

University of South Bohemia in České Budějovice
Faculty of Science

**Environmental control of clonal growth in *Carex nigra*:
What can be masked under the name *Carex nigra* subsp.
juncella in the Czech Republic?**

RNDr. Thesis

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■ Annotation

The thesis was focused on causes of variability of clonal growth in *Carex nigra* (*Cyperaceae*), a taxonomically challenging sedge. According to field observations, *C. nigra* produces long creeping rhizomes in a wide range of environments but forms tussocks (cespitose morphotypes) under specific site conditions only. High level of phenotypic plasticity in clonal growth but rare genetic (ecotypic) differentiation among contrasting (cespitose and rhizomatous) morphotypes were revealed in three cultivation experiments. These findings imply that growth form cannot serve as a reliable taxonomic character in *C. nigra*.

■ Declaration [in Czech]

Prohlašuji, že svoji rigorózní práci jsem vypracoval samostatně pouze s použitím pramenů a literatury uvedených v seznamu citované literatury.

Prohlašuji, že v souladu s § 47b zákona č. 111/1998 Sb. v platném znění souhlasím se zveřejněním své rigorózní práce, a to v úpravě vzniklé vypuštěním vyznačených částí archivovaných Přírodovědeckou fakultou elektronickou cestou ve veřejně přístupné části databáze STAG provozované Jihočeskou univerzitou v Českých Budějovicích na jejích internetových stránkách, a to se zachováním mého autorského práva k odevzdanému textu této kvalifikační práce. Souhlasím dále s tím, aby toutéž elektronickou cestou byly v souladu s uvedeným ustanovením zákona č. 111/1998 Sb. zveřejněny posudky školitele a oponentů práce i záznam o průběhu a výsledku obhajoby kvalifikační práce. Rovněž souhlasím s porovnáním textu mé kvalifikační práce s databází kvalifikačních prací Theses.cz provozovanou Národním registrem vysokoškolských kvalifikačních prací a systémem na odhalování plagiátů.

České Budějovice, 6.2.2014

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Jan Košnar

■ ■ **Participation of the candidate on the publication**

This is to declare that Jan Košnar had a major contribution on the research presented in this thesis. Jan Košnar collected data and plant material in the field, participated on isozyme analyses, carried out the cultivation experiments, analysed data, wrote the draft of the manuscript, and edited the comments of the co-authors and reviewers. Petr Koutecký supervised isozyme analyses, analysed isozyme data, and commented the draft of the manuscript. Milan Štech participated on collecting plant material in the field and commented the draft of the manuscript.

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ABSTRACT

Carex nigra plants forming elevated dense tussocks are often named *C. nigra* subsp. *juncella*, as opposed to rhizomatous *C. nigra* subsp. *nigra*. It is uncertain, however, whether the cespitose growth form is a hereditary trait useful for definition of the distinct taxon or a site modification of little taxonomic value. We used vegetation analyses (phytosociological relevés) to reveal main patterns in ecological demands of the cespitose *C. nigra* plants in the Czech Republic, and three cultivation experiments to assess changes in clonal growth of *C. nigra* under various environmental conditions. In the field the cespitose *C. nigra* plants were typically found in abandoned wet meadows near open water, whereas the rhizomatous morphotypes frequently occurred also in regularly mown wet meadows and in peat bogs. The cespitose growth form disappeared in the cultivations, and the rhizome system responded plastically to immediate environmental stimuli. Number of rhizome branches and mean rhizome length decreased after defoliation of aboveground parts and denudation of belowground parts, whereas increased due to inundation. In the population from the cold site in high altitude (Modrava, Šumava Mts.), however, the originally cespitose plants repeatedly produced shorter and less numerous rhizome branches than the rhizomatous plants cultivated in the same conditions. This suggests ecotypic (genetic) differentiation in some populations of *C. nigra*, driven by environmental selection for more compact growth form in climatically severe sites. The cespitose *C. nigra* plants thus arise polytopically, by different mechanisms. The growth form itself therefore cannot serve as the character reliably delimiting *C. nigra* subsp. *juncella* as the distinct taxon.

Keywords: cespitose morphotype, cultivation experiments, ecotype, plasticity, polymorphic taxa, rhizomatous sedge

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