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# 落叶松人工林生长季节土壤呼吸通量各组分的变化

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# Variations of soil respiration flux components in a *Larix gmelinii* plantation during growth season.

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摘要

2010年采用挖壕法，利用Li-8150土壤碳通量全自动观测仪对东北林业大学哈尔滨实验林场落叶松人工林土壤各组分呼吸通量进行昼夜观测，研究土壤呼吸通量的昼夜和月变化特征，以及对土壤温度的敏感性.结果表明： 各月份落叶松的枯枝落叶、根和矿质土壤呼吸通量昼夜变化均呈现单峰形态.5—10月各组分土壤呼吸通量昼夜变化幅度分别在3.1%～12.4%、1.9%～8.7%和10.9%～67.2%；枯枝落叶和根呼吸的平均值分别占土壤呼吸总量的21.2%、11.1%、13.4%、12.0%、14.2%和10.3%、8.8%、11.6%、10.0%、12.5%，昼夜波动幅度较小，月平均值分别为14.3%和10.6%.矿质土壤呼吸平均值分别占土壤呼吸总量的68.5%、80.2%、75.1%、78.1%和73.3%，昼夜波动幅度较小，月平均值为71.5%.枯枝落叶和矿质土壤呼吸通量对地表下10 cm的温度敏感性($Q_{10}$)显著高于地表，且矿质土壤呼吸通量$Q_{10}$值高于枯枝落叶呼吸通量.根呼吸通量对地表下10 cm处和地表$Q_{10}$值无显著差异.枯枝落叶和根呼吸$Q_{10}$值的月变化为低温时较高、高温时较低，而矿质土壤呼吸$Q_{10}$值则夏季较低、春秋季较高.

关键词： 枯枝落叶层 根系 矿质土壤 呼吸通量 温度敏感性 落叶松人工林

Abstract:

By using trenching box method and Li-8150, an observation on the diurnal and monthly variations of soil respiration flux components in a *Larix gmelinii* plantation in the Harbin Experimental Forest Farm of Northeast Forestry University was conducted in 2010, with the temperature sensitivity of the flux components analyzed. The diurnal variations of the respiration flux of litter, root and mineral soil presented a single peak pattern. From May to October, the diurnal variation amplitudes of the respiration flux of litter, root and mineral soil were 3.1%-12.4%, 1.9%-8.7%, and 10.9%-67.2%, respectively. The mean values of the respiration flux of litter and root occupied 21.2%, 11.1%, 13.4%, 12.0% and 14.2%, and 10.3%, 8.8%, 11.6%, 10.0% and 12.5% of the total, with a small diurnal fluctuation and the mean monthly value being 14.3% and 10.6%, respectively. The mean value of the respiration flux of mineral soil was 68.5%, 80 2%, 75.1%, 78.1% and 73.3%, also with a small diurnal fluctuation and the mean monthly value being 71.5%. The sensitivity of the respiration flux of litter and mineral soil to the temperature at 10 cm soil depth was significantly higher than that to the temperature at soil surface, and the $Q_{10}$ value of the respiration flux of mineral soil was higher than that of the respiration flux of litter. No significant difference was observed in the sensitivity of the respiration flux of root to the temperature at soil surface and at 10 cm soil depth. The monthly variation of the $Q_{10}$ for the respiration flux of litter and root was higher at low temperature and lower at high temperature. On the contrary, the monthly variation of the $Q_{10}$ for the respiration flux of mineral soil was lower in summer and higher in spring and autumn.

Key words: litter layer root system mineral soil respiration flux temperature sensitivity *Larix gmelinii* plantation.





没有本文参考文献

[1] 符裕红1,2,黄宗胜1,喻理飞1** . 岩溶区不同根系地下生境类型白栎叶片$\delta^{13}C$值的变化[J]. 应用生态学报, 2912, 23(11): 2961-2967.

[2] 孟品品1,2,刘星1,2,邱慧珍1,2,3**,张文明1,2,3,张春红1,2,3,王蒂2,3,4,张俊莲2,3,4,沈其荣5. 连作马铃薯根际土壤真菌种群结构及其生物效应[J]. 应用生态学报, 2912, 23(11): 3079-3086.

[3] 孙三杰1,李建明1**,宗建伟2,姚勇哲1,陈凯利1 . 亚低温与干旱胁迫对番茄幼苗根系形态及叶片结构的影响[J]. 应用生态学报, 2912, 23(11): 3027-3032.

[4] 曹恭祥1,王绪芳2,熊伟1**,王彦辉1,于澎涛1,王云霓1,徐丽宏1,李振华1. 宁夏六盘山人工林和天然林生长季的蒸散特征[J]. 应用生态学报, 2013, 24(8): 2089-2096.

[5] 丁红1,张智猛1**,戴良香1,康涛1,2,慈敦伟1,宋文武1. 干旱胁迫对花生根系生长发育和生理特性的影响[J]. 应用生态学报, 2013, 24(6): 1586-1592

[6] 胡举伟1,朱文旭2,张会慧1,许楠1,李鑫1,岳冰冰1,孙广玉1**. 桑树/大豆间作对植物生长及根际土壤微生物数量和酶活性的影响[J]. 应用生态学报, 2013, 24(5): 1423-1427.

[7] 王德玉,孙艳**,郑俊鸾,赵娜,王丽英 . 土壤紧实胁迫对黄瓜根系生长及氮代谢的影响[J]. 应用生态学报, 2013, 24(5): 1394-1400.

[8] 杨阳1,2,刘守伟1,潘凯1,吴凤芝1**. 分蘖洋葱根系分泌物对黄瓜幼苗生长及根际土壤微生物的影响[J]. 应用生态学报, 2013, 24(4): 1109-1117.

[9] 万晓华1,2,黄志群1,2,何宗明3**,胡振宏1,2,杨靖宇3,余再鹏1,2,王民煌1,2. 阔叶和杉木人工林对土壤碳氮库的影响比较[J]. 应用生态学报, 2013, 24