Projekt TAČR

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Program Prostředí pro život

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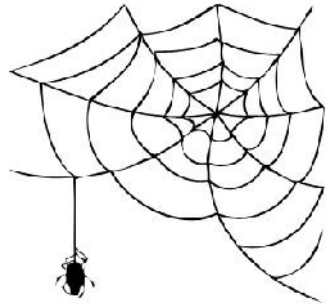
Nejprve trocha historie



1992-1995 – Mze

program Ozdravění ŽP (úkol II.5.8. „Sledování a hodnocení vývoje založených prvků lokálního ÚSES“).

pět biokoridorů - Křižanovice, Medlovice, Radějov, Stříbrnice, Vracov

pedologie

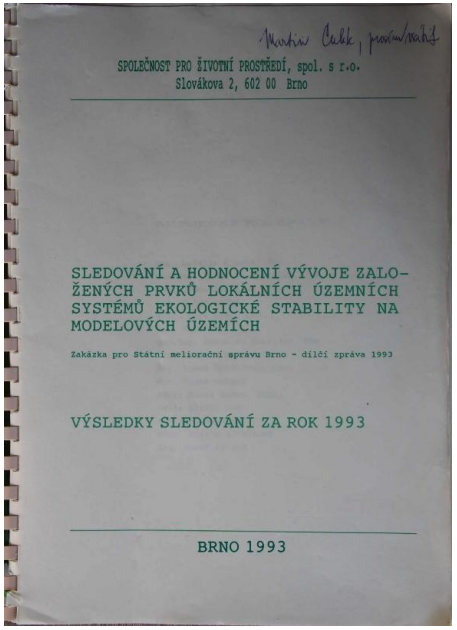
dendrologie

botanika

entomologie

zoologie

Výstup - závěrečné zprávy


SPOLEČNOST PRO ŽIVOTNÍ PROSTŘEDÍ, spol. s r.o.
Slovákova 2, 602 00 Brno

SLEDOVÁNÍ A HODNOCENÍ VÝVOJE ZALOŽENÝCH PRVKŮ LOKÁLNÍCH ÚZEMNÍCH SYSTÉMŮ EKOLOGICKÉ STABILITY NA MODELOVÝCH ÚZEMÍCH

Zakázka pro Státní meliorační správu Brno - dílčí zpráva 1993

VÝSLEDKY SLEDOVÁNÍ ZA ROK 1993

BRNO 1993

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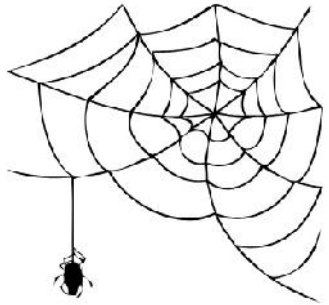

1996-2001 – MŽP

VaV/610/1/96 Péče o krajinu I

VaV/640/1/99 Péče o krajinu II (Ústav aplikované ekologie LF ČZU Kostelec nad Černými lesy)

„Experimentální zakládání skladebných částí územního systému ekologické stability“

dendrologie

botanika

entomologie

zoologie

Výstup - závěrečné zprávy

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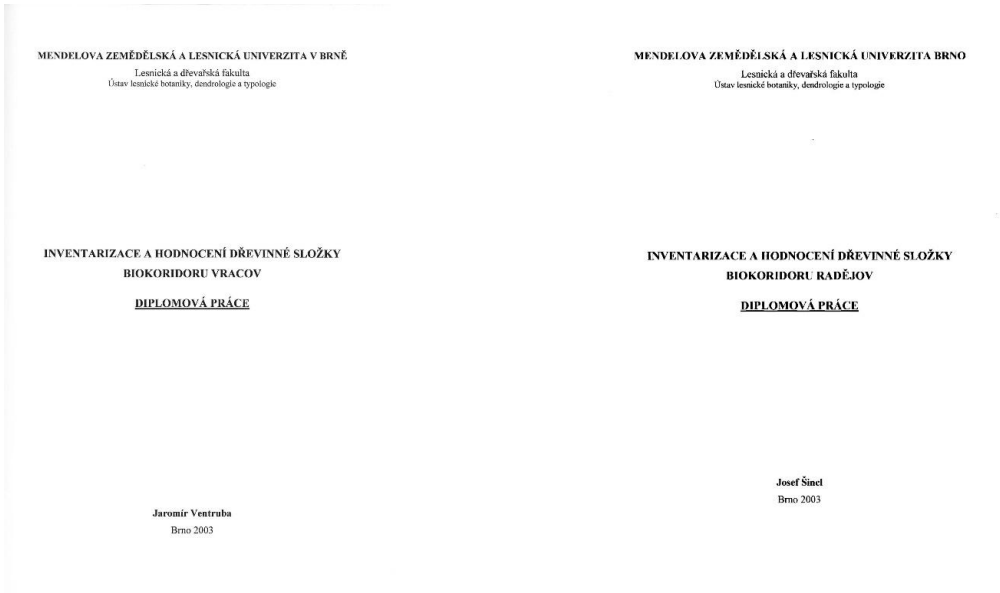
Závěrečné práce studentů

dřeviny ve sledovaných biokoridorech – nepravidelně od roku 1997

bylinná vegetace v karpatských biokoridorech – ojediněle

dřeviny v karpatských biokoridorech – ojediněle

Výstupy – něco málo bylo publikováno



MENDELOVA ZEMĚDĚLSKÁ A LESNICKÁ UNIVERZITA V BRNĚ

Lesnická a dřevařská fakulta

Ústav lesnické botaniky, dendrologie a typologie

INVENTARIZACE A HODNOCENÍ DŘEVINNÉ SLOŽKY BIOKORIDORU VRACOV

DIPLOMOVÁ PRÁCE

Jaromír Ventruba

Brno 2003

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Ústav lesnické botaniky, dendrologie a typologie

INVENTARIZACE A HODNOCENÍ DŘEVINNÉ SLOŽKY BIOKORIDORU RADĚJOV

DIPLOMOVÁ PRÁCE

Josef Šinct

Brno 2003

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Funkčnost územního systému ekologické stability a její perspektiva v podmínkách globální změny klimatu

reg. č. SS01010174

Řešitel

Mendelova univerzita v Brně

Aplikační garant

Ministerstvo životního prostředí České republiky

Doba řešení: 03/2020 – 02/2023

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Cíle projektu

Ve vybraných segmentech zhodnotit:

1. vývoj vlastností půd a jejich porovnání s okolními zemědělskými pozemky,
2. biodiverzitu vybraných skupin organismů a jejích změn,
3. reakci dřevin na sucho a jejich perspektivu při plnění požadovaných funkcí,
4. možné ekonomické benefity (hodnocení metodou CBA).

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Sledované biokoridory

- v minulosti sledované biokoridory z 90. let 20. století
- staré větrolamy (Bílé Karpaty, Znojemsko)
- mladé biokoridory

1. Hrušky
2. Křižanovice
3. Kuželov
4. Litobratřice jih
5. Litobratřice sever
6. Malá Vrbka
7. Medlovice
8. Podolí
9. Radějov
10. Stříbrnice
11. Tvarožná Lhota
12. Únanov
13. Vracov
14. Želeč

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Co se dělalo

Pedologický průzkum

Floristická inventarizace

Dendrologická šetření

Mykologický průzkum

Entomologický průzkum

Zoologický průzkum

Ekofyziologická šetření

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Pedologický průzkum

- fyzikální vlastnosti
- chemické vlastnosti
- mikrobiologie
- obsah těžkých kovů

zopakování analýz po téměř 30ti letech

Floristická inventarizace

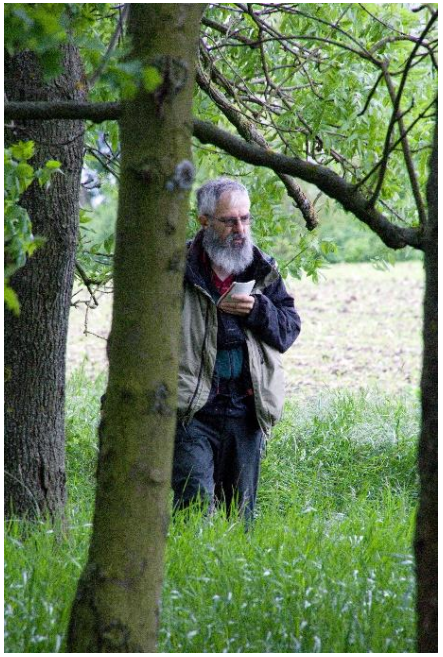
- soupis druhů
- vyhodnocení pokryvnosti

porovnání se stavem po založení

Dendrologická šetření

- měření na trvalých výzkumných plochách
- vyhodnocení pokryvnosti

vyhodnocení mortality a růstu dřevin



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Mykologický průzkum

- sledování plodnic a specifických symptomů na transektu

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Entomologický průzkum

- odchyt do zemních pastí
- sledování denních motýlů
- smykání vegetace

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Zoologický průzkum

- pobytové stopy a přímá pozorování
- použití fotopastí

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Ekofyziologická šetření

- měření objemových změn kmene
- měření vodního stresu
- vyhodnocení fotosyntézy

půdní čidlo

meteostanička

dendrometr

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Výsledky projektu

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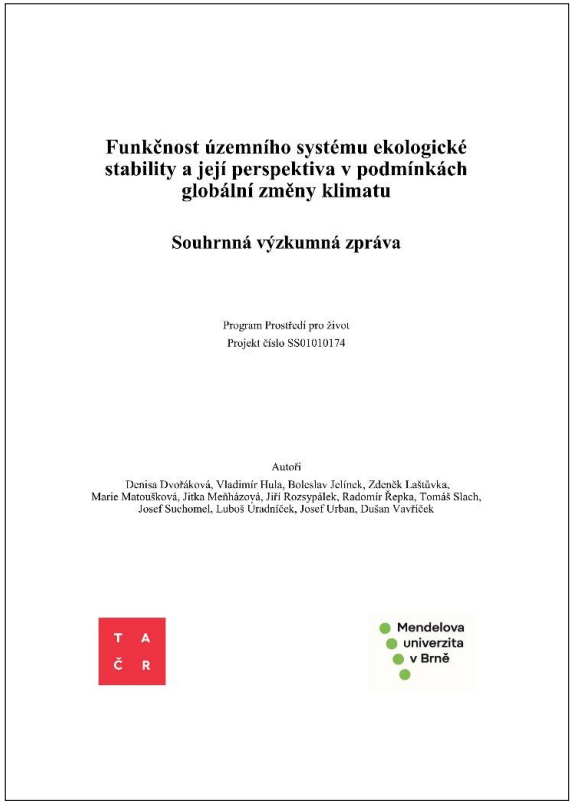
Souhrnná výzkumná zpráva

Zobecněné závěry projektu a doporučení pro praxi

předáno MŽP


Funkčnost územního systému ekologické stability a její perspektiva v podmínkách globální změny klimatu

Souhrnná výzkumná zpráva

Program Prostředí pro život
Projekt číslo SS01010174

Autoři
Denisa Dvořáková, Vladimír Hula, Boleslav Jelínek, Zdeněk Laštůvka, Marie Matoušková, Jitka Meňházová, Jiří Rozsypálek, Radomír Řepka, Tomáš Slach, Josef Suchomel, Luboš Úradníček, Josef Urban, Dušan Vavříček

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Funkčnost územního systému ekologické stability a její perspektiva v podmínkách globální změny klimatu

Zobecněné závěry projektu a doporučení pro praxi

Program Prostředí pro život
Projekt číslo SS01010174

Autoři
Boleslav Jelínek, Luboš Úradníček

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Odborný článek – dendrologie

časopis Journal of Landscape Ecology, prosinec 2022

sciendo
DOI: 10.2478/jlecol-2022-0018 Journal of Landscape Ecology (2022), Vol: 15 / No. 3

THIRTY YEARS OF GROWTH OF WOODY PLANTS IN A BIOCORRIDOR ESTABLISHED ON AGRICULTURAL LAND: CASE STUDY FROM VRACOV (CZECH REPUBLIC)

BOLESLAV JELÍNEK*, LUBOŠ ÚRADNÍČEK, TOMÁŠ SLACH

Mendel University in Brno, Faculty of Forestry and Wood Technology, Department of Forest Botany, Dendrology and Geobiocoenology, Zemědělská 3,616 00 Brno, Czech Republic
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Received: 2nd September 2022, **Accepted:** 5th October 2022

ABSTRACT

In the 1970s and 1980s, the concept of ecological networks was developed in the Czech Republic. The first biocorridors were established on arable land in the beginning of the 1990s. One of them was the Vracov biocorridor. This paper deals with the growth and development of trees on two permanent research plots in the period from 1993–2021. In the biocorridor, repeated inventories of woody plants and monitoring of biometrical parameters of trees and shrubs were carried out. The number of woody plants has been decreasing as the level of stand canopy has increased. Moreover, mean heights and diameters of skeleton (*Quercus robur*, *Tilia cordata*) and filling (*Acer campestre*, *Prunus avium*) trees and shrubs (*Cornus sanguinea*, *Ligustrum ovalifolium*) were compared. Under the given conditions, the growth of these tree species can be positively evaluated.

Keywords: Biocorridor, tree inventory, tree growth, game damage, TSES

INTRODUCTION

The concept of a territorial system of ecological stability (TSES) of the landscape was developed in the Czech Republic in the 1970s and 1980s in response to deepening problems in agricultural landscapes. The aim was to use elements of vegetation to reduce the negative impacts of human activity (e.g. declining biodiversity, increasing erosion, reducing soil retention capacity), enhance ecological stability and ultimately create a harmonious landscape (Buček *et al*. 2012; Mackovčin, 2000).

Such a landscape should have been characterised by more stable and appropriately distributed ecosystems in an intensively managed (used) landscape (Buček & Lacina, 1984). The basis of TSES are biocentres and biocorridors (Buček *et al*., 1995). Biocentres should enable the long-term survival of organisms in the landscape, while biocorridors should ensure their connectivity (Löw *et al*. 1995, Zimová *et al*., 2002, Binová *et al*., 2017).

The idea of ecological networks is not specific to the Czech Republic and is being utilised elsewhere in the world (Jongman, 2008). However, the foreign approach is different from TSES. Abroad, biocorridors are mostly designed to connect reserves and national parks and ensure migration (Bennett, 2003; Bennett & Mulongoy, 2006; Fabos & Ahem, 1996, Hilty

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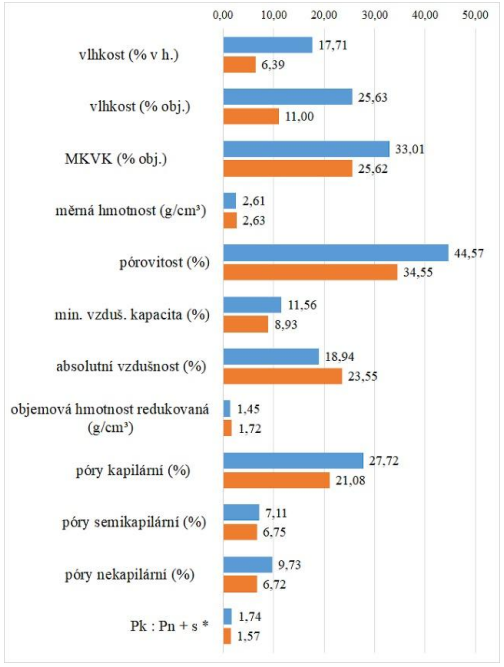
Odborný článek – Pedologie

časopis Heylon, leden 2023



Heliyon | First Look

A Comparison of Farmland and Long-Established Biocorridor Soils in the Central European Rural Benchlands

Heliyon

35 Pages • Posted: 26 Jan 2023 • Publication Status: **Preprint**

Aleš Kučera
Mendel University in Brno

Dušan Vavříček
Mendel University in Brno

Daniel Volarik
Mendel University in Brno

Pavel Samec
Mendel University in Brno

Luboš Úradníček
Mendel University in Brno

Abstract

This study focuses on soil properties in 30- and 60-year-old biocorridors established on agricultural land and includes a comparative overview with neighbouring farmland. Both mixed and undisturbed soil samples were collected in each of six vegetation zones to assess a wide spectrum of soil physics, hydrophysics, soil and physical chemistry and biological soil properties. Biocorridor soils were typified by having a higher water retention capacity, porosity, aeration and soil carbon stock, the latter being higher at lower depths. On the other hand, biocorridor bulk density was lower, indicating progressive soil restoration under forest vegetation cover. Slightly lower soil reactions in biocorridors did not confirm the hypothesis of soil acidification on nutrient-rich soils forming substrates with a high base cation content. Biological activity, expressed through respiration coefficients, was generally low due to unfavourable physical conditions (clayey or silty-clay substrates dominant), with lowest levels in biocorridors. Nevertheless, biocorridor soil microbiota displayed more effective utilisation of organic matter as a carbon and nitrogen source, with lighter-textured soils tending to show more effective organic matter utilisation after excluding the influence of land use. Our results confirm biocorridors as an important landscape component contributing to both the stability and local revitalisation of soil environments.

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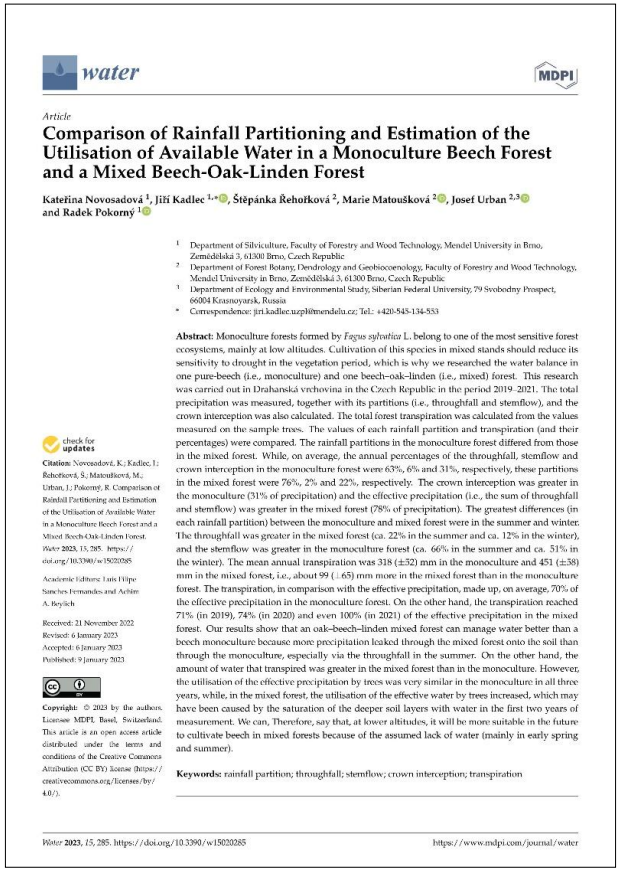
Odborné články – ekofyziologie



water

MDPI

Article

Comparison of Rainfall Partitioning and Estimation of the Utilisation of Available Water in a Monoculture Beech Forest and a Mixed Beech-Oak-Linden Forest

Kateřina Novosadová [1], Jiří Kadlec [1,*], Štěpánka Řehořková [2], Marie Matoušková [2], Josef Urban [2,3] and Radek Pokorný [1]

[1] Department of Silviculture, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, 61300 Brno, Czech Republic
[2] Department of Forest Botany, Dendrology and Geobiocoenology, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, 61300 Brno, Czech Republic
[3] Department of Ecology and Environmental Study, Siberian Federal University, 79 Svobodny Prospect, 66004 Krasnoyarsk, Russia
* Correspondence: jiri.kadlec.uzpl@mendelu.cz; Tel.: +420-545-134-553

Abstract: Monoculture forests formed by *Fagus sylvatica* L. belong to one of the most sensitive forest ecosystems, mainly at low altitudes. Cultivation of this species in mixed stands should reduce its sensitivity to drought in the vegetation period, which is why we researched the water balance in one pure-beech (i.e., monoculture) and one beech–oak–linden (i.e., mixed) forest. This research was carried out in Drahanská vrchovina in the Czech Republic in the period 2019–2021. The total precipitation was measured, together with its partitions (i.e., throughfall and stemflow), and the crown interception was also calculated. The total forest transpiration was calculated from the values measured on the sample trees. The values of each rainfall partition and transpiration (and their percentages) were compared. The rainfall partitions in the monoculture forest differed from those in the mixed forest. While, on average, the annual percentages of the throughfall, stemflow and crown interception in the monoculture forest were 63%, 6% and 31%, respectively, these partitions in the mixed forest were 76%, 2% and 22%, respectively. The crown interception was greater in the monoculture (31% of precipitation) and the effective precipitation (i.e., the sum of throughfall and stemflow) was greater in the mixed forest (78% of precipitation). The greatest differences (in each rainfall partition) between the monoculture and mixed forest were in the summer and winter. The throughfall was greater in the mixed forest (ca. 22% in the summer and ca. 12% in the winter), and the stemflow was greater in the monoculture forest (ca. 66% in the summer and ca. 51% in the winter). The mean annual transpiration was 318 (±32) mm in the monoculture and 451 (±38) mm in the mixed forest, i.e., about 99 (↓65) mm more in the mixed forest than in the monoculture forest. The transpiration, in comparison with the effective precipitation, made up, on average, 70% of the effective precipitation in the monoculture forest. On the other hand, the transpiration reached 71% (in 2019), 74% (in 2020) and even 100% (in 2021) of the effective precipitation in the mixed forest. Our results show that an oak–beech–linden mixed forest can manage water better than a beech monoculture because more precipitation leaked through the mixed forest onto the soil than through the monoculture, especially via the throughfall in the summer. On the other hand, the amount of water that transpired was greater in the mixed forest than in the monoculture. However, the utilisation of the effective precipitation by trees was very similar in the monoculture in all three years, while, in the mixed forest, the utilisation of the effective water by trees increased, which may have been caused by the saturation of the deeper soil layers with water in the first two years of measurement. We can, Therefore, say that, at lower altitudes, it will be more suitable in the future to cultivate beech in mixed forests because of the assumed lack of water (mainly in early spring and summer).

Keywords: rainfall partition; throughfall; stemflow; crown interception; transpiration

check for updates

Citation: Novosadová, K.; Kadlec, J.; Řehořková, Š.; Matoušková, M.; Urban, J.; Pokorný, R. Comparison of Rainfall Partitioning and Estimation of the Utilisation of Available Water in a Monoculture Beech Forest and a Mixed Beech-Oak-Linden Forest. *Water* **2023**, *15*, 285. https://doi.org/10.3390/w15020285

Academic Editors: Luis Filipe Sanches Fernandes and Acácio A. Borges

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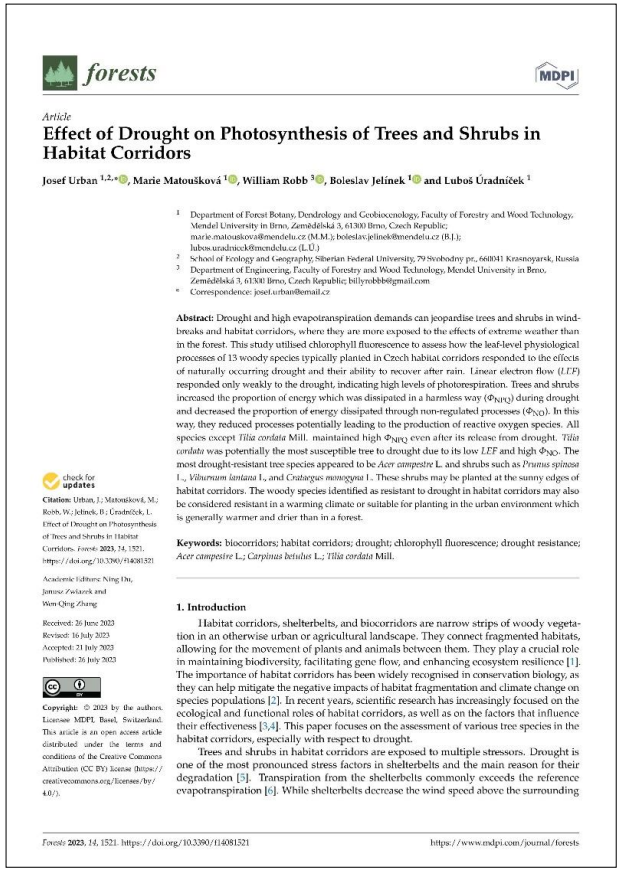
Published: 9 January 2023

časopis Water, leden 2023



forests

MDPI

Article

Effect of Drought on Photosynthesis of Trees and Shrubs in Habitat Corridors

Josef Urban [1,2,*], Marie Matoušková [1], William Robb [3], Boleslav Jelínek [1] and Luboš Úradníček [1]

[1] Department of Forest Botany, Dendrology and Geobiocenology, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, 61300 Brno, Czech Republic; marie.matouskova@mendelu.cz (M.M.); boleslav.jelinek@mendelu.cz (B.J.); lubos.uradnicek@mendelu.cz (L.Ú.)
[2] School of Ecology and Geography, Siberian Federal University, 79 Svobodny pr., 660041 Krasnoyarsk, Russia
[3] Department of Engineering, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, 61300 Brno, Czech Republic; billyrobbb@gmail.com
* Correspondence: josef.urban@email.cz

Abstract: Drought and high evapotranspiration demands can jeopardise trees and shrubs in windbreaks and habitat corridors, where they are more exposed to the effects of extreme weather than in the forest. This study utilised chlorophyll fluorescence to assess how the leaf-level physiological processes of 13 woody species typically planted in Czech habitat corridors responded to the effects of naturally occurring drought and their ability to recover after rain. Linear electron flow (*LEF*) responded only weakly to the drought, indicating high levels of photorespiration. Trees and shrubs increased the proportion of energy which was dissipated in a harmless way (Φ_{NPQ}) during drought and decreased the proportion of energy dissipated through non-regulated processes (Φ_{NO}). In this way, they reduced processes potentially leading to the production of reactive oxygen species. All species except *Tilia cordata* Mill. maintained high Φ_{NPQ} even after its release from drought. *Tilia cordata* was potentially the most susceptible tree to drought due to its low *LEF* and high Φ_{NO}. The most drought-resistant tree species appeared to be *Acer campestre* L. and shrubs such as *Prunus spinosa* L., *Viburnum lantana* L., and *Crataegus monogyna* L. These shrubs may be planted at the sunny edges of habitat corridors. The woody species identified as resistant to drought in habitat corridors may also be considered resistant in a warming climate or suitable for planting in the urban environment which is generally warmer and drier than in a forest.

Keywords: biocorridors; habitat corridors; drought; chlorophyll fluorescence; drought resistance; *Acer campestre* L.; *Carpinus betulus* L.; *Tilia cordata* Mill.

1. Introduction

Habitat corridors, shelterbelts, and biocorridors are narrow strips of woody vegetation in an otherwise urban or agricultural landscape. They connect fragmented habitats, allowing for the movement of plants and animals between them. They play a crucial role in maintaining biodiversity, facilitating gene flow, and enhancing ecosystem resilience [1]. The importance of habitat corridors has been widely recognised in conservation biology, as they can help mitigate the negative impacts of habitat fragmentation and climate change on species populations [2]. In recent years, scientific research has increasingly focused on the ecological and functional roles of habitat corridors, as well as on the factors that influence their effectiveness [3,4]. This paper focuses on the assessment of various tree species in the habitat corridors, especially with respect to drought.

Trees and shrubs in habitat corridors are exposed to multiple stressors. Drought is one of the most pronounced stress factors in shelterbelts and the main reason for their degradation [5]. Transpiration from the shelterbelts commonly exceeds the reference evapotranspiration [6]. While shelterbelts decrease the wind speed above the surrounding

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Citation: Urban, J.; Matoušková, M.; Robb, W.; Jelínek, B.; Úradníček, L. Effect of Drought on Photosynthesis of Trees and Shrubs in Habitat Corridors. *Forests* **2023**, *14*, 1521. https://doi.org/10.3390/f14081521

Academic Editors: Ning Du, Janusz Zwiazek and Wen-Qing Zhang

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Odborný článek - zoologie

časopis North-Western Journal of Zoology, květen 2023

NORTH-WESTERN JOURNAL OF ZOOLOGY 19 (1): 000-000
Article No.: e231601

http://biozoojournals.ro/nwjz/index.html

Which parameters of woody biocorridors have a positive effect on bird diversity in cultural landscapes?

Denisa DVOŘÁKOVÁ*, Jan ŠIŤOŠ and Josef SUCHOMEL

Department of Zoology, Fisheries, Hydrobiology, and Apiculture,
Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic
*Corresponding author: D. Dvořáková, E-mail: denisadvorakova@seznam.cz

Received: 08 February 2023 / Accepted: 25 March 2023 / Available online: May 2023 / Printed: June 2023

Abstract. The intensification of agriculture in Europe led to the homogenization of the landscape, which had a negative impact on a whole range of animal species. Animals are often able to survive in agricultural landscapes due to isolated close-to-nature habitats (e.g., avenues, forest strips, or copses). Therefore, connecting these spatially isolated woody habitats is important to maintain high species diversity in agricultural landscapes. The strips of forest habitats (biocorridors) are important for vertebrates, including birds, and allow the flow of biotic information in the landscape. In our study, we focused on the occurrence of birds in fourteen woody biocorridors in the South Moravia Region in the Czech Republic. We monitored bird movement frequencies using camera traps from October 2020 to June 2022. The monitored biocorridors were distributed across the landscape to well represent the region of South Moravia (including intensively used agricultural lowlands, highlands areas, or extensive agricultural landscapes at the foot of the mountains). According to the results, species richness and frequency were positively associated with narrow and long woody biocorridors. On the other hand, wide, forest-like biocorridors were negatively associated with species richness and frequency. We explain this surprising result by two main ecological processes: the effect of species pool on local (alpha) diversity and the effect of cross-habitat spillover of organisms. We also revealed that forest bird species prefer wide biocorridors with mature stands and high shade-casting ability. Based on our results, we can conclude that woody biocorridors in intensively used cultural landscapes are able to support the diversity of forest and non-forest bird species.

Keywords: bird diversity, forest strips, corridors, forest habitat, migration, connectivity, spillover effect.

Introduction

The configuration and composition of a landscape are some of the most important determinants of the landscape structure and connectivity functionality (Karimi et al. 2021). In the Czech Republic, the landscape's composition and protection are defined using the Territorial system of ecological stability (TSES), which is part of Act No. 114/1992 Coll. on nature and landscape protection. The landscape component of the system is made up of local, regional, and supra-regional landscape components. The European Ecological Network, connected to the supra-regional part of the TSES in the Czech Republic, represents higher units of landscape network protection on a European scale. The parts of the system include biocentres (i.e., their condition and size enable the permanent existence of natural or close-to-nature ecosystems), biocorridors (i.e., woody line elements), and interaction elements. The system's main goal is to preserve and conserve the existence of wild species in the natural and/or near-natural landscape components. These landscape components provide living space for wild animals with the possibility of reproduction and migration (Löw 1995, Mackovčin 2000). The strips of woody corridors, also known as biocorridors, represent potentially important habitats for many species of vertebrates, including birds, and enable the flow of biotic information in the landscape. The connectivity of forest fragments by woody biocorridors is also crucial for forest plant species' survival (Wehling & Diekmann 2009). On the other hand, woody biocorridors as linear elements do not have to be continuous along their entire length but can be interrupted or possibly even divided by anthropogenic or natural influence, such as a road or a watercourse (Löw 1995). Moreover, due to their limited influence on the light-demanding open habitat specialists, they are reported to insufficiently support this part of the biodiversity (Hess & Fischer 2001, Pedley & Dolman 2020). Woody corridors usually do not create conditions for the species' long-term survival but enable species migration between the biocenters, which they connect in an intensively farmed and fragmented landscape. The functionality of these elements is given by spatial parameters such as the structure and shape itself, the width of the corridor, variability in the interior-to-edge ratio, and vegetation composition (Löw 1995).

Birds living in agricultural landscapes are a suitable bio-indicator group that can indicate the degree of degradation or the degree of similarity of the woody biocorridor, for example, with a forest habitat (Padoa-Schioppa et al. 2006). Species in agricultural landscapes survive in a mosaic of different habitats, which are connected by the movement of the individuals (Haslem & Benett 2008, Fahrig et al. 2011). Linear landscape features such as hedgerows and tree lines or woodland corridors are important factors in maintaining the complexity and connectivity of agricultural landscapes (Beier & Noss 1998, Pascual-Hortal & Saura 2006, Tiang et al. 2021). These features provide birds with additional opportunities for nesting and roosting, or possibly a place to hide, and often allow forest and forest edge species to expand their presence into the agricultural land (Wilson et al. 2017).

In this study, we monitored the occurrence of bird species in fourteen woody biocorridors of South Moravia from October 2020 to June 2022 by capturing frequencies of bird movement by camera traps. The study aimed to find out a) which bird species and how intensively they use woody biocorridors, b) which structural characteristics of biocorridors have the greatest influence on the bird community structure and richness, and c) which biocorridor parameters are important for the occurrence of a group of forest bird species. Evaluation of these objectives will allow

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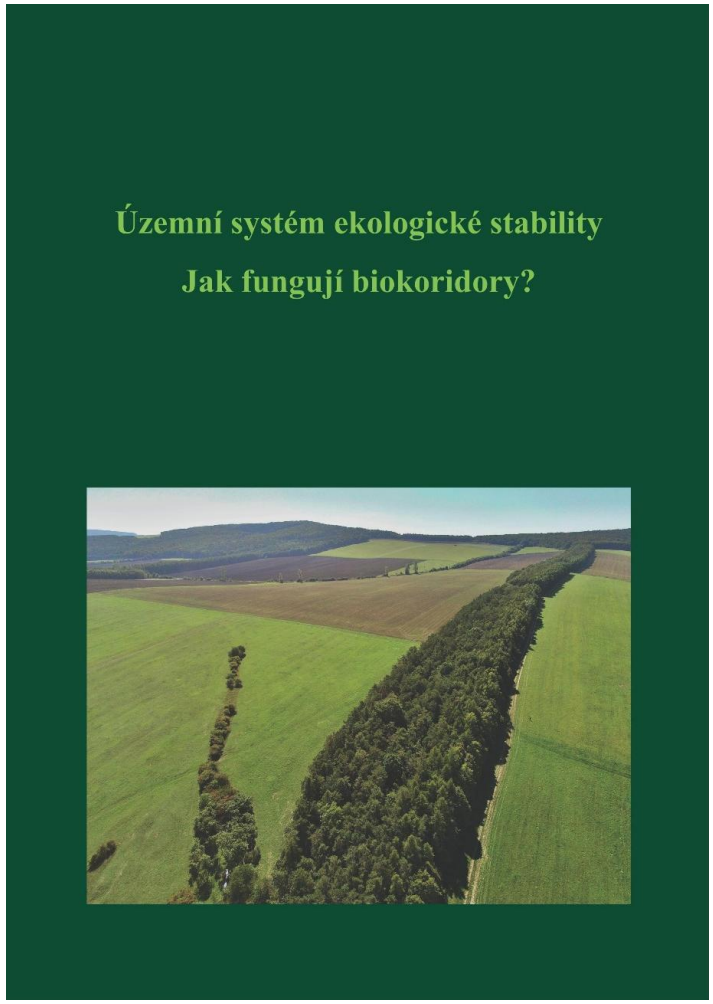
Kniha – shrnutí výsledků



Obsah

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