



CO₂ efflux from wood and coarse woody debris in Russian southern taiga.

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The CO₂ efflux (R_W) from living tree stems, dead standing trees and fallen trees was measured in August 2002 and from June to October 2003 in Central Forest Biosphere Natural Reserve (56°30'N, 33°00'E, Tver region, Russia). Measurements were performed in two experimental stands: *sphagnum-vaccinium* spruce forest (SVF) and complex spruce forest (CSF).

Measurements were performed by CO₂ analyzer “Kedr” (Russia) and partially by CO₂ analyzer LI-6262 (Li-Cor, Inc., USA) using polyethylene chambers mounted at stem surfaces with open scheme. Totally 34 measuring points were installed including 10 living trees (7 spruces, 2 birches and one maple), 14 fallen trees and 10 dead standing trees. The forest inventory of both experimental plots and meteorological data for the period of observations were also available.

The stem respiration in **living trees** did not change significantly from early June to early August 2003, reaching the values from 0.3 to 8.6 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ with mean value of 2.8 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$. In mid September it decreased 1.3 to 1.6 times and then it decreased once more 3 to 5 times from mid September to mid October. No reliable difference in R_W per unit surface of living trees of similar DBH between different experimental sites observed. R_W of spruce and birch trees at the same plot did not differ reliably, too. Under drought stress in August 2002 R_W of spruce was 4-6 times less compared to the same period of wet season 2003, whereas R_W of birch was similar.

The mean R_W of living trees in the CSF had strong linear dependence on tree DBH, i.e., respiration per wood volume (R_{WV}) did not differ significantly for trees with

different DBH. In SVF the non-monotone dependence of R_{WV} on DBH was found with minimum for trees with medium DBH. The mean respiration of living tree stems from June to September at stand level was 47 and 43 $\text{mmol}\cdot\text{m}^{-2}$ of stand area d^{-1} for CSF and SVF, respectively.

The increasing temperature dependence of R_W was observed for all spruce trees in CSF and for dominant trees in SVF with Q_{10} from 2.0 to 2.5 for different sample trees. In birch this dependence was non-monotone with maximum about 12-14⁰. The diurnal curves of respiration increased until the end of measurements (20-21 hours).

The mean R_W for **dead wood** varied between sample trees up to 20 times for dead standing trees and up to 200 times for fallen trees and depended mostly on the stage of decomposition and the presence of bark. The seasonal maximum of R_W for dead wood was in August-September. The effect of wood moisture and density on R_W was pronounced for late stages of decomposition. The dependence of R_W for dead wood on meteorological variables was not expressed.

Generally, the dependence of R_W for both living and dead wood on tree characteristics and environmental factors was more pronounced for CSF than for SVF plot.