

Contents and Abstracts of the Bulletin of Forest Science

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Endre SCHIBERNA, Béla LETT and István JUHÁSZ:

Theoretical considerations of evaluating economics of continuous cover forestry ... 7–19

Abstract – This paper discusses the theoretical aspects of evaluating the economics of continuous cover forestry identifying continuous cover forestry as a result of selection silvicultural system. A special emphasis is being put on the comparison of cash flows occurring with different timing and scale in case of selection forest and rotation forest; their effects on the economic conditions of forestry is also investigated. The analysis is using a numeric silvicultural model of a beech stand of medium productivity and quality.

Comparison is based on the annuity of cash flows of rotation forest and selection forest. At a discount rate of 0.75% annuities are on the same level, while at discount rate of 3.5% annuity of selection forest is four times larger than that of the annuity of rotation forest. However, selection system cannot be regarded as being unambiguously economically preferable, as its advantages resulted from the frequent and stable cash flows can be balanced by the same cash flows from rotation system with a suitable great area and an even distribution of age classes.

László KOLOZS and Gábor VEPERDI:

Determination of the volume and increment of selection and transformation forests with one-variable volume functions ... 21–34

Abstract – Recently the selection and transformation systems became more and more important due to the close-to-nature forest management in Hungary. The application of these systems requires a more accurate estimation of the increment by diameter classes. In order to improve the accuracy and the speed of the inventory work the authors elaborated a new volume estimation method based on the data of the Growth Monitoring Network gathered for the past 15 years.

Borbála GÁLOS, Csaba MÁTYÁS and Daniela JACOB:

The role of afforestation in mitigating climate change ... 35–45

Abstract – For the 21st century warming and drying of summers in Hungary are projected to be more extreme than the hemispheric average. Climate change impact studies in the region show that recurrent droughts cause growth decline and mortality of zonal forests at their lower

(xeric) limit of distribution. Forests affect the climate through their influence on surface energy fluxes and on water cycle that alter the climate change signal. Biogeophysical feedbacks of forest cover changes on the climate have been investigated for two forest cover scenarios in the 21st century, using the regional climate model REMO. For 2021-2025 the model has been driven by the potential afforestation concept (Járó and Führer 2005) assuming 7% increase of forest cover in country mean. In the same time period as well as at the end of the 21st century (2071-2100), effects of maximal afforestation (forests over all vegetated area) have been studied.

The potential afforestation has no significant influence on the climate of Hungary. For the maximal afforestation case study (2071-2100), the expected tendency of drying may be mitigated. The largest increase of precipitation has been projected to the northeastern region, where 50% of the climate change signal can be compensated, if there is enough available water in the soil. Regarding to surface temperature, the evaporative cooling effect of forests seems to dominate.

Analysing the results it has to be taken into account that in the simulations forest cover change was performed on a limited area, and the effects appear partly in adjacent regions. Also, because of the uncertainty of certain temperate forest cover parameters, results of future field measurements are needed to improve model precision, especially at higher spatial resolution.

Gábor KOVÁCS, Gábor ILLÉS, Diána MÉSZÁROS, Orsolya SZABÓ, Andrea VIGH and Bálint HEIL:

Evaluation of changes of site parameters in the Noszlop forest district ... 47–60

Abstract – A new forest management planning period is near for the forest stands of the 400 ha sized Noszlop forest district. During planning future forest stands we have to take into account the ongoing changes in site conditions. Speeding changes are forcing us to develop current site evaluation methods. In our study field observations were evaluated using advanced GIS tools.

The assessment of climate data for the past 50 years revealed that the amount of precipitation has dropped by 20% while the average temperature has increased by 1.2 °C within the study area. On the basis of newly surveyed soil profiles and core samples we derived more detailed soil and site maps than it was currently available in forest management plans. By the application of digital elevation model and connected spatial datasets the site characteristics can be visualised in a more detailed extent and their changes can be assessed. It makes us capable to describe the projected future conditions for areas of interest, spatial pattern of forest climate categories and forest site parameters can be refined within the forest management data.

Zsolt KESERŰ and Károly RÉDEI:

Tending operation models for leuce-poplars under sandy soil conditions ... 61–71

Abstract – The role of the Leuce-poplars, first of all of the white poplar (*Populus alba*) and its natural hybrid, the grey poplar (*Populus x canescens*) is increasing continuously in new afforestations and artificial regenerations mainly on calcareous sandy sites in the Danube-Tisza region. The study presents a simplified tending operation model as well as age – target diameter models for Leuce-poplar stands which are suitable for qualitative log production or for the production of mass sortiments. The published practice-oriented models may help to improve the quality of Leuce - poplars growing technology in Hungary.

Roland József PESZLEN and Gábor VEPERDI:

Modification of the silver lime yield table ... 73–80

Abstract – Approximately 1.2-1.9% of the Hungarian forests is covered by lime stands, almost half of these forests consists of silver lime (*Tilia tomentosa* Mönch.). First lime tree yield table was published by Gábor Hajdu as previously lime stand growth data had not been available. During the preparation of the graphical yield tables (called nomograms) there were some indications that the original yield data had not been realistic. Within this study possible explanations were produced and suggestions are given to modify the values of volume data.

Károly RÉDEI, Imre CSIHA, Ágnes KAMANDINÉ VÉGH and János RÁSÓ:

The effect of intermediate cuttings on the yield and value changes in black locust (*Robinia pseudoacacia* L.) stands ... 81–88

Abstract – The investigation of the effects of intermediate cuttings on the growth of stands and their yield change is based on maintaining of long term experimental plots and their systematic estimates. On the basis of the majority of the international and inland literature the total yield of stands can not be increased by intermediate cuttings in general. From the reported case studies we can draw as a conclusion, that the investigated black locust stands' total yield can not be increased by intermediate cuttings but their stand-quality index can be increased by 11-24% too.

Balázs KISFALUDI, Péter PRIMUSZ, József PÉTERFALVI and Gergely MARKÓ:

Subjective condition surveying and rating of forest roads ... 89–105

Abstract – Maintenance is required on forest roads after their construction. To maintain the good serviceability on the road network, its condition and the expected scale of heavy traffic must be known. In view of these two parameters, maintenance works must be and can be) done in proper time and way. Using informatics and digital technology, an efficient tool can be developed, that allows fast assessment of forest road network condition. The digital subjective condition surveying and assessment system developed in our institute makes possible the logging and evaluation of the condition of 20–25 km forest roads daily. If a forestry company possesses a digital road inventory, the condition of its road network can be displayed in a GIS. By combining the condition and expected traffic data, the necessary maintenance treatments, and their expenses can be estimated. The system has been tested on more than 1000 kilometres of forest roads. On the basis of this database, deductions can be done regarding the condition of the whole cca. 3000 kilometres of Hungarian paved forest road network.

Gergely MARKÓ, Péter PRIMUSZ and József PÉTERFALVI:

Measuring bearing capacity of forest roads with the Advanced Benkelman Beam Apparatus ... 107–121

Abstract – Forest roads covered with asphalt pavement represent the basis of the forest opening up networks in Hungary. If properly maintained, asphalt pavements offer a high level of service. While traffic load of forest road networks have grown, expenses on their maintenance remained lower then required in the last three decades. As a result, this roads are in poor condition, generally. Renovation projects demand the knowledge of the roads' bearing capacity. Bearing capacity measurements of roads traditionally were carried out using the

Benkelmann beam. The Benkelman beam measurements provide the maximum vertical deflection of the pavement under 50 kN of wheel load. Nowadays the bearing capacity of public roads are measured with falling weight deflectometers. Falling weight deflectometer measurements provide the full deflection basin. It is convenient to use these high precision instruments on forest roads, but their application is inefficient and costly. Researchers of the Department of Forest Opening Up developed a new method to measure the full deflection basin with the Benkelman beam. Besides the instrument improvement the authors developed a new method for the processing of the deflection basin data. New results are presented via the case study of a 2nd class opening up forest road.

Tamás MAJOR, Katalin SZAKÁLOS NÉ MÁTYÁS and Attila László HORVÁTH:

Determination of the mechanization-affecting soil resistance at forested sites using the „3T System” electronic soil layer indicator ... 123–134

Abstract – Recently the selection and transformation systems became more and more important due to the close-to-nature forest management in Hungary. The application of these systems requires a more accurate estimation of the increment by diameter classes. In order to improve the accuracy and the speed of the inventory work the authors elaborated a new volume estimation method based on the data of the Growth Monitoring Network gathered for the past 15 years.

Katalin SZAKÁLOS NÉ MÁTYÁS, Attila László HORVÁTH and Tamás MAJOR:

Tree utilization systems in the XXI. Century ... 135–149

Abstract – The development and improvement of suitable soil cultivation machines is unfeasible without knowing the proper characteristics of the soils. After a detailed review of the applying scientific literature we have concluded that the physical-mechanical properties of forest soils with extensive root systems have hitherto been unidentified.

The goal of our research was to study the mechanical properties of forest soils, and to investigate the effect of the tree root system on these physical-mechanical characteristics, especially on the soil resistance. In order to reveal the interdependences we have performed several soil resistance measurements.

Using mechanical and statistical methods, we have fitted a surface to the measured data points, which can predict the changes of soil resistance as a function of the diameter of the trees and of the distance from the trees. According to our measurements it can be established that around the stems in a radius of 1-1,5 meters the higher soil resistance is caused by the presence of roots.

Norbert FRANK and Viktor TAKÁCS:

Windbreaks and shelterbelts examination by their effect on decreasing the windspeed ... 151–162

Abstract – Analysis of shelterbelts gives evidence for their eligibility and their multifunctionality has positive effects on environment, landscape and habitats. Not only as a system, but its elements must be considered.

Getting back to the main purpose (wind speed reduction) of belts, the numerical classification is essential for maintaining the porosity and to justify the structure. The structure has always been changing by the environmental conditions. Not only the distribution of the network, but the trees and shrubs edges also require modification of the structure for the desired effect: reduce wind speed and creating snow dumping zone in a

proper distance. Modelling provides details of the flow system: including a number of factors, local conditions and the meteorological conditions cause differences. A few degrees difference in wind direction causes "structural change" and change in wind speed, as well as the surface. Our research aims to develop methods and metrics to objectively assist the forest belt, for a long-term maintenance and development of protection effects. We have found, if the rate of wind protected and wind effected porosity is between 1.6-5 it is a well structured windbreak. Instead of the breakthrough factor this is more simple and preciously measurable value for description. While the breakthrough factor use the wind measurements and does not examine the inner spacing, the porosity consider the changes of density.

András NÁHLIK, László DREMEL, Gyula SÁNDOR and Tamás TARI:

Long term effects of browsing of seedlings as examined in pole stage ... 163–172

Abstract – According to our hypothesis browsing of seedlings and saplings by large herbivores causes long term negative changes in quantity and quality of forest stands, trees and timber.

Data were collected in the Bükk mountains, North Hungary. Sample territory was marked out in sessile oak (*Quercus petraea*, Mattuschka – Lieblein) pole stand previously having been browsed on seedling's stage by large herbivores. Similarly to the sample area control territory was marked out in an unbrowsed forest stand. The number of sample and control territory in oak stands was 10-10, with a 10x10 m size. We recorded the number of trees, measured the diameter at breast height (1.3 m) of the stems, the height of the trees and the malformations of the stems which occurred lower than 2 m, such as tortuosity and fork growth. The data were evaluated by Student's t-test and Mann-Whitney U test.

1. Browsing caused slight but significant, 50 cm decrease in the height of trees and a high ratio of fork growth.
2. We concluded that despite of heavy browsing activity which lasted several years, timber quality at harvesting will not decrease.
3. At the same time a slight decrease in timber output will occur.
4. Browsing will raise costs of regeneration due to the expenses of increased number of weeding.

András KOLTAY, Tamás LAKATOS, Tímea TÓTH and Zoltán ANDRÉ:

Biological control technology against *Heterobasidion annosum* root rot in Scots pine stands ... 173–185

Abstract – In forest-ecosystems it is very important to apply selective and biological control technologies against pests and pathogens. Such method in forestry is the usage of antagonistic fungi or other micro-organisms. One of the most dangerous pathogens of conifers in Hungary is the *Heterobasidion annosum* root rot. Formerly Dr. Hubert Pagony applied successfully a biological control agent against it in Scots pine (*Pinus sylvestris*) forests. However, these research achievements fell into oblivion, although the pathogen is still present in our forests. In the past few years we re-developed this method, by the usage of *Phlebiopsis gigantea*, and rearranged it according to present-day requirements. We were able to produce an inoculum, which is suitable for industrial-scale usage and manufacturing. Our experiments so far evidently claimed that this method can open new perspectives in root rot control in Scots pine and Austrian pine forests. However, the unsuccessful inoculation experiments in Norway spruce stands show that the technology in its current form is not suitable for the prevention of root rot in spruce forests.

György CSÓKA, Anikó HIRKA and Levente SZÖCS:

Insect globalization in the Hungarian forests ... 187–198

Abstract – 108 alien insect species with real or potential importance for forestry have been recorded in Hungary between 1881 and 2010. The colonization rate steeply increased in the last 2-3 decades. More new species were recorded in the last 30 years (1981-2010) than in the previous 100 years (1881-1980). Order Hemiptera (particularly aphids) represent the 2/3 of the species. 46% of the species have Asian, 31% North American, 21% European, 2% African origin. 2/3 of the alien species have non native woody plants (35% conifers, 31% broadleaves) as host plant. It is quite evident that accidental introductions, spread and colonization will continue in the future. Only early recognition, increasing and disseminating the knowledge concerning them may help to slow their spread and decrease the damage caused by them.