



ADVANCED AG SYSTEMS'

Crop Soil News

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"It is the crops that feed the cows that make the milk which creates the money."

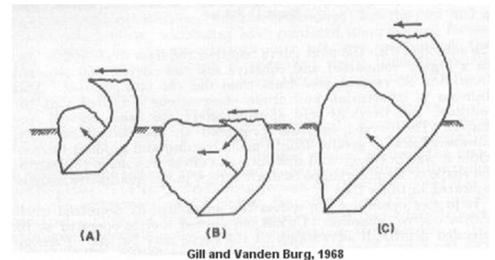
Holistic Approach to Removing Compaction

The last newsletter covered how compaction forms in your fields. The yield loss and increased cost for a unit of production are real. Bigger tractors, even with more tires, and an attitude of we have to get this done, have increased the size of wet areas in the fields and turned even well drained soils into something much less. The popularity of the vertical tillage that farmers have been told they can go on the field anytime and it will dry it, results in tremendous compaction issues. One farm I worked with actually ripped the legs off of a deep tillage unit when they tried to remove the vertical tillage compaction. My research crop had only rooted 2 inches deep on that farm.



We had to harvest NOW. Damage can be forever

A common reaction when compaction is found, is that the frost will take it out the next couple of year. As I pointed out in the October letter, after 15 years of an alfalfa grass stand, the compaction remained. The next reaction is to chisel plow deeper to remove the layer. As you go below the operating level of the curve of the point, instead of loosening the soil you are pushing it forward, down and out the side, creating more lateral compaction (drawing above right). The picture below right shows a field of curved bricks from trying to chisel deeper than the unit was designed for. To properly break a compacted layer you need a tillage tool designed to go a couple of inches deeper than the bottom of the compaction and lift to the surface. A large curved shank or a narrow vertical leg could do the job. Unfortunately, farmers frequently get a deep tillage ripper and hook it to the biggest tractor and go out and blow a tremendous amount of diesel smoke and make a heck of a mess. In many cases the soil is left in worse condition than if it had not been deep tilled at all. The first step is to mount a shovel holder on your deep tillage tool. This is critical. Rip for 100 feet and then stop, dig a hole to see if you are doing any good. If the deeper soil is too wet and plastic, stop, go back to the farmstead and find something else to do. Continuing while the surface is being ripped and the deep layers are being laterally compacted is a waste of time and fuel.



Gill and Vanden Burg, 1968

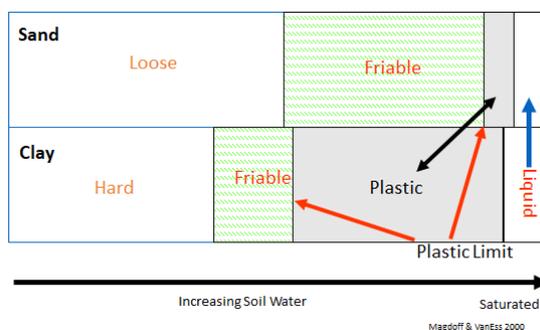


Tillage researchers in New Zealand categorically state that "Deep tillage without a change in the rest of the tillage/planting system is a waste of time. As the above farmer that had the serious compaction said, "we have to approach this problem comprehensively and it

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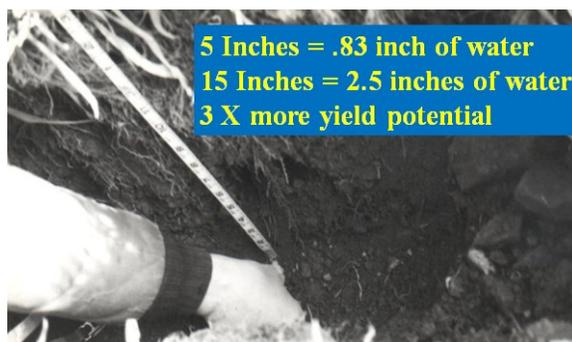
will take multiple years” to remove compaction. A systems approach needs to consider the time, the soil conditions, and the crop. Ripping the soil and then going back and spreading manure, tilling the surface, and planting a row crop will convert a compaction layer to full profile compaction.

What has worked best is to first shatter the compaction when it is in a friable condition. The graphic at right from Magdoff and VanEss shows if too dry such as a clay-based soil, it tends to stay in larger blocks as it shatters. If it is friable, it will crumble into golf ball size or smaller pieces in V profile from the point up. If it is too wet, it becomes plastic and instead of breaking the compaction it only smears and compacts laterally, assuring no roots can go through. As we pointed out in the last letter, often the top 5 – 6 inches is friable while the compacted layer is plastic. You need to dig to the depth the point is operating to see if you are doing any good. You also need to dig to see if you are under the pan to lift and shatter it. In the hayfield we showed in October, it looked like we were doing a great job. When we dug the hole, (picture at right) we found we were simply lifting the topsoil off the compacted layer and cutting a groove in the compaction. When we dropped the point another 2 inches so it was under the layer it shattered the compacted soil in a V above the point.



We do NOT suggest using any sweeps or wings. This will put a layer the consistency of a concrete road at the bottom and the width of the sweep working depth. Thus, moving compaction below the point where you can never practically remove it. The narrow type deep till will lift and break in a V pattern above it without the sweep/wings smear pan.

We don't suggest breaking all the compaction out at once. We did that once and when it rained, the field had the trafficability of a bowl of pudding. The only time we would consider complete shatter is if you only have one chance due to weather and you are going to seed it to a winter forage and then follow with a no-till planting of hayfield into the winter forage stubble. The other time would be if you are shattering it in mid-summer when it is dry and then doing an August 1 seeding. In both cases there is considerable time for the roots to grow throughout the shattered profile and stabilize the loosened soil before machinery runs on it again. In any case the process is to ideally break the compaction and then stabilize the loosened soil with fine fibrous roots from grass and alfalfa rather than corn. Winter forage triticale has a tremendous root system that we have seen take advantage of deep tillage to go 15 inches down in a soil formerly compacted at 5 inches (picture at right).



Early planted winter triticale forage into just shattered compaction, will keep the soil open and is stabilizing the soil 17 inches deep. This triples the available water for yield while simultaneously drying the surface for trafficability

As farmers are doing more acres of corn than hay, our preference if you need to do row crops is the narrow, straight leg units. They break out an area of about 15 inches wide and when set on a 30 inch center, leaves a perfect tilled seed bed strip with no compaction. They also bring up much fewer stones than the curved shanks. You then can plant on these strips (deep till in a pattern like you were planting corn). This leaves solid ground between the rows so you can still drive on to plant and harvest the crop without compacting much of the loosened soil. As soon as the corn is chopped, if the soil is at proper moisture/ dryness, deep till to remove compaction between the corn row (the un-deep tilled area) and then plant a winter forage triticale crop. Those roots will stabilize the loosened soil and provide a base to harvest the same crop the next spring. Then no-till seed a legume into the triticale stubble so a second crop's deep roots can reach down and give structure to the area where the compaction was removed. It takes planning and the weather must be in your favor. A very wet fall or spring before/after corn, will mean that the deep compaction correction will

have to wait.

A variant on this is to deep till and then use a coulter manure injector to place the manure directly under where you are going to plant the corn. Cornell research found injection can meet all the fertilizer needs of the corn crop. It increases the nitrogen recovery from manure 75% by eliminating volatilization of the ammonia. One farmer (photo at right) has combined both and injects the manure directly behind the vertical subsoil leg as he removes compaction. His depth depends on the shovel test – are the lower layers dry enough to shatter. If not he brings it up and only runs 7 – 8 inches. When he runs deep the manure coats the soil clumps and keeps them from re-consolidating.



Once you break the compaction out, you need to change your tillage/planting practices. No-till with a winter forage cover has been the best in our research.

A switch that enhances that holistic change is to always kill you sod fields between the first and 15 of October (New York climate region – closer to the first further north; closer to 15 to the lower edge of Pennsylvania, and later further south). We do not suggest spraying earlier as you lose too much cover and nitrogen as the sod breaks down in the fall. This is an underutilized practice that Advanced Ag Systems found way back in 1980 when glyphosate first came out. We used a quart of glyphosate and a quart of 2,4,D. The sod died over the winter. It works well on cool season perennials. We set the whole jug on orchard grass in the spring and did not kill it, while a pint of glyphosate in the fall wiped it out. Come spring the ground is still has a thin layer of residue to protect from erosion (photo at right); is warmer than under a spring killed sod; and because the plants died over the winter, the decaying roots leave the soil mellow and loose like potting soil. It plants like a dream and yields 17% higher than a spring killed sod. Thus you are saving your beneficial deep till work from back when you removed compaction before seeding. There is no reason to till. It is also the first corn you plant in the spring.



Fall killed sod, no-till planted makes beautiful planting conditions without tillage recompacting the soil you previously loosened.

You noticed I did not list any crops to remove compaction. Based on digging in many fields, they do not. The advantage of some of the deep rooted crops such as radish and mammoth red clover is that then can be a huge benefit to stabilize the deeper soil after you break the compaction out.

Prevention is the last, but critical step in removing compaction. As I mentioned in the October newsletter, you need to change your equipment setup so no axle has more than 5 ton load. If you don't do that then the deep tillage is a waste of time. Setting the tires to have 15 psi goes a long ways to keeping the top 5 – 10 inches from being compacted.

Sincerely,

Thomas Kilcer,
Certified Crop Advisor

2150 Cherry Street
Rutledge, TN 37861

Tel: 518-421-2132

tfk1@cornell.edu

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