

研究报告

土壤温度和湿度对长白松林土壤呼吸速率的影响

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摘要

2003年6月17日、8月5日和10月10日, 研究了长白山长白松林地内土壤呼吸速率和断根土壤呼吸速率日变化, 并于2004年5~9月对其季节变化进行了测定. 结果表明, 土壤总呼吸速率和断根土壤呼吸速率的日变化均呈单峰型, 峰值一般出现在12:00~14:00, 8月份土壤呼吸速率的日变化幅度小于6月份和10月份. 土壤总呼吸速率、断根土壤呼吸速率和根系呼吸速率具有明显的季节变化, 6~8月份较高, 5月份和9月份较低. 2004年5~9月份, 土壤总呼吸速率、断根土壤呼吸速率和根系呼吸速率的平均值分别为3.12、1.94和1.18 $\mu\text{molCO}_2\cdot\text{m}^{-2}\cdot\text{s}^{-1}$, 根系呼吸对土壤总呼吸的贡献为26.5%~52.6%. 土壤呼吸速率与土壤温度之间呈显著的指数相关, 与土壤湿度之间呈线性相关. 土壤总呼吸速率、断根土壤呼吸速率和根系呼吸速率的Q10值分别为2.44、2.55和2.27, 断根土壤呼吸速率对温度的敏感程度大于土壤总呼吸速率和根系呼吸速率. 土壤总呼吸速率对土壤湿度的敏感程度大于根系呼吸, 断根土壤呼吸速率对土壤湿度的敏感程度最差.

关键词 [长白松, 土壤呼吸速率, 土壤温度, 土壤湿度](#)

分类号

Effects of soil temperature and humidity on soil respiration rate under *Pinus sylvestrifomis* forest

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Abstract

Employing root-wrenching method and LI-6400-09 soil respiration chamber, this paper measured the diurnal changes of soil respiration rate with and without roots in situ on June 17, August 5, and October 10, 2003. The seasonal changes of soil respiration were also measured from May to September, 2004. The results showed that both the total and the root-wrenched soil respiration appeared single diurnal pattern, with the peaks presented during 12:00~14:00. The diurnal fluctuation of soil respiration on August 5 was smaller than that on June 17 and October 10. There were also obvious seasonal changes in total and root-wrenched soil respiration, as well as in root respiration, which were higher from June to August but lower in May and September. The average total soil respiration, root-wrenched soil respiration, and root respiration were 3.12, 1.94 and 1.18 $\mu\text{mol CO}_2\cdot\text{m}^{-2}\cdot\text{s}^{-1}$, respectively, and the contribution of roots to total soil respiration ranged from 26.5% to 52.6% from May to September, 2004. There were exponential correlations between respiration rate and soil temperature, and linear correlations between respiration rate and soil humidity. The Q10 values were 2.44, 2.55 and 2.27 for total soil respiration, root-wrenched soil respiration, and

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root respiration, respectively. The effect of soil temperature on root-wrenched soil respiration was larger than that on total soil respiration and root respiration. Soil humidity had a larger effect on total soil respiration than on root respiration and root-wrenched soil respiration.

Key words

[Pinus sylvestriformis](#) [Soil respiration rate](#) [Soil temperature](#) [Soil humidity](#)

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