Assessing Which Traits Determine the Performance of Canadian Black Spruce (*Picea mariana*) in the Face of Climate Change

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Climate change is advancing rapidly, yet there is limited research on the adaptive potential of long-lived species under future climates. The ability of long-lived species to adapt hinges largely upon existing trait variation. Thus, assessing whether traits of a species positively or negatively influence performance is pivotal in understanding the adaptive capacity of a species in the face of climate change. In this study, we examine how *Picea mariana* traits, with a known response to warming and drought, impact individual performance. We conducted our investigation across three sites spanning a temperature and water availability gradient, mimicking the expected climate change in the North American Boreal Forest. The strength and direction of selection determine which traits or combinations of traits enhance or impede performance under different temperatures and water availabilities. Among the three study sites, we found that distinct trait combinations contribute to high performance, indicating varying selection pressures between the sites. We conclude that traits which exhibit directional variation along the gradient are correlated with the changing climate. Future research will explore how trait variation among different *P. mariana* populations aligns with the vector of selection in the warmest and driest site, which closely resembles future climates.