

Economics of Soil Health

The very beginning

Starting with Students

and

Next Steps



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Soil Health

From Wikipedia



Soil health is an assessment of ability of a soil to meet its range of ecosystem functions as appropriate to its environment.

•Aspects

The term soil health is used to assess the ability of a soil to:

- Sustain plant and animal productivity and diversity;
- Maintain or enhance water and air quality;
- Support human health and habitation



The underlying principle in the use of the term “soil health” is that soil is not just a growing medium, rather it is a living, dynamic and ever-so-subtly changing environment. We can use the human health analogy and categorize a healthy soil as one:

Soil Health – Student Definition

- Proper nutrients, right amount of moisture and organic matter
- Darker soil that has more organic matter and can help plants grow at their maximum potential
- A biologically active soil. “Living soil” is a healthy soil.
- Healthy, nutrient packed
- Soil health is when the nutrients and organisms are at the right level and has structure
- The amount of nutrition or nutrients in the soil
- The nutrient and pH levels in the soil and the moisture
- The condition of the soils and organic matter, pH levels, and parent material

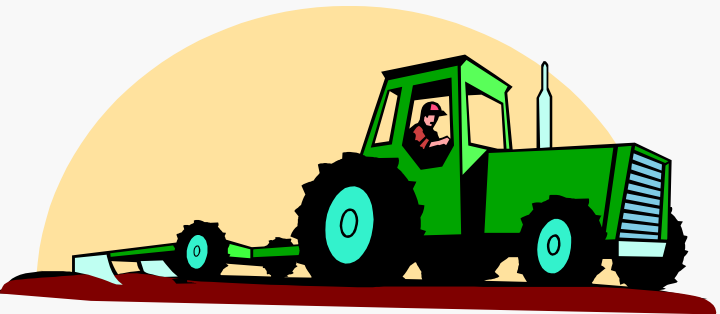


Intensive Tillage Systems

From Wikipedia



Intensive tillage systems leave less than 15% crop residue cover or less than 500 pounds per acre (560 kg/ha) of small grain residue. These types of tillage systems are often referred to as **conventional tillage systems** but as reduced and conservation tillage systems have been more widely adopted, it is often not appropriate to refer to this type of system as conventional. These systems involve often multiple operations with implements such as a mold board, disk, and/or chisel plow.



Conventional Till - Student Definition

- Bringing nutrients up to the surface to restore to top surface
- You till it all up after every crop
- Plowing the dirt so there is a clean soil bed to plant
- The tilling of the land by disc, plow or tiller to till under the organic matter
- Planting crops after plowing fields to break up the top soil
- Working the soil to make a better seed bed



Tillage Systems

From Wikipedia

Conservation tillage systems

are methods of soil tillage which leave a minimum of 30% of crop residue on the soil surface or at least 1,000 lb/ac (1,100 kg/ha) of small grain residue on the surface during the critical soil erosion period. This slows water movement, which reduces the amount of soil erosion. Conservation tillage systems also benefit farmers by reducing fuel consumption and soil compaction. By reducing the number of times the farmer travels over the field, farmers realize significant savings in fuel and labor.



No Till – Student Definition



- Nothing is done to the land, it is left as is
- Not disturbing the soil by turning over the soil
- No-till is not working the soil and possibly use a cover crop
- Where farmers do not till the soil. Less erosion. Soil is less clumpy and more moisture.
- No till is more compact. It is not broken up and it is harder for water to reach the seed
- Not disturbing the soil, so as to let mother nature take care of the soil health naturally
- No till leaves the soil with nutrients and organic matter and less run off

First Flush of Students



No-Till Soils

- Not healthy
- Wetter soils
- Lower yields
- Have to wait
- More chemicals
- Weed problems
- Compaction

Conventional Till Soils

- Better Seed Bed
- Healthier Soils
- Look better
- Higher yields
- Dries up quicker
- Kills weeds

Conventional

No-Till



Blind Soil Test



A students words



Blind folded Students said:



No Till Soil feels:	Conventional Soil feels:
Finer soil	More Compacted
More clay, finer	More grit, dryer
More broke up	Thinks it's no till
A lot wetter, more stuff	Clumped up
More ground up	Clumpy, thinks it's no till
Has more clay	Has more clay, thinks no till
Less compacted	
More fine	Chunks
More compacted	Dryer
Wetter, easier to break up	Like rocks
No differences	Thought it was no till b/c more clumps
Smaller particles	Clay
Better soil, no till	Rocks, dry
Better soil, no till	Mulch, rocks, dry



Blind Soil Test Results



35 students were polled to see which tillage type was the healthiest?

Before:

25 students voted for No-Till
10 students voted for Conventional

After:

34 students voted for No-Till
1 student voted for Conventional

Students words after “Seeing the Light”:

- The no-till soil looked healthier but in order to go completely no-till, I would like to see more data yields on our soil type. I would consider trying it on a few soils.
- It has made me see some more positives of no-till.
- Today, proved my point that no-till works. It's pretty sad when conventional tillers agree, but don't change their mind set.
- I learned the difference between no-till and conventional. I would have thought no-till soil would be more compacted and dry.
- No-till seemed to have a darker tint to it because it has more of the organic matter. No till helps save on fuel costs.
- I've never had a preference but today showed me the major organic difference in no-till vs. conventional till.



Students economic thoughts after seeing the light:

- Less trips – More money.
- More moisture for dry years – better yields
- Less erosion – More nutrients in soil – less needed
- Less soil in water – better water quality
- Less compaction – better root system
- More organic matter – better tilt of soil
- “Don’t Fool with Mother Nature”
- More money for other “expenditures”

Now to put \$ to these figures -- students to find.



Costs using WinMax

Max Program - Machine Cost differences



More money in the pocket

	No Till		Conventional Till
Planting	\$ 14.39		\$ 14.69
Cultivate			\$ 10.03
Chisel			\$ 13.21
Spray	\$ 5.63		\$ 5.63
Spread Fertilizer	\$ 5.55		\$ 5.55
Harvest	\$ 24.21		\$ 24.21
Total	\$ 49.78		\$ 73.32

Machine Cost Difference = \$23.24/ acre

WinMax Program



WinMax is a computer program developed at Purdue University to calculate and compare economic returns on crop production. From 1991-1998, WinMax and its earlier DOS version were used to manage data for the national Farming for Maximum Efficiency program (The MAX[®]) sponsored by the Conservation Technology Information Center and *Successful Farming* magazine.

WinMax manages crop input data, calculates crop fertilizer recommendations, generates production cost and nutrient management worksheets, and allows sets of custom input costs to be created and used in all calculations.

Various management options, such as tillage, pest control and fertilizer strategies, can be compared to help assess which practices are both economically efficient and environmentally sound.

WinMax Website: <http://www.purdue.edu/agsoftware/winmax/>

Soil Health Consulting



Students helping local resident with soil types, soil testing, and nutrient recommendations under the guidance of a local fertilizer dealership.

Both students and resident were learning about the process and making recommendations

Next Steps:



Students will be conducting farmer interviews next semester. We will be working with our local Soil and Water Conservation District and NRCS to find individuals to interview about Dollars and Sense.

Next Steps:



Questions or Comments?

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