

Crown Ideotypes as a Silvicultural Tool in Varietal Loblolly Pines

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Summary (50 Words)

Ideotypes are simplified models of crop species intended to increase yields by selecting for desired traits. Assessment of 227 varieties at four field sites revealed that varieties with rapid stem volume production early in the rotation can have a range of crown ideotypes. This affords land managers with the opportunity to select varietal material tailored to their specific silvicultural systems.

Abstract (300 Words)

Ideotypes are simplified models of crop species intended to increase yields by selecting for desired traits. The application of ideotypes to varietal forestry may improve the efficiency of screening varieties to be put into production and may allow varieties to be categorized to simplify silvicultural decision making. Crown traits are easily and rapidly measured, and in some studies have been shown to correlate strongly to growth as they integrate tree-level carbon gain. The objectives of this research were to assess if crown ideotypes 1) could be easily and consistently quantified, 2) were consistent across sites within a genotype, and 3) were indicative of growth shortly after establishment. A total of 227 varieties that were each replicated at three sites across the southeastern Coastal plain were assessed during the middle of the third growing season. Stem dimensions, crown width, and foliar density were quantified on six to eight ramets per site. Breeding values were calculated with best linear unbiased prediction (BLUP) implemented in ASReml. Breeding value accounted for more than 70% of variability in qualitative crown width and foliar density ideotypes, indicating that rapidly scoreable traits were consistent across sites within genotypes. However, crown ideotypes were not indicative of stem growth through the first three growing seasons. These results suggest that crown traits alone are likely not sufficient to select varieties for production. However, they do indicate that there are opportunities to select varieties with different crown ideotypes that achieve similarly high yields. For example, managers could select rapidly-growing narrow-crowned varieties to achieve higher stocking or rapidly-growing broad-crowned varieties with dense foliage to reduce the need for competition control through heavier understory shading earlier in the rotation.

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