

COMPETITION-INDUCED GROWTH INCREASES IN POPLAR

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The response of *Populus trichocarpa*, *P. deltoides*, and their interspecific hybrids to competition was studied both in a greenhouse and in the field. The competition response was manipulated by growing trees at close spacing with open-grown trees serving as the control. The competition response is mediated by phytochrome and is a result of decreasing red:far-red ratio as the canopy closes and leaves overlap. Responsive clones showed consistent increases in height, diameter, shoot weight, and specific leaf area. The number of branches and root weight decreased in these same clones. The height growth response was a result of increased internode length; the number of nodes remained unchanged between treatments. In a field study, a measurable response to competition was evident within one week of moving trees from open grown to close spacing. Genetic control of the response was studied in a three-generation pedigree population (Family 331): The *P. trichocarpa* mother was responsive and the *P. deltoides* father was not. In the F₁ parents, one hybrid was responsive and the other not. In the F₂ population, six clones were selected in a stoolbed based on the presence or absence of sylleptic branching. Those without sylleptic branching exhibited statistically longer internodes and were found to be responsive to competition, and those with sylleptic branching were unresponsive in this greenhouse study. If this response could be captured by manipulating field spacing, aboveground productivity could be increased by 20 to 30 percent without any additional cultural inputs.

KEY WORDS: increased productivity, competition, physiological response, phytochrome, red:far-red ratio

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