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Title: Genome-wide association studies of adaptive traits in *Populus trichocarpa*

Abstract

Global climate change is re-shaping the distribution of terrestrial plants across the world with changes in temperature and precipitation regimes. In the absence of adaptation or migration, many plant species and populations will trend towards decline or even extinction. In order to determine the potential for adaptation under climate change, we must first have a comprehensive understanding of the genomic basis for variation in climate-related phenotypic traits. With a widespread geographical distribution, populations of *Populus trichocarpa* exhibit latitudinal and altitudinal clines in many phenology and eco-physiological traits. In this study, we explored the phenotypic as well as genetic variation across poplar populations and detected loci underlying adaptive phenotypes using genome-wide association mapping technique. The knowledge of genetic control of local adaptation can help complete the bigger picture of adaptation mechanism among plant species and is important for future tree breeding for climate change.