COOPERATIVE FOREST GENETICS RESEARCH PROGRAM
RESEARCH PROJECT SUMMARY

**NUMBER:** P-21  
**KEYS:** PG, TX  
**TITLE:** Genetic control of slash and loblolly pine root morphology.  
**INITIATED:** 1990

**CONTACT:** M. O'Donnell  
**COOPERATORS:** CFGRP, CCA, RAY, A. Long, P^3_R  
**LOCATIONS:** Austin-Cary Forest

**OBJECTIVES:**

The overall goal is to identify seedling traits expressed during the first 2 years of growth that are predictive of a family's growth potential at maturity on field sites. Specific objectives are: 1) to evaluate lateral root architecture, feeder root development, and mycorrhizae frequency over two growing seasons, 2) to determine relationships between root morphology and seedling nutrient efficiency, and 3) to determine if any root morphology traits are correlated with family growth rates in the field.

**APPLICATIONS:**

The CFGRP has made nearly 1000 advanced-generation selections of slash pine that need to be tested as part of the advanced-generation slash pine program. An early selection procedure using a selection index composed of seedling traits to predict mature field performance could be used in many ways to reduce costs and/or increase gains. Also, it is important to understand the mechanisms controlling seedling and field growth rates.

**MATERIALS AND METHODS:**

There are 20 open-pollinated families chosen on the basis of substantial field progeny test data showing that each family is either fast- or slow-growing in the field: 5 fast-growing and 5 slow-growing loblolly pine families from the Atlantic Coastal Plain and 5 fast-growing and 5 slow-growing slash pine families.

Seedlings in this study are planted together with those in P-15 which is S. Surles' Ph.D. research. Seed were sown into large boxes (65' long X 6' wide X 38.5” deep) containing coarse sand. At each harvest, the experimental design is a randomized complete block, split-plot design with 4 blocks, 2 whole-plot level treatments (5 and 50 ppm of N) and the 20 families as the sub-plots. At the end of the first two growing seasons, the trees will be lifted and measured for several root morphology traits. Analyses will test species differences as well as correspondence with the a priori field growth rankings.

**SCHEDULE OF ACTIVITIES:**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ACTIVITIES</th>
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<tbody>
<tr>
<td>1989</td>
<td>Choose families, obtain seed and construct soil boxes</td>
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<tr>
<td>Apr 1990</td>
<td>Sow experiment</td>
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<td>Oct 1990</td>
<td>Harvest roots from season 1; measure root morphology traits</td>
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<tr>
<td>Nov 1991</td>
<td>Harvest roots from season 2; measure root morphology traits</td>
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<tr>
<td>1992</td>
<td>Complete analyses and report results</td>
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