



Growth and Physiological characteristics of *Abies koreana*, *Pinus densiflora*, *Quercus serrata* seedlings under the elevated temperature and CO₂ concentration conditions

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The changes of forest ecosystem such as the plant distribution range shifts and the change of stand dynamic patterns under the global mean temperature warming, varied from the growth and physiological response characteristics of each species. For the last three years, studies on the growth and physiological mechanism have been conducted with two-years-old seedlings of three representative species (*Abies koreana*, *Pinus densiflora*, *Quercus serrata*) in Korea. We used a Temperature Gradient Chamber(TGC) and CO₂-Temperature Gradient Chamber(CTGC) which were exposed to ambient and elevated CO₂ concentration, temperature to simulate the climate change conditions; the TGC were the ambient temperature(aC-aT) as the control and the 5° warmer conditions with an ambient CO₂ concentration(400ppm; aC-eT) and the control of the CTGC was at the ambient and the 2.2 times of CO₂ concentration(880 ppm; eC-eT) of the atmosphere with 5° warmer conditions for treatment. Photosynthetic rate(P_n) and biomass were measured and Carboxylation efficiency(CE) and biomass allocation were calculated to investigate the physiological responses of the seedlings. *A. koreana* and *P. densiflora* significantly increased their P_n under aC-eT and eC-eT conditions. However, in the case of *Q. serrata* showed the decrease of P_n and CE at the third year. There were no significant differences in total biomass but the shoot/root ratio in *Q. serrata* showed a significant increase in aC-eT condition. These results highlight the need to study nutrient processes together to better understanding how the species-specific physiological responses and carbon allocation are differed to climate change.