Wood Quality of Southern Pine Hybrids with Reference to Their Slash and Loblolly Parents

X.B. Li[1], D.A. Huber[2], G. Powell[3], C.L. Huang[4], G.F. Peter[2]

[1]Graduate Student, [2]Associate Professor, [3]Senior Biological Scientist School of Forest Resources and Conservation, University of Florida, Gainesville, FL, USA, [4]Weyerhaeuser Company, Tacoma, WA, USA

Hybridization between closely and distantly related species is a valuable approach to genetic improvement, and has been successfully used in many plant species, including forest trees to improve yields and to introduce other desired traits such as cold tolerance and disease resistance. Loblolly and slash pine were hybridized and the F1s planted in replicated field trials. At year two, F1 hybrids were on average smaller than the parental species, indicating negative hybrid vigor (Lopez-Upton et al., 1999, *Silvae Genetica* 48 (6): 303-313) for growth traits. This result was somewhat surprising given the two species have overlapping ranges and are highly related.

Given the negative hybrid vigor found for early growth, we wanted to evaluate wood properties of these slash and loblolly pine F1 hybrids to determine whether they also showed negative hybrid vigor. During the 11th year of growth, in-tree velocity stiffness was measured using Treesonic and the Director ST300. Our results show that the slash and loblolly parents had similar velocity stiffness; whereas, the F1 hybrids had significantly lower velocity stiffness. From two of the sites, 12 mm wood cores were taken at 1.3 m from a diameter at breast height stratified subsample of loblolly, slash and F1 hybrid trees. With these cores, the microfibril angle (MFA) of earlywood and latewood was determined with x-ray diffraction from rings 9 and 10. For both earlywood and latewood, the MFA of the parents where similar but the MFA of the F1 hybrids was significantly higher MFA. This increase in MFA agrees with the decrease in in-tree velocity stiffness. Thus, MFA and in-tree velocity stiffness show negative hybrid vigor, similar to the negative hybrid vigor found for early growth.

In other studies (Watt et al., 2006, *For. Ecol. Manage*. 229, 136-144; Roth et al., 2007, *For. Ecol. Manage*. In press), in-tree velocity stiffness was correlated with the ratio of height to diameter at breast height (H:DBH), with more slender stems having increased stiffness. We have investigated the correlation between H:DBH and MFA and in-tree velocity stiffness to test if this explains the negative hybrid vigor observed.