

Penetrometer Can Measure Soil Compaction

URBANA, ILL.

The rain that fell in northern Illinois during the weekend of March 7 and 8 is a reminder that soil compaction caused by field traffic and machinery increases with high soil moisture. It is not too early to think about soil moisture conditions and soil compaction.

As noted in the February 27 issue of the Iowa State University Integrated Crop Management News, maximum soil compaction occurs when soil moisture is at or near field capacity. This happens because soil moisture works as a lubricant between soil particles under heavy pressure from field equipment.

Authors of the article, Al-Kaisi, Hanna, and Licht, note that indications of soil compaction during and immediately following a normal rainfall include slow water infiltration, water ponding, high surface runoff, and soil erosion. In addition, soil compaction can be diagnosed by stunted plant growth, poor root system development, and potential nutrient deficiencies. These symptoms of soil compaction result from an increased bulk density that affects the ideal proportion of air and water in the soil.

How can one verify soil compaction in the field? Using a tile probe, spade, or penetrometer can determine relative soil density or com-

paction. Soil moisture conditions have a significant effect on penetration resistance by the previously mentioned tools. The authors suggest determining soil compaction early in the season or compare observations and measurements from suspected areas with adjacent areas that have little chance of soil compaction (for example fence rows).

The article concludes by suggesting these management strategies to minimize soil compaction. (1.) Avoid field operations when soil moisture is at or near field capacity. (2.) Properly adjust tire size and air pressure for the axle load being carried. Larger tires with lower air pressure allow for better flotation and reduce pressure on the soil surface. (3.) Use the same wheel tracks to minimize the amount of land traveled across. Most soil compaction damage occurs with the first pass of the implement. Controlled traffic patterns can be accomplished by using implements that have matched wheel-tread configuration for soil preparation, planting, row cultivation, spraying, and harvesting.

There are numerous reasons to avoid soil compaction, so hold off tillage operations until soil conditions are drier than field capacity and consider the benefits of conservation tillage systems. Δ



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