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Comparison of the evapotranspiration and its components before and after thinning in Japanese cedar and Japanese cypress forest

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Water source area of Japan is often covered by forest, and 40 % of forest cover is coniferous plantation. Thinning has become a major tool in the management of plantation in recent years, but its effects on water cycle and its components are yet to be evaluated well. In this study, we investigated the changes in evapotranspiration and its components, including stand transpiration and canopy interception loss, after thinning in 50 years old Japanese cedar and Japanese cypress plantation at Yayama experimental catchment in Fukuoka, Japan. We established study plot in each Japanese cedar and Japanese cypress stand. Sap flow measurement was conducted for evaluating stand transpiration in each plot. Through fall and stem flow were also monitored to estimate canopy interception loss. The experiments were conducted over two years. During the measurements, 50 % of trees were thinned randomly in entire catchment, which has an area of 2.98 ha. Stem density was changed from 3945 to 1977 trees per ha after thinning. The reduction of daily stand transpiration in the studied Japanese cedar and cypress stands after thinning were 31.6 % and 48.2 % under the same condition of microclimate, respectively. These values were comparable to the changes in total sapwood area, 34.2 % and 44.5 %, and sap flow density did not change after thinning. It implies that sapwood area is a primary determinant of stand transpiration. Canopy interception ratios were 27 % and 26 % for Japanese cedar and cypress before thinning, and the ratios decreased to 24 % and 21 % after thinning, respectively. Thus, we obtained the changes in annual evapotranspiration and its components at catchment scale by using observation and models. The changes in partitioning of evapotranspiration is also discussed. The evapotranspiration before and after thinning were also compared to water balance data in this study site.