EFFECTS OF THE SILVICULTURAL INTENSITY ON THE 4-YEARS GROWTH AND LEAF-LEVEL PHYSIOLOGY OF LOBLOLLY PINE VARIETIES

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The role that genetic improvement plays in the increase of productivity in loblolly pine (*Pinus taeda* L.) in the South has been recognized (McKeand and others 2003). Varietal forestry has the potential to improve the productivity and quality of loblolly pine stands, and higher genetic gains can be achieved in volume and stand uniformity (Zobel and Talbert 1984). However, to achieve this potential productivity, the use of elite genotypes must be linked with silvicultural management. Although the positive growth responses due to intensive silviculture have been reported extensively, much less is known about the physiological processes that drive these responses. It is expected that increasing the genetic uniformity, from open-pollinated (OP) to control mass-pollination (CMP) families and finally to varieties, is associated to a higher uniformity in both growth and physiological processes occurring among the trees. Aspinwall and others (2011) found no relationship among the different level of genetic and phenotypic uniformity. Their results are based in single-tree plot trials, and little information exists about the performance of loblolly pine varieties In monoclonal blocks, which is the standard way to deploy elite genotypes.

In order to gain major insight about the genetic x silviculture interaction on the growth and leaf-level physiology in loblolly pine, a study was established in 2009 on the Virginia Piedmont and North Carolina Coastal Plain of the U.S. Each trial was designed as a split-split plot, with two levels of silviculture (operational and intensive) as the whole plot and six genotypes entries (one OP, one CMP, and four clones) as a split-plot factor. Two of the clones selected have a wide-crown ideotype, and two have a moderately broad crown. Three different planting densities (250, 500, and 750 trees per acre) were arranged as the split-split plot treatments. The study was on 4-year growth data and leaf-level physiology in a subsample of trees in the spacing of 500 trees per acre. Leaf-level physiology was also sampled in the upper and lower crown. We assessed the interaction effects of the genotypes with the silvicultural treatments and site conditions.

Preliminary results indicate that the relation between growth and leaf-level physiology is not clear. There were interaction effects among site by silvicultural treatments and site by genotype. At the Piedmont site, the OP family had the lower averaged-photosynthetic rate (fig. 1). Future analyses will focus on distinguishing differences among crown traits and leaf area of the varieties.

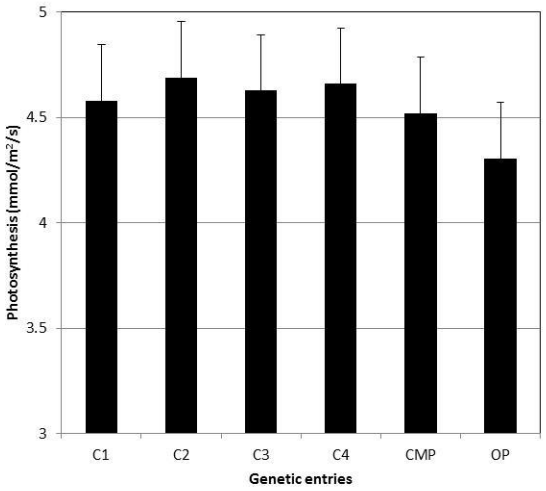

Figure 1—Photosynthetic rates of the different genotypes at the Piedmont site in Virginia.

LITERATURE CITED

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