SLASH PINE PROGENY TESTS INDICATE GENETIC VARIATION IN RESISTANCE TO RUST

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Southernfusiform rust caused by Cronartium fusiforme one of the most serious diseases attacking slash pine. Each year, it kills many trees and the cankers make portions of the trunks unfit for lumber and other products. The nature of this disease is well known but little in the way of practical control measures is available for planted or natural stands.

One approach to the problem of control is to select resistant strains of slash pine, if they exist, or to develop resistant strains through planned breeding. A first step in this approach is to determine whether disease-free trees in infected stands produce seedlings having more than average resistance to the rust. Early results of 1-parent progeny tests at the tree improvement project of the Ida Cason Callaway Foundation near Chipley, Georgia, indicate that some degree of rust sistance a in fact passed on to the seedling progeny.

The test at Chipley are part of a broad program aimed at developing superior strains of souther pines. The mother trees, in a -year-old plantation of unknown seed source, were selected in 1950 on the basis of their growth rate, trunk and crown form, and freedom from rust cankers. At that time, about 75 percent of the surviving trees in the plantation were cankered. This stand had more trees with rust infections than the average, although fast-growing, old-field plantations generally have a high rate of infection.

The seedlings from the 1950 and 1951 seed crops were grown in the Foundation's nursery in 1951 and 1952 respectively. Seedlings were given standard spraying treatment to control rust in the seed beds and infection was low. Nothing is known of the culling practice for the control seed lings, which were purchased, but the usual practice is to cull diseased seedlings at the nursery. Seedlings lots designated control seed number 1 and 2 and Southern Mississippi were grown in the Foundation's nursery. Seed of control number 1 was purchased, that of control lot number 2 and Southern Mississippi were supplied by the Southern Forest Experiment Station

Seedlings were outplanted as 1-0 stock in the spring of 1952 a 1953. The 1952 planting was in plots varying from 20 to 100 trees wit h 3 replications. The 1953 planting was in 25-tree plots with 4 replications and was adjacent to the 1952 planting. Stem and branch cankers were counted in the fall of 1955, when trees planted in 1952 averaged about 8

Table 1. Rust Infection in Slash Pine Progenies from open-pollination of Disease-Free Mother Trees and of unselected Mother Trees.

Seedling lot or numbers of parent	Planted Spring 1952				Planted Spring 1953			
	Trees:	Stem cankered	Branch cankered	Total trees with canker	Trees	Stem cankered	Branch cankered	Total trees with canker
	Number	Percent	Percent	Percent	Number	Percent	Percent	Percent
Control Seed (1)	114	37	55	64	66	18	15	30
Control Seedlings	104	28	58	64	42	2$	33	48
Control Seed (2)	30	53	70	77	85	36	28	51
Southern Mississippi	56	52	71	77	92	50	26	58
Average	---	42	64	70	--	33	26	47
C-4	62	23	45	45	80	26	19	32
C-6	71	24	34	48	79	25	16	33
C-7	71	30	42	54	71	30	15	39
C-10	250	24	51	59	97	23	24	39
C-37	216	14	26	30	84	8	12	20
C-50	212	34	52	61	94	29	31	50
C-51	203	22	51	58	89	19	15	27
C-63	58	16	26	29	92	23	28	39
C-65	252	13	36	43	85	12	11	21
Average	---	22	40	47	--	22	19	33

feet in heighten those planted a year later averaged about 5 feet.

Progeny groups of certain maternal parents had only about half as many infected trees as others (Table 1). Also, the average percent infection in progeny of 9 selected trees was 33 and 30 percent less in the. 1952 and 1953 plantings respectively, than in 4 lots of control seedlings from unknown parent trees.

Infections were low in the progeny of C-37 in both plantings and were less than half that of the controls, Furthermore, the C-37 progeny are among the fastest growing,in the plantations and the trees have characteristicly short branches. Progeny of C-50 are also very fast growing and extremely slender crowned, but they have the highest infection of any select group. Control seed number 2 and Southern Mississippi lots planted in 1952 and 1953 represent single lots of seed respectively. Part of each of the two lots of seed was planted in the *nursery* id 1951 and part in 1952. In the 1952 planting the percent of total trees with cankers was the same in both lots. In the 1953 planting there was only a 7 percent difference, However, for both seedling lots, there were fewer trees with stem cankers than branch cankers in the 1952 planting while the reverse was true in the 1953 planting, However, it should *be* pointed out that in these groups as well as in the progeny of plus trees it was difficult to tell if a large stem canker in a whorl of branches originated on the branches or on the stem. Stem cankers are the more damaging because they may deform the trunk, weaken it so that it breaks, or even kill the tree.

Although the results reported here are fro m few tests of short duration, they indicate there may be some inherent differences in susceptibility to rust among individual slash pine trees. More complete information will soon be available from periodic observations of these trees as they grow older and of trees in additional plantings made in 1954, 1955, and 1956 with seed from open-and controlled-pollination.