REGIONAL SITE-SELECTION MODELS FOR HYBRID POPLARS

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Hybrid poplars (*Populus* spp.) can quickly produce significant biomass compared with other hardwood species and, as a result, are increasingly being grown for pulp and wood products. Global energy demands have rekindled interest in hybrid poplar as an alternative, renewable energy source. Future production of hybrid poplar to meet demand will depend on optimization of site selection, clone selection, and management practices. In this study, we attempt to identify and validate site factors that are correlated with growth potential of hybrid poplar. Because data were unavailable to describe the growth of common clones replicated over a range of sites, we selected aspen (*P. tremuloides*) as a surrogate poplar species. We identified 306 aspen stands that were naturally growing in near-monocultures at densities comparable to those recommended for commercial hybrid poplar production. We then used ridge-regression to evaluate the relationship between aspen site index and several soil and climatological measures. Site index was positively correlated with the percentage (by weight) of coarse soil particles and negatively correlated with calcium carbonate concentration, vertical water flow, and hardwood habitat quality. To validate the model, in 2005 and 2006 we measured diameter at breast height (d.b.h.) of *P. deltoides* × *nigra* and *P. nigra* × *maximowiczii* clones in 31 commercial plantations in Todd County, Minnesota, planted in 1999 and 2000. Observed d.b.h. was positively correlated with predicted site index for plantings in 2000 but not 1999, presumably because of outbreaks of defoliating insects. Our resulting map may be helpful when selecting future sites for hybrid poplar plantations, but clone selection, insect and disease impacts, and management practices have as much or greater impact on fiber production.

KEY WORDS: *Populus*, productivity, site relationships

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