SOUTHERN FOREST EXPERIMENT STATION

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PINE DIRECT SEEDING NOT IMPERILED BY FLORIDA HARVESTER ANTS

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SOUTHERN FOREST EXPERIMENT STATION

Florida harvester ants foraged mostly empty seeds and spent seedcoats from germinated seedlings on areas sown to slash pine in Mississippi. Pine stocking was not improved significantly by eradicating ants before sowing.

Florida harvester ants *(Pogonomyrmex badius* (Latr.)) are seed predators, and they have been observed foraging pine seeds broadcast for reforestation in the Southeast *(1)*. Two studies were made in Greene County, Mississippi, in 1966 and 1967 to measure the impact of ant depredations on the success of direct-seeding operations.

METHODS AND RESULTS

The first study was established on a 17-acre tract that had an average of 5.6 ant colonies per acre. Ten plots, each 160 by 160 feet, were located so that each had a minimum of three nests and a 1-chain buffer strip around it. Plots were then paired by proximity. One plot of each pair was chosen at random for ant eradication; ants on the other plot were left undisturbed. All colonies on and within 1 chain of plots designated to be treated were fumigated with methyl bromide. The study area was within a large commercial seeding tract, on which 1¼ pounds or about 18,000 slash pine *(Pinus elliottii* Engelm.) seeds per acre were broadcast by helicopter in February 1966. Seeds were treated with bird, rodent, and insect repellents as described by Mann and Derr *(3)*.

Harvester ants did not cause a significant reduction in initial seedling stocking. The May 17-18 inventory showed 2,770 seedlings per acre on plots where ants were killed prior to sowing and 2,440 where ants were left to forage. Cooper et al. *(1)* found similar results with sand pine; ant control caused some increase in stocking, but the increase was not of practical significance.

An average of 9.8 pine seeds or remains of seeds were found deposited on the surfaces of 32 active mounds that were examined 3 months

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after sowing. Only 3.2 percent of the seeds were sound; the remainder were either empty seeds or spent seedcoats from germinated seedlings. Twenty colonies were examined in detail about 4 months after seeding. Seeds were collected from the surface, and each nest was excavated in layers. The soil was sifted through a fine-mesh wire screen to retrieve all contents. The bulk of material consisted of weed and grass seeds. An average of 35 pine seeds per nest were also collected, 23 of which were on the surface. Forty-nine percent of the pine seed were classed as spent seedcoats, 40 percent were empty, and only 11 percent were sound. Before the excavations it was suspected that unsound seeds were rejected within the cavity and returned to the surface. That theory proved unfounded. Sound seeds on the surface outnumbered those underground, and many empties and spent seedcoats appeared to be in storage chambers. Golley and Gentry *(2)* believed that harvester ants collect seeds in spring and summer for winter food. Apparently, workers indiscriminately gather seeds for storage without inspection for soundness.

Results of the first study showed that the threat of harvester ants to direct-seeded pines was more apparent than real. It was decided, however, that 66 feet of isolation might have been inadequate for fumigated plots. Cooper et al. *(1)* observed ants carrying seeds as far as 75 feet from their nests, and Van Pelt *(4)* noted foragers 100 feet from home.

A second study was done with isolation strips 100 feet wide. Ten plots, 280 by 280 feet, were mechanically located to insure at least one ant colony within the central 80- by 80-foot section of each. Plots were again paired by proximity, and the fumigation treatment was randomly assigned to one of each pair. Colonies per plot ranged from eight to 13. To provide for comparable depredations on each check plot, all nests in excess of eight were fumigated at the same time as those on treated plots. Depredations were therefore based on 4.4 active colonies per acre. Stratified loblolly pine *(Pinus taeda* L.) seeds were treated with bird, rodent, and insect repellents *(3)* and broadcast at the rate of 18,000 seeds per acre in February of 1967.

The seedbed was unfavorable—a 3-year grass rough—and 4 months after sowing there were only 333 seedlings per acre on untreated plots while treated plots averaged 444 per acre. Differences were not statistically significant.

Seed depredations were appraised in the second study by excavating two active colonies on each check plot. An average for each of the 10 nests were 196 seeds on the surface and 93 in underground chambers (fig. 1). Thirty-seven percent (107) of the total were either empty seeds or spent seedcoats from germinated seedlings. Another 38 percent (220) were half seedcoats, which may have been from 110 spent seedcoats or from good seeds opened and eaten by the ants. Seven percent (20) apparently started to germinate but failed to complete the process (seeds were slightly cracked open), and 18 percent (52) were full, ungerminated seeds. If all except the 106 empty seeds and spent seedcoats were potential seedlings, total depredations by 4.4 ant colonies per acre were only 4.5 percent of the sound seeds.

Figure 1.—*Partial excavation of a harvester ant nest revealed three pine seeds and five pieces of debris in an upper chamber.*

DISCUSSION

Until now, a forester who saw four to 10 Florida harvester ant nests per acre with up to 200 seeds around each had cause for concern. Results of the studies described should relieve that concern. A concentration of 4.4 to 5.6

colonies per acre did not significantly affect direct-seeding success. Most of the seeds found in nests were not viable when examined, and probably were not viable when they were foraged.

Why did the ants forage empty seeds and spent seedcoats? Careful observations showed that the ants did not become active until mid-April when daily maximum temperatures were consistently above 80° F. Most germination of the spring-sown seeds was complete by then. Only seeds that failed to germinate and spent seedcoats were available to forage, and harvester ants apparently did not distinguish full from empty seeds.

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