

PACIFIC NORTHWEST BLACK COTTONWOOD POPULATIONS EXHIBIT NEGATIVE  
LINEAR ASSOCIATION BETWEEN CONVENTIONAL CHILLING TEMPERATURES  
AND BUD BREAK DATE

by

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## 1 Abstract

In order to determine the effectiveness of very negative temperatures on the fulfillment of the chilling requirement of black cottonwood (*Populus trichocarpa* Torr. & A. Gray ex Hook.), cuttings from two Pacific Northwest populations of different latitudinal origin were stored at a range of temperatures (-16, -10, -6, -3, 0, 3, 6, and 9 °C) for either 4 or 8 weeks, with the number of days to bud break upon forcing used to determine which temperatures were most effective at advancing bud break. Cuttings collected in mid-November showed no consistent relationship across chilling temperatures in this first trial, indicating that the chilling requirement of black cottonwood may be minimal. In contrast, cuttings collected in mid-December showed a significant negative linear correlation between bud break and chilling temperature, with the slope of that relationship significantly more negative after 8 weeks than after 4 weeks. Warmer chilling temperatures showed even earlier bud break after 8 weeks of chilling than in the 4-week treatment across different genotypes. This relationship suggests that temperatures above a certain point act to advance bud break in black cottonwood, with a more pronounced advancement effect at warmer chilling temperatures. Bud break data for both populations support -11 °C as the point of separation between temperatures that promote bud break and those that do not. As climate change continues to progress, this rapid responsiveness to warm temperatures and late dormancy induction can be expected to allow black cottonwood to capitalize on warmer temperatures and an extended growing season.