

A REGENERATIVE FARMER'S STORY ON HOW WE FIX THIS ?

Our farm is located in SE Minnesota 20 miles
due North of the down town Rochester.

I've made my living from farming for 50 years.
My Grandfather bought the original 200 acres
of land we farm in 1892.

Farmed since by the Sommerfield family.

Our son Rick is now the principal farm
operator and manager

Rod Sommerfield

**Everybody Talks About the
Weather, But Nobody Does
Anything About It.**

Charles Dudley Warner

Editorial in the Hartford Courant of Connecticut
dated August 27, 1897

Quote often attributed to Mark Twain, what I found was
Samuel Clemens and Mr. Warner were friends,
And for a time lived close on the same street.

I don't know if man has the ability to change the climate back to what people would like it to be ?

What I do know is that by working with Nature through Regenerative Management the catastrophic effects weather has been having in our country can be reduced significantly, and better managed!

How is Regenerative Management different than what we commonly hear about Conservation ?

<h2>Conservation</h2>	<h2>Regeneration</h2>
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Man based

- Mitigation effort by it's definition, you're trying to preserve what you still have and prevent more loss. Best used as a type of triage to stabilize mismanaged resources. This is **Not** a cure for the problem. It doesn't have the ability to return the resource to what it once was, before there was a problem.

Nature based

- **Your looking to emulate how Nature created the resource in the first place. With the goal of restoring it to it's original state if not better. This is intended to be a CURE for the problem. The resource and everything related to the resource are now managed to be the BEST they can be!**

For several decades our farm has used Regenerative Management to Partner with Nature, Growing our soils deeper and more productive!

- It began for us back in the 1980s. We were looking for a way to better manage livestock waste. Winter pack from beef cows, over full manure pits under barns.
- We tried doing composting, and when we did it right, it was wonderful stuff!
- We'd put it on fields with amazing results!

Then in the 1990s the price we were getting for hogs collapsed! I think we got bids as low as \$6 cwt

We couldn't afford anything. No more help, so the livestock had to go , and my wife had to go back to work at Mayo just to have insurance and buy groceries.

Without livestock we at first believed we couldn't compost to get humus anymore, but we studied what others were doing and started what we call composting between the row. Keeping the crop residue aerobic so it could complete the decomposition cycle.

Forming HUMUS!

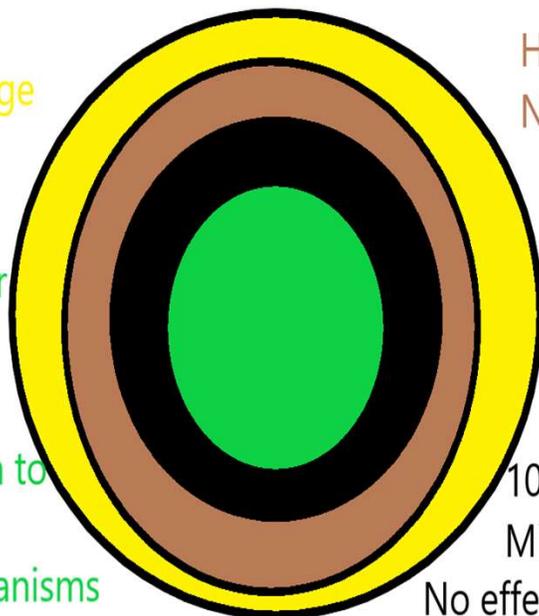
HUMUS & MICROAGGREGATES

The building blocks of Natural Tilth

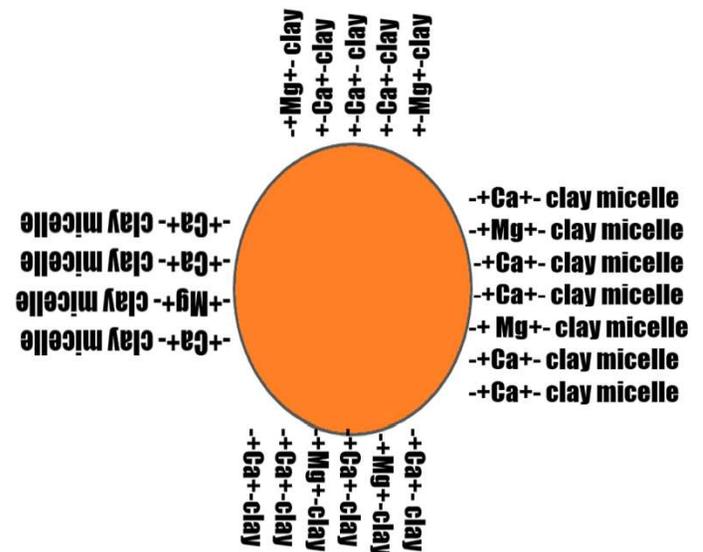
A HUMUS particle is like a Super Anion, with strong Negative charges coming out everywhere this gives it the ability to attract Covalent Cat ions like Ca^{++} and Mg^{++} helping cover the surface of the HUMUS particle.

The other + charge finds a – from small clay micelles and attaches to them. The HUMUS particle is now protected from outside microbes mineralization These are the bricks needed to build soil structure a vibrant community for all life in the soil!

Flulvic Acid
Negative charge
Mineralize in
5 to 10 years
Organic matter
that has not
completed
decomposition to
Humus.
live Microorganisms



Humic Acid
Negative charge
100 to 200 year
Mineralization
Humin
Positive charge
1000 to 2000 year
Mineralization.
No effect soil structure



Macroaggregates: we have the bricks to build. we just need to stick them together to create structure to have Micro & Macropores to hold Oxygen & water.

Glues & Mortar

- **Polysaccharides:** derived from plants decayed material or secretions
- **Glomalin:** Fungal hyphae coating, helps soil fungus mine nutrients bound in soil to be traded to plants for food.
- **Earthworm slime:** Lube secreted by worms to help them go through soil. Worm tunnels have been found to last for 25 years or more.

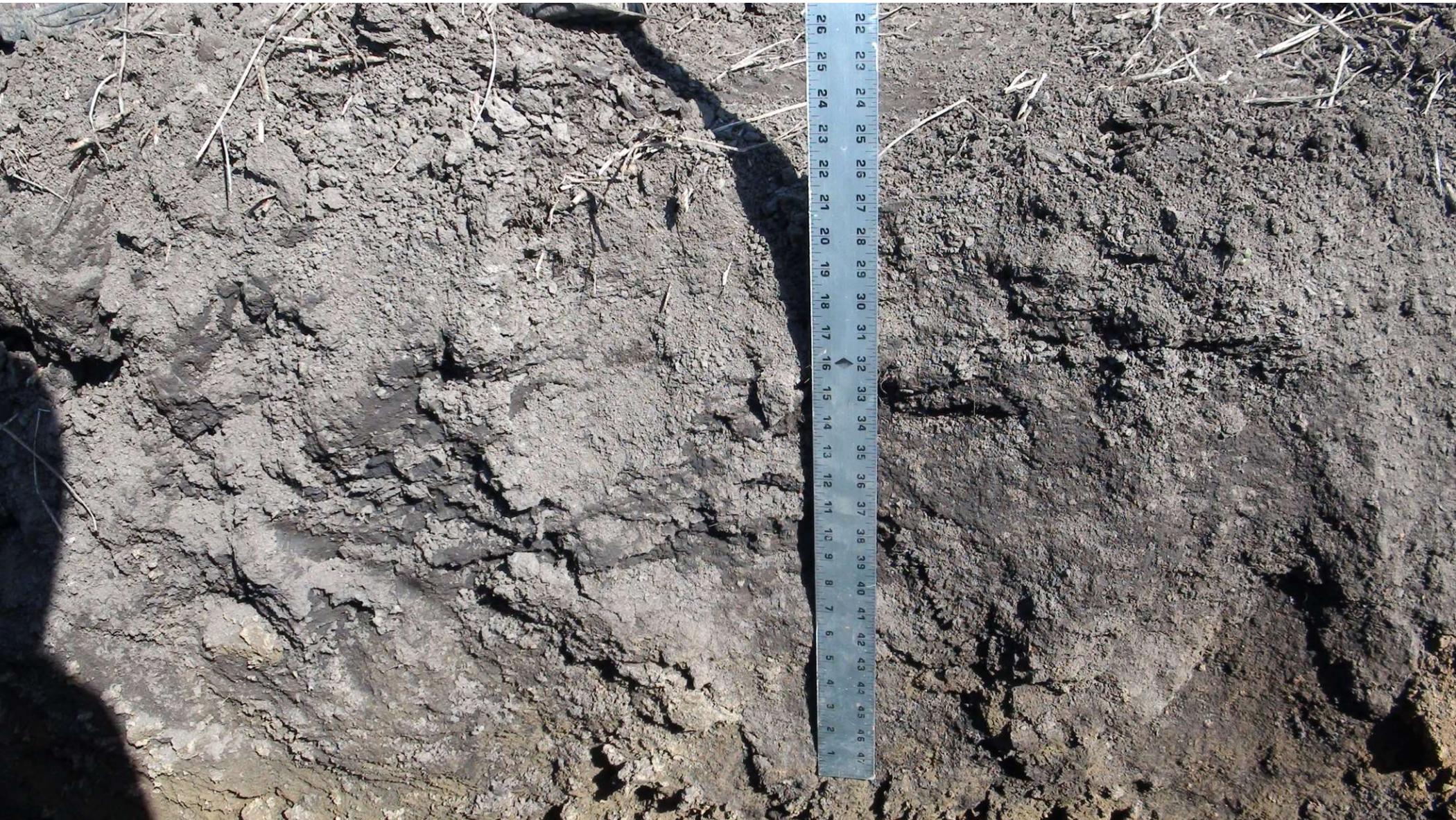
Lattice work & Rebar

- **Plant roots:** Cargo net like wrapping of smaller aggregates together into bigger aggregates
- **Fungal hyphea:** same principal except hyphea are much finer than roots or root hairs. Neither needs to be living both easily destroyed by tillage.
- **For VIBRANT life in the soil Microbes require 3 things. Oxygen, Water and Food.**

This picture is from never farmed soil in the grove behind our house. This is likely what our soils formed from hardwood forests looked like 200 years ago, before settlement. The land cleared and plowed, farmed traditionally. The original A Horizon soils usually are around a foot deep, and test 5.5 to 6% soil organic matter.



Regenerative practices have significantly improved our soils. The A Horizon “Primary Root Zone” of this soil is now around 24 inches deep. The aggregate structure is much improved over the never farmed soil. 100 plus years of traditional tillage had caused the Natural tilth to degrade losing structure and function. Most A Horizon’s have lost a third to half their depth do to erosion. We now tell people if the ground isn’t frozen, water seldom leaves our land.



This is a large aggregate that rolled off the pile when digging the last picture. The whitish smaller clumps covering the surface [blue arrow] are worm castings that often cover our soils in the spring. The top two inches of our soils are the O Horizon very high in SOM. We try hard not to blend it out. Earthworms create bio-channels deep into our soils. This is a soil's respiratory system allowing spent gases out, and Oxygen in.



Most of our fields have areas where the soils look like this . Many of these areas have slopes steep enough that if you put your feet together you will fall over. Regenerative Management has grown these soils above the Karsts rock C Horizons into highly productive soil, with great structure. These soils seldom erode!



Sustainable Economics of Regenerative Management

- The main everyday economic advantage of partnering with Nature is that Nature's bio-diversity can significantly reduce or eliminate much of a farmer's non-land costs of production.
- Our fertilizer purchases have been reduced by half to two-thirds
- Energy use is usually half or less of Industrial Ag Systems
- Expensive traited seeds are usually not needed
- The only Inicides we generally use are herbicides and then less
- Equipment and time in the field is often significantly reduced
- Regenerated soils increase rain infiltration six fold storing water
- When runoff does leave the field it often looks like spring water
- Evidence of erosion is hard to find
- Specialty crops often have a higher nutrient density

Phosphorus from Mycorrhizal Fungi

- Researchers used soil with no tested Phosphorus to accurately measure the difference in fertilizer Phosphorus needed. Dividing the soil in to two trials, one corn trial they made sure there was no Arbuscular Mycorrhizal Fungi living in this soil. The other trial a healthy population of fungi was propagated. They applied Phosphorus to achieve the same growth and yield from both trials. The trial with the Mycorrhizal Fungi needed $1/5$ as much phosphorus applied as the trial with NO FUNGI for the same yield.**

This is the field sign from one of the cover crop studies we helped with about a decade ago. We also gave data to Iowa State for a Practical Farmers of Iowa study, and did a Nitrogen from cover crop trial for the MDA



Flood of 2010



This picture was the Post Office in Zumbro Falls the first town down river from the dam. The flood water got high enough that only the top of the pole and the flag weren't under water. Flood waters flowed through the second story of the businesses on Main street. After FEMA paid to repaired the damage, the town was told they would get no more Federal help if flooded again.



We had a Conservation dam built in the 1980s that takes in runoff from 129 acres, it holds 5 acre feet of water to the spillway. There were 3 rains of 6 -7 inches before our soils transitioned to Natural tilth where runoff went over the spillway about a foot deep 20 feet wide for half a day. Now we got twice that over 30 hours of heavy rain. Yet when I went out to see if the dam had damage the runoff was not over the spillway

Conservation Service

Mar 12, 2013



Math for the 2010 flood event

Research shows a Healthy soil will infiltrate 85% of the rainfall ,with 15% runoff.

While a unhealthy soil will infiltrate only 15% of the rainfall, with 85% runoff!

1 inch of rain on a acre = 27,154 gallons of water

13 in rainfall per/ acre = 353,002 gallons of water/acre

129 acres times 353002 =45,537,258 gal. of water/ total area

Healthy 15% runoff rate times 45,537,258= 6,830,589 gallons runoff/ from area

Unhealthy 85% runoff rate times 45,537,258 = 38,706,669 gallons runoff/ from area

5 acre feet capacity of retention dam = 1,629,240 gallons held back by structure.

capacity of 100 ft. 15" culvert 7,331,580 gal. per day

The difference 85% runoff (38,706,669) gallons

subtract 15% runoff (6,830,589) gallons

31,876,080 GALLONS LESS RUNOFF !

In March of 2014 the man in the center of the picture came to us to ask if we would host the Mc Knight Foundation board and show them solutions to the Mississippi filling with sediment. Here I'm demonstrating a terrarium we made. It has 200 lbs. of soil profile 14 inches deep from one of our fields. When doing demonstrations outside we'd bring this and pour 4 inches of water in the top. The water would infiltrate through the soil and out the bottom clear as drinking water. Then ask people to reach in and see if the soil was muddy. It Never was!



Here our son Rick is standing by our tile plow, telling the same group who came on August 14th 2014 about the importance of proper soil drainage. Many non-farm people have a lot of misconceptions about tile drainage believing it actually causes more flooding. In truth like a glass already full will hold no more water. Soil saturated beyond field capacity has little ability to infiltrate, or hold water. It can only runoff over the surface causing more erosion and flooding.



Mark Muller the gentlemen who had asked us to host the Mc Knight group came back a couple weeks before the event to see if we were ready. He also said they would be bring along some friends the Walton's. It took me a bit before realizing he was talking about several generations of the Sam Walton family. In the slide that's me down in the soil pit, The soil looked much like the profile of in the earlier slide. After thinking about having to tell my wife that one of the richest families in America were coming in a couple weeks and would likely want to use her 1968 last remodeled bathroom. I wondered if I might be better off digging a hole like this and pulling the dirt in after me?



The man next to me in the blue shirt and pants is Mr. Wang the manager of a 80,000 acre communal farm in China. He came to the States to learn about Sustainable farming practices here. The man in the striped shirt and tan pants is Charles Wang a Chinese importer / exporter from Des Moines Iowa who setup his trip and the interpreter.



In March of 2019 we answered an ad looking for land to lease with south slopes and XCEL 3 phase power lines for a community solar garden. They came the next day and said it was just what they were looking for. We agreed on a design and they agreed to maintain the site in pollinator plantings. We signed the lease that August thinking it would be built as soon as frost out in 2020. Then the pandemic hit and it kept being delayed. Finally getting built this winter in 2022.



.The garden has the capacity of 1.44 megawatts to supply clean energy for 240 average use homes. After signing the lease we began thinking about this project with a Holistic vision. What else could we do here to not only benefit the local human community, but the Natural one also? The first idea was the fence in this picture and the ground cover developing here should provide the perfect habitat not only for pollinator insects, but any ground nesting bird specie also. Their nests and young protected from predators. There would still be around 4 acres of the original six acre unfarmed wildlife area left, which could be improved. The vision we call “Sunnyfield Farms Bird, Bee and Butterfly Sanctuary”



This is the about 4 acre wildlife area in the Southwest corner. The dam was built in the 60s mostly to water sheep as my Dad had 15 acres of sheep pasture here. The vision is to construct walking paths from here across the dam, up the knoll, around and back over to this area. The idea is to have signs all along the pathway teaching about things like alternative energy, pollinators, people returning to a Interdependent relationship with Nature and Regenerative management. We're planning for weather proof signs with QR codes to a website. Hopefully the local school districts will use this as a teaching site for Elementary students.



**EVERYBODY TALKS ABOUT
THE WEATHER.
IT TAKES A LOT MORE
MANAGEMENT TO DO
SOMETHING ABOUT IT.**

THANK YOU!

Rod Sommerfield