SOIL COMPACTION AND LOBLOLLY PINE GROWTH

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Lull (1) reviews comprehensively the effects of logging, grazing, and trampling on soil compaction and plant growth. His data show that typical logging can result in the serious compaction of 10 to 50 percent of an area.

There are few data that can be used to compare tree growth on compacted and normal soils. However, on a 26-year-old loblolly pine plantation on the Hill Forest, Durham County, N. C., 30 trees planted in old road ruts produced only 46 percent as much cubic-foot volume as 30 trees planted in a surrounding field (table 1).

The soil type in the plantation area is Cecil (40 percent clay in B horizon, typical of the upland Piedmont). Infiltration at three locations in the plantation was measured in triplicate, using a crude infiltrometer that consisted of a 6-inch steel pipe with a sharpened lip. The pipe had handles so that it could be worked into the soil to provide a tight seal and hence compel downward percolation of a standard measure of water (1 quart). The average time required for percolation was 80 minutes to more than 4 hours in the ruts of a road that is still used regularly, 18.5 minutes in road ruts abandoned at least 26 years ago, and 3.5 minutes in an abandoned field of the plantation.

TABLE 1.--Comparison of 30 trees growing in old road ruts with 30 trees growing in a surrounding abandoned field

Trees	Average diameter at breast height	Average height	Average volume
	Inches	Feet	Cubic feet
In ruts.....	6.3	53.9	4.1
Out of ruts.....	8.7	61.9	8.8

From this experiment it can be assumed that the percolation rates in the old field are typical for uncompacted Cecil soils, that the old woods roads were abandoned the same year that the plantation was established, and that recovery from compaction is linear with time.. These improbable assumptions lead to the conclusion that approximately 40 years are required for natural re-establishment of normal percolation rates in the severely compacted ruts of an abandoned woods road. I believe that the 40-year estimate is conservative. Doubtless, other soils would require different recovery times. Certainly a 55-percent reduction in growth from compaction justifies considerable effort to correct' or avoid this deleterious effect of man's activity.

Literature Cited

(1) Lull, Howard W. 1959. Soil compaction on forest and range lands. U.S. Dept. Agr. Misc. Pub. 768, 33 pp., illus.