



Managing Soil Compaction on Flooded Fields

Kansas State University • Cooperative Extension Service • Manhattan, Kansas

Soil compaction is a difficult topic to address since it depends on soil moisture and type along with highly varying causes. Hard soil conditions or compaction due to heavy rainfall and flooding has been reported in Kansas. Rain pounding on the soil surface may cause it to become extremely hard. This compaction, while probably not very deep, could make planting crops more difficult, especially on no-till fields. Fields that were harvested under wet conditions could be compacted from combine and grain cart traffic. Tillage may or may not be the answer. Before tilling the soil, it is best to assess the degree and depth of compaction.

Determining if soil compaction is present

Determining the degree of compaction is difficult enough in dry soil, but becomes extremely difficult, if not impossible, when soil is wet. Researchers typically use a cone penetrometer to measure compaction by determining the penetration resistance of the soil. However these tools are somewhat expensive and can be difficult to use. Cone penetrometers might give the first indication of compaction, but keep in mind that their measurement is influenced by soil moisture.

A shovel is the tool of choice to look for compaction. Dig a hole and feel for dense layers of soil. If the surface layer is dense, the compaction was likely caused by hard rains. If there is a dense layer in the top eight inches, the compaction was probably caused by continually tilling at the same depth. Compaction due to traffic is harder to find since a dense soil layer is not created, but the entire compacted area becomes denser. Areas that are compacted in this manner are usually evident when the areas have standing water or under developed crops.

When should you till?

If you find compacted soil and feel the need to eliminate it this fall, there are some things that you should consider. The first item to consider is soil moisture at the time of tillage. Soil should be dry enough to shatter for adequate tillage to take place. Most fields in northeastern Kansas have a full moisture profile which could contribute to further compaction when tractors are operated on fields. Tractors with axle weights exceeding 15,000 pounds could cause compaction below the normal tillage depth. This in turn could be detrimental to crop growth next summer and make subsoiling necessary next fall. Lighter tractors are not likely to cause too much compaction.

Another item to consider is the type of cropland. Tillage on no-till fields should be avoided if possible. Freezing and thawing this winter could break up compaction near the soil surface. If freeze/thaw action does not help, a tillage pass next spring when soil is dryer might eliminate the compaction. Cropland that is in conventional or conservation tillage, could be tilled this fall if soil is dry.

Tillage tools

If only the surface is compacted, the compaction can be removed with normal tillage, however deeper compaction may require subsoiling. A chisel plow is probably the best implement to remove surface compaction while leaving residue on the soil surface. Operating chisel points just below the compacted layer will cause it to shatter. Shallow chisel operation will also reduce residue burial. A disk or sweep type tool operated in moist soils has a tendency to shear the soil and could cause further compaction. Shearing heavy clay soils can seal the soil and cause a plow pan which is not easily penetrated by moisture. Another

tillage pass may be necessary to remove the plow pan.

If compaction is the result of harvest traffic, it is probably deeper than normal tillage depth. Operating a C-shank chisel deep could remove the compaction, but ripping or subsoiling may be needed. Again the key is to determine the extent of compaction before prescribing tillage. Removing wheel tracks is the first step. Then chiseling or subsoiling is needed when soil is dry enough to shatter. Operating chisel or ripper shanks in wet soils will only cut a slot in the soil and will do nothing to remove compaction.

Summary

Soil compaction can be alleviated with tillage. However, determining if compaction is present is the difficult part. Tilling wet soils to remove compaction will aggravate the problem due to compaction caused by tractors. An effort should be made to determine the degree and depth of compaction before trying to cure it. If land is classified as highly erodible, always check with the Soil Conservation Service before tilling.

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