

Getting fields back in shape after compaction issues

What do farmers need to get fields ready for planting next spring after a very wet harvesting season that was hard on fields in large parts of Iowa?

It was a tough fall, so while we don't like to run on wet soils, there weren't many options. So we do the best we can and get the crops out, but when soils are wet like they were in many places this fall, they are more susceptible to compaction during harvest operations. There are different types of compaction- soil surface crusting is one, tillage induced plow-pan is another- and the type we may have the most concern about from this fall is of course the wheel traffic type. Heavy equipment loads weaken soil structure where water works as lubricant, leading to the collapse of soil aggregates; essentially we pack the soil tighter as the traffic reduces the pore space. Soil compaction can reduce water infiltration, root development, and yield for a season or more; the overall impact varies depending on soil types and condition, equipment loads and many other factors.

How do we know if we have compaction issues?

A great question without a great answer, or at least an answer that is easily implemented by planting time. Testing the mechanical strength of soil with a tile probe, spade, or penetrometer can indicate compaction, and is probably the most common and efficient way we'll have to implement before we are ready to start field work. Because effects of compaction can be subtle, taking a lot of measurements with whatever tool you pick is imperative. Do a lot of comparisons between areas you suspect have compaction and adjacent areas that are not compacted. Good candidates are low traffic areas like fence rows, buffer strips or adjacent fields that you don't have compaction issues in. With wheel traffic type compaction, you may be able to compare traffic and non-traffic areas within your fields.

If you have ever looked for soil compaction with some of these tools, you may agree that deciding if compaction does exist is part science and part experience. Probing dry soils can make you think there is compaction all over the place since they offer a lot of resistance, so factor that in as well in case we do dry out this spring.

In-season, sometimes we can see hints of compaction that can help us out if we don't get a chance to work on it this spring prior to planting. Indications of soil compaction during and immediately following a normal rainfall include: slow water infiltration, water ponding, high surface runoff and soil erosion. Stunted plant growth, poor root system development and nutrient deficiencies like reduced potassium uptake can be signs of compaction so these areas can be noted and followed up on with some root digs or soil probing. Remote imagery/sensing can be another layer of information to help identify potential problem areas.

What can we do about it?

Once we have excessive compaction, especially deeper types, there aren't really any quick fixes. Preventing compaction is what the soil scientists advocate, and that is accurate. It also is a discussion that could fill a dozen articles, so for this article we'll stick with what to do with our current situation heading into next season.

The freeze/thaw cycle is a topic that comes up sometimes as a natural cure for compaction. In our part of the world, soils freeze several feet deep more or less... but at the deeper levels, one freeze/thaw cycle per year is pretty much it. So while over time it will help, it isn't a quick fix for deeper compaction issues. A little better news is that upper soil profile, from the surface to maybe 4-6" deep or so depending on many factors, is more likely to get multiple cycles which may help with surface compaction much faster.

Crop rotation and cover crops can help over time as well, so I don't want to sell them short, but they aren't a fix for us by this spring.

Deep tillage may or may not be a viable option this spring. If conditions are dry enough to "shatter" soil between the points of a subsoiler or chisel plow, tillage can lower the bulk density of soil and reduce compaction. But you have to be sure that the soil at the compacted depth isn't wet; then mechanical tillage will do little to loosen soil, and could make the problems worse. If it does dry out enough to give this a shot, till only to the depth needed to break up the compacted layer; no deeper, no shallower. Picking subsoiler shanks is another art form, but with a little trial and error a lot of farmers have found the right balance of soil movement and residue management to fit their needs. So if you haven't used one in a while and wonder what shanks may work best for you, hopefully neighbors and equipment dealers will steer you in the right direction.

The way things look now, odds are our subsoils are going to be at capacity or close to it this spring, so deep tillage probably won't have a shot at helping out.

The more shallow compaction like the surface tracks/ruts that are just too much to deal with as we spray and plant this spring will be a case by case decision. Whether we just hit the roughest spots so we can plant, or in some cases where full width tillage will be needed to get a crop in, the main thing will be to make sure it is dry enough we don't create more problems on top of anything left over from last fall.