Effects of Traffic on Soils

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I. Traffic can disfigure the soil surface.

A. Dry soil will not rut but repeated traffic to remove sod will pile up dust in track. (Figure 1) Tracks going up and down slope can cause erosion.

B. Traffic on soft soil will cause rutting (degree depends on tire and weight). (Figure 2)

II. Traffic can press soil particles closer together (compact). A normal soil is about 50% by volume solids and about 50% space occupied by either air or water. Compaction eliminates many of the larger spaces. Compaction is measured by resistance to penetration, change in size of pores, volume weight and others. Amount of compaction depends on many factors other than pressure per square inch and frequency of application of pressure. Some important factors are:

A. Soil texture: The fineness of solid particles—how much sand, silt and clay is in the soil—organic matter. Fine-textured soils (clays) are more subject to compaction than coarse-textured soils (sands). Hence the current recommendation for large quantities of coarse sand in greens construction. The texture also influences the amount of large pore space.

B. Soil moisture: When soil is very dry, it is difficult to compact. When soil is saturated, it is a hydraulic system and will not compact but will displace. Soil is seldom completely saturated in nature. Moist or wet soil will compact.

III. Effects of compaction.

A. It reduces non-capillary pore space.

B. Inhibits infiltration and percolation of water.

Figure 1

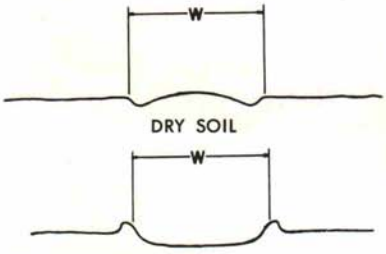

Figure 2

C. Reduces oxygen diffusion in the soil.

D. Inhibits root development.

E. Changes plant community - Knotweed, *Poa annua*, other weeds invade bentgrass or Kentucky bluegrass where there is excess compaction.

IV. Unanswered questions.

A. Is it better to make twice as many passes over a given spot with a 12-inch wide tire than one-half as many with a tire 6 inches wide?

B. Does surface compaction hold over from one year to the next or is the compaction corrected by freezing and thawing in cold areas?

C. How much compaction can be tolerated and still be able to produce a good turf?