

## Effects of climate conditions on annual stem growth in hinoki cypress forests with different stand densities

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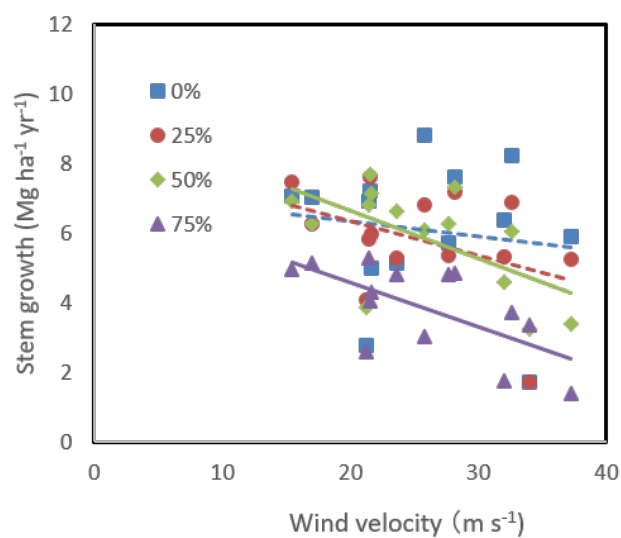
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Negative effects on stem growth is concerned due to recent changes in climatic conditions whereas forest ecosystems are important sinks of carbon dioxide in the atmosphere. The thinning in hinoki cypress plantations is an important management option for promoting timber production, carbon sequestration and related ecosystem services. However, there is few information about decadal changes of stem production after thinning. This study investigated stem growth for 14 years after thinning practices (0%, 25%, 50% and 75% of tree removal) in hinoki cypress plantations at high (1150-1280m) and low elevation (500-550m) in Kochi prefecture, southern Japan. The multiple regression analysis was performed to evaluate the effects of climate conditions on stem growth in the study sites.

Stem growth after 1-7 years and after 8-14 years were calculated. At the low elevation area, stem growth in the thinned plots after 8-14 years was comparable to that in the unthinned control plot (83-110% of the control). At the high elevation area, increase of stem growth in the thinned plots was slow and the growth of 50% and 75% thinned plots after 8-14 years was 76% and 50% of the control plot, respectively. At the low elevation site, the stronger wind in autumn caused lower stem growth in the following year at the 50% and 75% thinned plots whereas the effect of wind is not significant in the 25% thinned and unthinned plots. At the high elevation site, the effect of wind is not significant in the all plots. The results suggest that at the low elevation site stem growth in the thinned plots recover rapidly but is negatively affected by the strong wind and at the high elevation site stem growth does not increase in the thinned plots due to adverse environmental conditions and does not show the correlation with the strong wind. In the lower elevations the repeated thinning with lower intensity is recommended to achieve the increased stem growth and reduce the risk of strong winds.

Keywords: climate condition, stem growth, conifer plantation

## Low elevation site



## High elevation site

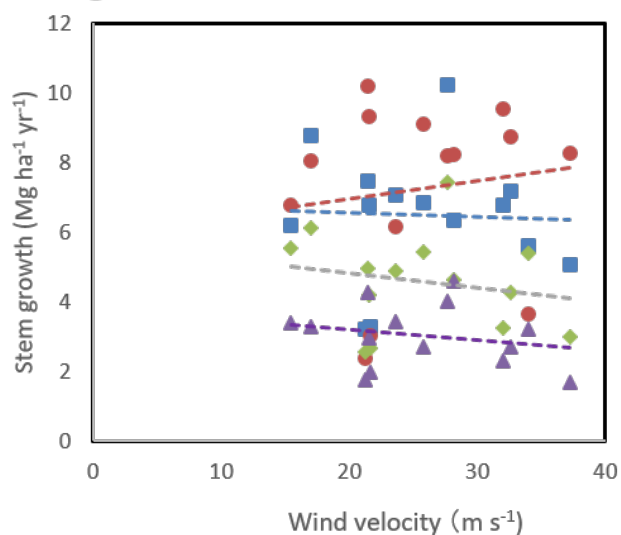


Fig. Relationship between maximum wind velocity at the weather station near the study sites and stem growth in hinoki cypress plantations in the following year at low and high elevation sites during 2005-2019. The percent removal of trees is shown.