



ČESKÁ ZEMĚDĚLSKÁ UNIVERZITA V PRAZE

Fakulta lesnická a dřevařská

Sborník abstraktů

Conference abstracts

STUDENTSKÁ KONFERENCE
MASTER 2016

STUDENT CONFERENCE
MASTER 2016

Praha, 22. dubna 2016



Česká zemědělská univerzita v Praze
**Fakulta lesnická
a dřevařská**

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Editor sborníku

Blahoslava Vytisková

Organizační garant

Blahoslava Vytisková

Obálka

Kateřina Dekojová

Blahoslava Vytisková

Publikace neprošla jazykovou úpravou. Za obsah příspěvků odpovídají jejich autoři.

FLD ČZU v Praze, 2016

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Nedřevní lesní produkty, analýza trhu, marketingový mix

Non-timber forest products

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Abstract

This diploma thesis explores the significance of non-timber forest products in the Czech Republic with a particular emphasis on the chosen region. The main part of the diploma thesis is a detailed analysis of two most collected categories of the NWFP: mushrooms and blueberries. Furthermore, the diploma thesis is aimed to find out the value-system of these products at the processing and merchant places. As a result, the obtained data are compared with data from the whole of the Czech Republic and the trends and changes throughout years are evaluated.

Klíčová slova: nedřevní lesní produkty, analýza trhu, marketingový mix.

Keywords: non-timber forest products, market analysis, marketing mix.

Ekonomické faktory a konkurenceschopnost pilařského zpracování dříví

Economic factors and profitability in woodworking industry

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Abstract

The diploma thesis is focused on identification of economic factors in the lumber factory and their influences on economic efficiency and competitiveness under real company conditions. The other aim is in the field of economic viability of forestry and lumber sector. The sawmill Javořice, Inc. became the selected company because of its complex history. The sawmill was analyzed by financial indicators for period 2003 – 2014. The axis was divided in three time frame, of that two periods are evaluated (1/2 - 2003 - 2006; 2/2 - 2011 - 2016). The second step gives a definition the current competitive environment, for the identification SWOT analysis and 5F were used. Results of thesis contribute to the issue of the economic viability of forestry and lumber sector in the Czech republic. The improving trend of financial stability with the deleveraging of the financial situation, which is a residue of the insolvency period, follow from the economic analysis of the saw Javořice, Inc. In the field of competition the situation in the company is relatively good. The thesis can be a valuable tool, with which everyone can evaluate the company and a partner with who can trade.

Klíčová slova: pilařská firma, ekonomická efektivnost, rentabilita, konkurenceschopnost.

Keywords: sawmill company, economic efficiency, profitability, competitiveness.

Analýza objemových rozdílů mezi podklady z aukcí nastojato a prvotní evidence harvestorů

Analysis of the volume differences between the auction and operating records of harvesters

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Abstract

The aim of this thesis is to compare the volume output from electronic auctions and present auctions of standing volume, awarded by the state enterprise Lesy České republiky (LČR) with individual volumes obtained (by volume) of electronic measurement of properly calibrated harvester on a production site, "P" (stump).

Data were obtained from the company 1. Lesní realitní s. r. o. which is involved in electronic and present auctions offered by LČR. It was compared 47 auctions, which the company won during the four years (2012 - 2015). Of the 47 auctions were 40 auctions electronic and 7 auctions present. Data about standing volume were taken from input sheets of these auctions. Subsequently were taken data from printed output of a optimising and control software (Motomit IT) of harvester type Logset H8. The control measurement was made before logging in each stand and after that, eventually, the calibration was also made. Results showed that the volumes offered in the auctions are bigger than the volumes determined by harvester. The total volume of timber determined through auctions was 21 385,54 m³, but the total volume of timber identified by harvester was 20 298,16 m³. The difference between these values was 1087, 39 m³. They were also determined differences between the volume of timber measured by harvester and measured by LČR after categorization auctions according to the volume of

wood. It was found that in the category of 0 - 300 m³ differences were 3,41 %, in the category of 300 - 600 m³ differences were 4,38 % and in the last category 600 - 1100 m³ was a difference of 8,32 %. Statistical evaluation, however, showed that the differences between the categories are not significant. Further differences were determined by tree species. The greatest differences were in pine 8,70 %, then larch 6,70 % and the minimum differences exhibited spruce 4,51 %.

The results can be applied as a basis for companies engaged in buying timber in auctions. Determined differences, buyers can take into account when making bids. These bids are reflected in the total gains or losses.

Klíčová slova: harvestor, aukce nastojato, LČR s. p., měření dříví, krychlení dříví.

Keywords: harvester, auctions of standing volume, LČR s. p., measurement of timber, scaling.

Mapovanie lesných ciest z údajov leteckého laserového skenovania a snímkovania z nevegetačného obdobia

Mapping of forest routes by data of airborne laser scanning and phototgraphy of non-vegetation period

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Abstract

Data were obtained from the company 1. Lesní realitní s. r. o. which is involved in electronic and present auctions offered by LČR. It was compared 47 auctions, which the company won during the four years (2012 - 2015). Of the 47 auctions were 40 auctions electronic and 7 auctions present. Data about standing volume were taken from input sheets of these auctions. Subsequently were taken data from printed output of a optimising and control software (Motomit IT) of harvester type Logset H8. The control measurement was made before logging in each stand and after that, eventually, the calibration was also made. Results showed that the volumes offered in the auctions are bigger than the volumes determined by harvester. The total volume of timber determined through auctions was 21 385,54 m³, but the total volume of timber identified by harvester was 20 298,16 m³. The difference between these values was 1087, 39 m³. They were also determined differences between the volume of timber measured by harvester and measured by LČR after categorization auctions according to the volume of wood. It was found that in the category of 0 - 300 m³ differences were 3,41 %, in the category of 300 - 600 m³ differences were 4, 38 % and in the last category 600 - 1100 m³ was a difference of 8, 32 %. Statistical evaluation, however, showed that the differences between the categories are not

significant. Further differences were determined by tree species. The greatest differences were in pine 8,70 %, then larch 6,70 % and the minimum differences exhibited spruce 4,51 %.

Klíčová slova: letecké laserové skenovanie, DTM.

Keywords: airborne laser scanning ,DTM, identification of forest routes,.

Porovnanie lesníckych lanoviek s traktorovou technológiou

Comparison of forestry cableways with tractor technology

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Abstract

The thesis briefly deals with the technology of skidding lumber in forest stands classified by technological typing to third group intended for skidding wood by cableway technologies and by machines designed for those purposes. The aim of the work was to provide knowledge about performance of cableway systems and compare them with tractor technology used in these forest stands. One of characteristic under examination due to evaluation of technologies was natural tree regeneration caused by work of machines: Steyr (9,04 %), Larix (24,28 %) and LKT (40,15 %). Research was also aimed to harvesting and transportation erosion, that reached values in level Steyr KSK 16 0,076, Larix 3 t 0,085 and LKT 81 T 0,933 (stated values can be explained as a ratio of eroded soil in m³ attributable to 1 m³ of skidded wood). Result of review was finding, that against unacceptability of tractor technologies due to terrain (type 3, 6, 7, 8, 9 and 10) and technological typing (type 3) we in practice met with using tractors even in this conditions. Their performance in skidding wood is comparable with performance of cableway technologies, but with significantly higher damage of soil and remaining stand.

Klíčová slova: lesnícka lanovka, lano, výkonnosť, erózia, poškodenie.

Keywords: forestry cableway, rope, performance, erosion, damage.

Posouzení efektivnosti využití alternativních metod při efektivním zjišťování dendrometrických parametrů lesních porostů v provozních podmínkách ČR

Evaluation of modern Methods for Forestry Mensuration in operational Conditions in the Czech Republic

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Abstract

In the theoretical part this Diploma thesis contains a description and information about environment of the forest's economic unit Kladská in the protected landscape area Slavkovský les including methods of providing the maximum height of logging in the area. The thesis explains why is so necessary during the restoring of forest's management plan in the first zones of protected landscape area to exactly identify timber stocks in the forest. It also describes the most commonly used methods of forest mensuration including correct methodology of data sampling. It introduces the reader to the issues and provides an overview of selected modern measurement devices and software used for data collection in the forestry practice. Finally the thesis deals with control of forest measuring. It describes the first of its generic sense and then it applied to the area of economic forest's regulation. In the practical part of the Diploma thesis the author describes the facts associated with developing of a new forest management plan, respectively facts associated with identifying the timber stocks in the first zones the mentioned protected landscape area. They are identify and analyze errors caused by incorrectly

forest mensuration. Furthermore is in a specific area tested using the representative methods of forest mensuration for the purposes of effective control. The results of representative methods are compared from several independent sources, including the full forest mensuration. Among the objectives of the work belonged analysis and assessment of the most repeated errors made by the full forest mensuration during the creation of the new economic plan. It was made with the question together, whether when the new measuring devices are used, these errors will be eliminated. Another aim was to design an effective control procedure that would in a relatively short time period found errors in determining the standing timber stocks. The results indicated that the most common error in determining the standing timber stocks were incorrectly defined borders of stand groups. Two solutions have been proposed to eliminate this error. The forest mensuration must be done in conjunction with the forests description or alternatively clipper can use GPS technology for border demarcation and control themselves on the display of digital caliper. The Contracting Authority may require a electronic file with the coordinates of the border to confront the shape of forest group in the vegetation map and in the real. It means that quick effective control may be carried out in the office. Furthermore, the results confirmed use of representative methods by modern measurement devices as a way of possible control. The results of representative methods are generally fluctuated around 1,4 % of the difference full forest mensuration and time-consuming was almost half as long.

Klíčová slova: zjišťování porostních zásob, eliminace chyb, efektivní kontrola, elektronické registrační průměrky, provozní podmínky.

Keywords: forestry mensuration, elimination of errors, effective control, programmable computer calipers, operational conditions.

Vliv pěstebních opatření na mechanické vlastnosti dřeva borovice lesní

Impact of Silvicultural Measures on Some Mechanical Wood Properties of Scots Pine

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Abstract

The purpose of this study is to assess the impact of silvicultural measures on selected mechanical properties of Scots pine of the area Doksy and Plasy. Each area is characterized by growths that are typical for the locality. From areas Doksy were selected 3 stands and 2 from Plasy region. For each crop were chosen representative of the trees that were cut down, and testing material was produced. On test samples was determined density at 12 % level moisture, modulus of rupture, modulus of elasticity, toughness and compression strength in the fiber direction. All tests were carried out by standardized procedures. Using statistical methods, it was found that a statistically significant value of compared areas were only in the density. The others properties which were examined in the areas are statistically insignificant. However, when assessing individual stands with ANOVA was generally for the most of properties found statistically significant difference. This suggests that the pine wood properties are dependent on location. In horizontal plane strain was found a statistical significance for all of the tested characteristics. That shows that the position of the wood in the stem has impact on the mechanical properties. Furthermore, the individual results were

evaluated in terms of dependence on the density. Which resulted in the majority of cases middle to high dependency.

Klíčová slova: dřevo, mechanické vlastnosti, borovice lesní, pěstební opatření, variabilita.

Keywords: wood, mechanical properties, Scots pine, silvicultural measures, variability.

Porovnanie mechanických vlastností jaseňa, javora a buku pre výrobu lukostreleckých ramien

Comparison of mechanical properties of maple, ash and beech wood for manufacturing bow limbs

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Abstract

In this study, there are compared mechanical properties of beech wood with maple and ash in reinforced laminated veneer lumber (RLVL) for manufacturing of bow limbs core. For this aim, test pieces from main stressed area of the bow limbs were prepared. Core of the samples was produced from two 2 mm veneer from chosen wood species, which were sheathed with 2 mm acacia veneer and 0,8 mm of fiberglass. Epoxy based adhesive was used for lamination. Samples were tested on modulus of elasticity (MOE) and modulus of rupture (MOR) according to relevant standards, and obtained values were compared to each other. Moreover, a hypothetical mathematical method was introduced to identify optimal combination for manufacture of laminated bow limbs, called bow index. Testing of wood species was divided into four levels until assembling the whole laminate. Results have shown that beech veneer could be a good alternative material for bow limbs or material for manufacturing other dynamically loaded wooden sport equipment. Suitability of beech veneer is given by combination with some other wood veneer as decoration layer bonded with appropriately chosen adhesive.

Klíčová slova: javor, jaseň, buk, mechanické vlastnosti, luk.

Keywords: Alder, Ash, Beech, Mechanical properties, Archery Bow.

Mechanické vlastnosti vrstveného materiálu

Mechanical properties of the laminate materials

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Abstract

This thesis evaluated an experimental research on the influence of selected factors (species, thickness, density, number of cyclic stress) on the specified material characteristics (modulus of elasticity, modulus of rupture, limit of proportionality, bendability coefficient). The measured values were statistically evaluated and expressed with tables and graphs. As hardwood was selected beech, as soft-wood has been studied aspen. Tree species affects all observed characteristics. The results show that the modulus of elasticity with increasing densification of the material increases, but with the increasing thickness of the material decreases. A similar dependence is observed even with modulus of rupture and limit of proportionality, which is also the number of cycles. Coefficient bendability is affected by the material thickness. There is an expectation that based on the evaluation of the results will be possible to design materials with tailored properties.

Klíčová slova: zhuštění, cyklické namáhání, modul pružnosti, mez pevnosti, mez úměrnosti.

Keywords: densification, cyclic loading, modulus of elasticity, modulus of rupture, limit of proportionality.

Reologické charakteristiky neupraveného a termicky upraveného dřeva při dlouhodobém zatížení v ohybu

Rheological characteristics of un-treated and thermally modified wood under long-term loading in bending

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Abstract

Heat-treatment belongs to the most ecological methods of wood preservation and increase of its natural stability in exposition to outdoor conditions. Mechanical properties research opens new possibilities of thermowood usage in general. This work presents first insight to the matters of thermowood rheology and inspects its behavior under long-term loading in bending. Wood appertains to viscoelastic materials and due to long-term loading creeps. There currently rise both elastic deformation, deformation elastic in time and plastic deformation. Partially there are irreversible changes due to stress even after unloading. This paper compares ratio of these three types of deformation in untreated wood and thermally modified wood in seven different temperatures (140; 160; 180; 190; 200, 210°C). The samples were exposed to 600 hours applied loading covering 40% of ultimate stress. Long-term testing consisted of four-point bending test under constant conditions in special creeps unit in conditioning chamber. In regular time periods the deflection was scanned. Increasing deformation under constant load was analyzed by Burger rheological model under constant conditions. The ratio of different types of deformation was calculated from the parameters of Burger model function. The results show that samples treated under lower temperatures (140 and 160°C) exhibit less creep than untreated wood. This result is positive. On the

other hand the samples treated under higher temperature levels display deterioration of mechanical properties. This is due to changes in wood structures caused by heat-treatment. The most important impact of this work goes to future research of this field. Next development has to apply for the best quality of samples and also select rather prismatic parallelism than transversal one. Also application of 40% ultimate stress loading appeared as too high and together with wood defects led to destruction of samples.

Klíčová slova: reologie, tečení dřeva, termodřevo, dlouhodobé zatížení, viskoelasticita.

Keywords: rheology, wood creep, thermowood, long-term loading, viscoelasticity.

Optimalizace výroby netkaných textilií z přírodních vláken

Optimization Process of Natural-Fibre Nonwovens

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Abstract

The presented research deals with the processing of air-laid nonwovens using the natural hemp and flax fibres. SPIKE® air-laying technology from the Formfiber Denmark ApS Company was used. The technology is based on dry forming of a fibre web in a forming box. Fibre-separating rollers (spike rollers) singularise fibres from fibre clumps and there are two kinds of machine setting parameters that affect web quality: velocity and direction parameters. The web-formation processes, as well as properties of the fibre-webs, were evaluated. After needle-punching, the properties of the reinforced fibre-mats were evaluated. The investigations have clearly revealed that the settings of the air-laying machine influence the web-formation process and nonwoven properties. On the basis of monitoring of web-formation processes and evaluating of fibre-web, or fibre-mat quality, several machine settings were defined that can be used to enhance the productivity of the machine, or the settings that are proper in order to fabricate nonwovens with high density or great tensile properties.

Klíčová slova: vzdušné vrstvení; len; konopí; přírodní vlákna; netkaná textilie.

Keywords: air-laying; flax; hemp; natural-fibre; nonwoven.

Klimatická odezva smrku ztepilého (*Picea abies* L.) a stříbrné jedle (*Abies alba* Mill.) v Severní Velebit

Climate response of Norway spruce (*Picea abies* L.) and Silver fir (*Abies alba* Mill.) in Northern Velebit

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Abstract

As part of an international project 'Mixed severity disturbances as drivers of structural variability and carbon dynamics at the stand and landscape levels' this article and presentation try to define and describe the problematics of Silver fir (*Abies alba* Mill.) and Norway spruce (*Picea abies* L.) growth and development in virgin forests of Northern Velebit connected with the past climatic events and climatic factors influencing those forests, using the methodology and techniques of dendrochronology and dendroclimatology. Climate change is an extremely important scientific issue, and using core increments and dendrochronology, we have the ability to look into the past climatic events that have taken place hundreds of years ago and see how they influenced the development of individual trees and forests of Northern Velebit in general, but also gain information about climate itself, how often climatic extremes happened in the past, what that meant for the developing trees, and from all those informations, we have the ability to analyse and compare today's climate with the past, and, in some part, hypothesise about the upcoming decades. From a foresters point of view, especially if we take commercial forests and managed tree species into account with the climate change and the biological adaptability of each species, this kind of work will prove influential in choosing the most promisable tree species and adapting future management of forests to keep up with the climate changes, while

preserving both biodiversity and sustainability of commercial and protection forests.

Klíčová slova: výzkum letokruhů; reakce klimatu; dendrochronologie.

Keywords: tree-ring research; climate response; dendrochronology.

Maximálně panmiktický design klonových semenných sadů lesních dřevin

The maximally panmictic design for clonal seed orchards of forest trees

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Abstract

Seed orchards are the most frequently used production populations in forestry worldwide. Clonal orchards are preferred as they are not limited to early-flowering species. Each clone is represented by a number of genetically identical copies termed as ramets. When a new orchard is established, factors such as the census of contributing genotypes, number of ramets per clone and their physical allocation (design) must be considered. All these factors affect the realized response to selection (genetic gain) and levels of gene diversity, and thus good design should promote random mating (panmixia) and minimize inbreeding. The former means random mating of clones and the later describes mating between related clones. While the existing designs are primarily focused on minimizing levels of inbreeding, the objective of the proposed Panmictic Design (PD) is to maximize panmixia. It is generally known that pollination efficiency is a function of distance and thus most frequent genetic exchange occurs among neighboring clones. Therefore panmixia in seed orchards was defined as a situation where close neighborhoods of all possible combinations of clones occur with the same frequency within the orchard grid. To achieve this, original solution was developed where the variance (calculated across all pairs of neighboring clones across the whole grid) is minimized as a criterial function. Subsequently, heuristic algorithm has

been developed and programmed in R and it was tested for different tasks including balanced and unbalanced scenarios, variable clonal sizes and different sizes/shapes of seed orchards. This algorithm excels in solving all of these specific tasks. In the case of balanced numbers of clones, optimal solution is often found already within the first iteration. To evaluate the relative quality of resulting schemes a theoretical proxy to level of maximum panmixia was defined for every task as the theoretical minimum variance. Furthermore, equalization of close neighborhoods leads to uniform allocation of ramets. Therefore, the risk of inbreeding is minimized as a co-product, meeting the second general objective in seed orchard design. In addition, PD can be used in combination with other designs without losing its efficiency. We conducted a case study of PD connected with predefined „Minimum Inbreeding“ design of clonal rows. This hybrid scheme will be used for the establishment of *Abies fraseri* seed orchard in North Carolina State University at CTG Program

Klíčová slova: náhodné křížení, šlechtění stromů, produkční populace.

Keywords: random mating, tree improvement, production populations.

Rozlišení diploidních a tetraploidních jedinců bříz na základě měření listových parametrů

Distinguishing between diploid and tetraploid taxa of the genus *Betula* L. based on leaf measurements

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Abstract

The aim of this study was to propose a reliable method for distinguishing between diploid and tetraploid taxa of the genus *Betula* L. This method is based on macroscopic traits on Birch leaves that can be measured by common tools, such as ruler and protractor. Main advantage of suggested approach is its applicability even in the field. For statistical analysis, 97 individuals from 6 localities within Šumava region were sampled. From every individual, 4 leaves were selected and 16 quantitative parameters were measured on each of them. Samples were also analysed by flow cytometry method to determine their real ploidy (genome size). Differences in selected parameters between diploid and tetraploid taxa were statistically tested. In total, significant results were observed in 12 out of 16 parameters. For prediction of real ploidy on any individual from *Betula* genus (commonly occurring in Czech Republic), a classification function was designed and its reliability was tested on three different regions within Czech Republic and compared to functions previously suggested by other authors. Overall performance of the suggested function was 89 %, which is the highest percentage of all compared functions. An Android application was created for even better feasibility of suggested method in the field. This application makes repetitive calculations easier. For

more information, download and testing, please contact first author of this study.

Klíčová slova: bříza pýřitá, bříza bělokorá, klasifikační funkce, taxonomie.

Keywords: Betula pubescens, Betula pendula, classification function, taxonomy.

Účinky termínu výsadby a aplikácie hydrogélových prípravkov na vývin kultúr smreka obyčajného a borovice lesnej na ploche v Strážovských vrchoch

Effects of planting term and application of hydrogels on plantation development of Norway spruce and Scots pine on research area in Strážovské vrchy

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Abstract

This thesis evaluated the effect of hydrogels and term of plant on the growth, mortality and mycorrhiza characteristics of seedlings of Scotch pine (*Pinus sylvestris* (L.)) and Norway spruce (*Picea abies* (L.) Karst.). The experiment took place at windthrow damaged area in the Strážovské vrchy Mountains. We used bare-root and containerized seedlings for planting in the autumn and spring term. We used hydrogel Stockosorb® and Ectovit® within the analyzed areas. Stockosorb® represents typical hydrogel and Ectovit® is hydrogel with ectomycorrhizae spores and hyphas of mycelium. The experiment started during the autumn 2013 and spring 2014. Experimental material was collected after the first and the second vegetation period. The main characteristics measured on the seedlings were stem diameter, stem height, volume of aboveground part and height increment. The roots were evaluated in density of short roots together (cm⁻¹) and density of active mycorrhizae (%) from all short roots. We also implemented a chemical analysis of photosynthetic apparatus. Containerized spruce seedlings planted during the autumn demonstrated a significantly higher proportion in stem diameter, stem height and volume of aboveground part after both vegetation periods. Containerized

and also bare-root Pine seedlings planted during the autumn demonstrated significantly higher proportion in stem height but only after the first vegetation period. The number of short roots in variant spring was significantly higher. These results showed that artificial inoculation, using of hydrogels, containerized seedlings and autumn term of planting can be used in forestry practice. However effects of these approaches may not always be necessarily positive.

Klíčová slova: hydrogél, krytokorenný, ektomykoríza, smrek, borovica, jesenný termín.

Keywords: hydrogel, containerized, ectomycorrhiza, spruce, pine, autumn term.

Dendrologická revize vybrané zeleně v intravilánu a majetku města Blatná

Dendrological survey of selected vegetation in the property of Blatná city

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Abstract

Trees and green areas have always had in general a positive effect to human beings. Our ancestors were very well aware of this fact during building and widening cities and therefore they created various forms of parks, gardens or alleys. Although these did not correspond to a form as we know it nowadays they still fulfilled the various social or environmental functions. It was important to take care about this greenery and always keep an overview. This aspect became more important as time goes by. This diploma thesis aims to evaluate the status of selected assets of the greenery in the town of Blatná. The status is based on the dendrology revision, which took place in January 2016. During the revision the basic dendrology and qualitative values were identified. Within this work I would like to propose some measures and other following steps and modifications which should help to increase the attractiveness of some less used areas and improved the related green functions. The valuation of the five the most valuable specimens was conducted according to the methodology AOPK ČR. The project created in AutoCAD software which should serve and help to visualize the monitored areas is the last outcome of this paper.

Klíčová slova: inventarizace stromů, dendrometrické veličiny, městská zeleň.

Keywords: tree inventory, dendrometric characteristics, town greenery.

Vývoj vojenského chování a jeho polyethismus u termitů

Ontogeny of soldier behaviour and its polyethism in termites

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Abstract

Soldier caste is a synapomorphy of all termites. Polyethism is most often in the worker caste. It is often linked with polymorphism and/or age. In soldier caste, there are only scarce studies, and the polyethism is always linked with polymorphism. During my thesis, I collected data that show the fact that certain kind of polyethism occurs at species with monomorphic soldiers (*Prorethitermes simplex*, *P. canalifrons*; Isoptera: Rhinotermitidae). In the experiment, I exposed the soldiers of known age to a heterospecific opponent (worker of *Reticulitermes flavipes*; Rhinotermitidae). The interactions of the specimen and his opponent were recorded the day after moulting, the third, sixth and twelfth day of the specimens age. The control group consisted of fully mature soldiers of the same species and number. The control group was recorded in the same days as "young" soldiers. The reactions to the opponent can be divided into four groups - retreat (U-turn away from the opponent), ignoring (no interest in opponent at all), interest (antennal inspection of the opponent, often combined with poking or ramming the opponent) and full-force attack (with mandibles). Interactions were divided as aggressive (interest+full-force attack) and passive (ignoring+retreat). My results show, that mature soldiers are more aggressive than the young ones and the aggression rises with the age of the soldier. The interesting part of the results is the fact that I can define two groups of soldiers. Judging by a number of

aggressive interactions and their impact on the opponent we can define "braves" and the "cowards". The "braves" attacked more often and their attacks were more dangerous, on the other hand, "cowards" were overall more passive but showed other kinds of behaviour like spreading the alarm. The results should be published in a behavioural journal later on, during my Ph.D. studies.

Klíčová slova: termiti, vojáci, vojenské chování, polyethismus.

Keywords: termites, soldiers, soldier behaviour, polyethism.

Vliv zápoje koruny na společenstva pavouků v nížinných dubových lesích s návrhem lesního a ochrannářského managementu

Impact of canopy openness on spider communities in lowland oak forests with suggestions on forest management and conservation

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Abstract

Large-scale unification of forest habitats caused by the joint effects of forestry intensification and abandonment of traditional management methods has resulted in a critical reduction of forest biodiversity throughout Europe. An important question is whether even small-scale habitat structures maintained by different levels of canopy openness in abandoned coppiced forest may constitute conditions suitable for forest as well as open habitat specialists with presence of rare and endangered species. The objective of the present study was to investigate the impact of canopy openness on epigeal spider assemblages in abandoned coppice forests in order to develop conservation recommendations for forest management in lowland woodlands. In particular, we studied the effect of canopy openness on species richness, abundance, functional diversity, community composition, conservation value, and degree of rareness. We established transects reflecting the canopy openness gradient in each of the eight forest stand. A total number of 90 spider species, including high proportions of xeric specialist and red-listed threatened species. The peaks of conservation indicators, as well as spider community abundance,

were shifted toward more open canopies. On the other hand, functional diversity peaked at more closed canopies followed by a rapid decrease with increasing canopy openness. Species richness was highest in the middle of the canopy openness gradient, suggesting an ecotone effect. Ordinations revealed the rapid species turnover along canopy openness gradient with presence of most conservationally important species in sparse and open conditions. The results show that the various components of biodiversity peaked at different levels of canopy openness. Therefore, the restoration and suitable forest management of such conditions will retain important diversification of habitats in lowland oak forests. According to these results, even small-scale improvements could be suitable conservation tools to prevent the general decline of woodland biodiversity in the intensified landscape of Central Europe. The study was financially supported by the Internal Grant Agency of Mendel University (Reg. No. LDF_VT_2016002/2016).

Klíčová slova: pavouci, zalesněná krajina, diverzita stanovišť, ochrana biodiverzity, lesní hospodaření.

Keywords: spiders, woodlands, habitat diversity, biodiversity conservation, forest management.

Habitatové preference jelena evropského a jelena siky v Doupovských horách

Habitat preferences of red deer and sika deer in Doupovské hory Mts.

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Abstract

This master thesis is focused on GPS telemetry of red deer (*Cervus elaphus*) and sika deer (*Cervus nippon*) in the Doupovské hory Mts., the Czech republic. Positional data from 14 red deer does and 2 sika deer does was collected during the study period of April 2013 to February 2016. The main aim was to determine habitat preferences of does with the use of the very precise vertical differentiation of vegetation created by air laser scanning of the surface (LiDAR technology). The study examines the dependence of the average maximum height of vegetation nearby positions of does on the time of year and time of day. For the evaluation was used two-way factorial analysis of variance. The highest average height of the vegetation nearby does was found during the day and the lowest during the night. Does of red deer and sika deer occurred in open habitats particularly at night, where they were actively seeking for food and more closed habitats with higher vegetation during the day, where they could hide themselves. Focusing on a period of the year, the height of vegetation in the summer period without hunting was significantly lower than in the summer period with hunting. This could be caused by starting hunting season but also it might be a response to reduced quality of available grass by aging. The two does of sika deer were treated individually. Significant differences were revealed between both does. However they both were

occupying habitats with the lowest height of vegetation at night during the rut season. The gained results can now be used to supplement information about ethology of red deer and sika deer. The comprehensive knowledge of ethology can be directly used in the management of these two species, particularly for hunting efficiency and subsequent reduction of their population numbers, particularly in the case of sika deer. However these results can be directly used in forest management in active protection of forest stands against damage by wild game.

Klíčová slova: GPS telemetrie, letecké laserové skenování, LIDAR, Cervus elaphus, Cervus nippon.

Keywords: GPS telemetry, remote laser scanning, LIDAR, Cervus elaphus, Cervus nippon.

Porovnanie rôznych metód izolácie DNA z projektilov ulovenej poľovnej zveri

Determination of different genetic methods of DNA isolation from projectiles of hunted wildlife

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Abstract

In this thesis, there is determined efficiency of different genetic methods of DNA isolation from projectiles of hunted wildlife, by comparison of isolated DNA amount. Samples of projectiles were of different caliber and different wildlife species. Methods used for isolation were Chelex 100, market-available set from firm Macharey Nagel and method Doyle & Doyle (1987), whose was furthermore modified for use on isolation DNA from animal tissues by Oliveir et al. (2007). Then we investigated the amount of isolated DNA through UV spectrophotometer, when the results were evaluated by appropriate software and MS Excel. It was found that Chelex 100 method, as the only method, was demonstrated as effective enough, for isolation DNA from given samples.

Klíčová slova: forenzní genetika; mikrosatelity; izolace DNA; měření.

Keywords: Forensic genetics; Microsatellites; DNA isolation; investigation the amount.

Analýza výsledkov cvičných strelieb študentov z poľovníckych brokových a guľových zbraní

Statistical analyses of students practical shooting results from hunting rifles and shotguns

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Abstract

The thesis is aimed to put a review from shooting training of students, conducted during the field exercises within the Game Management subject. The students performed practical shooting at the shooting-range in Sielnica. Results were subject of statistical analyses, by which we tried to isolate statistically significant and insignificant elements, and came up with some conclusions, that can help our students to improve their results in shooting. In fact, we were analyzing the qualitative factors like gender, ownership of weapon license and graduated high school in conjunction with the shooting disciplines, where the dependent quantitative factor was score of students in individual shooting disciplines. The thesis also gives insight about targets, allowed weapon systems many other directives set up by SPK. In our research, two factorial analysis of variance with replications was used as well as Tukey's HSD test as a post-hoc test. The fact is, that the shooting is under influence of many factors, which are impossible to remove. So we tried to eliminate as many secondary factors, as our database allowed by sorting the students to the groups, where the conditions were homogenous to maximize the effect of factor we evaluated. In the last part of dissertation are results of this research, where we concluded that the gender is significant factor in every sample as well as the shooting discipline. The ownership of weapon license seems to be

significant mostly within the groups were the gender was irrelevant factor and inside the groups formed only by men. The last factor was not very significant at all.

Klíčová slova: analýza rozptylu; cvičné strelby; vyhodnocovanie výsledkov; zbraň; terč; faktor.

Keywords: analysis of variance, practical shooting; results evaluating; weapon; target; factor.

Publikace neprošla jazykovou úpravou. Za obsah příspěvků odpovídají jejich autoři.

Název: **Sborník abstraktů**
Conference abstracts

Studentská konference MASTER 2016

Student conference MASTER 2016

Editor: Blahoslava Vytisková
Vydavatel: Česká zemědělská univerzita v Praze, Fakulta lesnická a dřevařská,
Kamýcká 129, 165 21 Praha, Česká republika, www.fld.czu.cz
Určeno: pro účastníky konference
Vydání: 1. vydání
Rok vydání: 2016
Počet stran: 45
Kontaktní osoba: Blahoslava Vytisková, vytiskova@fld.czu.cz

