

FORESTRY AND GAME MANAGEMENT RESEARCH INSTITUTE
PARTICIPATE WITH
FORESTS OF THE CZECH REPUBLIC, S. E., REFORESTATION AGENCY, TEPLICE ,
FACULTY OF FORESTRY AND WOOD TECHNOLOGY, MENDEL UNIVERSITY OF AGRICULTURE AND
FORESTRY BRNO,
FACULTY OF FORESTRY, CZECH UNIVERSITY OF AGRICULTURE PRAGUE
IN ORGANIZATION OF NATIONAL WORKSHOP

Results of forestry research in the Ore Mts. in 2001

Teplice 14. 3. 2002

The aim of the Workshop is to provide the new results of forestry research in the air polluted region of the Ore Mts. to forest owners, to the State Administration and to other interested experts.

Contributions were divided into three thematic blocks:

1. Soil Environment – orientation on the topic problem of pioneer species, liming and nitrogen in forest ecosystem of the Ore Mts.
2. Health Condition of Forest Stands – orientation primarily on the development of deposition in the area of the Ore Mts., on the health status of assimilation organs of forest tree species and on the dynamics of phytophages on birch.
3. Silviculture – orientation on new results on development of target trees in stand conversion, on dynamics of needle substitute tree species and on silviculture technique in substitute stands of blue spruce.

Presented contributions were included in proceedings:

Výsledky lesnického výzkumu v Krušných horách v roce 2001. [Results of forestry research in the Ore Mts. in 2001]. Sborník referátů z celostátní konference. Teplice, 14. 3. 2001. Sest. M. Slodičák, J. Novák. Jíloviště-Strnady, VÚLHM 2001. 170 s. - Res. angl. - ISBN 80-86461-20-3.

List of contributions:

Block I – Soil environment

Dušan Vavříček: Soil environment – an important stressing factor of the Ore Mountains plateau

Iva Ulbrichová, Vilém Podrázský: Evaluation of main broad-leaved preparatory tree species from the viewpoint of restoration and protection of forest soils in the Ore Mts.

Vilém Podrázský, Iva Ulbrichová: Long – term effects of surface liming on the spruce plantations and the forest soil dynamics in immission areas

Jiří Kulhavý, Pavel Formánek: Nitrogen in forest ecosystems of the Krušné hory Mts.

Block II – Health condition of forest stands

Věra Fadrhonsová, Vít Šrámek, Monika Kroupová: Development of deposition in the Ore Mts.

Pavel Hadaš: Total potential deposition of sulphur, nitrogen and hydrogen ions in the territory of the Krušné hory Mts. natural forest region in 1999

Emanuel Kula, Milan Stoklasa: Interpretation of the dynamics of changes in the health condition of birch stands in the eastern part of the Ore Mts. (Krušné hory) based on satellite scenes

Emilie Bednářová: State of assimilatory apparatus at forest tree species in the Ore Mts.

Emanuel Kula, Jadwiga Ząbecka: State and dynamics of birch phytophages in the eastern Ore Mountains (1995 - 2001)

Emanuel Kula, Ivan Stieber, Zbyněk Vicha: Leaf spot on birch and the possibility of its elimination

Petr Hrdlička, Emanuel Kula: Element content in leaves of birch in the transects the Ore Mts. and the Děčín sandstone highlands in 2001

Bohumír Lomský, Vít Šrámek: The development of the health state of spruce young stands in the Ore Mts.

Block III – Silviculture

Horst Kriegel: Development of target species during conversions of species composition in substitute tree species stands in monitored air pollution and ecological conditions in the Ore Mts. (experimental plot Fláje)

Jiří Remeš: Comparison of the growth dynamic of coniferous substitute species on experimental plot Boleboř

Marian Slodičák, Jiří Novák, Dušan Kacálek: Silvicultural measures in substitute blue spruce stands (results of experiment Fláje II in 1996 – 2001)

Ondřej Ivanek: Isoenzyme analysis of Norway spruce on ICP Forest plots in the Karlovarská vrchovina Natural Forest Area

Overview of abstracts:

SOIL ENVIROMENT – AN IMPORTANT STRESSING FACTOR OF THE ORE MOUNTAINS PLATEAU

DUŠAN VAVŘÍČEK

ABSTRACT

Geomorphologic formations of the Ore Mountains plateau (7th forest altitudinal zone) is a complex with high amount of precipitation; bedrock is built mainly with acid rocks. These conditions lead to undermined prevailing process of podsolisation. The typical podsol and humus podsol have been formed genetically. The hydrological relation is significantly changing during deforestation and soil hydromorphism interfere to upper soil layer and decrease the soil physiologic depth.

EVALUATION OF MAIN BROAD-LEAVED PREPARATORY TREE SPECIES FROM THE VIEWPOINT OF RESTORATION AND PROTECTION OF FOREST SOILS IN THE ORE MTS.

IVA ULBRICHOVÁ, VILÉM PODRÁZSKÝ

ABSTRACT

*Large areas were deforested as a consequence of the immission calamity in the Czech Republic in the last decades. As a part of restoration activities, preparatory species were utilised, both planted and sown, to cover forest soils, to prevent soil erosion and to regenerate forest microclimate, necessary for afforestation and reintroduction of target, climax species. Among the species tested, two domestic species were considered of special importance: Birch (especially *Betula verrucosa*) and Rowan tree (*Sorbus aucuparia*). Presented study documents their effect on the forest soil status on studied localities in the area of the Krušné hory (Ore) Mts.*

LONG – TERM EFFECTS OF SURFACE LIMING ON THE SPRUCE PLANTATIONS AND THE FOREST SOIL DYNAMICS IN IMMISSION AREAS

VILÉM PODRÁZSKÝ, IVA ULBRICHOVÁ

ABSTRACT

Liming represents important component of forest restoration strategy in heavy air polluted regions. It is common practice in the last decades in all immission areas. It aims soil acidity lowering, toxic soil components elimination and, revitalisation of plantations. Despite of negative potential it is applied also on immission clear-cuts in higher altitudes. Presentation documents liming effects on immission clear-cut in higher mountain conditions of the Orlické hory Mts. In the first decade, the liming influenced positively the plantation height growth, nutrition and soil chemistry, on the other hand the nitrogen and soil potassium dynamics was affected negatively.

NITROGEN IN FOREST ECOSYSTEMS OF THE ORE MTS.

JIRÍ KULHAVÝ, PAVEL FORMÁNEK

ABSTRACT

The long-term leaching of cation nutrients (especially Ca^{2+} , Mg^{2+} , K^{+}) from forest soils in Krušné hory mountains and the tendency to excessive nitrate nutrition, which is the cosequence of nitrogen deposition, led to the absolute or relative deficiency of other nutrients with regard to nitrogen. Reclamation measures were introduced to attenuate negative cosequences of the atmospheric deposition influence on soils. Preliminary results aimed at nitrogen regime in soils evaluation and at the relation to mineral nutrition are presented in the contribution.

DEVELOPMENT OF DEPOSITION IN THE ORE MTS.

VĚRA FADRHOŇSOVÁ, VÍT ŠRÁMEK, MONIKA KROUPOVÁ

ABSTRACT

The long term measurements of bulk and throughfall deposition are reviewed for the area of the Ore Mts. Despite the decrease of deposition load since 1980 the trend has been not so pronounced as in the case of air pollution. The substantial growth of pH growth is observed in last 20 years. The sulphate deposition have decreased, even though the current level of about $30 \text{ kg} \cdot \text{ha}^{-1} \cdot \text{year}^{-1}$ is still high. The bulk deposition of nitrogen is currently at the level of about $10 \text{ kg} \cdot \text{ha}^{-1} \cdot \text{year}^{-1}$ and it have not exhibited decreasing trend since the half of nineties.

TOTAL POTENTIAL DEPOSITION OF SULPHUR, NITROGEN AND HYDROGEN IONS IN THE TERRITORY OF THE ORE MTS. NATURAL FOREST REGION IN 1999

PAVEL HADAŠ

ABSTRACT

Spatial field of total potential acidic deposition of hydrogen ions, sulphur and nitrogen was assessed for the territory of the Ore Mts. on the basis of model computations of dry and wet deposition fluxes of sulphur and nitrogen within a network of 1341 reference points for the year 1999. The computations make use of the Gaussian puff model to derive the SO_2 , NO_x , and dust aerosol concentrations, the resistance model to derive the deposition rates, the numerical simulation for the computation of dry and wet components of SO_4^{2-} , NO_3^- , and the orographic interpolation to derive the spatial totals of atmospheric precipitation. The calculations also make use of the measured meteorological parameters characterizing dispersal conditions (wind direction and velocity, temperature stratification), immission concentrations and chemical composition of atmospheric precipitation. The calculation of deposition fluxes is made for the air-pollution situation of central Europe in the year 1999.

**INTERPRETATION OF THE DYNAMICS OF CHANGES IN THE HEALTH
CONDITION OF BIRCH STANDS IN THE EASTERN PART OF THE ORE MTS.
BASED ON SATELLITE SCENES**

EMANUEL KULA, MILAN STOKLASA

ABSTRACT

The methods of investigations of the changes in the health condition of birch stands in the eastern part of the Ore Mts. were checked in practice using Landsat satellite scenes. The results showed that within a tolerable accuracy (and within its physical possibilities) this method is capable of providing full-area evaluations of the annual changes in the health condition of birch stands if the satellite scenes are classifiable at least minimally. The output of the interpretation is a digital raster map and database of the damage and mortality of birch stands. Using satellite scenes from the archives, which store all monitoring data on the health situation of state-owned forests of the Ministry of Agriculture will enable annual monitoring of the health condition of birch stands in the eastern part of the Ore Mts.

**STATE OF ASSIMILATORY APPARATUS AT FOREST TREE SPECIES
IN THE ORE MTS.**

EMILIE BEDNÁŘOVÁ

ABSTRACT

The damage of assimilatory apparatus caused by air pollution was studied during the past five years using the method of evaluating epicuticular waxes changes at Norway spruce and birch in the localities Litvínov and Klášterec in all altitudes (500 – 1230 m above sea level). The boundary altitude for epicuticular waxes damage caused by air pollution increased over 800 m above sea level in the year 2001. Destruction of epicuticular waxes declined and the amount of epicuticular waxes in leaves and needles increased at all stands. The damage is present in a latent form at the stands with lower altitude.

**STATE AND DYNAMICS OF BIRCH PHYTOPHAGES IN THE EASTERN ORE
MOUNTAINS (1995 - 2001)**

EMANUEL KULA, JADWIGA ZĄBECKA

ABSTRACT

*Long-term monitoring of the extent and causes of damage to the assimilation apparatus of birch (*Betula pendula* Roth) in the eastern Ore Mountains (1995 - 2001) enabled us to determine the dynamics of the proportion of the individual pathogen groups. Caterpillars and weevils were dominant. Leaf-mining insects *Coleophora serratella* L. and *Eriocrania* have low population density. The presence of spider mites *Aceria rudis* Can. and *Phyllocoptes lionotus* Nal. is increasing. The partial decrease of damage to the birch assimilation apparatus by phytophages in 2001 is due to the weather course and it is not so far possible to consider it as a reaction to positive changes of air-pollution conditions. Cluster analysis confirmed significant independence of phytophages of the birch stand age and their dependence on altitude.*

LEAF SPOT ON BIRCH AND THE POSSIBILITY OF ITS ELIMINATION

EMANUEL KULA, IVAN STIEBER, ZBYNĚK VÍCHA

ABSTRACT

*The leaf spot of birch can be found on higher elevation of the Ore Mts. (800-1000 m above sea level) as the result of presence of pathogens *Venturia ditricha* (Fr.) P. Karsten, *Discula betulina* (Westend.) Arx. From eight tested fungicide preparates Dithane M 45, Discus, Chorus 75 WG, Baycor 25 WP, Rubigan12 EC, Horizont 250 EW, Syllit 65 a Delan 700 WDG, the most effective ones were Discus and Horizon 250 EW. There are insufficient data as for the periodicity of application, effect, biology and epidemiology, so large-scale application cannot be recommended.*

ELEMENT CONTENT IN LEAVES OF BIRCH IN THE TRANSECTS OF THE ORE MTS. AND THE DĚČÍN SANDSTONE HIGHLANDS IN 2001

PETR HRDLIČKA, EMANUEL KULA

ABSTRACT

The content of major elements (S, N, P, Ca, Mg, K), minor elements (Mn, Zn, Cu) and foreign elements (Pb, Cd, Al) was determined in birch leaves from stands in transects of the Ore Mts. and the Děčín Sandstone Uplands in 2001. Analyses showed that the content of S and N decreased down to the level of moderate insufficiency (the result of declining emission in the region), the content of P, Ca and Mg was sufficient and the content of K permanently low. The content of Mn was continuously high (particularly in the Litvínov transect at an altitude of 500 m) and the content of Zn and Cu was low. The Pb and Al contents corresponded with the values of the background and the content of Cd was permanently excessive. No symptoms of insufficiency or surplus of the above elements were observed in the investigated stands.

THE DEVELOPMENT OF THE HEALTH STATE OF SPRUCE YOUNG STANDS IN THE ORE MTS.

BOHUMÍR LOMSKÝ, VÍT ŠRÁMEK

ABSTRACT

In the transect of long-term investigated plots in the Ore Mts. region, defoliation was assessed and the supply of nutrients and stress elements in needles stated. Average defoliation of the young tree crowns has slightly decreased again in 2001 – to 31%. However, in some plots in the eastern part of the Ore Mts., yellowing of individual trees or groups of trees still can be observed. Increased content of sulphur and fluorine was not found. Insufficient content of magnesium in needles was found at five localities. Nutrient supply is presented in 8 year serie.

**DEVELOPMENT OF TARGET SPECIES DURING CONVERSIONS OF SPECIES
COMPOSITION IN SUBSTITUTE TREE SPECIES STANDS IN MONITORED AIR
POLLUTION AND ECOLOGICAL CONDITIONS IN THE ORE MTS.
(EXPERIMENTAL PLOT FLÁJE)**

HORST KRIEDEL

ABSTRACT

Stand conversion of the 16 year-old mixed stand of white spruce, birch and rowan started by planting beech, sycamore maple, Scotch elm, common spruce and white-fir in the Ore Mts. (800 m above sea level, pollution thread zone A – the most polluted area). Performance of plantings was assessed including the monitoring of air-pollution and ecological conditions. After overcoming the planting shock (in 1 to 3 years) the better stand of health occurred in plantings established by containerised planting stock. Upper layer of soil in mountain areas freezes up to 20 cm depth depending on air temperature and height of snow layer. Sulphur deposition measured by the contact method recently suggests slightly increasing trend.

**COMPARISON OF THE GROWTH DYNAMIC OF CONIFEROUS SUBSTITUTE
SPECIES ON EXPERIMENTAL PLOT BOLEBOŘ**

JIRÍ REMEŠ

ABSTRACT

Contribution presents the growth of the experimental plantations that were established in the Ore Mts. conditions in 1983. The monitoring was restored in 2000, after plots revisions. Evaluation of the technical and biological amelioration and species composition and their effects on the substitute stands growth dynamic is the object of the observation. The different growth speed of the selective species and positive effect of the amelioration were confirmed.

**SIVICULTURAL MEASURES IN SUBSTITUTE BLUE SPRUCE STANDS
(RESULTS OF EXPERIMENT FLÁJE II IN 1996 – 2001)**

MARIAN SLODIČÁK, JIRÍ NOVÁK, DUŠAN KACÁLEK

ABSTRACT

*The experiment Fláje II for investigation of growth and development of substitute blue spruce (*Picea pungens* Engelm.) stands in top part of the Ore Mts. was founded in 1996. Experimental series consists of three comparative plots with an area of 0.1 ha (25 m x 40 m) each. Blue spruce stands with initial density ca 2.5 thousand per hectare and dominant height 5 m (age 16 years) are considerably differentiated (dbh = 2 – 15 cm). In spite of the low quality of the stands, crown area covers more than 90% of stands area and therefore thinning and stand conversion can be started. Thinnings on plots 2 and 3 began with different intensity in 2001. The stand on comparative plot 1 is control without thinning. The stand conversion, as underplanting of site suitable tree species, began on all comparative plots (at first phase large-sized plants and saplings of European aspen – *Populus tremula* L.). The effect of tending first year after thinning was inconsiderable. Soft acceleration of growth (diameter and height) was founded for average stem and dominant trees only on plot 3 with heavy thinning.*

ISOENZYME ANALYSIS OF NORWAY SPRUCE ON ICP FOREST PLOTS IN THE KARLOVARSKÁ VRCHOVINA NATURAL FOREST AREA

ONDŘEJ IVANEK

ABSTRACT

Isoenzymes of Norway spruce populations from 2 ICP Forest plots, Level II in Natural Forest Area 3 - Karlovarská vrchovina, differing in geologic, pedologic, climatic and phytocenologic characteristics were analysed. Atmogeochemic measurements (MFE, Molecular Form of Elements) were also performed here.