

Temporal and spatial variability of the most important phenological phases of birch in the Czech Republic

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Abstract

HÁJKOVÁ, L., SEDLÁČEK, V., NEKOVÁŘ, J. 2007. Temporal and spatial variability of the most important phenological phases of birch in the Czech Republic. *Folia oecol.*, 34:

Phenology is the study of the times of recurring natural phenomena in plants and animals. The Czech Meteorological Service launched its phenological observations in 1940, with a whole data-providing network, including the archives from the year 1923. Today the Czech Hydrometeorological Institute (CHMI) operates with a network of phenological stations encompassing field crops, fruit trees and wild plants, according to the Methodical instructions number 2, 3, 10. There are also observed several very important allergenic species from which birch (*Betula verrucosa* Ehrh.) has been chosen for the subject of this case study – as one of the most frequent allergenic plants in Europe, including the Czech Republic. Its pollen grains are the most important allergen.

Observing phenological phases (flower buttons visible, beginning and end of flowering) is important for identification of the pollen season. At wild plant stations, there are observed these phenophases in *Betula verrucosa* Ehrh: sprouting, first leaves, full leaves, flower buttons visible, beginning and end of flowering, bud creation, lignification of sprouts, yellowing of leaves, defoliation and ripening of fruits. Temporal and spatial variability in the chosen phenophases (sprouting, first leaves, full leaves, flower buttons visible, beginning and end of flowering) was explored with using statistical (basic statistical characteristics) and GIS methods for the periods 1992–2006 and 1992–2007 with respect to allergenic importance of the phenophases.

Temporal variability was monitored at the phenological stations Lednice (48°48' N, 16°48' E, 165 m asl) and Pernink (50°22' N, 12°47' E, 860 m asl), the spatial variability 4 at 4 stations with MASL (mean above sea level) ranging from 155 m (Doksany – Polabská nížina) to 1102 m (Filipova Hut' – Šumava). The results are presented in form of tables and maps. In this case study we observed the following shifts in phenophases (lowland in comparison with mountain): sprouting (22.6 days), first leaves (19.8 days), full leaves (21.6 days), flower buttons visible (26.5 days), beginning of flowering (27.2 days), end of flowering (25.4 days).

Keywords

pollen, birch, phenophase, flowering, allergy season, GIS, sprouting

Influence of snow damage on aerodynamic characteristics of a spruce stand

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Abstract

HURTALOVÁ, T., NATEJKA, F., JANOUŠ, D., POKORNÝ, R., ROŽNOVSKÝ, J. 2007. Influence of snow damage on aerodynamic characteristics of a spruce stand. *Folia oecol.*, 34:

Influence of snow damage on aerodynamic characteristics of a spruce stand was investigated during the growing seasons 2005 and 2006 before and after the winter 2005/2006 that caused damage to the forest. With this aim, the wind speed profiles measured in and above the investigated forest stand were analyzed. This forest is situated in the Experimental Ecological Study Site Bílý Kříž in the Moravian-Silesian Beskydy Mountains, the Czech Republic. The experimental site consists of two plots with Norway spruce monocultures with different stand densities. In the growing season 2005, the mean tree height was 11.9 m on the “dense” plot (Fd; a density of 2,044 trees/ha) and 11.0 m on the “sparse” one (Fs; a density of 1,652 trees/ha). The measurements of wind speed profile were realized at six levels on 26-m-high towers situated near the centre of each plot. The winter 2005/2006 was characterized by continuous snow cover (from November 2005 to April 2006) with a high water value in the investigated locality. The damage to the forest caused by this snow blanket was noticeable, mainly in Fd. The stand density decreased by about 29% on Fd and by about 14% on Fs plot. It witnesses entirely new airflow conditions within and over this forest stand and connected changes in its aerodynamic characteristics.

Key words

snow damage, spruce stand, wind speed, roughness length, zero plane displacement

Intraseasonal stem circumference oscillations: their connection to weather course

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Abstract

JEŽÍK, M., BLAŽENEC, M., STŘELCOVÁ, K. 2007. Intraseasonal stem circumference oscillations: their connection to weather course. *Folia oecol.*, 34:

The diameter (circumference, radial) growth of trees is primarily connected with activity of secondary lateral meristematic tissues – cambium and phellogen. Their activity is linked with the basic physiological processes running in trees, the influence of which can be either direct or indirect. This process is also influenced by climate and weather fluctuations. At the same time, the tree stem with its tissues (bark, phloem, xylem) serves as a water reservoir for transpiration, and the short-time oscillations in the stem magnitude reflect the water balance and water potential of these tissues. The study ran in the vegetation period 2006. We measured short-time stem circumference changes on 1 beech and 3 spruce individuals in a primeval spruce forest in locality Predná Poľana (1360 m asl). In this contribution we deal mainly with inter-daily circumference changes and their connection to the seasonal weather course. A strong weather signal, affecting the circumference changes, was observed both on spruce and beech.

Key words

circumference changes, growth, spruce, beech, climatic signal

Decomposition dynamics and biological activity in a floodplain forest

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Abstract

Lorencová, H. 2007. Decomposition dynamics and biological activity in a floodplain forest. *Folia oecol.*, 34:

The submitted work presents preliminary results of study evaluating the values of humus ratio in a hardwood floodplain forest situated near Lednice na Moravě, Forest Enterprise Židlochovice. The basic characteristics of surface humus layer in the mixed growth of the examined forest are assessed. The research locality is situated at an altitude of 151–153 m. The average of annual temperature is approximately 9–10 °C, average of annual rainfall is 500–550 mm. In samples of litter fall (oak, ash), the contents of carbon, nitrogen, dry matter and C/N ratio were determined and the microscopic pictures of foliage decomposition were made.

Key words

floodplain forests, humus, litter fall

On the possibility of usage of GIS for ecological damage evaluation, demonstrated on example of the wind calamity in the High Tatra National Park

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Abstract

MELICHAROVÁ, A., SCHNEIDER, J., MIKITA, T., CELER, S., KUPEC, P., VYSKOT, I. 2007. On the possibility of usage of GIS (Geographic Information System) for ecological damage evaluation, demonstrated on example of the wind calamity in the High Tatra National Park. *Folia oecol.*, 34:

The article presents methodology and results of ecological damage evaluation carried out with using the Geographic Information System (GIS). The concerned ecological damage was caused by the wind calamity impacted the most part of the High Tatra National Park (TANAP) in November 2004. The ecological damage to mountain forests has been evaluated by the ecosystem method called Quantification and Evaluation of Forest Functions (VYSKOT, 2003) as empowering (reduction) of the ecosystem functions resulting from the wind calamity having caused the damage. There have also been determined the damage categories and their presence in the forest stands. The GIS was used in the first step for the extensive data set processing; in the second step for some special analyses. The GIS software special analyses were applied in multi criteria evaluation of forest stands resistance to wind ecological damage, where different parameters of forest stand biotic and abiotic conditions were combined. The results presented in the article show evidence of powerful usage of GIS software for analyses connected with ecological damage evaluation.

Key words

GIS, functional analysis, damage to forest functions

Prediction of medium- and long-term changes in soil reaction in a beech forest – based on observations in the beech stemflow zone

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Abstract

PICHLER, V., GREGOR, J., HOMOLÁK, M., CAPULIAK, J., BEBEJ, J., VÁĽKA, J. 2007. Prediction of medium- and long-term changes in soil reaction in a beech forest – based on observations in the beech stemflow zone. *Folia oecol.*, 34:

The active soil reaction in a mature beech forest subjected to alkaline dust deposition reflected parallel influence of both alkaline and acid deposition. As a result, the active soil reaction within the stemflow zone at the depth of 5–10 cm decreased from 7.4 and 6.5 to 5.9 and 4.7, respectively. Outside the stemflow zone, the soil pH values were reduced from 7.9 to 6.6. This phenomenon occurred due to the long-range acid air pollution transport. Stoichiometric calculations showed that the amount of acid deposition was amplified through the stemflow effect in beech trees that in their turn partly offset the alkaline deposition. Thus, the active reaction of the topsoil subjected to stemflow moved from moderately alkaline to moderately acid range during the period 1991–2006, while a similar shift from moderately alkaline towards neutral values occurred outside the stemflow zone. The pH decrease was correlated with a more than 90% reduction in alkaline dust emissions from magnesite works. In the stemflow zone, the active soil reaction at the depth of 0–5 cm is supposed to remain in the related intervals up to about 2030. Outside the stemflow zone, the active soil reaction at the same depth should persist in the neutral range until 2015. Subsequently, the active soil reaction will move towards the moderately acid range even outside the stemflow zone. Standard forest management will probably cause the active soil reaction to converge to the original soil pH value of 5 in the course of approximately 200 years.

Keywords

forest soils, beech forests, stemflow, alkaline deposition, acid deposition, soil reaction prognosis