Use of Genetic Variation to Adapt Climate Change

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An unprecedented global warming is predicted and observed. The concern about its impacts on forest adaptation and productivity is increasingly overwhelming. Forest geneticists are facing the challenge to better understand the relationship between forests/ecosystems and climate, and to use genetic variation to adapt to climate change. Through the development of a high-resolution climate model (ClimateBC), analysis of a comprehensive lodgepole pine provenance trial, and modeling of ecosystems and species distributions in future climates, we explored the possibility of selecting populations and species for changing climate. ClimateBC can provide 75 climatic variables for 30-year normals, each of the past 105 years and future periods (2020s, 2050s and 2080s) predicted by different GCMs. Growth response functions based on the lodgepole pine provenance trial allows us to predict the productivity of populations with different climate change scenarios and identify populations with wider adaptation range and greater growth potential in future climates. Modeling of ecosystems and species distributions enabled us to use inter-species variation to adapt to climate change.