significant in terms of Fe, Mn, Zn, Cu contents in spring of 2007 and 2008 and in autumn of 2007. According to the research results; in 2007 spring period, the highest value of Mn (33.7 ppm) was determined from intercropping (tomato-bean combination) while the highest values of Fe (254.9 ppm), Zn (19.7 ppm) and Cu (5.8 ppm) were determined in control. In 2007 autumn period while the highest Fe (105.5 ppm) and Mn (33.8 ppm) contents were found in control, Zn (35.5 ppm) and Cu (5.0 ppm) contents also were found in tomato-bean combination. In the last period (2008 spring), the highest Fe (82.6 ppm) and Mn (25.5 ppm) values were determined in tomato-bean combination, while the highest Zn (14.5 ppm) and Cu (1.8 ppm) values were determined in control.*

Key words: *Solanum lycopersicon, Phaseolus vulgaris, intercropping, micro element.*

GREENHOUSE VEGETABLE PRODUCTION ON THE SMALL-SCALE FAMILY FARMS

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Abstract. *In this paper a way of improving the greenhouse production on the small scale or family farms is presented. A new type of round greenhouse construction is introduced that should lead to more energy, economy and ecology efficient vegetable production. Energy efficiency of the spinach and tomato production in the round greenhouse was compared with classical tunnel structure. Results show that, regardless the production surface restrictions, with this type of greenhouse construction financial and energy savings are possible together with the minimization of the plant protection chemical usage. If organic fertilizer is used this type of construction can lead to improved food safety production.*

Key words: *round-shaped greenhouse, tunnel greenhouse, spinach, tomato, energy, energy productivity.*

THE EFFECTS OF SOME AGRICULTURAL WASTE COMPOST APPLICATIONS ON SOIL MACRO NUTRIENT (N, P, K, Ca, Mg) CONTENTS

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Abstract. *The wastes emerge at the end of the agricultural production and they are being eliminated without any care and concern. Cut flower carnation cultivation and mushroom production are carried out in Antalya (Turkey) region for a long time. As a result of these productions great quantities of organic waste (carnation wastes and spent mushroom compost) occur. In this study; some agricultural wastes are composted with different proportions and organic additives by mixing. Composts were added in soils for growing (standard) carnation. In this article the effects of compost and organic material on macro nutrient (N, P, K, Ca, Mg) contents of soil were evaluated. With the organic material and compost application in soil, the macro nutrient contents of soils were found to be statistically significant ($p<0.001$). The effects of organic materials on nutrient contents in soils provide positive relation for vegetable production.*

Key words: *compost, spent mushroom compost, carnation wastes, nutrient contents*

REDUCTION OF THE RISKS RELATED TO FALLING FROM HEIGHTS IN PROCESSES OF GREENHOUSES ROOF MAINTENANCE

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Abstract. *The present communication tries to show the important safety deficiencies of greenhouses roof maintenance operations, because these operations had to carry out by workers at 4-5 meters height. In this context, the objective of this work will be the design of a new mobile equipment adapted to the roof greenhouse shape in order to increase workers safety during maintenance operations as roof shadowing, cleaning and plastic cover change.*

This investigation began with the study of the state-of-the-art of the maintenance operations in greenhouses roof, including scientific publications and patents, and simultaneously, an evaluation of the film cover renovation works in two multispan greenhouses was carried out. Collected data in these two greenhouses was used to make an evaluation of labor risks following the methodology proposed by the National Institute of Labor Safety and Health in Spain (INSHT), classifying the risk levels for each one of the identified dangers. Finally, a technical solution was designed to guarantee the safety in these operations.

The literature reviewed revealed at the moment that advances in this area of greenhouses construction are few, with no methods or designs that facilitate the accomplishment of these operations in a safe way. Nevertheless, the means and procedures used in the maintenance operations show great safety deficiencies, verifying that, in the majority of cases, the legal measures proposed to avoid or to reduce these risks are not applied.

In this communication, design and operation of a new safety element has been described. This element has been tested and demonstrates that improves the working conditions avoiding risks of fall from height to which the worker are exposed.

There are many authors that consider design as the key to avoid or reduce labour risks (Van Gorp, 2007; Gambatese, 2008; Toole, 2008). In this way, a new procedure and structure to carry out all the greenhouses maintenance operations have been design and tested. This invention consists on the simultaneous use of a sliding platform and a film changer machine. The platform has been design to rise the film changer machine to the greenhouse roof and slide over a rail to move from one greenhouse tunnel to other. Also, this platform permits supply the roof from some materials as plastic film or lime. In the other hand, the film changer machine consists on a double curve structure adapted to the greenhouse shape and joined between then with bars like a stepladder. This machine ends on both extremes with a pair of wheels which runs over the gutters. Also can be used as support to realize all the maintenance operations and permits to attach workers harnesses.

Key words: *greenhouses, safety, maintenance, intensive agricultural, risks.*

INFLUENCE OF GREEN BEANS GROWING TIME ON MECHANIZED HARVESTING EFFICIENCY

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Abstract. *Successful green bean production involves scheduled sowing to maintain continuous supply through the harvest period, and timely harvesting when beans are prime quality.*
Machine harvest is the only way to efficiently pick the required green beans quantity. However, mechanical harvesting of green beans may lead to discoloration of the broken ends of the bean pods, especialy if there is a delay in processing them.
The aim of this study was to choose the appropriate operating mode of mechanical harvesting system for green bean production. The harvesting machine used in the study was a Ploeger BP 700 bean harvester. This machine is primarily intended for use in edible green bean harvest, however, its design allows it to be used in a variety of vegetable crops.
The harvest efficiency was found to vary from 51 to 83% and was dependent on plant spacing and height, which affected pods location on the plant.

Key words: *Phaseolus vulgaris L., green bean pods, combine harvester, quality, losses.*

THE ANALYSIS OF WORK QUALITY THRESHERS "V-08" IN TRITICALE SEEDS THRESHING

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Abstract. *This paper presents the examined qualitative characteristics of mobile thresher manufacturer „ERNET" from Kikinda, type V-08 for threshing seeds of field and vegetable crops at the experimental fields Institute for forage crops-Kruševac. On small experimental plots threshing is an integral part of the crop after harvesting. The aim was practical application and evaluation of the device in certified seed threshing triticale in micro experiments.*
Ongoing investigations have revealed the losses in seeds threshing straw walkers and sieves that appear in the tailings and spikes in threshed free grain mass. Height loss and quality of harvested seeds depends on the variety, seed moisture at harvest time, the number of revolutions the drum, the clearance between the concave hole size on screens and their purity. Overall losses in working threshing machines ranged from 1.4% to 2.62% % which is less than the loss of seeds on sieves from 0.16% to 0.83% of the yield, and the rest of the losses on the walkers.
Threshing quality was satisfactory because the share of pure seed ranged from 87.9% to 93.5%, a sicly seeds from 5.67% to 10.63% and other impurities from 0.25% to 1.64%.
Quality of harvested triticale seed is satisfactory with minimal seed losses of the total quantity of seeds in the sample with correct adjustment mode.

Key words: *threshers, triticale, seed losses, threshing quality*.

EFFECTS OF CONSERVATION SOIL TILLAGE SYSTEMS ON YIELD OF MAIZE, WINTER WHEAT AND SUNFLOWER IN SREM REGION

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Abstract. The paper presents comparison of two soil tillage systems in maize, winter wheat and sunflower growing in Srem region, Serbia, during 2008-2011. Tillage systems and implements were: conventional system (CT) - plough, disc-harrow and combined implement, and conservation system (ST) – vibratory subsoiler, disc-harrow and combined implement. The aim of testing was comparison of different tillage systems energy consumption and its influence on yield and profit. Results indicate that conventional tillage (CT) system was the lower energy consumer with 433.18 MJ·ha^{-1}, or conservation (ST) system spent 10.08% energy more. In the first season the greatest yield of maize, 7,083 kg·ha^{-1}, achieved conservation tillage (ST) system while conventional tillage (CT) system achieved 9.92% lower yield. Second season the greatest yield of winter wheat, 4,525 kg·ha^{-1}, achieved with conservation tillage (ST) system with regard to conventional (CT) system with 3,577 kg·ha^{-1}. Third season the greatest yield of sunflower 3,011 kg·ha^{-1}, achieved conservation tillage (ST) system again, with regard to conventional (CT) system with 8.56% lower yield.

Key words: *soil tillage, conventional tillage, conservation tillage, energy consumption, yield, profit.*

EFFECT OF VINYARD FLOOR MANAGEMENT ON YIELD AND GRAPE QUALITY OF CV. CABERNET SAUVIGNON (*Vitis Vinifera L.*)

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Abstract. *Two variantes of floor management were applied: v1 - completely bare soil maintained by mechanical cultivation, and v2 - partially covered soil, using a special mixture of grasses for perennial plantations between rows with a regular mowing regime. Investigations were carried out on cultivar Cabernet Sauvignon in central Serbian vinegrowing region. The latitude is 44^o 25'47'' North, longitude is 20^o 02'43'' East. Altitude is 163 m. Average annual air temperature is 10,8 ^{o}C, mean vegetation temperature 16,6 ^{o}C and total anual amount of precipitation 600 – 700 mm. The two-year results of experiment clearly indicate that covering the soil between rows with grass vegetation with regular mowing reduce vine vigor and yield. The winter pruned shoot weight decreased from 1,15 to 0.5 kg per vine and yield from 1.8 to 1.6 kg per vine. Partially floor cover increased content of total dry matter in must (from 24.7 to 26.1 Brix %), total anthocyanins content in berry skin (from 10.4 to 11.45 mg g^{-1} FW) and total phenols (from 1010.5 to 1075.0 mgl^{-1} GAE). Contet of total acid in must was slightly reduced from 6.4 to 6.1 gl^{-1}. Using a special mixture of grasses between rows is a powerful tool for controlling vegetative growth of grapevines in moderate temperate climate, where there is small possibility of drought during flowering and berry set.*

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

FIRST EXPERIENCE ON IMPLEMENTATION OF GLOBAL G.A.P. STANDARDS ON DAIRY FARMS IN SERBIA

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Abstract. *GlobalG.A.P. (Global Good Agriculture Practice) is a private, sector body that defines and sets voluntary standards for the certification of agricultural production processes around the globe. GlobalG.A.P. is managed by "FoodPLUS GmbH" from Cologne, Germany. The main purpose of GlobalG.A.P. is providing mechanisms for control of food safety, the environment, working conditions for workers and welfare of farm animals. It is a pre-farm-gate standard, which means that the certificate covers the process of the certified product from farm inputs and all the farming activities until the product leaves the farm. With the development of GlobalG.A.P. standards, the uniform standard of good agricultural practice are developed. As in other countries, also in Serbia, the application of this standard is not required by law, but its use is entirely voluntarily, since GlobalG.A.P. belongs to the group of so-called "Private standards". In order to assess the possibilities, advantages and disadvantages of the implementation and certification of GlobalG.A.P. standards on livestock farms, 8 pilot dairy farms were chosen and over the period of two years (2012-2013) the complete GlobalG.A.P. standards were applied (all 4 modules related to milk production). The paper discusses the most important aspects of the implementation of these standards on dairy farms as well as its advantages, but also the difficulties and obstacles that can lead to increased unattractiveness and lack of interest of farmers for its application.*

Key words: *private standards, pre-farm-gate standards, dairy farms, environment, food safety*.

RESOURCE EFFICIENCY IN AGRICULTURAL PRODUCTION–ENVIRONMENTAL IMPACT INDICATORS OF DAIRY FARMING

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Abstract. *The world's population and food consumption are increasing drastically while natural resources are decreasing. The development of indicator systems which describe the sustainability of food production requires more detailed knowledge on resource use at the farm scale. The importance of management strategies in agricultural farming and how the intensity of production may influence the energy intensity, the Global Warming Potential (GWP) and, the requirement of arable land will be discussed. The presentation demonstrates system modeling to examine interactions between crop and livestock procedures and between levels of different input factors and their effects on yields in order to determine agricultural resource use efficiency. A life cycle inventory analysis is done for feed supply and feeding in dairy farming. Different site conditions, milk performances and diet compositions are proofed within the system boundary from "cradle to farm-gate".*

Based on direct and indirect energy inputs the energy intensity in dairy farming is calculated, which is linked with carbon dioxide emissions. Methane emissions of enteric fermentation and of excrements are determined as well as the soil-borne nitrous dioxide emissions. The GWP is calculated for different milk performances and vary in a range of 1.01 (4,000 kg milk cow^{-1} year^{-1}) to 0.38 kg $CO_{2\text{-equi.}}$ kg^{-1} milk (12,000 kg milk cow^{-1} year^{-1}). The energy intensity varies from 2.14 to 1.83 MJ kg^{-1} milk, and the use of arable land from 1.71 m² to 1.09 m² kg^{-1} milk, respectively.

In conclusion it is to highlight that improvement in resource use (e.g. fossil energy, land) and the mitigation of GHG emissions are not always in agreement. The holistic view on the environmental impacts in agricultural production is highly recommended to enhance the sustainability of food production.

Key words: *dairy farming, energy, GWP, land use, sustainability indicator.*

BENEFITS OF BIOSECURITY PLANS APPLICATION IN DAIRY FARM PRODUCTION

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Abstract. *Farm biosecurity is a concept which includes set of measures designed to protect a dairy farm production from the entry and spread of pests and diseases. It includes active approach of the farmer, being not only his responsibility, but also responsibility of every person visiting or working on the dairy farm. It is not easy to demonstrate specific and measurable benefits of proper and also effective biosecurity management, due to the highly complex nature of the system within which biosecurity practices operate. The aim of this review is to scrutinize the most important outcomes and benefits of biosecurity plan application for farmers, dairy industry and consumers. Certain measures require substantial investments, but comprehensive and consistently applied biosecurity plan is the most reliable and financially effective way to protect farm production. Countries experiencing a changing agricultural demographic, including dairy farm expansion, can benefit from documenting the implementation of on-farm biosecurity.*

Key words: *biosecurity, benefits, dairy, farm.*

OPTIONS OF AMMONIA EMISSION REDUCTION THE CATTLE AND PIG SLURRY DURING THE STORAGE AND PROCESSING

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Abstract. *Nowadays manure management has become an urgent problem. The Hungarian Institute of Agricultural Engineering is looking for the convenient solution. The aim of our project reducing the ammonia emission and raising the bound NH_4-N in cattle and pig slurry during the storage and the fermentation. In 2012 we carried out laboratory experiments to reduce the ammonia emission of poultry manure during the fermentation. We added various materials zeolite, aluminium sulfate and calcium chloride, and covered the samples with straw and wood chips to reduce the ammonia emission. In 2013 we have continued the experiments with pig and cattle slurry. We added to this materials and covered with vegetable oil. This tests are more important, because in slurry the moisture content and ammonia emission are much higher. Before the fermentation processing we have to reduce the moisture content of slurry with separator. After the separation the pig manure can be processed with same fermentation procedure. Ammonia binders was added in two stages before the storage and after the separation. Before and after the fermentation procedure we measured ammonium content, moisture content and pH value. We determined the ammonia emission during the manure storage and fermentation period. Our destination is reducing the ammonia emission and we looked for a convenient material.*

Key words: *pig and cattle slurry and poultry manure processing, ammonia emission reduction.*

TECHNICAL ASPECTS REGARDING THE CALCULATION OF AXLES OF ROAD TRANSPORT VEHICLES

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Abstract. *Mathematical models of mechanical structures, structural models are characterized by three main components: geometry, border conditions (bearing or ties with the outside environment for dynamic problems and initial conditions)) and the load (external actions on the mechanical system studied). The first component (geometry) is a idealized component of the reality – the shape of the body or the shape of bodies assemblies studied. This can be improved until the level desired by the analysts. The other two components (border conditions and load) are engineering assumptions. These components of the model, being engineering assumptions, must be either theoretically deduced and experimentally verified, either experimentally directly deduced by various of measurements. In general, when studying separate components of a whole assembly, these assumptions are difficult to formulate and thus, the overestimates lead to design of some massive structures, that generate high consumptions and reduced maneuverability. As easily, the underdimmensionnement may occur leading to more serious effects, malfunctions resulting with failures or major accidents. This article aims to tackle the issue of conditions (structure bearing) at the border of the structural model, suggesting solutions for the situation which, the components of a whole assembly are separately analyzed.*

Key words: *components, conditions, mathematical model, vehicles.*

TRACKS OR WHEELS – PERSPECTIVES AND ASPECTS IN AGRICULTURE

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Abstract. *The issue of tracked vehicles (tractors) or wheeled vehicles (tractors) for off-road operations has been a subject of debate for a long period of time. While a number of experimental studies in comparing the performances specific agriculture of tracked vehicles and of wheeled vehicles with those under selected operating environments have been performed, it appears that relatively little fundamental analysis on this subject has been published in the literature. This paper is aimed at evaluating the tractive performance of tracked and wheeled vehicles from the standpoint of the mechanics of vehicle–terrain interaction. The differences between a track and a tires in generating thrust are elucidated in agriculture. As the interaction between an off-road vehicle and unprepared terrain (soil) is very complex, to compare the performance of a wheeled vehicle with that of a tracked vehicle realistically.*
Investigations cover tracked tractor in harrowing and soil levelling coupled with an adequate implements, and wheeled tractors coupled with implements regarded harrowing and seedbed preparation.
Characteristics in a physical mechanical properties of non compacted soil (PMPS) like cone index, bulk density, total porosity, moment of torsion and shear stress, have been compared with compacted soil on passes under driving systems tracked or wheleed of tractors.
It is hoped that this papers will illustrate the fundamental factors that limit the traction of wheeled vehicles in comparison with that of tracked vehicles, hence contributing to a better understanding of the issue of tracks or wheels in conditions and perspectives in agriculture.

Key words: *tracks, wheels, conditions, physical-mechanical properties of soil (PMPS).*

MOBILE DEVICES AND ITS APPLICATION IN AGRICULTURE

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Abstract. *In recent years we have witnessed the incredible expansion of the smart mobile phones (smartphones) and tablets. Sales of such devices for several years is growing rapidly. These types of computers are slowly but surely pushing aside personal desktop at least as we knew in the past. With the development of a new generation of mobile devices has increased the number of mobile applications. Mobile applications are developed in all areas of interest, so the number of applications developed and applied in the field of agriculture. abstract*

Key words: *mobile applications in agriculture, mobile and tablet devices.*

OPTIMIZATION MODE OF THE ELECTRIC DRIVE PUMPS WITH THE DOUBLY-FED INDUCTION MOTOR

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Abstract. *This paper defines the opportunity to optimize the electric drive pumps with the wound rotor induction motor, which regulates the speed of a double feeding, with the stator from the power supply, and with the rotor through a semi-conductor converter, whose voltage and frequency can be independently regulated. Optimization is an action of the rotor voltage, at which, for a given frequency, the induction motor that drives the pumps operates with the rated currents of the stator and rotor, or with the stator and rotor currents whose ratio is equal to the ratio as at rated operation. Then the induction motor operates with minimal losses and maximum efficiency level, and then the demands of the semi-conductor converter are the smallest.*

Key words: *induction motor, double feeding, electric pump, semi-conductor converter, speed regulation, optimization of the rotor voltage.*

THE SIGNIFICANCE OF POST-HARVEST TRANSPORTATION TASKS IN THE FIELD ROOT VEGETABLE PRODUCTION

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Abstract. *In the paper we present the up-to-date mechanized production technology of carrot production from ridge preparation till harvesting including transporting as well. By the presentation of the performance and economic data of machines necessary for production, we are emphasizing the significant volume of transport tasks in the production technology. Our surveys have proved that the machine work costs of field root vegetable production are high. Considering machine costs it is advantageous if, as in the studied cases, harvesting is done by tractor-pulled working machines instead of expensive self-propelling harvesting machines with high operational costs, as the acquisition cost of connected working machines is more favourable and a better utilization and lower specific operational costs of power machines can be achieved by the use of tractors. It can be stated that special attention is to be paid to the following operations: harvesting, transport, cultivation and plant protection which are the most costly operations that represent about 95-97 % of the total machine operational costs.*

Key words: *mechanisation, root vegetable production technology, machine investments and usage costs, transportation tasks.*

LYOPHILISATION TECHNOLOGY FOR ISOLATION OF NATURAL SUBSTANCES

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Abstract. *The natural components (anthocyanins) of plant origin in selected therapeutically indications have their own advantages in a compare with the synthetic chemistry. With regard to general isolation of these components (secondary metabolites of plants, animals and other organisms) the distillation and extraction methods are used. The method of freeze drying is totally different against distillation or extraction technologies. The aim of research and development is the optimization of lyophilisation process with acetone extracts of fruits of the northern high bush blueberry (Vaccinium corymbosum L.). The acetate extracts were supplied in a frozen condition. The solvent - acetone was vacuum-evaporated after extraction from all samples. The device GEA Lyophil SMART LYO 2 from the German producer GEA was used for the lyophilisation. The work consists of two parts: optimally diluted samples by purified water after defrosting and optimization of the lyophilisation program in a way to achieve the final product in the form of a dry powder at the end of the process. The basic research in its various stages confirmed the assumption that by the method of freeze-drying can be isolated natural substances (anthocyanins) after extraction from plant material with their stabilization and their biological activity.*

Key words: *anthocyanins, blueberry, extract, fruits, lyophilisation.*

CHANGES IN PHYSICAL PROPERTIES OF CARROT ROOT AFTER OSMOTIC DEHYDRATION

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Abstract. *Physical properties of carrot root were investigated based on the changes in mass, volume, moisture content on wet base, mechanical properties and color. Osmotic drying was carried out at a temperature of 40 and 60°C and concentration of sucrose solution of 50 and 65°Bx, three hours. The carrot root was sliced at 10 mm. Samples were pretreated with 4% malic acid (20 minutes) at temperature 20°C, water blanched at temperature 90°C (3 minutes) or without pretreatment.*
Blanched samples had lower values of the physical properties in reference to fresh or pretreated samples with malic acid. Applying osmotic dehydration, statistical significant differences in mass, volume, moisture content and mechanical properties were found. Moisture content after 3 hours of osmotic dehydration was in range 69.40% to 47.15%, with regard to temperature and concentration of sucrose solution. Testing the color, there was not found statistical significant differences after osmotic drying.

Key words: *physical properties, mechanical properties, carrot root, osmotic dehydration.*

METHODOLOGICAL IMPROVEMENT OF LABORATORY SPECTROSCOPY FOR POSTHARVEST SEPARATION OF FUSARIUM INFECTED GRAIN SAMPLES

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Abstract. *In common alimentation habit most cereals are consumed in refined form. The separation of kernel outer layer (bran and germ and endosperm removal) during the grinding and refining process results in the so called "white flour". This means decisive loss of useful nutrients and elements. Due to the modern healthy alimentation trends the scale of the "whole flour" increases. "Whole flour" also contains the above mentioned components so it is more robust, full-flavored flour with valuable vitamins, minerals and more protein. The part of the trend is the growing demand toward organically or ecologically produced and treated foods such as ecological whole grain products. Due to the strict regulation of such production lines the chemical protection against fungal diseases is rather limited, nevertheless, seeds infected with fungal disease - if not separated properly from the raw material - can cause serious health problems. In this study we are introducing a basic study which aims to identify the optical characteristics of Fusarium infected wheat samples to facilitate an effective non-destructive separation method.*

Key words: *whole grain products, fusarium, postharvest selection, spectroscopy*.

ERGONOMICS APPROACH TO EVALUATE SAFETY RISKS WITHIN THE UK FOOD INDUSTRY, PRELIMINARY RESULTS

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Abstract. *Generally ergonomics, a science concerned with the 'fit' between people and their work, could considerably reduce injury risks improving productivity and reducing wastes. To assess the fit between a person and its work, a range of factors have to be considered including: job task, individual both physical and psychological characteristics, organization and social environment. In this paper the authors aim to understand how ergonomics and human factors can improve health and safety within the UK food industry. The aim was to identify hazards and risk within the industry and ways to reduce or eliminate dangerous situation. In conclusion author observed that ergonomics has both a social goal (well-being) and an economic goal (total system performance); that ergonomics considers both physical and psychological human aspects; and that ergonomics is looking for solutions in both technical and organizational domains.*

Key words: *ergonomics, health & safety, injury, work related illness.*

LIGNOCELLULOSE FIBRES AND RESISTANT STARCH OF MAIZE HYBRIDS

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Abstract. *The objective of this study was to investigate and compare ZP maize hybrids of a different genetic background for lignocelluloses fibres and resistant starch. The results showed that the NDF, ADF, ADL, hemicelluloses and cellulose contents in the whole maize plant of the observed different ZP hybrids varied from 41.7% to 50.0%, 19.3% to 21.3%, 2.9% to 3.5%, 22.4 to 28.7% and 15.9 to 17.9%, respectively. The hybrid ZP 544 had the highest content of NDF and ADF in the plant without the ear and the lowest dry matter digestibility of (45.1%). Starch, protein and oil contents of kernel ranged from 67.9 to 73.0%, 8.5 to 12.7% and 4.7 to 6.4%, respectively. The amylase content, being characteristic for normal, i.e. waxy maize starches, ranged from 26.0 to 1.0%. The resistant starch content was very low (0.62–1.61%) in the samples of selected ZP maize hybrids.*

Key words: *maize hybrids, lignocelluloses fibres, resistant starch.*

COMPARISON OF DIFFERENT BY-PRODUCT SILAGES DERIVED FROM SORGHUM PLANT

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Abstract. *The aim of the study was to investigate the fermentation quality of different by-products derived from the sorghum plant applied in the bio-ethanol industry for sugar extraction. Authors ensiled the whole crop, the sorghum leaves (by-product) and the sorghum seedhead-leaf mix (1:1 fresh weight) determining the nutrient content, fermentation quality and hygienic status of the different silages. It was found that the sorghum leaf and the seedhead-leaf mix could be ensiled efficiently. However, fermentation intensity was significantly lower in the sorghum leaf- and seedhead-leaf mixed silages, than in the whole crop sorghum silage, while lactic acid- and acetic acid ratio were similar. The by-product sorghum silages had higher dry matter content (401 g/kg and 453 g/kg, respectively), as compared to the whole crop sorghum silages (290 g/kg dry matter), limiting the fermentation process and in parallel the harmful bacteria proliferation. Sorghum leaf- and seedhead-leaf mixed silages can be potential feedstuffs for dairy- (heifers, dry cows) and beef cattle.*

Key words: *sorghum, fermentation, silage.*

MASS TRANSFER KINETICS DURING OSMOTIC DEHYDRATION OF SOUR CHERRY AND SWEET CHERRY AFTER FREEZING IN SACCHAROSE SOLUTION

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Abstract. *Osmotic dehydration is a process of partial removal of water by submersing fruit in hypertonic solution. It is a pre-treatment for further steps of drying, with main aim of conserving the natural fruit quality by reducing the process temperatures and drying times. Studies have shown that osmotic dehydration improves the product quality in terms of color, flavor and texture.*
The aim of the present study was to investigate the influence of different concentration of saccharose solution (75 %, 60 % and 40 % w/w) on mass transfer kinetics during the osmotic dehydration of sour cherry and sweet cherry. One temperature level of osmotic solution at 25 ºC, for 360 min, was evaluated. The mass ratio of solution to sample during the experiment was 10:1, to avoid dilution and decrease of the driving force during the drying. During the experiment of osmotic dehydration the changes of water loss (WL) and solid gain (SG) depending on the time were monitored, using the simple gravimetrical method in oven at 105 ºC. Increase in saccharose solution concentration resulted in higher water loss and solid gain values through the osmosis period for both sour cherry and sweet cherry, due to increase in the osmotic pressure gradients. In addition, the applicability of Peleg's model to the experimental data is evaluated. Peleg's equation presented good fitting for both sour cherry and sweet cherry water loss experimental data.

Key words*: osmotic dehydration, cherry, saccharose.*

RESEARCH OF DIFFERENT CONTROL STRATEGIES FOR ELECTRO-HYDRAULIC POSITION SYSTEMS

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Abstract. *The object of the research are electro-hydraulic control systems designed to perform a wide range of tasks in agricultural machinery with linear motion, high speed response and precise positioning under a varying load. A significant problem in their development and application is a choice of control methods, since it is a non-linear dynamic system with time-varying parameters. Dynamic behavior of electro-hydraulic system can be improved by using modern methods of automatic control theory, especially the methods of artificial intelligence - fuzzy logic, neural networks and genetic algorithms. In this paper, these methods have been successfully applied in modeling and identification of an electro-hydraulic system, as well as determining the parameters of the controller in order to achieve the desired system behavior. The research results represent a contribution to the development of the concept of intelligent hydraulic cylinder for use in agricultural machinery.*

Key words: *electro-hydraulic control systems, artificial intelligence, fuzzy logic, neural networks.*

FLEXIBLE MODEL OF FRUIT DRYING

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Abstract. *There is a great diversity of fruit species in the continental South East Europe and southern parts of Central Europe. This ensures good preconditions for fruit drying over long periods of time. The longer the drying period, the higher the economic efficiency is. Combined fruit drying models have been developed at the Faculty of Agriculture in Novi Sad. The main operations of these models are the osmotic drying in a sugar solution and the convective drying by heated air. A family model of such technology was developed with the processing capacity of up to 1,000 kg of fresh fruit per day. The original equipment designed for the model will be briefly presented in the paper. Drying kinetic researches were conducted for apricots, pears, quinces, peaches, nectarines and other fruit species. The changes in fruit physical properties were investigated, especially mechanical and optical properties. The production model was applied in practice. The industrial model of fruits processing by combined technology is currently under development. The design of this model will be presented in the paper. The model is based on a module system with the unit production capacity of 3 t / day of fresh fruit. In the second case, the original method of continuous osmotic drying was developed as well. Years of research and practical experience have contributed to reliable prediction of processes and changes which occur in many fruit species. The special significance of both models is the user-friendly technology and the use of renewable energy sources. Possibilities of various contemporary drying processes such as sublimation and vacuum drying are under consideration. An inexpensive solar air drying heater was developed based on flexible, ribbed, plastic, black pipes. The model is designed as a semi-concentrated solar collector. All these performance features provide flexibility to the system for processing different fruit species and producing different final products.*

Key words: *fruit, dried fruits, drying, osmotic drying, combine technology.*

INFLUENCE OF AIR TEMPERATURE AND RELATIVE HUMIDITY IN THE HOT PHASE OF KAJMAK FORMATION

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Abstract. *Kajmak is a traditionally made Serbian dairy product which can be classified between cheeses and butter. In the traditionaly production, heat and mass transfer processes at milk/air contact surface are highly dependent on the environmental conditions, resulting in uneven product quality. In order to carry out the industrialization of kajmak production, it is necessary to reduce the production time, to introduce the environmental conditions control and to manage mass and energy transfer. Initial stage of kajmak production (first 60 min of kajmak formation process) results in surface coagulation of top layer of milk, due to mutual influences of: surface tension driven fat and protein concentration increase; and water evaporation driven by high milk temperature. This paper presents research on influense of air temperature and relative humidity in hot (initial) phase of kajmak formation. Varation of these paramteres are shown trought the emitted heat flux from milk surface. Given mathematical model is validated by experimental data obtained by measuring milk and moist air parameters over 60 minutes. Statistical analysis of numerical and experimental data has shown good agreement.*

Key words: *kajmak, heat and mass transfer, convective and evaporative cooling, numerical modelling.*

EXTRUSION AND PELLETING PROCESS IN FEED PRODUCTION

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Abstract. *Extrusion and pelleting are one of the most frequent used heat treatments for nutritive enrichment of feedstuffs and complete feed mixtures in Serbia. There are a quite number of heat treatments used for improvement of nutritional, physical, chemical and hygienic characteristics of feed, whose effectiveness depends on many factors. The two most important factors are the temperature and the time of its action, but some additional factors, such as humidity, pressure, etc., mustn't be forgotten. Extrusion is a process in which the material is pushed through the tube with the screw of different configurations and then pressed through the matrix at the end of the pipe. The basic concept of the extrusion process is high temperature for a short time (HT/ST). By using the extrusion process, statistically significant (P<0.01) difference are recorded when it comes to increasing the feed digestibility, hygiene and reduction of antinutritional substances in comparison with the starting material. Pelleting is one of the basic technological operations in the feed industry and can be defined as an agglomeration of individual compounds or mixtures which are compressed and pushed through the holes in the matrix which are then catted to the desired length. It is usual for feed to be condition before pelleting, to reach temperature of about 80°C before entering into the pelleting press. Recorded changes in treated material after pelleting are reflected in statistical significant (P<0.01) differences in higher digestibility of starch, destruction of antinutritional substances, better taste, etc., compared to untreated material. Aim of this paper is to present two heat treatments, different by purpose, heat source, equipment construction and the applied process parameters and to show its effects on feedstuffs and complete feed mixtures quality enrichment.*

Key words: *extrusion, pelleting, feed, nutrition, quality.*

PRELIMINARY TESTING OF A NEW THREE POINT HITCH DEVICE TO MEASURE THE DRAFT REQUIREMENT OF TILLAGE TOOLS

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Abstract: *A precondidtion for successful implementation of site-specific field data management is a reliable system of collecting spatial parameters in the field.*
To assess the physical condition of soil layers in field conditions commonly are in use a hand penetrometer probe and soil probe for sampling undisturbed soil. The disadvantages of these methods are time-consuming to get relatively small number of discontinuous spatial information. On-the-go measurement of draft force can improve and simplify the process of collecting field data for the purposes of scientific research. Development of a system for measuring draft force is a major challenge, because in addition to the design of mechanical parts and measuring equipment, it is important to determine the characteristics of the system and its interaction with the tools and soil, in order to apply the appropriate method of measurement.
The tested device is a rigid frame with front and rear three point hitch Category II and III according to ASAE S217.12 DEC2001. Calibration was performed in stationary conditions simulating the horizontal load on lower points of frame and the upper top link. Dynamometers are "S" type with capacity of 100 kN, 0.1 N, resolution and accuracy of 0.1 kN ± 0.5% and (tractor top link) dynamometer capacity of 200 kN, resolution and accuracy of 0.1 kN ±0.5%. Sensors are connected to a universal measuring amplifier / data acquisition system. The measuring acquisition system has adjustable sampling rates (up to 19200 Hz). Communication between PC and data acquisition system is over an Ethernet connection. The Trimble GPS reciever EasyGuide 500 was used for measuring real travel speed. Adjusted sampling rate of GPS reciever was 10 Hz.
Field experiment was conducted on November 2011th in the province of Vojvodina, northern Serbia (19.60 E, 45.40 N) at the test plot area of 0.9 ha. The lowest average draft resistance value of 17.59 kN was achieved in 16 passage, while the highest is reached after 8 passage and is 19.94 kN. The lowest average speed (1.751 m/s) was achieved in 9 passage, while the highest (1,863 m/s) was 17 passage. Between the average values of the draft force and speed in all passages are noticeable closeness. The standard deviation is the largest in the 1st passage (3.306 kN), while in other passages there is considerable familiarity in this parameter and the values range from 1.58 to 16 kN and 2.38 kN at 15 passage. Measured average value of the draft force on is 17.4 kN, which is very close to predicted value. Statistical analysis of the data with a reduced sample, indicates that the sampling rate (frequency measurement) can be several times smaller without significant result deviation. Also, it confirmed by the spectral analysis of draft signals in which can be seen as the most spectral density are frequency to 10 Hz.

Key words: *tillage, mouldboard plow draft, measurement, dynamometer.*

UNIVERSAL MODEL FUNCTION FOR THE CHANGES OF MANURE FERTILIZING PROPERTIES

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Abstract. *Solid manure crucially changes its fertilising properties during the aerobic treatment. In present study, the contents of water, organic matters, mineral matters, total and soluble nitrogen, phosphorus-pentoxide and kalium-oxide, as well as PH-value has been measured during the period of seven weeks of aerobic fermentation. Among other changes, the increase of amounts of N, P_2O_5 and K_2O, of more than 300% in average with respect to raw solid manure at the begining of the process, has been evidenced. However, it has been found and experimentally verified that changes of all of analyzed properties generally follow an exponential laws, analytically described by function* $y = e^{a + b x + c x^2}$*, with respect to the length of fertilising period as independent variable x.*

Key words: *manure, aerobic treatment, fitting function, exponential law.*

THE CHAOTIC AGRICULTURAL MONOPOLY OUTPUT GROWTH AND AN INDIRECT TAX

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Abstract. *The basic aim of this paper is to construct a relatively simple chaotic growth model of the agricultural monopoly output that is capable of generating stable equilibria, cycles, or chaos. An indirect tax is included in the model.*

A key hypothesis of this work is based on the idea that the coefficient $\pi = \frac{f\ (1+d)}{2\ b\ (\alpha - 1)}$ *plays a crucial role in explaining local stability of the agricultural monopoly output where: d - an indirect tax rate; f - the coefficient of the marginal cost function of the agricultural monopoly; b - the coefficient of the inverse demand function,* α *- the coefficient of marginal revenue growth. The quadratic form of the marginal cost function of the agricultural monopoly is important ingredient of the model.*

Key words: *agricultural monopoly, output, indirect tax, chaos.*

SPATIAL ANALYSIS (GIS) AS A TOOL FOR TIMBER EXTRACTION AND FOREST MANAGEMENT OPTIMIZATION. A STUDY CASE IN BASILICATA REGION, SOUTH ITALY

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Abstract. *ArcGIS software was used for timber harvesting planning in five (5) different mountainous broadleaf forest areas from Basilicata region, located in South Italy. Orographic characteristics, such as slope, watershed systems features, hydrogeological risk and other natural obstacles (accidental nature of ground) were considered. The different manual and mechanical timber extraction and concentration methods used by local timber companies were also considered. The different typologies of roads network to access forests were also introduced in the models.*
The analysis allowed identifying forest areas with territorial constraints and orographic restrictions, and with different accessibility, for a new planning of additional roads necessary for timber extraction optimization, as well as optimized site-by-site timber extraction methods. This methodological approach should be tested in other mountainous forest regions.

Key words*: timber harvest, GIS, forest accessibility, new forest road construction, territorial constraints.*

MODELING THE TOMATO FRUIT GROWTH USING TOPOGRAPHIC MAPS

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Abstract. *Developmental analysis of pericarp can predict fruit yield and quality in many crops, including tomato. Tomato fruit development in wild type, during late stage of cell division and cell expansion to ripe the fruit stage has been observed under controlled growing conditions. Detailed anatomical analysis of the pericarp indicates response of fruit developmental processes under optimal irrigation treatment. During fruit aging almost linear relationship between the increase of pericarp and mesocarp thickness has been verified. Simultaneously, exocarp and endocarp had slower growth and, consequently, lower impact on the total pericarp size. On the base of performed analysis, topographical maps showing relationships between the pericarp, exocarp, mesocarp and endocarp thickness against the fruit age and number of cell layers have been constructed. These kind of maps enable more precise control of tomato fruit growth and development during the production process.*

Key words: *pericarp thickness, cell layers number, two-dimensional interpolation, topographic map.*

STATISTICAL ANALYSIS OF SOME BIOLOGICAL AND TECHNOLOGICAL CHARACTERISTICS FOR VARIETIES AND LOCAL BIOTYPES OF VINES IN WESTERN ROMANIA

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Abstract. *Over 16 local varieties and biotypes of vines from the western part of Romania, have been identified and analyzed in terms of the biological and technological traits. The results were analyzed through comparison with some known and common varieties in the area. The quantitative and qualitative results for these varieties, were interpreted on the basis of statistical and mathematical models and finally applied to multivariate analysis.In addition to statistical interpretation that provides accuracy data, it was revealed the special value of some of these local varieties and biotypes.*

Key words: *local biotypes, wine, statistical analysis, Romanian viticulture*

USING THE ERROR FUNCTION FOR EVALUATION OF THE MIXING TRAILERS FOOD DISTRIBUTION UNIFORMITY

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Abstract. *The paper presents a simple novel approach, based on the „error function, for evaluation of mechanized food distribution quality in the livestock barns. Two concepts of mixing trailers were tested: trailers equipped with the horizontal mixing rotors and those having the vertical mixing rotors. The experimental results, processed by the algorithm based on the „error function" showed that the best uniformity of food distribution was achieved with trailers having the horizontal rotors. The least efficiency was evidenced for the trailer equipped with single vertical rotor. It is verified that the „error function" algorithm is very efficient for evaluation of food uniformity distribution in livestock barns. An additional graphical method is also presented and verified as a simple and easily readable graphical complement of "error function".*

Key words: *mixing-distribution trailer, food distribution, uniformity, error function.*

MODELING THE LATERAL UNIFORMITY OF WHEAT SEEDING

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Abstract. *Sowing units represent complex mechanical and pneumatic systems exposed to various stochastic disturbances. They have an important role in the technological process of wheat production. Under regular conditions, sowing operation should place the seed in rows at desired span, depth and seed to seed spacing, as well as to properly cover the seeds with soil and provide proper seed compaction. Depending on the crop species and agro-climatic conditions, recommended seeding parameters (row to row spacing, seed rate, seed to seed spacing, and depth of seed placement) may differ significantly. Sowing of small grain crops, such as wheat, barley, or oats, is most commonly done by seed drills, what imposed this kind of machines in the focus of interest of present paper. Imperfectness of seeding operation can decrease the crop yield and increase the consumption of seed over the minimum quantity that was actually needed for optimal crop growing. To enhance its quality and efficiency, the seeding process has to be carefully planned, accurately controlled and final seeding results have to be evaluated. Therefore, this paper presents an original mathematical model based upon the formerly reported experimental results, as well as own experimental study dealing with the lateral distribution of wheat seeds after machine seeding. Differential equation, accompanied with the specific appropriate additional conditions, which describes lateral distribution of wheat seeds after machine seeding, has been formulated and presented. Developed model was experimentally tested. It has been demonstrated that proposed differential equation has an analytical solution in the form of the normal Gaussian distribution function, which tightly follows the lateral distribution of wheat plants seeds after their seeding with pneumatic drill seeder.*

Key words: *mathematical model, wheat, seed distribution, partial differential equation, stochastic disturbances.*

ON THE PROPERTIES OF HEAVY SOIL AFTER AUTUMN TILLAGE

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Abstract. *This paper is based on the experimental study focused to analysis of the non-carbonated humogley, exposed to autumn treatment specified to provide optimal conditions for sowing wheat. Predominant contents of soil fractions, having size between 1 and 9.5 mm in the amount of 51.67%, as well as absence of fractions larger than 50 mm (0%), confirmes that analysed soil sample is a representative and realistic basis for testing the corresponding mathematical models of interest. Among others, presented experimental results verify significant dispersion of statistical parameters describing the distribution of soil fractions according to aggregate size, at different measuring points of tested sample plots. This way, a crucial role of detailed multi-point acquiring of soil samples, instead of ordinary used five-piont sampling, has been verified.*

Key words: *multi-point sampling, aggregate size distribution, black soils, conservation soil tillage.*

MATHEMATICAL MODELS FOR OPTIMIZING INVESTMENTS AND ACTIVITIES IN VITICULTURE

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Abstract. *Research has focused on analyzing and interpreting mathematical level of investment for setting up of some different sizes vineyards in the west of Romania.*
Were analyzed eight wine farms, with the area among 5 and 80 hectares, in terms of initial investment, technological level applied for crop maintenance, damping investment opportunities and their input as swiftly as possible for profit achievement.
Based on available data, we tried to obtain a mathematical model that show the specific real climatic conditions in the west of Romania, which is the most appropriate technology so that the vineyards to can obtain the desired economic effect.

Key words: *vineyards, investments, production technology, mathematical model.*

INFLUENCE OF THE CARP FISH POND MODEL SELECTION IN SERBIA ON THE INVESTMENT VALUE FOR ESTABLISHMENT OF THE FISH POND FACILITY

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Abstract. *Production of carp and related fish species in Serbia is carried out in the fish ponds of different sizes and different technical and technological characteristics. In order to estimate as optimal as possible the amount and structure of investments in the selection process of different production models on the carp ponds, there have been designed five organizational and economic models which on representative way reflect the situation in the carp production of Serbia. For construction of those models there have been defined complete investment items necessary to be done before the beginning of the production process. On defined models it has been analyzed the structure of investments, as well as the comparison of particular categories of investments between different models. The analysis showed significant differences in the amount of investments, and in the structure of investments depending on the applied model of carp fish pond.*

Key words: *carp fish pond, organizational and economic models, investments*

THE IMPACT OF LAND USE ON SOIL EROSION AND RUNOFF IN THE KRIVAJA RIVER BASIN IN MONTENEGRO

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Abstract. *Modelling of soil erosion should be one of priorities for soil conservation because of better understanding of the soil erosion phenomenon, what is further important for preventing the land degradation. For the Krivaja River Basin of Polimlje the authors studied soil erosion processes, using a series of data that are characterizing variations in land use over the period of four decades. The computer-graphic modelling was used to calculate soil erosion intensity analysing data of Forest Management Plans, Cadastre, Landsat images and Statistical Yearbooks. It was concluded that the condition of the vegetation cover and the land use have influenced the development of erosion processes in the territory of the subject river basin. The authors calculated the maximal outflow from the river basin on 42 m^3s^{-1}. Research shown that the river basin belongs in „Destruction Category IV", according to the classification system of Gavrilovic. The strength of the erosion process is weak. The real soil losses from the river basin are over 1200 m³/year. The results indicated that decrease of grassland did not pose a significant risk to soil erosion, because of continual increase of areas under the forests. Change of the land use in structure for the period of four decades (1970-2013), in the studied river basin, decreased the soil erosion intensity for 3.43%.*

Key words: *soil erosion, runoff, land use, modelling, prediction, IntErO model.*

THE HISTORY OF LAND CONSOLIDATION IN SERBIA

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Abstract. *Development of agriculture depends on many factors on which man may or may not have the impact. One of the parameters which is directly dependent of human will, and which is important for development of agriculture, is improvement of the structure of land property (several parcels owned by the same owner) in which is planned agricultural production. Land consolidation presents the measure that is traditionally used to regulate agricultural land and improve its structure. There is presumption that performing land consolidation began in the XIX century. In the second half of XX century works in carrying out the land consolidation were very intensive, so until 1990 land consolidation had been realized on ¼ of area of agricultural land.*

Along with the changing the structure of land property through grouping parcels and construction of infrastructural facilities, there were another measures carried out in order to improve life quality of farmers. Above all, it refers to the measures that have contributed to better economic and social position of farmers.

Further development of land consolidation is primarily determined by planned material resources for its purpose. If the goal of land consolidation project is to maximize the results (excluding material resources), it is necessary to implement changes that will allow it. Primarily, it is necessary to introduce changes to the existing legislation (in fields of agriculture and land consolidation), and then in the state administration organization and educational system. The particular section of the paper is devoted to the content of the proposed changes in this area.

Key words: *land consolidation, agricultural land, recommendations for development.*

ANALYSIS OF THE EVOLUTION OF LANDSCAPE AND LAND USE IN A GIS APPROACH

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Abstract. *The use of Geographical Information Systems facilitates spatial analysis and allows the understanding of the evolutionary processes that occured over the years and have led to the current conditions. Thanks to a comparison between an historical cartographic map with recent ortophotos, it was possible to evaluate the meaningful elements present in an area and their changes over time. A compared analysis, started early 1800, found that the study area, mainly its rural and forestry land, have been affected by deep transformations, due to natural events, human intervention, and changes in natural cycles, that resulted difficult to understand. The historical map represents the entire municipality of Ruoti (Basilicata Region, Southern Italy), traditionally devoted to arboreal cultivation or wood-sheep farming,. The map reports the town and the surrounding area in the Year 1812, showing the main rivers, the land use of the area, the different type of vegetations, expressed with different colors and symbols.*
The spatial analysis of this study area showed a succession of land use changes, influenced by the modern cultivation techniques, while vegetation changes give variations of the agro-forestry landscape over the years, and cultivation conversion caused a loss of CO2 fixation value.

Key words: *GIS, historical map, hand use, carbon balance.*

SUBSTRATE ADDITIVE FOR BIOLOGICAL DEPURATION

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Abstract. *The following study presents the results of testing of a substrate liquid added to a pre-existing system of biological filtration process air of a composting plant. The substrate under test is a mixture of micro and macro nutrients useful to improve the efficiency of degradation in the cases of degradable pollutants from microbial metabolism in the presence of a ratio C : N : P equal to 200 : 10 : 1. The tests were conducted in the field by applying the substrate in liquid form to a biofilter present in a plant for composting. The biofilter involved in the trial receives the effluent gases captured from the section of accelerated bio-oxidation system. The distribution of the substrate was carried out manually above the filter surface and the quantity of substrate used has been established in relation to the pollutant load input to the garrison to environmental and chemical-physical characteristics of the filter material. The effect of the use of the substrate was evaluated in terms of concentration of microorganisms in a cm^3 of filter material and the method used for this measurement was that established by Standard EN ISO 6222 of 1999.*

Key words: *degradable pollutants, biological filtration, biofilter, composting plant, microbial metabolism.*

ANCIENT ROADS IN SOUTHERN ITALY: AN HYPOTHESIS OF REQUALIFICATION FOR THE VALORIZATION OF THE RURAL LANDSCAPE

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Abstract. *The rural heritage of a specific area represents the form that man has been able to give to its surrounding landscape. Over the centuries, in many European rural areas, roads have lost their traditional design motivation. Their requalification, in the framework of a sustainable development of rural areas, can be an important way for the protection of the landscape. Through the provision of new alternative activities, compatible with the particular nature of the environment, new opportunities for a sustainable preservation of the environment are possible*
The "Francigena Way" is a combination of arterial roads dating back to the Roman era. The "Herculia Way" is part of the "Francigena Way" that was built in southern Italy. The aim of this research is to study a possible requalification of a part of the Herculia Way. Some ancient paths, known as "tratturi" (sheep-tracks) and small royal tratturi, in some measure still existing, have been identified and located on historical maps. One of these paths has been chosen for the present analysis; different surveys have allowed us to identify some rural buildings along its route, with a significant architectonical, historical and landscape value. The hypothesis of a structural and functional recovery through their maintenance and restoration will help the sustainable protection and enhancement of the landscape.

Key words: *path valorization, Roman ways, rural landscape, agricultural buildings, sustainable development.*

WATER MOVEMENT TROUGH LEVEE WITH AND WITHOUT DEFORMATION

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Abstract. *Levees as line hydro technical objects are being built in order to prevent flooding. Although most of the year is not exposed to water, when flood coming, water movement trough the body of the levee exists. Depending on the characteristics of the levee and duration of floods, as well as the occurrence of certain deformations of the body of the levee, on the protected slope may occur spring water flow as a result of water movement through the body of the levee. Because of the deformation which can be varied, increasing the possibility of changing seepage line and the formation of flow on protected slope causing erosion of the levee body and threaten its stability. This paper presents a possible scenarios of hydraulic modeling of water movement through the body of the levee with and without deformation. Special emphasis is given to the analysis of the impact of small rodents burrow formed in the levee.*

Key words: *levee, hydraulic modeling, seepage line.*

ENERGY IN AGRICULTURE: CONSUMPTION VS. PRODUCTION

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Abstract. *Agricultural sector is considered as a non major energy consuming sector. However, the energy consumed in agriculture considerably affects the cost of the agricultural products and as a consequence the agricultural market. For this reason, the use of alternative energy sources in agriculture is of importance to keep the agricultural product prices in low level. On the other hand, agriculture appears to be an important energy producing sector, taking into account that biomass either in the form of energy cultures or agricultural waste and residues are also agricultural products or byproducts. Under these circumstances and taking into consideration the recent energy crises, EU encourages the biomass energy production, which can replace considerable amounts of polluting conventional fuels.*

Key words: *agriculture, renewable energy, energy consumption, energy production, biomass*

THE CURRENT STATE OF RENEWABLE ENERGY SOURCES OF ELECTRICITY IN SERBIA

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Abstract. *An analysis of the development of renewable energy sources (RES) and their influence on the development of an improved concept of electric power system having distributed electricity production in Serbia is presented. The state and prospects of the future development of renewable energy in Serbia are presented in detail. The fascinating development of renewable energy sources in Europe and worldwide which occurred while doing this study has been taken into account. Annual gross energy consuption in Serbia is about 17 Mtoe and near 6% is produced by renewable energy sources, namely, by hydropower plants. A review of the potentials of renewable energy sources and a short analysis of the price of a wider use of renewable energy sources in the electricity production in Serbia is included.*

Key words: *renewable energy sources (RES), potential, electric power system, distributed electricity production.*

ENERGY EFFICIENCY IN AGRICULTURE – OPPORTUNITIES, CONSTRAINTS AND RESEARCH NEEDS

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Abstract. *Agriculture as a primary industry relies on energy use to a great extent. With the depletion of fossil resources, increased energy prices will have a dramatic effect on the competitiveness of agricultural production systems and energy efficiency will have a great impact on the comparative cost advantages of agricultural production systems. Within a Coordination and Support Action funded by the 7th research framework of the EU (www.agree.aua.gr) a consortium from seven European countries identified opportunities, constraints and research needs concerning energy efficiency in agriculture.*

Key words: *energy efficiency, precision farming, reduced tillage.*

ENERGY EFFICIENCY AND GHG EMISSIONS IMPACT FROM TRADITIONAL TO ORGANIC VINEYARD CULTIVATIONS IN GREECE AND PORTUGAL

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Abstract. *Traditional farming systems are based on achieving high yields using high inputs, targeting acceptable farmers' income. Nowadays, traditional farming shifts towards maximum possible crop yield using minimal inputs in an optimized way or towards organic farming, namely accomplishing low yield of high quality products without using conventional agrochemicals (i.e. fertilizers, pesticides). The last approach leads, in general, to lower energy consumption per unit area of land, therefore lower cost and lower greenhouse gas emissions (GHG). However, in a global perspective it has the risk of significant reduction in total production. Hence, it is vital to consider energy efficiency, namely the ratio between a unit of product and an input of energy, as a key comparison unit affecting the overall efficiency of crop farming systems in terms of energy and GHG emissions. In the present paper, two show cases of vineyard cultivations are presented to illustrate the energy efficiency and GHG emissions impact when switching from traditional to organic vineyard cultivations in Greece and Portugal. In the Greek vineyard case, organic farming leads to significantly lower grape yield (31%) resulting in a 0.4% reduction of energy efficiency and a 6.7% reduction of GHG emissions. In the Portuguese vineyard case, organic production results in a grape yield decrease of approximately 21%, leading to lower energy efficiency (4.7%), also reflected in GHG emissions (2.7%).*

Key words: *vineyard cultivation, organic farming, energy efficiency, GHG emissions.*

ENERGY EFFICIENT TECHNOLOGY AND TECHNICAL SYSTEMS FOR BIOMASS COLLECTION FROM CROP PRODUCTION

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Abstract. *Energy plays a key role in the economic growth and economic structure of a country whether it is developed, less developed and underdeveloped country. It is estimated that the total amount of crop residues in crop production ranges from 9.55 to 13 million tons, and the expected amount of crop residues that can be used as fuel is from 3.06 to 4.17 million tons. The increase of the energy efficiency is a constant task for the researchers, businesses and business associations. The aim of this paper is to show the energy balance of the technological and technical systems in the process of collecting biomass as well as to determine its share in the total energy balance of biomass and total biomass quantities available. The experiment showed that with the increase of transportation distance from 5 to 15 km, fuel and energy consumption is increasing for more than 80% toghether with the 60% lowering of fuel consumption per unit of transportation distance. Having in mind the fact that the energy value of wheat, corn and soybeans straw varies from 12 to 15 MJ/kg and that the actual average straw yield per hectare in conditions of PKB corporation is around 2.5 t/ha, then converted to energy is around 30 GJ/ha. This imposes a clear conclusion that the energy cost of collection and transportation of materials that varies from 297 to 570 MJ/ha can be characterized as more than modest.*

Key words: *biomass, renewable energy, energy efficiency, crop residue.*

ENERGY POTENTIAL OF TOBACCO STALKS IN BRIQUETTES AND PELLETS PRODUCTION

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Abstract. *Residues from crop production have a great energy potential and therefore they are suitable for briquettes and pellets production. Although tobacco stalks are rarely or almost not used in this purpose, in comparations with other crops, according to the chemical composition they have great heating value. Nicotine content in stalks, which is potential obstruction in combustion process is on the very low level, and it can be used as renewable energy source. This paper shows comparation of two types of tobacco stalks virginia and barley with other known crops that are used as biomass. Heating values are calculated according to the elementar chemical composition and lignine content in crops. Results shows good agreemnet of tobacco stalks heating values with other crops.*

Key words: *tobacco stalks, renewable energy source, heating value, lignine.*

ANALYSIS OF THERMAL LOADS OF GREENHOUSE HEATED WITH GEOTHERMAL ENERGY

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Abstract. *Use of geothermal energy for agricultural heating has several advantages. As renewable source of energy it can provide constant energy supply with significant CO_2 emission reduction and in same time it can be provided sustainable food chain. Greenhouses are very suitable for this heating type because of theirs purpose of intensive food production with all energy demands decreasing in the same time. This paper deals with dynamic analysis of greenhouses heat consumption heated with geothermal energy in order to determine the optimal operating parameters greenhouse, or heat energy necessary to regulate temperature and humidity in greenhouses. In paper is used TRNSYS software package which allows analysis of the impact of various operating parameters. Based on the characteristics of the existing greenhouse, heat load is analyzed at different operating regimes in different zones of greenhouses. Described analysis allows optimization of working parameters of greenhouses in conjunction with the geothermal energy source in order to achieve maximum energy efficiency and yield of agricultural crops grown throughout the season.*

Key words: *greenhouse, dynamic simulation, heat load, geothermal energy.*

COMPARISON OF DRIFT REGULATIVES AT APPLICATION OF PLANT PROTECTION PRODUCTS IN SLOVENIA AND SOME EU COUNTRIES

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Abstract. *The paper presents different legislative concepts to limit negative side effects of plant protection product use and approaches for the continuous restriction on the conditions of their use. Very restrictive concepts are more or less acceptable to most of public who have no direct contact with agricultural production. The paper compares the systems of adjustable buffer zones for protection of surface waters and sensitive natural or urban areas against contamination with plant protection products, as in many EU countries is already the common practice, with the system of fixed buffer zones used in Slovenia and regulated by the Plant Protection Products Act and the Waters Act, and their sub-law regulations. In the areas, where the adjustable buffer zones are already established, there are more positive than negative experiences present, on the segment of monitoring of environmental parameters and also on the field of monitoring of the economic performance of agricultural producers. The alternative system that we intend to develop via the accomplishment of national research project would eliminate currently present difficulties detected at system of fixed buffer zones, which often discourage producers from investments into agriculture production, or even completely make the agricultural production unfeasible.*

Key words: *drift, reduction rate, drift-reducing nozzles, buffer zone.*

NEW EU TYPE APPROVAL FRAMEWORK REGULATION FOR AGRICULTURAL AND FORESTRY VEHICLES

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Abstract. *In the Official Journal No. 167 from 2013 the new Regulation (EU) No 167/2013 of the European Parliament and of the Council of 5 February 2013 on the approval and market surveillance of agricultural and forestry vehicles has been published. This Regulation is a framework legislation that covers all technical requirements for agricultural and forestry vehicles before putting on the market. It will repeal the existing framework Directive 2003/37/EC and also 23 separate Directives on 1 January 2016. The layout, the structure and main requirements are aligned with the framework legislation for motor vehicles with four or more wheels. The European Commission that prepared this regulation followed recommendations from the Competitive Automotive Regulatory System for the 21st century (CARS 21) report and therefore simplify the current whole vehicle type-approval regulatory framework. This Regulation is followed by seven delegated acts and one implementing act. This paper describes all chapters of this new regulation and point out all important and new prescriptions.*

Key words: *EU legislation, agricultural vehicles, forestry vehicles, approval.*

THE CONTRIBUTION OF AGRICULTURAL MACHINERY TO SUSTAINABLE AGRICULTURE

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Abstract. *Sustainability plays an increasingly important role in the technical development of agriculture. Technical development is the framework of complex development activities in agriculture and it is similar to sustainability as it covers and integrates biological, chemical, technical and human factors. Intelligent production methods which have been developed in recent years mean great steps into the direction of sustainability. These up-to-date farming methods can be grouped under the umbrella of "precision farming". Machinery development plays a determining role among the complex innovation process. This paper presents the new technological solutions which are used in agricultural production. The economic background of agricultural machinery supply and the importance of training and education are also discussed.*

Key words: *sustainability, intelligent production methods, machine supply.*

NEW SECONDARY MATERIALS FROM RECYCLED AGRICULTURAL PLASTIC FILMS

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Abstract. *The extensive and expanding use of plastic material in the Italian agriculture for several diverse application results in increased accumulation of plastic waste in rural areas. The current practices adopted by Farmers consist, unfortunately, of a mismanagement of the plastic material that is abandoned or buried in open fields or burnt in a not controlled way, with heavy environmental consequences and a loss of material and energy.*
In the present paper, an analysis of the most technical efficient and economically feasible solutions for the management of agricultural plastic waste is given. These solutions represent main results of the European Project "Labelagriwaste" and they enable the analysis and planning of agricultural plastic waste fluxes, together with the possibility to investigate different development scenarios and to consider new planning strategies for the management of agricultural plastic waste.

Key words: *agricultural plastic materials, plastic material properties, plastic waste management, mechanical recycling.*

A EUROPEAN SYSTEM FOR THE WASTE MANAGEMENT AND VALORISATION OF EMPTY PLASTIC CONTAINERS OF AGROCHEMICALS

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Abstract. *Mismanagement of Agrochemicals Plastic Packaging Waste (APPW) constitutes a major environmental problem, resulting in the pollution of soil, air and water resources and compromising the agricultural products safety, the protection of the environment and the public health. Systems for the management of APPW established in some European countries are incompatible while their operational conditions and technical criteria could be improved. In many countries no schemes exist yet for the management of APPW with serious negative consequences for the environment and public health. In response to these problems the European project AgroChePack has developed an environmental friendly, economically viable European APPW management scheme by transferring know-how from existing schemes, designing a new integrated APPW management scheme and testing it through pilot trials in five countries. This work presents the basic design principles established by AgroChePack to develop an integrated APPW scheme and the pilot trials in Greece.*

Key words: *agrochemicals, packaging, hazardous, waste, recycling.*

INNOVATIVE MATERIAL AND IMPROVED TECHNICAL DESIGN FOR A SUSTAINABLE EXPLOITATION OF AGRICULTURAL PLASTIC FILM

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Abstract. *The use of plastic material in agriculture has been growing during the last decades thanks to the benefits that it provides in agricultural production. Mainly in protected cultivation plastics play an important role, by performing a passive effect – by protecting the crops from negative weather conditions – and, at the same time, an active effect – by realizing a more favorable environment for the cultivation. On the other hand, the durability of plastic films is strictly related to the modes of use, and in particular to the meteorological and environmental conditions, as well as to the consequences of stresses they are subjected to upon mounting and during their operational life. The possibilities for an improvement in the technical design of the agricultural plastic film, in terms of mechanical strength, radiometric properties and better aptitude of the material for a further recycling are connected with a more close link between its chemical formulation and the engineering performance of the material. The present paper shows, on the basis of an analysis about the main technical achievements in terms of improvement of the engineering properties of agricultural plastic film, a general review about innovative material and new techniques for mechanical recycling of agricultural plastic film.*

Key words: *agricultural plastic film, technical characteristics, innovative material, radiometric properties, mechanical recycling.*

THE MANAGEMENT OF AGRICULTURAL PLASTIC PACKAGING WASTE: A PILOT EXPERIMENTATION IN SOUTHERN ITALY

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Abstract. *In the early sixties started the "green revolution", a phenomenal increase in agricultural productivity worldwide; with it a wide and extensive diffusion of plastic material and a massive use of agrochemicals made their entrance in agriculture. The plastics used at farm level are many and different: film, hard sheet, net, string, tube and agrochemical container. All these plastics become waste and the problem of their disposal cannot be ignored since several studies indicate that most of them are disposed in an illegally way (by burning, burying, dispersion). When the waste are agrochemical containers the problem is more acute because they aren't often rinsed, resulting contaminated with chemical residues. In order to analyze the Italian current situation on this matter the Authors, in the framework of the "Agrochepack" Project, produced a mapping of Agricultural Plastic Packaging Waste (APPW) situation in an area of Southern Italy. This information was taken as a basis for the design of a pilot plant that was realized in order to enable pilot tests of APPW disposal. The first indications, as a result of meetings with farmers, showed an increased attention towards the "environmental protection", as shown by the good results that were obtained within the Project.*

Key words: *agricultural plastic packaging, waste management, pilot plant, sound disposal, environmental protection.*

RESEARCH OF GREEN PEAS COMBINE HARVESTERS

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Abstract. *Complex mechanization in green peas production presumes to have mechanized process of harvesting as one of a crucial assumption for quality of seed material refinement.*
This study presents the results of research working parameters of two types of green peas harvesters in the Republic of Serbia.
This article is summary of results observed in machine exploitation and presents some parameters of a importance for working quality.
Working quality and exploitation parameters were observed in dependence on machines operating mode and crop conditions.
A comparative analysis of exploitation parameters of these harvesters was completed. Based on that analysis, we determined directions for future using of these harvester types.

***Key words**: Pisum sativum L., green peas, stripping harvester, working quality, losses.*

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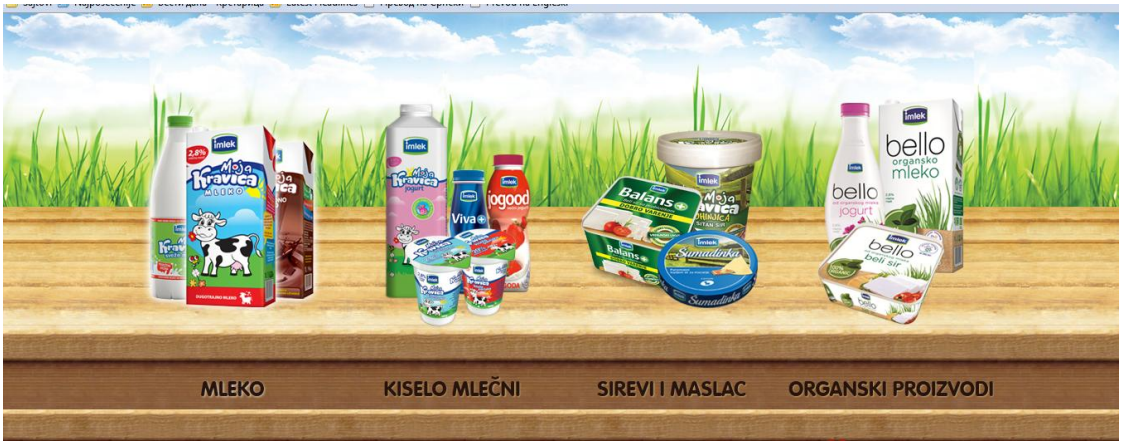

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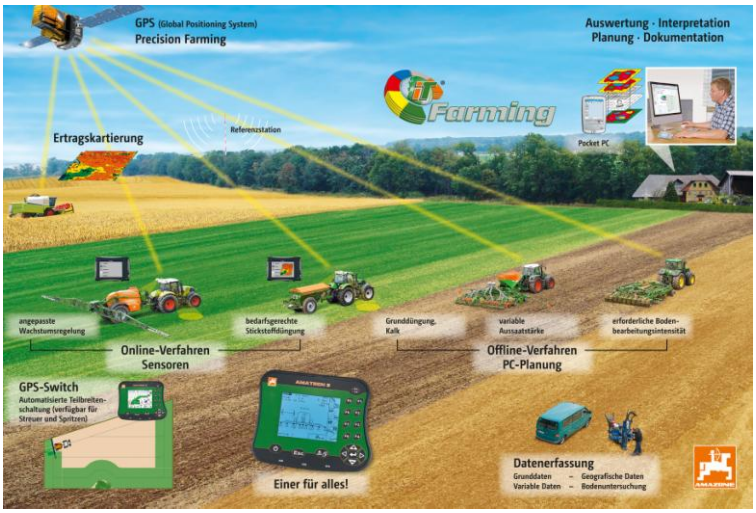

GEA Farm Technologies

FARME BUDUĆNOSTI – SVEOBUHVATNA REŠENJA

Gde god se mleko proizvodi i gde su životinje bitne, GEA Farm Technologies je pravi izbor. Od 1926. Poznati smo kao vodeći globalni proizvođač za tehničke inovacije, integrisana rešenja i efektnu higijenu životinja. Omogućavamo proizvođačima mleka da troškovno efikasno proizvode mleko visokog standarda. Uz dugo poznatu muznu opremu, danas je GEA Farm Technologies kompletiran sistemima za stajnjak i štalskom opremom što omogućuje kreiranje sveobuhvatnih rešenja za sve dimenzije porodičnih farmi ili poljoprivrednih korporacija.

Prateći svetske trendove i potrebe tržišta, razvijamo uvek nova tehnička i tehnološka rešenja. Pomažemo našim klijentima u dostizanju najviših standarda kako u kvalitativnom i higijenskom aspektu tako i u optimizaciji troškova proizvodnje i uvećavanju dobiti. GEA Farm Technologies nudi kompletan paket usluga potreban proizvođačima mleka. Od projektovanja tehnoloških planova farme, do menadžmenta stada. Brinemo se o Vašoj opremi i garantujemo dugovečnost i pouzdanost u radu. Naša servisna služba Vam uvek stoji na raspolaganju, kao i celokupna paleta proizvoda za higijenu kako životinja tako i opreme i muže. Osluškujući potrebe naših klijenata na svim kontinentima, pomeramo granice tehničkih mogućnosti. Razvili smo koncept „farme budućnosti“ sa potpuno automatizovanim sistemima za mužu, ishranu i izđubravanje (tretman stajnjaka) koje usklađujemo sa potrebama investitora.

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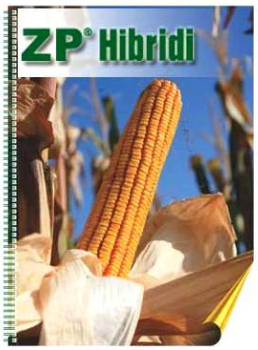

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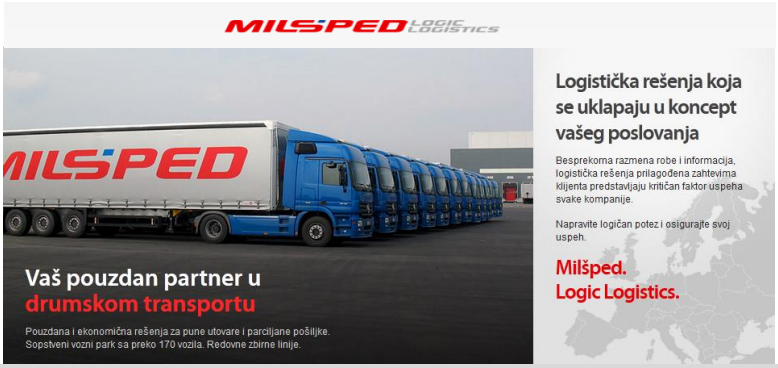

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