

ProfitPro[®]AG Farm Report

October 2020

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More from Every Acre, Every Animal
& Every Gallon of Manure

Crop Management News

by Dr. Jim Ladlie, ProfitProAG President

Carbon: The Limiting Nutrient

Crop production is all about energy

This may surprise you that I would suggest that carbon (CO₂) is the limiting nutrient in crop production. But the fact is, carbon makes up 45% of the plant mass above and below ground.

Mineral Percent of Dry Weight Plant Matter

MACRO NUTRIENTS

Structural Components

	Symbol	Atomic Weight	Plant Dry Weight %
Hydrogen	H	1	6
Carbon	C	12	45
Nitrogen	N	14	1.5
Oxygen	O	16	45
Magnesium	Mg	24	0.2
Potassium	K	39	1
Calcium	Ca	40	0.5
Phosphorous	P	31	0.2
Sulfur	S	32	0.1
Total			99.50%

2021 Early Order Product Cash Discount Program

- All products on conventional and organic price sheets (except for products listed below).
- The Early Order Product Cash Discount Program (E.O.P.C.D.P.) is for 2021 crop year inputs.

Deadline Discount Dates	2021 Retail Early Order Product Cash Discount ^{1,2}
October 1 – 15, 2020	10%
October 16 – 31, 2020	9%
November 1 – 15, 2020	8%
November 16 – 30, 2020	7%
December 1 – 15, 2020	6%
December 16 – 31, 2020	5%
January 1 – 15, 2021	4%
January 16 – 31, 2021	3%
February 1 – 29, 2021	2%

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or call ProfitProAG at
1-888-875-2425

¹Cash or check ²Products NOT included in the 2021 Early Order Product Cash Discount Program:

- Commercial fertilizers
- Manure pit treatment products
- Services
- Equipment
- Human products
- Fall Crop Residue Program is already discounted

FREE Teleconference Calls

Agronomic/Livestock

3rd Thursday of the Month

October 15, 2020

Time

8 to 9 pm Central Time

Visit www.profitproag.com

To join the Webinar,
click on the link provided in
"Monthly News Webinar"

For More Information
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Call **1-888-875-2425**

Ask about the **ProfitMaster™**
Full-Circle System and the
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"The Manure Treatment Experts"

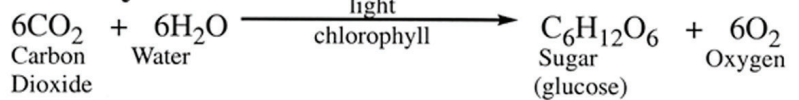
Any required material which is in short supply or an improper condition that prevents a metabolic process from occurring as rapidly as it could is called a *limiting factor*. In the case of photosynthesis, inadequate light in the morning or evening or on a cloudy day would be a limiting factor, as would cold temperatures and lack of sufficient carbon dioxide (CO₂). The air only contains an average of 0.03% CO₂.

Under high light intensities during the summer, this low level of CO₂ in the air [0.03%] probably is the main limiting factor in the photosynthesis.

The production of an acre of a 200 bushel corn crop requires about 8 tons of CO₂. On a still summer day, the CO₂ level in the air of a cornfield drops very low. The corn under full sunlight could use 20 times the normal level of CO₂. There is evidence that the CO₂ produced by the respiration of micro-organisms in the soil is an important factor in the supply of the gas to photosynthesizing plants: A well-fertilized soil rich in decomposing organic matter provides a much higher level of CO₂ in the air just above the soil than does a barren, infertile soil – proof that plant root exudates, crop residue sequestration and soil management can affect photosynthesis and thus, energy production by the plant.

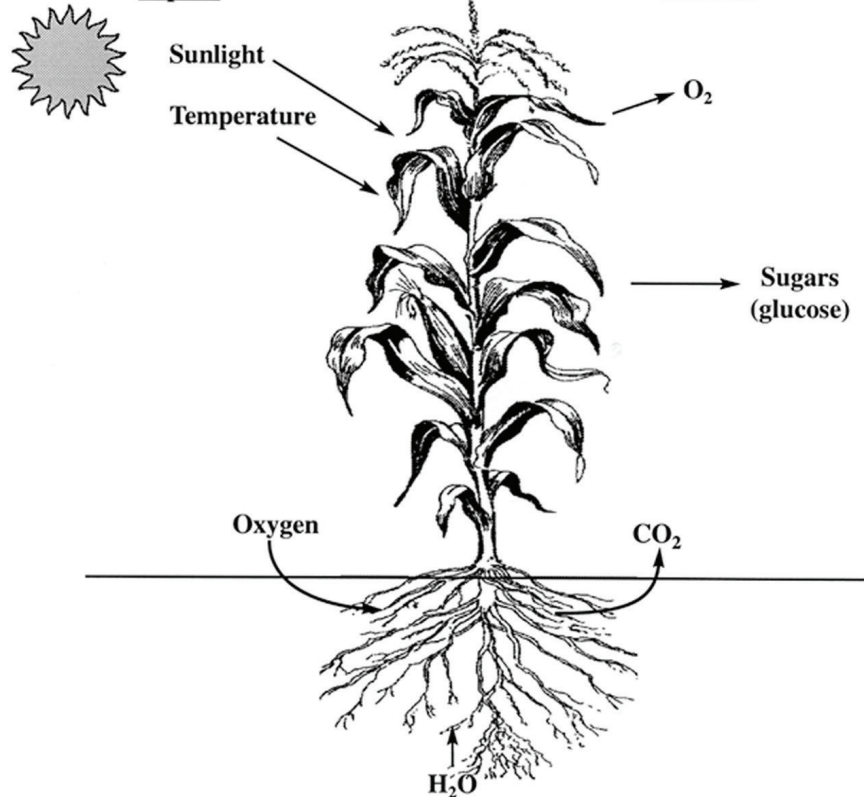
The Plant Energy Factory

Photosynthesis:



Inputs

Results



The ability of a plant to produce food (energy) begins with the process of photosynthesis, a complex process of combining the energy of the sun with carbon dioxide and water into a simple sugar (glucose) leaving oxygen as the byproduct.

Benefits of sequestering carbon into the soil



Carbon is needed to enhance soil structure and water holding capacity. As liquid carbon streams into the aggregates via the roots or fungal linkages, it enables the production of glues and gums that hold soil particles together.

Establishing a good soil structure enables nitrogen-fixing bacteria to function. You will rarely see a nitrogen deficient plant in a healthy natural ecosystem. Ammonia that is fixed from the air is rapidly converted into an amino acid or incorporated into a humic polymer. These organic forms of nitrogen cannot be leached or volatilized.

With rapid carbon sequestering, the growth rate of plants can quickly increase. That is the power of properly functioning soil.

The graphs below show the CO₂ and glucose requirements to build a bushel of corn or soybeans and high yields. It takes 1,300 semi loads of air to build one bushel of corn and 4,000 loads to build one bushel of soybeans. Through photosynthesis this CO₂ carbon is converted to glucose. The amount of glucose required for a bushel of corn is 100 lbs and a bushel of soybeans is 300 lbs. The higher the crop yield, the higher the energy required.



Ingredients & Components Necessary to

ACHIEVE HIGHER YIELD

Components of Corn Yield

The components that make bushels of corn are:

- Ears per acre
- Rows per ear
- Kernels per row
- Size of kernels produced

Approximately 38,840,000 kernels must be produced per acre to achieve 400 bu/A corn.



Ingredients & Components Necessary to

ACHIEVE HIGHER YIELD

Components of Soybean Yield

The components that make bushels of soybeans are:

- Number of:
- Plants per acre
 - Nodes per plant
 - Pods per node
 - Seeds per pod

Size of seed produced

At 2,500 seeds per pound about 15 million seeds must be produced per acre to achieve 100 bu/A soybeans.

INGREDIENTS OF CORN YIELD

Ingredient	Amount (Seed and Stover)
CO ₂	390,000 semi-trailer loads of air (1,300 loads/bu)
Glucose	30,000 lbs (100 lbs/bu)
Water	1,500,000 gal (5,000 gal/bu)
Nutrients in Seed and Stover	<ul style="list-style-type: none"> • 450 lbs (1.5 lbs/bu) Nitrogen (33% left in stover) • 180 lbs (0.6 lb/bu) Phosphorus (42% left in stover) • 390 lbs (1.3 lbs/bu) Potassium (80% left in stover) • 63 lbs (0.21 lb/bu) Calcium (90% left in stover) • 48 lbs (0.16 lb/bu) Sulfur (56% left in stover)
	1,131 Total Pounds

Source ProfitPro, LLC. 2003

INGREDIENTS OF SOYBEAN YIELD

Ingredient	Amount (Seed and Stover)
CO ₂	400,000 semi-trailer loads of air (4,000 loads/bu)
Glucose	301,080 lbs (301 lbs/bu)
Water	1,350,000 gal (13,500 gal/bu)
Nutrients in Seed and Stover	<ul style="list-style-type: none"> • 550 lbs (5.5 lbs/bu) Nitrogen (24% left in stover) • 120 lbs (1.2 lbs/bu) Phosphorus (29% left in stover) • 240 lbs (2.4 lbs/bu) Potassium (41% left in stover) • 170 lbs (1.7 lbs/bu) Calcium (88% left in stover) • 45 lbs (0.45 lb/bu) Sulfur (56% left in stover)
	1,125 Total Pounds

Source ProfitPro, LLC. 2003

Why is so much corn prematurely dying?

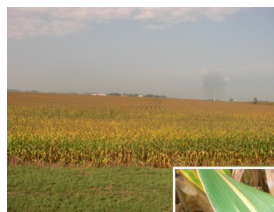
Stalk rots trigger almost all premature death in corn—and they're probably lurking in your field.

When a crop runs short of energy to fully complete its life cycle, it prematurely dies. This reduces yield and quality. Growing to full maturity requires high-yielding crops to “stay green” and die from a killing frost or the combine.

Healthy “Stay Green” Corn with a Mature and Dry Ear at Harvest



Premature Death of Corn



Stalk rots cause damage and yield loss in many corn fields across North America each year. Depending on location, stalk rot organisms may include Anthracnose, Gibberella, Diplodia or Fusarium, all of which survive in corn residue and are spread to the next crop by wind and/or rain. Stalk rots can reduce corn yield by killing the plant before physiological maturity. They can also cause plant lodging, increasing harvest losses and impeding harvest progress. When plants become infected with a stalk rot they are more susceptible to ear rot which can lead to grain quality issues and mycotoxins.



The lead cause of stalk rots getting established in corn is due to lack of proper nutrient and energy. In nature, plant diseases and insects are present to take out crops that are not worthy of reproducing or eating. They are nature's garbage collectors.

ENERGY

- Energy is the *amount of ordering* which exists at any given point in time and/or space.
- This definition fits agriculture very well, for crop health correlates *to order*, whereas weeds, diseases and insect pests correlate to soil/plant *disorder*.

What's Causing Premature Death of Crops?

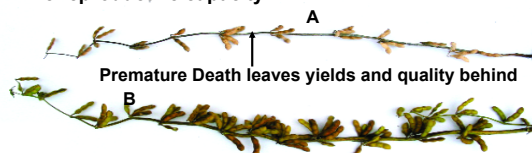
- The Question is . . .

Are your crops suffering from premature death?



What is Premature Death of a Crop?

- Premature death of a crop is the shortening of the time necessary to reach its full genetic yields and quality potential. This is caused by a lack of plant health. It is an indication of the lack of sufficient energy to maintain health allowing the plant to maximize reproductive capacity.



- These two plants were in neighboring fields. The soybean plant on the bottom (B) is showing high yield potential and the stem is green at harvest. The soybean plant on the top (A) is showing premature death, poor root system and podding.

Measuring BRIX is one of the simplest ways to evaluate crop health and productivity.

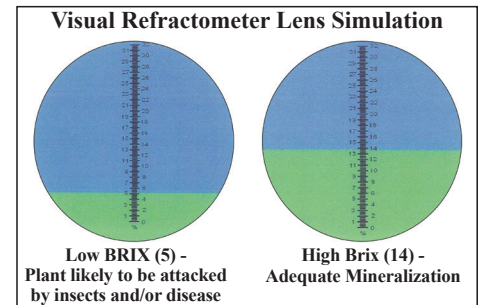
Brix is measured with a refractometer that measures (scale 0 to 32) total dissolved solids in plant sap (Brix) and provides information about photosynthesis, proteins and sugars. Low Brix levels (<12) can indicate a lack of balanced nutrients within the plant and/or the effect of environmental stress factors due to poor growing conditions (wet soils, cloudy weather, etc.) or low fertility. Low BRIX (<12) plants are more likely to be attacked by insects and/or disease. Brix readings of >12 indicate good plant health.



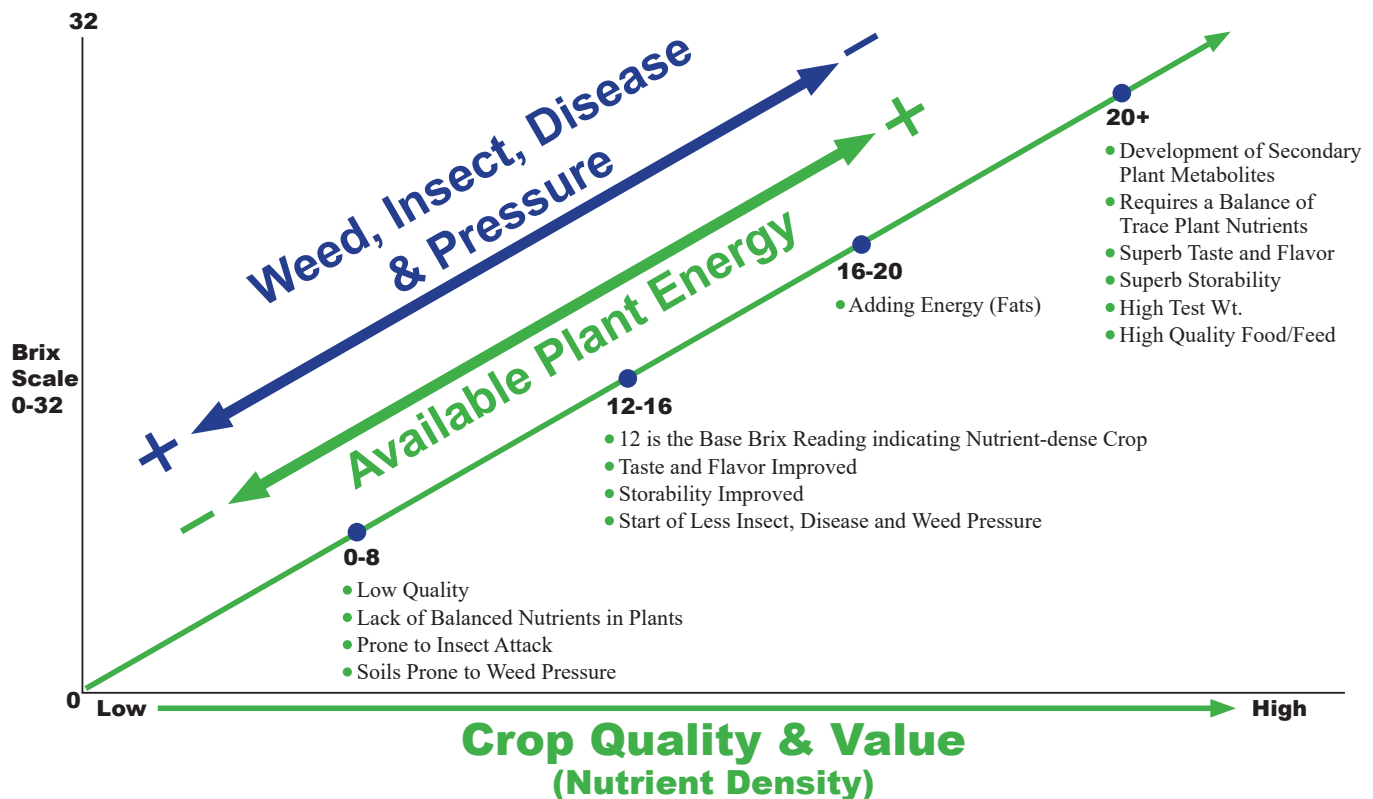
Visual Refractometer

Refractometer Readings

Within a given species of plant, the crop with the higher refractive index will have higher sugar, mineral and protein content, as well as a greater specific gravity or density. This adds up to a sweeter tasting, more minerally nutritious food with a lower nitrate and water content and better storage characteristics. It produces more alcohol from fermented sugars, is more resistant to insects and results in a decreased insecticide usage. Crops with high sugar content have a lower freezing point and, therefore, are less prone to frost damage. Soil fertility needs may also be ascertained from this reading.



Growing High Brix, Nutrient-dense Crops is Dependent on Soil Health



Sequestering soil carbon and building energy reserves for “stay green” crop production

Soil carbon loss in the Midwest corn belt has shown a steady decline since the onset of agriculture. The decline is related to carbon export, intensive tillage, changing from perennial to annual species, and increased mineralization of soil organic matter (SOM) due to nitrogen fertilization and tile drainage.

The best and fastest way to build bioactive carbon and energy reserves are as follows:

- 1. Healthy “stay green” crop produces lots of glucose, through extended photosynthesis, of which 30% to 40% exudes into the soil.**
- 2. Manage an effective crop residue digestion program. We refer to it as the “second harvest.”**

Residue management, by the numbers:

- 4 tons of residue per acre are left behind on a 180-bushel corn crop.
- 2.1 tons of corn roots are in each acre too.
- 80-30-190 (the N-P-K contained in those 4 tons of corn residue).
- 16 pounds of sulfur, 35 pounds of calcium and 25 pounds of magnesium are in those 4 tons, too.

This program will set the stage for:

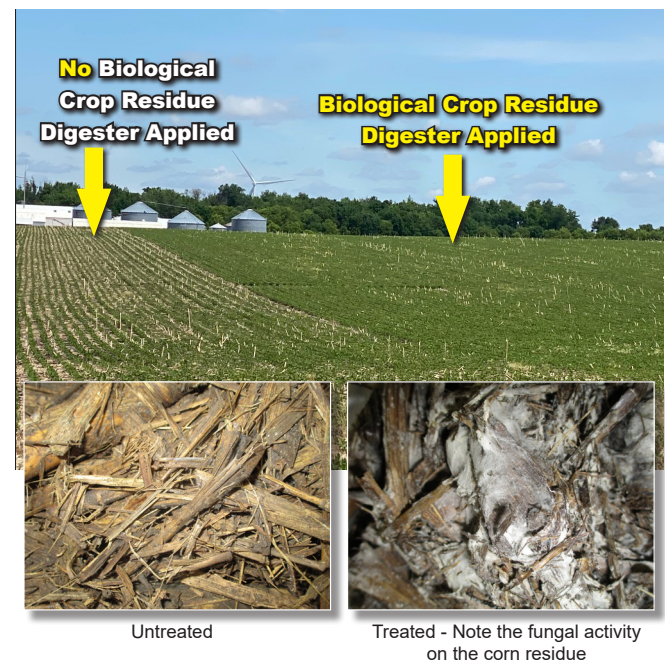
- Crop residue digestion, trapping the carbon (energy), nutrients and secondary microbial metabolites in the soil.
- Dramatic improvements in soil health and the soil food web, including improved soil structure over time, that allows for better drainage, aeration and nitrogen fixation.
- Reduced or eliminated mycotoxins, root and foliar diseases, insect and weed pressure. Remember, pathogens and insects are nature’s garbage collectors. They are there to take out the crops that are not worthy of reproducing. By eliminating toxins and building the bioactive carbon, biodiversity, nutrient balance and nutrient availability, you’ll reduce your cost of production over time. Yield, grain quality and profitability per acre will increase.
- Improved soil-to-seed contact, along with uniformity of seedling emergence and crop stand.
- Reduced tillage (strip-till) or no-till, due to residue digestion and improved soil structure. Tillage can be reduced (strip-till) or eliminated (no-till).
- The opportunity to receive carbon sequestration credits.

The benefits of building biologically active Soil Organic Matter (SOM):

Building SOM 1%

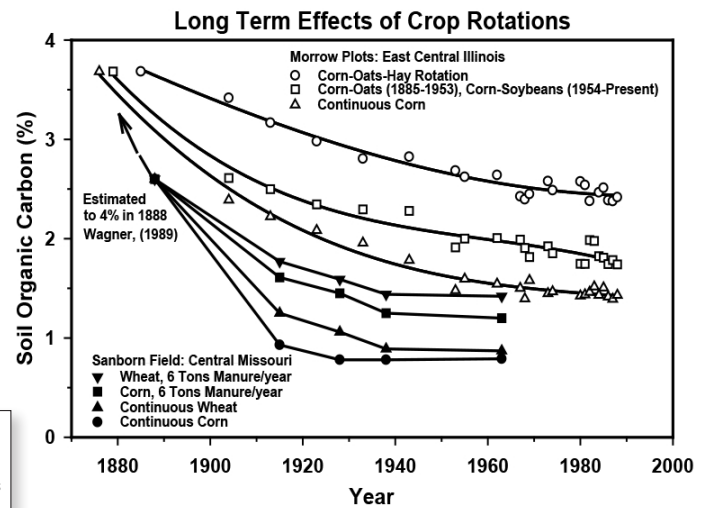
- ▶ Allows the soil to store another 10,000 gallons of water/acre
- ▶ Retain more nutrients per acre
 - 1,000 lbs N
 - 650 lbs P
 - 115 lbs K
 - 700 lbs Ca
- Retain more CO₂ for in-season energy production

The following visuals are the results of using ProfitProAG’s Crop Residue Digestion Program

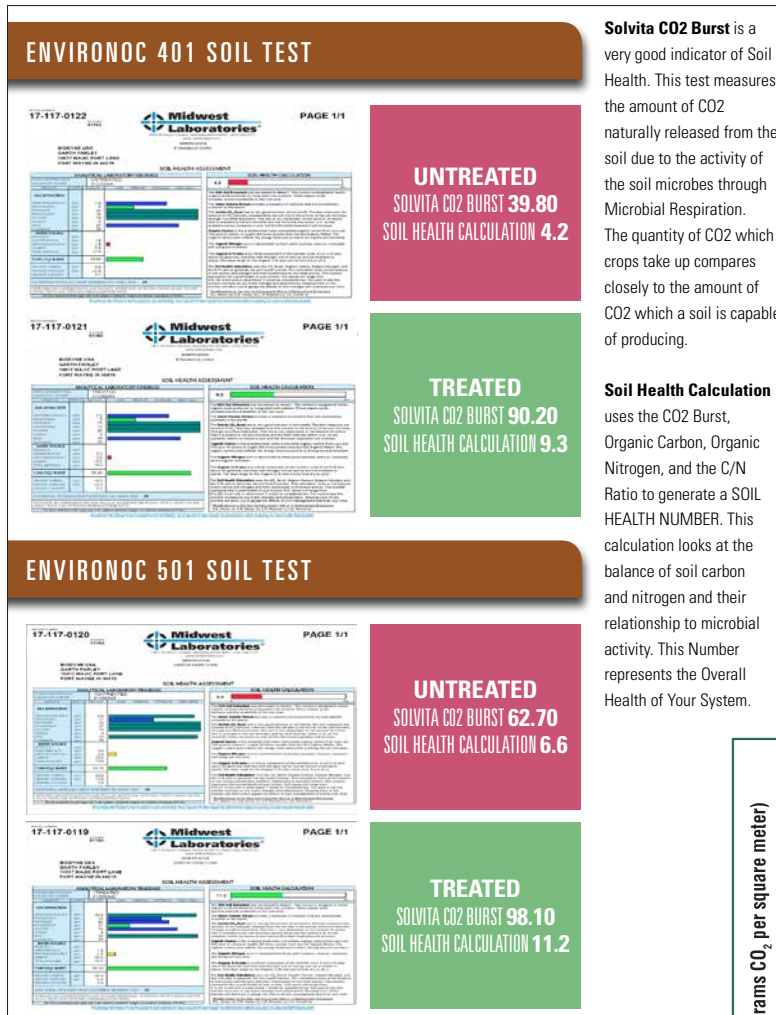


The combination of these ecologically-friendly soil and crop residue management technologies speeds the complete digestion of crop residue and primes the environment to produce nutrient-dense, high-energy crops.

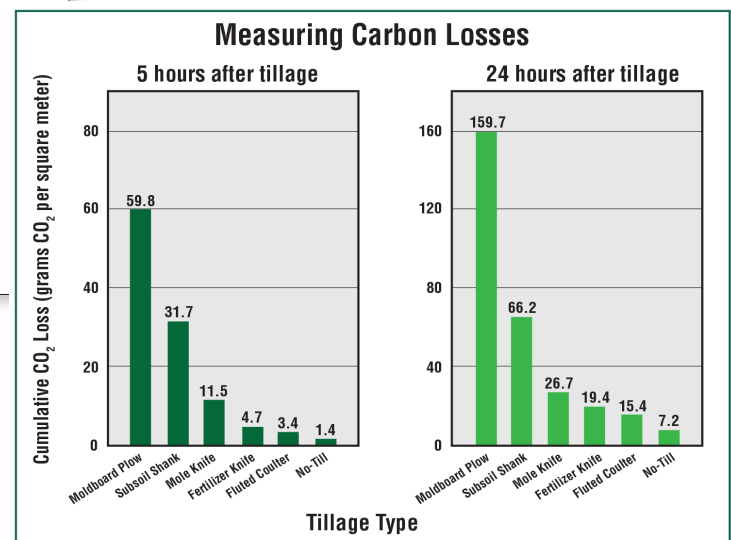
3. Plant diversity builds microbial diversity, bioactive carbon and energy through crop rotation (corn-soybeans-cereal or perennials) and cover crops.
4. Applying quality and multi-species (25 or more species) microbial products throughout the growing season (fall, at-plant and in-season) will enhance carbon sequencing by 50%, build soil energy, nutrient availability and balance and nitrogen fixation.



5. Reduce or eliminate tillage in your crop production cycle. The following graph shows the impact of different types of tillage on carbon (CO₂) and essentially energy loss from the soil.



In summary, CO₂ cycling is about energy to drive plant growth, “stay green”, yield, quality and ROI.



LASTING EFFECT. Don Reicosky's portable chamber measured the amount of CO₂ released from soil based on different types of tillage. While the bulk of CO₂ release came immediately after the tillage tool passed through the soil, it continued to be released for many hours afterward.

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For additional information or support in building your own high energy “stay green” production program, contact us at ProfitProAG.

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Featured Product of the Month

MeltDown Crop Residue Digester

Undigested residue is a physical tie up of your investment dollars. Recycle your nutrition and turn residue into a valuable resource for next year's crop.

MeltDown is the most complete and advanced tool for managing crop residue. It delivers enhanced residue breakdown powered by Environoc 501's 100% natural team of residue digesting microorganisms. This all-in-one residue management product combines viable and capable microbes with organic acids and nitrogen (1-0-0) to degrade complex polymers such as Cellulose, Lignin, Chitin and related compounds. This enhanced biological breakdown allows drills and planters to slice through residue instead of bouncing over it; reduces hair pinning, promotes optimal seed placement, uniform emergence and an optimized stand. **MeltDown** enhances the return of micro and macro nutrients from the residue to the soil and will help drive CO₂ cycling, promote higher yields and healthier soil. Deploy **MeltDown** to reclaim your investment dollars currently tied up by residue in your fields.

GUARANTEED ANALYSIS: 1-0-0

Total Nitrogen (N) 1%
Derived from plant protein hydrolysate

AMENDMENT INGREDIENTS:

Active Ingredients	Percent
Mixture of microbial strains	4.55% (nominal)
Bacillus amyloliquefaciens	1x10 CFU/ml
Bacillus licheniformis	1x10 CFU/ml
Bacillus subtilis	1x10 CFU/ml
Cellulomonas cellasea	1x10 CFU/ml
Chaetomium brasiliense	1x10 CFU/ml
Chaetomium murorum	1x10 CFU/ml
Pseudomonas putida	1x10 CFU/ml
Pseudomonas stutzeri	1x10 CFU/ml
Saccharomyces pastorianus	1x10 CFU/ml
Streptomyces albidoflavus	1x10 CFU/ml
Streptomyces ghanaensis	1x10 CFU/ml
Other Ingredients:	
Fulvic acid	0.13%
Ferment residue (non-animal)	0.35% (nominal)
Water	94.97%
Total	100%



ProfitPro®AG invites YOU to their
FREE WEBINAR
the third THURSDAY of each month.

**A cost-effective and convenient way to gain knowledge
on new crop production technologies**

It's Easy . . . It's FREE

Thursday, October 15, 2020

8:00 p.m. Central Time

Dr. Jim Ladlie, ProfitProAG President will present the webinar and answer questions.

For more information visit www.profitproag.com
and click on "Monthly News Webinar"

TO JOIN THE WEBINAR, CLICK ON THE LINK PROVIDED