

ASSESSING CROWN DYNAMICS AND INTER-TREE COMPETITION IN SOUTHERN PINES

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Genetic improvement of southern pines has been underway for 50 years and during this time, deployment of germplasm has generally evolved from more genetically diverse to less genetically diverse. Information is needed on how deployment of individual genotypes in pure blocks will affect traits such as within-stand variation in individual tree traits, as well as tree-level competitive interactions. Most genetic information for tree breeding programs is derived from single-tree or row-plot progeny tests. In contrast, modern forestry deployment strategies compel us to understand how elite genotypes will grow in single-family or even clonal blocks, where competition is either between closely related individuals or identical genotypes, respectively. This research focuses on understanding how crown characteristics of clones influence inter-tree competition.

The Forest Biology Research Cooperative at the University of Florida has established a clonal block plot trial series titled: Varietal ARchitecture Investigations Examining Tree Interactions on

Experimental Sites (VARIETIES). VARIETIES examines tree- and stand-level dynamics of select loblolly pine clones growing in pure- and mixed-genotype plots. Age 2- and 3-year data demonstrate similar growth performance among elite clones in the trials but variation among clones in crown size characteristics such as crown width, crown volume, and crown width/crown height ratio.

As a result, some clones show differences in indices of growth efficiency, such as stem volume/crown volume (table 1). We quantified biomass distribution in three contrasting clones in VARIETIES (ARB-1, ARB-2, and ARB-4) and found patterns suggesting some of the mechanisms underlying efficiency differences. For example, narrow-crowned clone ARB-1 allocated less biomass to branches than the other two clones but relatively more biomass to stem. In contrast, clone ARB-2 allocated relatively less biomass to foliage than the other two clones, suggesting differences in photosynthetic efficiency.

Table 1-- Age 3 year tree-level characteristics: stem volume (SV), crown volume (CV), crown width (CW), relative crown width (CW/H) and stem volume growth efficiency (SV/CV) for four clones in the VARIETIES I experiment near Starke, FL^a

Clone	SV	CV	CW	CW/H	SV/CV
	<i>dm</i> ³	<i>m</i> ³	<i>m</i>		<i>dm</i> ³ / <i>m</i> ³
ARB-4	14.81b	5.53b	1.91a	0.559c	2.41c
ARB-3	12.85b	4.66b	1.79b	0.517b	2.63ac
ARB-1	14.18b	4.75b	1.77b	0.496a	2.79a
ARB-2	22.87a	6.91a	2.05a	0.524b	3.21b

^aWithin a column and a biomass component, parameter estimates followed by the same lower case letter were not significantly different at $\alpha = 0.05$ level.

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