



ADVANCED AG SYSTEMS'S

Crop Soil News

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February 2019

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

Advanced Ag Systems
Research, Education, Consulting

Why do we manage poorly drained soils like they are well drained?

This sounds like a dumb question, but it is very ap-
propos. It happens on farms all across the northeast and
Midwest. Real farmers grow corn and alfalfa, so they do.
Multiple years of corn makes drainage worse as the soil
structure collapses and machinery compaction squeezes
out what little porosity the soil originally had. In Canada,
on silt soils, they now tile on 25 ft space as 50 ft no longer
works because of compaction and over worked soils. As I
mentioned in the November issue, 15 years of alfalfa grass
sod did not remove the yield and root limiting pan that re-
stricted roots to only 7 inches of soil. It was like a paved
road underneath. Nearly every, somewhat poorly drained
or silty/clay, field I have dug in has a yield/ root/drainage
limiting compaction when it was plowed while too wet
sometime in the past .

There are long term and short-term steps that you
can take to increase the quantity and consistency of yields
from these soils. Short term is to establish a plan to re-
move the limiting pan. Yes, I know the layer under that
may be even more poorly drained. Nearly every farmer
who wins the yield contests has carefully worked at gradu-
ally increasing the rooting depth and root mass. You are
not going to do it with a chisel, moleboard, or planting
radishes. As we discussed in the November letter, it is a comprehensive approach. When the
soil is dry, deep tillage followed by a fibrous rooted crop like winter forage or alfalfa grass
seeding will help keep the soil structure open. My ideal system
would simultaneously inject manure behind the deep zone tillage
shank to coat with organic matter the loosen soil particles of the
shattered compaction to prevent them from re-consolidating. Im-
mediately follow it by a fibrous rooted sod/winter forage crop. A
farmer I know who has been using this process, reports that his
marginal soil fields are now producing as well and consistently as
his better soil fields. He simultaneously removed the old compact-
ed layers and increased the rooting depth. After a couple of years
you will not need to work that deep as the compaction is out –
unless you harvested in the fall of 2018.

On a silty clay soil where we deep tilled, that was the only
part of the farm dry enough to work in the spring. When we dug a
hole (photo at right), at 16 inches down we had liquid water that
we could have pumped out. The surface water moved to the deeper



Silty clay with 4 inch disk pan on top of 7 inch plow pan limits yield. The picture below is the same soil next to it with one pass of a deep zone tillage. The massive roots went 17 inches deep.

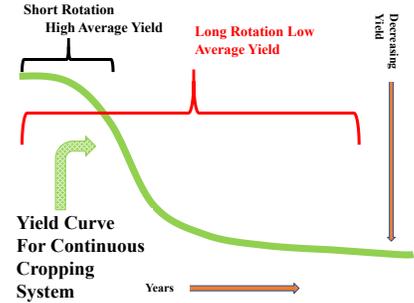


voids created, and dried the surface. We changed the internal moisture composition of the profile and significantly increased the opportunity to get on the ground for no-till or harvesting with properly deflated low compaction tires.

All this is a complete waste of time and money if you continue recreational tillage and long row-crop rotations suited for better drained soils. Short season rotation optimizes no till planting. No till saves time, soil, and keeps the compacting tillage equipment out of the deeper portion of these fragile soils. Short season puts you higher on the yield curve so average yield over the life of the rotation is significantly higher (graphic at right).

A 3 corn and 6 alfalfa over the 9 year life of the rotation on good soils will produce an average of 4.6 tons of dry matter/year. For less well drained soils, two years of corn followed each year with winter forage, and then short three year alfalfa or clover rotation will both improve the soil and the economic return. The system involves fall killing a sod, no-till planting corn when the soil is dry the next spring, harvesting the slightly shorter season corn and no-till planting winter triticale on time (2 weeks before wheat grain), harvesting the winter forage and no-tilling corn (use a clearing coulters to remove allopathy); followed by no till winter triticale followed by no till red clover into the harvested triticale stubble, and two more years of red clover (see [November 2013 Red Clover Harvest Letter](#) for making haylage in a day). At the end of the third year of clover or alfalfa, the sod is killed late fall for next spring's no-till corn. This is a simple system that works. This rotation can produce an average of 5.99 tons of dry matter/year or a 30% yield increase. The higher yield occurs because you are capturing the yield of just the peak years. First year corn is 15 – 20% higher yielding than corn following corn. This reduces the cost of putting a ton of silage in front of your cows. As the number of years of repeated corn occur, soil structure rapidly deteriorates and yields fluctuate greatly with the fault blamed on the weather. Short rotations minimize this impact. By the third year, rootworms have moved in and need to be controlled which means more cost for that same ton of silage. The corn you grow in short rotation does not have to be the expensive stacked genetics as it will not have any root worm issues. In long rotations, more nitrogen is needed either as fertilizer or expensive manure hauling. With short rotations the first-year corn, 50% of corn acres in this rotation, will not need any additional nitrogen beyond starter. As seedlings get stretched out, especially on somewhat poorly drained soils, yields are often lower than seeding year and are composed more of less nutritious weeds. Seeding year in this short rotation is planted into a harvested triticale crop. You have harvested 2.5 to 4.5 tons of dry matter (winter forage) seeding year before you took the first cutting of legume—so no yield drop seeding year. The same yield benefit happens with the corn followed by winter forage.

The key points are to remove prior damage and then use no-till to minimize ongoing damage to the soil. Do NOT leave these sensitive soils bare. Always have something growing on it over the winter. The only exception might be the sod killed (Albany, NY area) the first half of October for early no-till the next spring. The other winter forage benefit is that research has found a seven-fold increase in air and water movement in and out of a clay soil after a winter grain. As you can see in the picture at the right, the stubble stops erosion, and each stem has roots that as they die, leave an organic matter coated hole into the ground for air/water exchange on soils that normally seal over with the first rain.



Winter forage is critical for heavy, somewhat poorly drained soils. There is 60% less available water under the crop in the spring which allows you to get on without compaction earlier. Clearing coulters and no till allows the corn to be planted, leaving the stubble. Research has found the stubble increases air/water exchange 7 fold compared to tilled silty clay ground.

Sincerely,

Thomas Kilcer,
Certified Crop Advisor

172 Sunnyside Rd
Kinderhook, NY
12106

Tel: 518-421-2132

tfk1@cornell.edu

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Hand
to Better
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