

Title: Historical Tree Height Growth associated with Climate Change at The Species Geographic Range in Western North America

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The effect of climate change on tree growth in boreal and temperate forests has received increased interest in the context of global warming. However, most studies were conducted in small areas and with a limited number of tree species. Here, we examined the height growth responses of 14 tree species to climate change over the whole species range of western North America. 27425 stands from forest inventory databases in Canada and USA with varying establishment dates (1089-1967) were selected. Dominant and co-dominant trees from each stand were sampled to determine total tree height at 50 years from stand establishment measured at breast height and related to the average mean annual (AN_T) and summer temperatures (June-August; JJA_T), Palmer Drought Severity Index (PDSI), establishment date (ED), slope, aspect, soil fertility as determined by the rate of carbon organic matter decomposition (carbon on nitrogen), geographic locations (latitude, longitude, and elevation), species range (coastal, interior, and both ranges), growth habits (shade tolerance) and leaf form (needle leaves, deciduous needle leaves, and broadleaves). Climate change had mostly a positive effect on tree height growth. The model explained 55.5% of the height growth variance. Since 1880, warming was more beneficial for coastal species, although interior species showed the greatest sensitivity to JJA_T. Height growth increased more on moderate and steep slopes, on medium soil fertility, and for the medium and high-shade tolerant species. Greater height growth increase was globally observed at the leading range and upward. However, a few species showed the opposite trend and declined, probably related to the peculiarity and particularity of western North America topography and climate conditions. The novelty of this study highlights the role of the species ecological amplitude and traits, and geographic locations as the main factors determining the growth response and its magnitude to the recent global climate change.

Biography

Yassine Messaoud has completed his PhD at the age of 36 years from University of Quebec in Abitibi-Temiscamingue, QC, Canada and postdoctoral studies from Lakehead University. He has published 7 papers in reputed journals and has been serving as reviewer of reputed journals. He also participated in many conferences, workshops, and did posters in Canada.

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Category: Oral presentation