

**GENETIC AND SITE INFLUENCES ON GROWTH OF SLASH PINE
IN SOUTHERN BRAZIL AND NORTHEASTERN ARGENTINA**

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Open-pollinated progenies of 172 slash pine clones generally superior for growth in the southeastern United States were evaluated across seven sites in southern Brazil and northeastern Argentina. All but 33 progenies represented one of four major physiographic regions within the species' natural distribution: Atlantic Coast Flatwoods (ACF), East Central Florida (ECF) Flatwoods, Gulf Coast Flatwoods (GCF), and Southern Coastal Plain (SCP) (Table 1). Ninety-one progenies were established in 1982 in one to three tests on sites commercially planted to slash pine in the Brazilian states of Santa Catarina and Parana (Rockwood and Chaves 1988). In 1986, 119 progenies were planted in up to four tests representing the range of sites used for slash pine in Corrientes and Misiones states in Argentina. Each test contained at least one checklot of commercially available seed in the area. A randomized complete block design with row plots was used in each test: the Brazilian tests had six replications of 10-tree plots, and the Argentine tests had four replications of 8-tree plots. Through ages 6 and 8 years, respectively, tree height, DBH, and status were periodically measured, and tree volumes calculated. Least square means were generated for actual and standardized tree volumes. Narrow-sense heritabilities and Type B correlations were calculated by the methods presented by Lu (1999). Progeny performance in Argentina and Brazil was correlated with tree volume breeding values for the clones in the southeastern United States as determined by the Cooperative Forest Genetics Research Program (CFGRP) at the University of Florida.

The CFGRP progenies varied significantly within a test, were generally superior to local checks, and were consistent across tests within a country (Tables 1 and 2). Survival in all tests typically exceeded 90%. Across all Argentine tests, the 119 progenies averaged 13% more tree volume than the checks, with their superiority over checks in the four widely different test sites ranging from 0% to 24%. In the three very similar Brazilian test locations, the 91 progenies were 15% larger than the checks.

Table 1. Actual (cubic feet) and standardized (unitless) individual tree volume means by regions for CFGRP slash pine progenies in Argentina and Brazil.

Region	Argentina			Brazil		
	No. of Prog.	Actual	Standardized	No. of Prog.	Actual	Standardized
ACF	35	4.53	3.12	24	5.02	2.89
ECF	27	4.81	3.31	6	6.04	3.48
GCF	16	4.33	2.98	10	5.10	2.93
SCP	27	4.03	2.77	26	4.55	2.62
Plantation	14	4.39	3.02	21	5.21	3.00
Checks		3.82	2.70		4.51	2.60

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Table 2. Heritabilities, Type B genetic correlations, and correlations of performance with CFGRP breeding values for CFGRP slash pine progenies in Argentina and Brazil.

	Argentina	Brazil
No. of Clones	119	91
Narrow-sense Heritability	0.20	0.44
Type B Correlation	0.66	1.00
Correlation with CFGRP BVs for Volume	0.10	0.15
Correlation with CFGRP BVs for Rust	-0.23	0.01

Heritabilities and Type B correlations for Argentina and Brazil reflected between and within site uniformity (Table 2). Under the more variable Argentine tests, these estimates had values comparable to those from the southeastern United States, whereas in the Brazilian testing, heritability and correlation were high. Progeny performances across Argentina and Brazil were generally consistent (Figure 1). The associated genetic correlation was 0.63 for 35 progenies common to tests in both countries. Thus, good performers in one country may be expected to do well in the other.

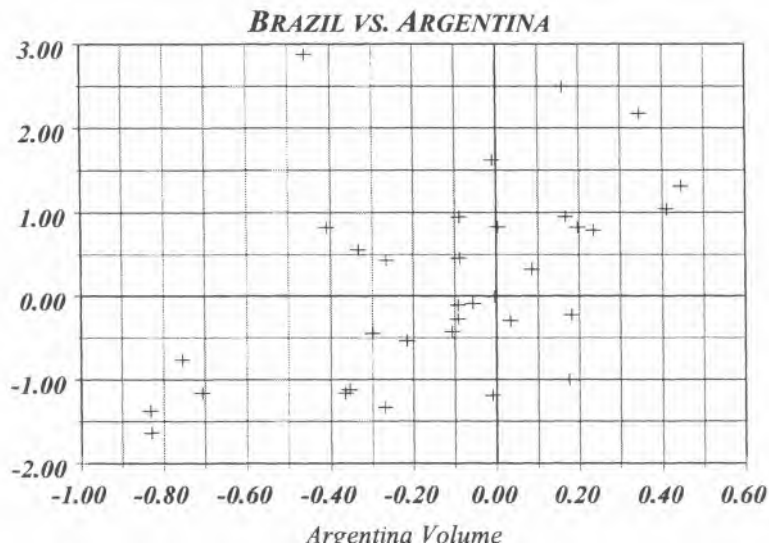


Figure 1. Relationship between tree volumes in Argentina and Brazil for 35 common CFGRP slash pine progenies.

Region (provenance) variability influenced slash pine growth in southern Brazil and northeastern Argentina (Table 1). The 30 progenies from the significantly better ECF region had average tree volumes that were 23% larger than the checks in Argentina and 34% larger in Brazil. The ACF and GCF regions were usually similar to clones selected in plantations. The SCP region was consistently inferior. The superiority of the ECF region is in strong contrast to its growth in the southeastern United States where breeding values for ECF clones are lower than those for the other regions. The superior ECF region, the southernmost and warmest of the four regions, is similar climatically to the Marion County, Florida, progenies that have done well in Argentina (Schmidtling et al. 1997).

In general, as was suggested at age 4 years in the Brazilian tests (Rockwood and Chaves 1988), tree volume breeding values in the Southeast were of little significance in predicting specific performance in Argentina or Brazil (Table 2, Figure 2). The correlations between CFGRP breeding values for tree volume were only slightly positive. A similar weak correlation was noted between fifth-year height performance of 92 progenies in the US and northern Argentina (Schmidtling et al. 1997).

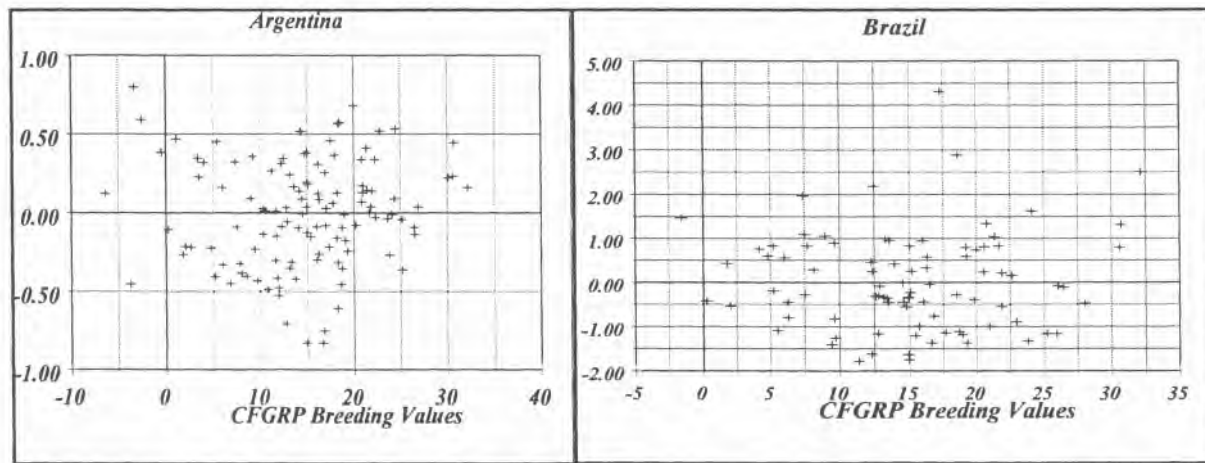


Figure 2. Comparisons of slash pine progeny standardized tree volumes in Argentina (left) and Brazil (right) with CFGRP breeding values for growth in the southeastern United States.

Keywords:--*Pinus elliottii* var. *elliottii*, southern pines, South America, G x E interaction.

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