

## Contents and Abstracts of the Bulletin of Forest Science

Bulletin of Forest Science (Erdészettudományi Közlemények) is a journal supported by the Hungarian Forest Research Institute and by the Faculty of Forestry of the University of Sopron. The papers are in Hungarian, with English summaries. The recent issue (Vol. 8, 2018) contains the following papers (with page numbers). The full papers can be found and downloaded in *pdf* format from the journal's webpage ([www.erdtudkoz.hu](http://www.erdtudkoz.hu)).

### Vol. 8, Nr. 1, 2018

Anikó HIRKA, Zoltán PÖDÖR, BALÁZS GARAMSZEGI, and György CSÓKA:

#### **50 Years trends of the forest drought damage in Hungary...11–25**

**Abstract** – The frequency of droughts increased in Hungary between 1962 and 2011. On top of this increasing trend, the extreme droughts had become more and more frequent. As a response for this, forest drought damage also showed an increasing trend. The yearly values of the forest drought damage showed a significant response for the yearly values of two drought indices (Pálfai and Forest Aridity index). Drought damage is reported not only from younger lowland stands, but also from older native stands of montane regions. It is proven that droughts play a decisive role in the health of sessile oak and beech stands. On top of their direct impacts, droughts have major indirect effects on forest health, manifesting in “damage chains”. Droughts regularly have positive effects on outbreaks of many forest insects. The trees and stands weakened by drought stress can successfully be attacked by pathogens which are less aggressive amid better weather conditions. If the frequency and severity of droughts (and other weather extremes) increase (as it is predicted), our forests will suffer from an even higher damage pressure, so further negative health trends can be predicted in Hungarian forests. Therefore the forest management/sylviculture should aim at increasing forest resistance/resilience. The reactive forest protection should be changed for a long term proactive approach.

Ernő FÜHRER:

#### **Forestry aspects of climate evaluation...27–42**

**Abstract** – In contrast to the other site factors, climate has shown a relative fast changes in the last decades. This emphasised the need of the rethink of the existing forest climate classification based on a more scientific, ecophysiological approach. For the more exact assessment of the climate, a new indicator (Forestry Aridity Index; FAI) has been developed that characterizes the forest climate categories with meteorological variables, thus the area of these categories and its observed and expected changes can be captured. FAI enables the more accurate climate categorization of the forest regions in the forest inventory, which is one of

the most important innovation in the forestry sector. Revision of the climate classification of the inventory is important, since the categories have also general forest management contexts, i.e. ecological, management and economic conditions are associated with them. In-depth understanding of these relationships allows the renewal of forestry site typology. Based on this, it is possible to develop a Decision Support System for forestry that can be applied to adapt to climate change its impacts.

Borbála GÁLOS and Ernő FÜHRER:

### **Climate projections for forestry in Hungary...43–55**

**Abstract** – Tree species selection and decision support in forestry require long term climate projections. Our study is focusing on the future temperature and precipitation conditions for the months that are determining and limiting the distribution, vitality, growth and production of forests. For the 21st century, results of 12 regional climate model simulations were analyzed assuming the A1B emission scenario of the IPCC. Forest climate categories as well as the droughts were defined based on the forestry aridity index (FAI). Increase of temperature and decrease of precipitation are expected to be the largest in the critical period (July-August), but they are also significant in the main growing period (May-August). In the Hungarian lowland the drier conditions (Forest steppe climate category) are expected to expand (replacing the former Oak climate category) and cover more than 35% of the total forest area. This will result also in novel combinations of site factors that have not existed in Hungary before. Based on the mean estimations, these so called ‘Steppe climate category’ can reach more than 10% of the country until the middle of the century. In absence of surplus water, these climate conditions will not be suitable for managed forests any more. Additionally to the changes of the climatic means, the total number of droughts and extremely droughts can be doubled for the period 2021-2050 relative to 1981-2010. Water scarcity and extremely high temperatures can enhance the drought risk thus can lead to severe impact on the vitality, growth and organic matter production of the trees. Based on the expected climate conditions the Agroclimate Decision Support System defines the forestry climate category for the selected region and makes suggestion for the tree species composition.

András BIDLÓ and Adrienn HORVÁTH:

### **Role of soils in climate change...57–71**

**Abstract** – Climate change will have a significant impact on forest cover of Hungary. Climate is one of the most important site factors therefore, it has a direct influence on forests. On the other hand, the climate has an indirect impact on the change of other site factors, such as hydrological and soil conditions. Some changes occur relatively fast, thus a significant change may happen during a single vegetation period. Some other factors need longer periods or hundred of years for transformation. During our research, we estimated the impact of climate change on soils. Soils not only create the foundations of human, animal and plant life but also have a very important role in regulation and production. Significant changes in soil-forming processes may emerge as a result of climate change. Along with the change in soil-forming processes, we also evaluated possible changes in the nutrient cycle of forest stands. The appearance of changing site factors and the emergence of a new climate category – steppe – will determine new site type variants. To summarize, we described what kind of site type variants can be expected in the future and what kind of criteria are needed for a tree species proposal. It provides a good basis for a Decision Supporting System (DTR) which will facilitate the selection of tree species in the future.

András HERCEG, Péter KALICZ, Balázs KISFALUDI and Zoltán GRIBOVSKI:

**A Thornthwaite-type water balance model for the analysis of the hydrological impact of climate change...73–92**

**Abstract** – The global temperature increase is expected to cause severe impacts on the water balance. The objective of this paper was to develop a new monthly step model based on a Thornthwaite-type monthly water balance estimation and calibrate the model parameters using remote sensing-based evapotranspiration dataset. The calibrated model was also used for projection based on the simulation results of 4 regional climate models applying the IPCC SRES A1B emission scenario. The 3 periods of projection were: 2010-2040, 2040-2070, and 2070-2100 compared to the reference period (1980/2010). The benefit of our method is its robust structure; therefore it can be applied if temperature and precipitation time series are accessible. The key parameter is the water storage capacity of the soil (SOILMAX), which can be calibrated using the actual available evapotranspiration data as well. If the soil's physical properties are available, the maximal rooting depth is also projectable. The model can be used at the catchment level or for areas without additional water amounts from below. We have determined parameters (REW; SWD) to evaluate the water stress during the 21st century. The model has been successfully calibrated for a mixed parcel and for a small forest covered catchment in Northwest Hungary.

Kornél CZIMBER, Csaba MÁTYÁS, András BIDLÓ and Borbála GÁLOS:

**Machine learning approximation of Járó-Table (table of applicable targeted forest stands and their growth for each forest site)...93–103**

**Abstract** – In this article, we would like to present a machine learning algorithm that processes the data of Járó's target stands and their growth for each forest site variation. The method is able to propose stand types and growths on the basis of existing data for new variations due to climate change and for a newly entering forest climate zone. The essence of this process is to place the entries of the Járó's table in a five-dimensional space, and use distance kernels to select the closest target stand types and weight their growth rate. It defines for a specific forest site, which target stands are likely to be in the area and what kind of growth can be characterized. The results will be incorporated into the decision support system of the Agrárklíma project after proper validation.

Gábor ILLÉS:

**Predicting the climate change induced yield potential changes of sessile oak stands...105–118**

**Abstract** – Growth of forest stands is a central question in the field of forest research. Climate change impact assessment also assigns significance to this question. The growing conditions of forests are changing in Central Europe and the impacts of changes are generally considered to be disadvantageous. Increasing frequencies and duration of heat waves and droughts constrain the growing potential of industrially important species. For this reason a statistical evaluation of growth of sessile oak (*Quercus petraea*, Liebl) was conducted using site (bioclimate and soil) describing predictor variables. The study involved 4594 geo-referenced species records from the National Forestry Database. We focused on practically monoculture stands of seed origin. Climate variables were represented by the Climate EU database. The period of 1961-1990 was considered as climatic baseline. The future, altered climate conditions were represented by the RCP 4.5 scenario based climate models for the period of 2041-2070. Soil and non-climate site data were added from the most recent spatial soil database of Hungary. The statistical random forest package of R was used to build

classifiers for yield class predictions based on soil and bioclimatic variables for the reference period. The results of the model series were tested on test sites taken from the permanent yield monitoring plots and forestry database. It was found that predictions reached a relatively high 62-83% correct classification rates by yield classes performing on 77% as an average. Models were run using future climate datasets for the period of 2041-2070 in order to assess changes in future yield classes of forests. Results showed that the extent of the area of best yield classes will decrease, and the most suitable areas show a slight shift to west and to north. In the Pre-Alps region, in the South-Transdanubian region, and in the Transdanubian Mountainous region the well growing sessile oak areas will probably turn into medium or even poorly growing ones. In the same time in the Northern Mountainous region models did not predict significant changes in yield potentials. Overall growing conditions of sessile oak seem to be slightly worsening in the next decades.

Imre BERKI, Norbert MÓRICZ, Ervin RASZTOVITS, Krisztina GULYÁS, Balázs GARAMSZEGI, Adrienn HORVÁTH, Pál BALÁZS and Bence LAKATOS:

### **Mortality and accelerating growth in sessile oak sites...119–130**

**Abstract** – The drought-induced vitality loss of sessile oak (*Quercus petraea* (Matt.) Liebl.) has been continuously observed in Hungary for more than three decades. On the other hand there are some publications about the accelerated and decelerating growth of this tree species in Hungary. The changing height growth was studied on dry sessile oak sites to decide the presence or absence of the accelerated growth of young stands neighbouring older one with mass mortality in the last decades. Results showed a significant accelerated height growth of young stands in dry landscapes. The mass mortality and the accelerated growth of sessile oak stands in the dry landscapes are not contradictory.

Csaba MÁTYÁS, Anikó HORVÁTH-KÓCZÁN, Antoine KREMER and Cuauhtémoc SAENZ-ROMERO:

### **Juvenile height growth response of sessile oak populations to simulated climatic change based on provenance test data...131–148**

**Abstract** – The report presents the analysis of phenotypic response (reaction norm) of selected sessile oak populations to simulated climate change, based on 10-year height data from an international provenance experiment network initiated by INRA (France). Reaction norms were calculated for assessing tolerance of populations to (simulated) warmer and dryer conditions than at origin. The unilateral responses to warming and drying climatic conditions have been linear. The maximum growth potential of populations was shifted toward more favorable conditions than the original ones. Phenotypic plasticity of populations of various provenance, interpreted as an indicator of climate sensitivity, was found significantly different. The provenances from the Carpathian Basin have shown average performance compared to other European populations. The better phenotypic plasticity of populations originating closer to the xeric (trailing, lower) limit is the most important result of the analysis, in terms of reproductive material use. The results corroborate the concept of "assisted migration" for sessile oak and may support the development of a strategy for adaptive forest management

György CSÓKA, Anikó HIRKA, Mariann CSEPELÉNYI, Levente SZŐCS, Miklós MOLNÁR,  
Katalin TUBA, Rudolf HILLEBRAND and Ferenc LAKATOS:

**Response of forest insects to the climate change (case studies)...149–162**

**Abstract** – There is a very tight relationship between insects and their environment, therefore if there is even the slightest change – due to climate change for instance, they react sensitively. This reaction can be very diverse. Their area can expand, their development time can change and consequently their number of generations can alter as well. Effect of factors influencing the size of the populations (natural enemies, mortality) can differ too. It should also be mentioned the sensitive interaction between herbivore insects and host plants in particular, where the insects can react very fast to the changes in the host plant (e.g. drought, stress caused by heat). Ultimately new species can appear, previously rare species can have mass outbreaks or their damage area can expand. We are demonstrating the changes of the last decades in six sample examples: oak lace bug (*Corythucha arcuata*), cockchafer (*Melolontha melolontha*), oak processionary moth (*Thaumetopoea processionea*), cotton bollworm (*Helicoverpa armigera*), gypsy moth (*Lymantria dispar*), in addition to the bark beetle damage in spruce stands.

Dénes BARTHA, Imre BERKI, Attila LENGYEL, Ervin RASZTOVITS, Viktor TIBORCZ and Gergely ZAGYVAI:

**Estimated shifts of forest communities and tree species during changing climate...163–195**

**Abstract** – Our study reflects a multiple approach. On the basis of native tree species estimated response we analyzed the probable rearrangement of our native forest communities. Theoretical estimations were synthesized with result of field work tree mortality and regrowth examination. From the point of view of potential invasion biology, low risk tree species were chosen for possible substitution of our native species. In case of native and invasive species country scale databases, in case of substitute tree species European scale were used for predict future potential distribution. On the basis of National Forestry Database potential natural forest community database of forests were created for the present and future prediction also. According to our results, case of forest and forest steppe habitats high species and structural diversity (fragmented forest stands with grasslands and shrubs) can report higher adaptation. Usage of non native tree species only be possible if new circumstances are not suitable in any case for native habitats and taxa.

Gergely ZAGYVAI, Attila EREDICS, Ágnes CSISZÁR, Márton KORDA, Attila LENGYEL,  
Viktor TIBORCZ and Dénes BARTHA:

**Studies on factors influencing forest gap vegetation with special attention to the microclimate...197–210**

**Abstract** – Based on data from 12 microclimate measurement networks placed in different gaps of various forest stands in Hungary, linear correlation was found between the gap size and certain daily meteorological parameters. The comparison of the forest and gap data to the nearest state meteorological observatory also revealed systematic differences. These provide opportunity to estimate certain climatic parameters, e.g. daily maxima or minima in various sized gaps and the surrounding forest stand, based on standard meteorological observations. Relationship between attributes of 109 gaps and species diversity were analysed as well as indication of microclimatic gradient by regrowth species. Effect of gap age and size are different by social behaviour type. The shape of gaps affects the species richness of regrowth. Positive correlation was detected between Forest Aridity Index and diversity variables. The total number of species, individuals and

effective numbers of regrowth species are highest in the centre of the gaps. Shady, moist areas of gaps are indicated by regrowth of typical mesophilous tree species.

Zoltán SOMOGYI:

### **Climate-change induced forest decline can further enhance climate change...211–226**

**Abstract** – Changes in the forest carbon cycle are among the projected risks of climate change. In this study, these changes were estimated for three important Hungarian tree species for two regional climate change scenarios and three wood harvesting scenarios using the carbon accounting model CASMOFOR. The effects of changing local climate type on species composition and tree growth were studied under *ceteris paribus* conditions using appropriate site-related forest inventory information. The effect of projected droughts on mortality was modelled using empirical results of a previous study, while conservative assumptions were applied for the effect of climate change on several less important model parameters. Results demonstrate dramatically increasing mortality, considerably changing species composition and significant drop of tree growth as the risk of drought increases. As a combined effect of all these processes, country-level emissions from forests are projected to reach the order of magnitude of the current total economy-wide greenhouse gas emissions by the second half of the century. By providing positive feedback, these emissions can considerably offset mitigation efforts in non-forestry sectors.

András POLGÁR, Judit PÉCSINGER, Adrienn HORVÁTH, Katalin SZAKÁLOS-NÉ-MÁTYÁS,  
Attila László HORVÁTH, János RUMPF and Zoltán KOVÁCS:

### **Carbon footprint and predicted climate risk of forest technologies...227–245**

**Abstract** – Forest management is the only economic activity which also permits the prolonged extraction of significant amounts of atmospheric carbon. The purpose of our research is to determine the carbon footprint of forest loggings during utilization within the entire life cycle of raw wood products. In addition, the environmental impact assessment of forest logging technologies also can be an important factor in climate change adaptation. Shortwood forestry work systems has been assessed by environmental impact assessment using the Life Cycle Analysis (LCA) method. Based on a common functional unit (1 ha), a comparative environmental LCA for intermediate and final cutting was performed in stands of beech, oak, spruce, acacia, hybrid poplar. Based on results, a carbon footprint order (GWP) were calculated for utilization life cycle phases and for the entire tree utilization life cycle. Final cutting had the most significant impact based on the analysis of the absolute carbon footprint (ABF) per hectare (considered fossil and biotic origin together). The distribution of ABF by final cutting showed the following order: hybrid poplar (8%) – beech (9%) – spruce (11%) – acacia (35%) – oak (37%). For the whole technological life cycle, the ranking of ABF was "hybrid poplar (77109,06) - spruce (120868,7) - beech (165050,7) - acacia (354843,2) - oak (439544,1) (GWP 100 years: [kg CO<sub>2</sub>-Equiv.]). For the carbon footprint of fossil origin, the ranking was „beech (2326,0) – oak (7679,89) – hybrid poplar (9063,94) – spruce (11109,85) – acacia (11206,34) (GWP 100 years: [kg CO<sub>2</sub>-Equiv.]). Based on the contribution of each climate change process, an ecological risk assessment has been added. With regard to the determination of carbon storage potential, raw wood products can be considered as low-emission raw materials

Ferenc JANKÓ, Laura BERTALAN, Judit PAPP-NÉ VANCÓS, Balázs ORMOS, Nikolett  
NÉMETH and Mónika HOSCHEK:

### **Climate change attitudes and adaptation of Hungarian forest managers...247–263**

**Abstract** – This study utilizes a national questionnaire sample and interviews to examine attitudes to climate change as well as perceptions and adaptation activities among Hungarian forestry managers. The results show the respondents addressing climatic changes are concerned mostly by the decrease in the number of snow-covered days, but differences of opinion can be attributed to geographical location and the forest areas managed. Hungarian forest management is still in the preparation phase with only 16% of respondents reporting the implementation of climate change adaptation measures; however, many foresters claim this is often hindered by legislative constraints. Those who have implemented adaptation measures show an increased concern toward climate change on average; they have been aware of climate change for a longer time and regard it as a serious problem affecting their management activities. The study has evidence that state forest managers do not adapt better than private foresters do, high level of concern and nature conservation factors do not hinder adaptation. However, during the interviews respondents reported that nature conservation factors do, in fact, hinder adaptation processes.

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Balázs GARAMSZEGI, Melinda NAGY-KHELL, Máté FARKAS and László NAGY:

#### **Impact of weather conditions on the interannual growth characteristics of alder and oak stands with improved groundwater-management...9–16**

**Abstract** – Tree ring analysis in common alder (*Alnus glutinosa*) and pedunculate oak (*Quercus robur*) stands were carried out as a part of the monitoring tasks related to the KASZÓ-LIFE project, which targeted to improve the groundwater supply of the project area. Aims of the research were to identify benefits of the increased groundwater level and its more balanced 10 Garamszegi Balázs, Nagy-Khell Melinda, Farkas Máté és Nagy László interannual course due to the technical interventions in the growth of the sample trees. A specific focal point was to assess the sensitivity of the annual increments to the severe weather events like droughts under the changed conditions. The preliminary results reveal a much stronger relationship of alder growth with climate (first of all, with summer rainfall and mean relative humidity) than in case of oak, even when considering the generally higher groundwater level of alder stands. Regarding the benefits of the technical interventions, a series of severe drought years after 2000, selected by the 6-month SPEI drought index and decrease in alder increments indicate that following the actions, growth decrease of alder stands were significantly lower than the rate at the control site in 2017, though a reverse tendency was common during all the previous drought periods. However, the average increment decline of all investigated stands was much stronger in this year, than it could be predicted by the weather conditions based on the growth-climate relationships dating back to the previous decades, giving a possible evidence of unfavorable climatic trends and recurrent drought periods, even parallel with the mitigating actions.

Csaba Béla EÖTVÖS and László HORVÁTH:

#### **Changes of groundwater levels in Szentábrahámszentmihály-forest as result of Kaszó-Life project...17–23**

**Abstract** – Monitoring of groundwater wells can give us a reliable method to the long-term analysis of the groundwater levels. With this method we have been able to follow the effects of different interventions to the groundwater recharge. During our experiments the groundwater level changes at 18 sample sites was investigated. The area was characterized by

decrease of the groundwater level in the last decades caused by anthropogenic influences such as water management or drainage and by uneven precipitation distribution. We intended to increase the groundwater level by water wales disposed perpendicular to the direction of the flow of the periodic watercourses that encircle the area and by heightening the dams of reservoirs, furthermore by building new reservoirs. In the frame of KASZÓ-LIFE project, according to our results the implemented water retention works did slow down the speed by half of the decrease of the groundwater levels; meanwhile the precipitation have been still not enough to stop the decreasing tendency of groundwater levels.

Eszter VISINÉ RAJCZI, Tamás HOFMANN, Levente ALBERT and Csaba MÁTYÁS:

**Antioxidant system as a potential indicator of the climatic adaptation of beech (*Fagus sylvatica* L.)...25–35**

**Abstract** – The effect of simulated climate change was studied on populations of different beech (*Fagus sylvatica* L.) provenances. The climatic adaptation of six selected beech provenances (Farchau, Pidkamin, Torup, Gråsten, Bánokszentgyörgy, Magyaregregy), growing at the site of the beech provenance test of Bucsuta (H) were compared by the assessment of their enzymatic and non-enzymatic antioxidant system. The total protein content, peroxidase (POD) and polyphenol oxidase (PPO) enzyme activities as well as ABTS (2,2'-azino-bis-(3-ethylbenzothiazoline)-6-sulfonic acid) antioxidant capacity were measured from the leaves of selected trees. The identification and quantitative determination of major leaf polyphenols was also determined from the same samples. By the comparative analysis of the enzymatic and non-enzymatic antioxidant systems 26 Visiné Rajczi Eszter, Hofmann Tamás, Albert Levente és Mátyás Csaba of the provenances it was concluded that the selected chemical variables were suitable for the assessment of the climatic stress, simulated by the translocation of the investigated provenances. POD enzyme activity as well as total protein content and the concentrations of certain polyphenols could be potential chemical indicators of the adaptation process and could be used in the forecasting of the future effects of climate change and in the selection of propagation material in the future.

Bence BOLLA, Tamás Márton NÉMETH and Zsolt GÁCSI:

**Monitoring of the hydrological balance in forest stands of Kiskunság...37–50**

**Abstract** – The aim of this paper to show how hydrological measurements in forests and grasslands can contribute to the treatment of different areas. The study was carried out in three different forest stands and their surrounding grasslands of the area of the Kiskunság Sandridge, between 2012 and 2015. Different methods were applied during the study of the water balance. The water balance shows that the values of the water uptake of the grasslands are lower than that of the surrounding foreststands. The hydrological measurements and results can be useful for the silviculture in different sand forest types under the changing climate conditions.

Dávid HEILIG, Bálint HEIL and Gábor KOVÁCS:

**Effects of spacing control on dendromass yield in short rotation hybrid poplar plantation...51–59**

**Abstract** – Nowadays forest plantations have a growing role in wood production. The area of SRF plantations is growing in Europe, but there is only little information about how traditional forestry interventions, like thinning affects yield in the first couple of years after establishment on short and midi rotation plantations. The aim of this paper is to see if spacing

controls result in higher yields. In 2011 an experimental plantation was established in the Dejtár 4 CS forest compartment, where the same intensity spacing control was used but at a different age on 'AF2 to see how it affects the yield. For this purpose, dendrometrical measurements were completed for 6 continuous growing seasons. There is no difference in the aspect of dendromass inventory between the controlled and not controlled plots nor in the case of interventions at different ages during the examination period. Following the year of spacing control, increment was higher than in the last growing season and then in the control plots. Despite having no difference between the yields, the dimensions of trees show difference in spacing controlled plots and in the control ones. This means that the spacing control mostly affects the quality of wood.

Viktória NEMES, Ágnes CSISZÁR and Dénes BARTHA:

**Studies on black cherry (*Prunus serotina* Ehrh.) occurrence in the area of comparative tree species examination, Nagylózs...61–70**

**Abstract** – Coenological studies have been carried out in Nagylózs 5F experimental forest subcompartment (Győr-Moson-Sopron county) to examine the occurrence of invasive black cherry in different forest stands planted in 1969. According to our monitoring results, black cherry is present in all parcels of the forest subcompartment and shows considerable spreading in the surrounding areas. Among the 12 studied parcels, the species became dominant in the canopy layer of sweet chestnut, Norway spruces and Scots pine parcels; where the presence of the former planted trees had decreased considerably. It occurs only infinitesimally, mainly with seedlings in linden parcels with high canopy closure. Statistical analyses confirmed negative correlation between the canopy closure and black cherry dominance in shrub layer. According to our studies, we would like to draw the attention to the importance of canopy closure and shading effect of the second canopy layer during the control of black cherry.

Réka ANDRÉSI, Gergely JANIK, Ágnes FÜRJES-MIKÓ, Csaba Béla EÖTVÖS and Katalin TUBA:

**Faunistical studies on Coleoptera of tinder conk [*Fomes fomentarius* (L. ex. Fr.) Kickx.] in Hungary...71–82**

**Abstract** – Our present knowledge on beetle communities of tinder fungi is far from complete in Hungary. During our research (2010– 2013) 193 fruiting bodies of *Fomes fomentarius* (L. ex. Fr.) Kickx. were collected from vicinity of 27 Hungarian settlements. Our purpose was to gain new knowledge from the beetle communities related to *Fomes fomentarius* fruiting bodies in Hungary. A total of 4,726 beetles were reared out from the samples. 4,703 specimen of this, belonging to 27 species were identified for species level. Some beetle species typically associated with *Fomes fomentarius* (e.g. *Bolitophagus reticulatus*), but *Bitoma crenata* is a predator, so other species could attract it to the fruiting bodies. The largest individual was the *Rhopalodontus perforatus*, from the Ciidae family, followed by *B. reticulaus* and *Cis castaneus*. Nowadays, treating dead wood has an ever-increasing significance in forests, so the examination of decomposer fungi and their communities is necessary to get better knowledge from diversity and functions of the forest ecosystems.

István HARTA, Dániel WINKLER and György FÜLEKY:

**Effect of reforestation on soil properties and mesofauna (Collembola) in a former long-term fertilization experimental area...83–97**

**Abstract** – Reforestation with black locust (*Robinia pseudoacacia*) and sessile oak (*Quercus petraea*) has occurred on two former fertilization experimental areas of Szent István University in Gödöllő. The aim of this study was to investigate the soil parameters and the Collembola fauna in the previously highest fertilizer-treated parcels. Nearby control sites (black locust forest, sessile oak forest, relict forest, as well as cultivated and abandoned arable land) have been selected for comparative analyses. Based on the results, the reforested areas were most similar to the control forests. Their Collembola fauna are transitional, species typical for both open areas and forests have also been detected. While the abundance, species richness and diversity of the experimental areas are still lower than in the control forests, we observed significantly higher diversity when compared to the communities found in the cultivated arable fields. While Collembola were slightly more abundant in the black locust plantation, species richness, diversity and evenness values were higher in the sessile oak plantation. Based on the Bray-Curtis similarity measure, open and forest communities clearly separated, moreover, the studied plantations and control forests formed separate subgroups.

Mariann KOMLÓS and Csilla KISS:

**Estimation of the fallen dead wood in the Sopron Mountains...99–111**

**Abstract** – In this paper we have analyzed the quantitative and qualitative dispersion of lying dead wood in two streambeds of the Sopron Mountains, the Tolvaj-árok and the Vadkan-árok. The estimation of the lying dead wood was made with the line transect method by perpendicular transects at the two valleys. The amount of dead wood was higher (30,66 m<sup>3</sup>/ha) in the Tolvaj-árok compared to the Vadkan-árok (21,23 m<sup>3</sup>/ha). The distribution of dead wood showed strong heterogeneity on the study area for the three studied parameters (decay stage, diameter and tree species). The amount of fallen dead wood increased with stand age. Concerning forest communities, the largest amount of dead wood has been found in the sessile oak-hornbeam forests.

Tamás MERTL and Endre SCHIBERNA:

**Private forest owners in Hungary...113–126**

**Abstract** – Based on the analysis of land registry data, it can be concluded that the land lots with forest area larger than 0.5 ha, classified as forest management area and not 100% state property is owned by 425 thousand individuals and 3 thousand organizations such as enterprises, municipalities, civil organizations and churches. This study is focusing on the analysis of individual owners and finds that the number of female and male owners is equal, but male owners own almost double the area than that of the female owners. More than half of the owners live in villages, one-fourth in small towns and one-fifth in large cities, while only a fraction of owners is living abroad or at unknown places. The average size of property is 1.85 ha, and the distribution of property sizes is strongly concentrated. On the one hand, one-third of the owners own less than 0.1 ha and their forests cover only 0.6% of the study area, while on the other hand, the owners with forest area larger than 10 ha have a 3.1% share in the number of owners and a 55.0% of the study area. Two-third of the owners owns forest only in one single land lot, and the same share of owners lives within a 10 km radius from their property.



