数据资源： 林业专题资讯

Divergent growth responses to warming and drying climates between native and non-native tree species in Northeast China

编号	040019101
推送时间	20190617
研究领域	森林培育
年份	2019
类型	期刊
语种	英语
标题	Divergent growth responses to warming and drying climates between native and non-native tree species in Northeast China
来源期刊	trees
期	第191期
发表时间	20190423
关键词	Tree ring; Carbon isotope composition; Water stress; Dieback;
摘要	Climate change significantly affects forest ecosystems. However, little is known about whether non-native and native tree species show similar responses to global warming. We found different trends in the basal area increment (BAI) and tree-ring stable carbon isotope ratio (δ13C) of two non-native (Pinus sylvestris var. mongolica and Populus?×?xiaozhuanica) and two native (Pinus tabuliformis and Ulmus pumila) tree species during the warming and drying periods from 1985 to 2014. The BAI of non-native tree species was stable, whereas that of the native tree species exhibited a significant increase. A significant increase in tree-ring δ13Ccorr (corrected for atmospheric changes in δ13C) for non-native tree species indicated increasing water stress. The intrinsic water use efficiency (iWUE, derived from tree-ring δ13C) of both non-native and native tree species increased significantly. However, the magnitude of the increase in iWUE was higher in non-native tree species than in native tree species, indicating that non-native tree species suffered stronger water stress. Increasing iWUE but no increase in BAI for non-native tree species suggested that water stress reduced stomatal conductance and, consequently, reduced carbon uptake. In contrast, increased iWUE accompanied by an enhanced BAI for native tree species indicated an increase in photosynthetic capacity induced by CO2 fertilization. These findings suggest that non-native tree species would experience greater mortality under extreme drought conditions once water stress passes a physiological threshold. However, native tree species would suffer only slightly due to benefiting from CO2 fertilization.
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