

University of South Bohemia in České Budějovice
Faculty of Science



**EXTREME RADIAL GROWTH REACTION OF NORWAY SPRUCE ALONG AN
ALTITUDINAL GRADIENT IN THE ŠUMAVA MOUNTAINS**



RNDr. Thesis

Mgr. Alžběta Čejková

České Budějovice 2012



This thesis should be cited as:

Čejková A., 2012: Extreme radial growth reaction of Norway spruce along an altitudinal gradient in the Šumava Mountains. University of South Bohemia, Faculty of Science, České Budějovice, Czech Republic, 10 pp.

Annotation

Extreme radial growth reactions were analyzed over a 79-year period (1922-2000) to compare response of Norway spruce (*Picea abies* [L.] Karst.) along an altitudinal gradient (376-1221 m.a.s.l.) in the Šumava Mountains, the Czech Republic. The comparison of the pointer years showed a specific pattern for altitudinal zones. Negative pointer years were usually induced by summer drought at low elevations and by wet-cold summer at high altitudinal zone. These two main limiting factors were probably combined at the middle altitudinal zone. Detailed understanding of the extreme tree ring pattern along the altitudinal and geographical scale may be used as one of the additional indicators of dendrochronological dating and provenance identification of spruce sample among altitudinal zones in the Šumava Mountains.

Declaration [in Czech]

Prohlašuji, že svoji rigorózní práci jsem vypracovala 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.

author's contribution

Alžběta Čejková collected the majority of samples, performed data assembly and analysis, wrote the manuscript.

Čejková A. et Kolář T., 2009. Extreme radial growth reaction of Norway spruce along an altitudinal gradient in The Šumava Mountains. *Geochronometria* 33: 41-47. (IF=0,656)

Financial support

This research was supported by Ministry of Education of the Czech Republic grants FRVŠ 1849/2003, FRVŠ 40/2006 and MSM6007665801.

Acknowledgements

Many thanks to everybody who has helped me along the way.

EXTREME RADIAL GROWTH REACTION OF NORWAY SPRUCE ALONG AN ALTITUDINAL GRADIENT IN THE ŠUMAVA MOUNTAINS

ALŽBĚTA ČEJKOVÁ^{1,2*} and TOMÁŠ KOLÁŘ¹

¹University of South Bohemia, České Budějovice, Faculty of Science, Branišovská 31, CZ-370 05, České Budějovice, Czech Republic

²Administration of Orlické hory PLA, Dobrovského 332, CZ-516 01, Rychnov nad Kněžnou, Czech Republic

* Corresponding author (e-mail: cejkova@gmail.com)

Abstract:

Extreme radial growth reactions were analyzed over a 79-year period (1922-2000) to compare response of Norway spruce (*Picea abies* [L.] Karst.) along an altitudinal gradient (376-1221 m a.s.l.) in the Šumava Mountains, the Czech Republic. Extreme growth events were defined as pointer years, when an average percentage of the site pointer years reached at least 50% strength observed at the relevant altitudinal zone (low < ca. 700 m; middle ca. 700-950 m, high > ca. 950 m). The comparison of the pointer years showed a specific pattern for altitudinal zones (Low: negative pointer years 2000, 1992, 1984, 1976, 1971 and positive 1997, 1975, 1960, 1949, 1932, 1926; middle: negative 2000, 1992, 1976 and positive 1997, 1989, 1978; high: negative 1996, 1980, 1974, 1965 and positive 1989, 1963, 1927). Negative pointer years were usually induced by summer drought at low elevations and by wet-cold summer at high altitudinal zone. These two main limiting factors were probably combined at the middle altitudinal zone. Detailed understanding of the extreme tree ring pattern along the altitudinal and geographical scale may be used as one of the additional indicators of dendrochronological dating and provenance identification of spruce sample among altitudinal zones in the Šumava Mountains.

Keywords: dendrochronology, *Picea abies*, pointer years, altitudinal gradient.