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Different tree species affect soil respiration spatial distribution in a subtropical forest of southern Taiwan

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Global forests contain 69% of total carbon stored in forest soil and litter. But the carbon storage ability and release rate of warming gases of forest soil also affect global climate change. Soil carbon cycling processes are paid much attention by ecological scientists and policy makers because of the possibility of carbon being stored in soil via land use management. Soil respiration contributed large part of terrestrial carbon flux, but the relationship of soil respiration and climate change was still obscurity. Most of soil respiration researches focus on template and tropical area, little was known that in subtropical area. Afforestation is one of solutions to mitigate CO_2 increase and to sequestrate CO_2 in tree and soil. Therefore, the objective of this study is to clarify the relationship of tree species and soil respiration distribution in subtropical broad-leaves plantation in southern Taiwan. The research site located on southern Taiwan was sugarcane farm before 2002. The sugarcane was removed and fourteen broadleaved tree species were planted in 2002-2005. Sixteen plots (250m*250m) were set on 1 km2 area, each plot contained 4 subplots (170m2). The forest biomass (i.e. tree height, DBH) understory biomass, litter, and soil C were measured and analyzed at 2011 to 2012. Soil respiration measurement was sampled in each subplot in each month. The soil belongs to Entisol with over 60% of sandstone. The soil pH is 5.5 with low base cations because of high sand percentage. Soil carbon storage showed significantly negative relationship with soil bulk density ($p<0.001$) in research site. The differences of distribution of live tree C pool among 16 plots were affected by growth characteristic of tree species. Data showed that the accumulation amount of litterfall was highest in December to February and lowest in June. Different tree species planted in 16 plots, resulting in high spatial variation of litterfall amount. It also affected total amount of litterfall temporal variation. Soil respiration was related with season variation in research site. Soil temperature and soil respiration showed highly spatial variation in 16 plots. Soil temperature showed significantly exponential related with soil respiration in research site ($p<0.001$).However, soil respiration showed significantly negative relationship with total amount of litterfall ($p<0.001$), suggesting that the tree was still young and did not reach crown closure.