

# How to Transition to Regenerative Agriculture

ACRES<sup>USA</sup>®

PREPARED FOR PACIFIC GRO BY ACRES U.S.A., THE VOICE OF ECO-AGRICULTURE



**PACIFIC GRO**

Seafood for the Soil®

**SUMMARY:** As more and more acres of farmland across the world lose the ability to grow yields at historic levels, consumers are also demanding food be grown in more natural environments. New but proven tactics are coming into the mainstream to help orchardists, farmers and ranchers manage their operations.

For many, transitioning to a new farming system first involves making the decision to change based on economics. For example, when a grower is spending more money on inputs such as synthetic fertilizer and biocides, but is seeing less of a crop response over time. Once that decision is made in attempt to reverse a negative trend, the path ahead involves finding a new system, a process that can take a few years to fully complete.

In this white paper, you will learn how to find a clear, two-step way ahead to transition your farm or ranch operation from a conventional system and into a regenerative, biological system that eventually decreases expenses and adds profits to your operation.

You will find information about:

- The business reasons to start to transition your operation in 2021;
- Details about the first two steps, cover cropping and soil testing, and why they are important;
- Science that supports the economic efficiencies of soil health; and
- True stories from real farmers who are finding financial success with a regenerative farming system.



**B**ob Wilt lives in the same Corvallis, Oregon farmhouse he grew up in. His transition from conventional berry production to regenerative underground “livestock” is similar to one many farmers are starting to follow: moving away from toxic, degenerative systems and one that better works with natural ecosystems.

Today, as the owner of Wilt Farms and Sunset Valley Organics, Wilt produces some of the most nutrient-dense and flavorful blueberries in the U.S. That he’s able to provide healthful food for people is a deep satisfaction for him, but Wilt knows that isn’t possible until he first feeds the organisms living in his soil. That means they get a steady diet of cover crops, compost, seafood and kelp applications and minerals — all new tools he has incorporated into his operation.

However, Wilt didn’t start his farming career by focusing on a biological, organic approach to growing. He said he made the switch back in 2001 out of desperation. “My crops were growing backward,” he said. He said was using more and more fertilizer and getting less and less response from his crops. He was using more pesticides than he wanted to. He could see things were on the road to failure.

Wilt had to ask the tough questions many fruit growers, farmers and ranchers are asking themselves in 2021. As input costs increase, seed supply lines become more com-

## NON-TOXIC & ORGANIC SYSTEMS

(Source: Rodale Institute)



plicated and proprietary, global trade decreases, public sentiment of synthetic fertilizer and pesticide use wanes, and new weather patterns challenge our understanding of risk management, the old formula for economic success is starting to break down.

As growers reach these crossroads with their operations — when expenses start to overwhelm the revenue — it often comes down to not just shifting a single lever or making a small step in a single direction. Often, it comes down to a complete change in mindset. In other words, it means rewriting the formula away from inputs and practices that cause soil degradation, and toward a system that leads to a decrease in overall input costs and reduction of risk, while maintaining or growing yields and profitability.

This shift in thinking often is a major step, and not to be underestimated in its difficulty or complexity. Removing a system that has been profitable for a generation or more is not an easy or simple task, and carries some risk. Approaching farming from a new direction, where one looks at biology, chemistry, physics — along with economics — means committing to understanding the connections between soil health and human health. Once those connections are made, the value of the product, and how it is grown, increases.

Asking others is a crucial step that also adds confidence when you are ready to make the decision. When he was nearing the point of trying to find a new system, Wilt said he was fortunate that Elaine Ingham happened to live in Corvallis. Ingham, a microbiologist and soil biology researcher who popularized the concept of the soil food web, agreed to meet with Wilt. Over three meetings and nine hours of conversation, Wilt felt he had enough soil health knowledge to get started.

He ditched the nitrate fertilizer and started applying kelp and fish products, what he now calls baby steps. He got positive results in the first year and by 2006 his farm was certified organic.

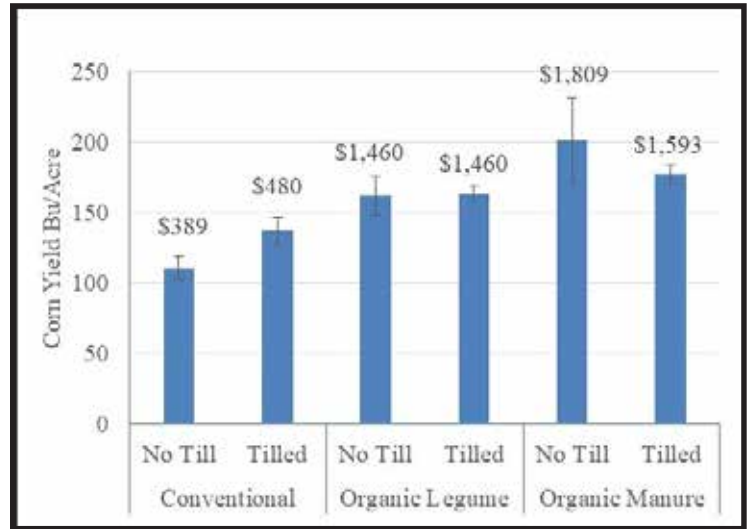
**“I GOT ON A REAL MISSION TO TRY TO GROW THE MOST NUTRIENT DENSE BERRIES YOU COULD HAVE,” HE SAID. “WE REALLY WORKED AT IT.”**

True, regenerative, soil-building agriculture is more work, he said. It requires more management and more thinking, especially in the beginning. However, resilient growing systems can pay off in the long-term — especially when the unforeseen strikes.

Once the mindset changes, the questions then become a bit more specific and tactical. How do we transform our farms? How do we decrease the risk in building a system that constantly regenerates soil health through effective tactics and methods? How do we make money doing so?

### **MAKE IT A BUSINESS DECISION**

Before an orchard or farm manager makes any major investments into a regenerative system, they must understand the value, function and power of biology and balanced minerals in the soil. Simply put, one goal of using nature-created and non-toxic



*(Source: Rodale Institute, 2016 corn study, that produced 200 bushels of corn per acre—a record-breaking yield for the Pennsylvania county and was almost twice the conventional no-till system)*

fertilizers and pesticides is to save money. That is what you are creating — a biological system that replaces your more costly systems in place today.

Often, transitioning growers early on can get bogged down on the how-to. Chemistry and biology were often the subjects we ignored in high school. Little did we know they would be essential for professionals to grow healthy food and be successful farmers and managers in the long run. This can be where the learning stops, as it involves a much more detailed approach to soil management.

The best advice comes from farmers who have already moved through the early stages. First, before we start learning soil-balancing techniques, the transition involves “... understanding the why. It has to be a business decision,” said Mitchell Hora, a seventh-generation family farmer in Washington, County, Iowa. His family’s operation started no-tilling corn in 1978, and has been 100% no-till soybeans since 1986. Implementing a 100% no-till operation takes a lot of time and patience. This is not an overnight conversion, he says. Initially, they started by cover cropping on parts of their operation. “It has to work effectively. With cover crops, you can break even in year one, and in three to five years see a real profitable difference.” For many of the operations Hora manages and consults with, the first step is securing the money to begin a new farming system. This does not involve going to a bank. This involves looking critically at the operation from an input and pesticide standpoint, decreasing usage where it isn’t needed, and investing those savings back into soil health.

Hora is also the founder and CEO of Continuum Ag, a company focused on helping conventional farmers make smart transitioning decisions based on data. In a typical case, he says, in less than five years they can reduce synthetic fertilizer by 50% and synthetic pesticide use by 75%.

**“WE ARE LOOKING AT PUSHING THOSE NUMBERS,” HE SAID. “WE ARE STILL HOLDING RECORD YIELDS AND OPENING UP THE PROFITABILITY.”**

And being economical also means managing time efficiently. That often can be one of the toughest challenges as a few chores are added into the workday. On Hora’s smaller family farm, they only have one big tractor for the 700 acres, so they can’t be doing a chore like driving a cart and planting at the same time, he says. Using a cover cropping system, for example, does expand the time spent planting each year in the spring and fall.

“If you’ve been harvesting corn for 14 hours all day, planting cover crops for six more hours isn’t so much fun,” Hora said. “That’s some of the timing and logistics to manage through — but we still do it and it still is a good investment.”



Dense cover crop (in Iowa)

## FIRST STEPS: COVER CROPPING & SOIL TESTING

Mark Dodd is VP-Agronomy of Pacific Gro and a part-owner of a 2,500-acre family farm in Hope, Indiana. They grow corn, soybeans, wheat and alfalfa and raise livestock.

While Dodd rejects the regenerative label as a bit romantic and soft around the edges — he prefers words like economically sustainable and resilient — the principles are the same: After a farmer makes the decision to change, the next steps are to reduce reliance on synthetic fertilizers and biocides through using cover crops, compost and sea-based amendments to feed soil biology. However, Dodd says that these methods have to be proven out through rigorous record keeping and soil and sap analysis.

While doing this, both Hora and Dodd advise setting realistic goals. Converting land will take at least three years, but that timespan often depends on the starting quality of soil health, biodiversity and structural conditions on the farm.

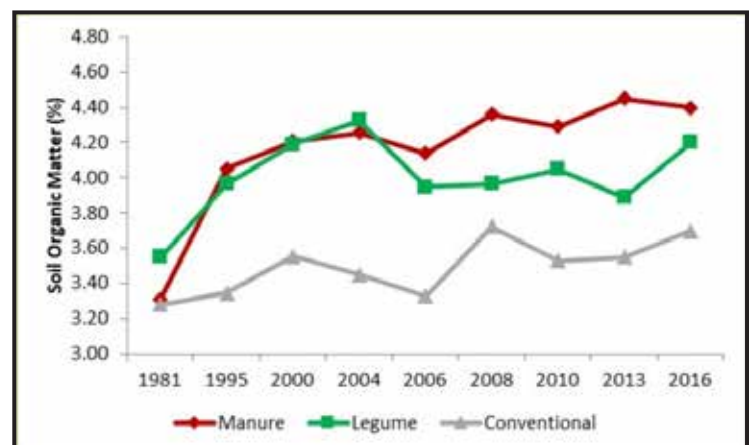
A 2020 study by land grant universities in Pennsylvania through Rodale Institute (image, right) measured organic matter in the soil increasing at a modest 17% over a 40-year span by using cover crops versus a USDA-approved conventional system. While that may not seem like a lot, even a 17% decrease in spending

on inputs of all types would be significant to any farmer, rancher or grower. (Sheoran et al. 2019; Lori et al. 2017; Das et al. 2017; Reganold, Elliott, and Unger 1987).

So starting the general transition in your soil health, according to Hora, means to focus on what you are not doing — planting after harvest. Instead of allowing bare ground, he says, use cover crops. An effective cover cropping system traps carbon, decreases topsoil loss, and provides organic material back to the soil at harvest, which decreases the overall need for pesticide and fertilizer use immediately. And the costs are small compared to the benefits, he says. Hora frequently sees the savings in fertilizer and pesticides in year one then be used to fund a strategy in year two that makes more substantial leaps in achieving overall soil balance and increased profitability.

The graphic on the opposite page, provided by Gary Zimmer, owner of the Otter Creek Organic Farm in Wisconsin and author of *Biological Farmer*, explains why soil balance is important from an efficiency standpoint. As you can see, when we have a balanced approach between our three parts of soil — chemistry, biology and soil structure — we have soil that is looser and easier to work, we have improved crop quality, more absorption of nutrients in the plant and a stronger bottom line.

But to achieve mineral balance and healthy biology, once again, it involves ignoring the tradition of measuring just nitrogen (N), phosphorous (P) and potassium (K) to complete an input strategy. Established as early as the early 20th century by scientists like Ehrenfried Pfeiffer and William A. Albrecht, healthy, balanced soil can involve understanding the role of 84 different minerals in the soil. It also involves rearranging the hierarchy of minerals farmers and growers have traditionally been using to establish in the soil input programs. Calcium (Ca) and carbon (C) are also huge contributors in regenerative soil health systems; in fact, those two are almost boss minerals to some, as they ensure other vital minerals are safe and have jobs to do — mainly, they ensure minerals are available to the plant. In other words, as Dr. Albrecht reported in many of his research papers, without balanced calcium, farmers find very quickly that nothing moves in the soil, no matter how many dollars worth of fertilizer one adds. And



without carbon, there is nothing for the plant to build with. But in conventional N-P-K input operations, calcium, carbon, sulfur, potassium, iron and many others are often ignored, overused or just forgotten.

The second step beyond cover cropping is then to measure the soil. How do you know what you are doing with cover crops is working? While some farmers and fruit growers will choose not to test soil, it becomes very difficult for them to be precise with their inputs in the future, which costs them more money over the long-term.

“I don’t think you have to have the soil data and the quantitative side of things, but it sure helps,” Hora said. “The data can get pretty expensive, up to \$20 per acre for data management and collection. Other testing can be layered on top for more expense, so you do have to understand your limits and what type of data you need.”

Sap testing, tissue testing and even soil DNA testing are methods available to farmers and growers, and testing companies often vary wildly in their approach and how they measure. (Dodd suggested DNA sequencing of the soil, adding, “That’s when you’re getting really deep in the weeds of data.”)



Mitchell Hora and his father Brian, checking out their diverse, interseeded cover crops.

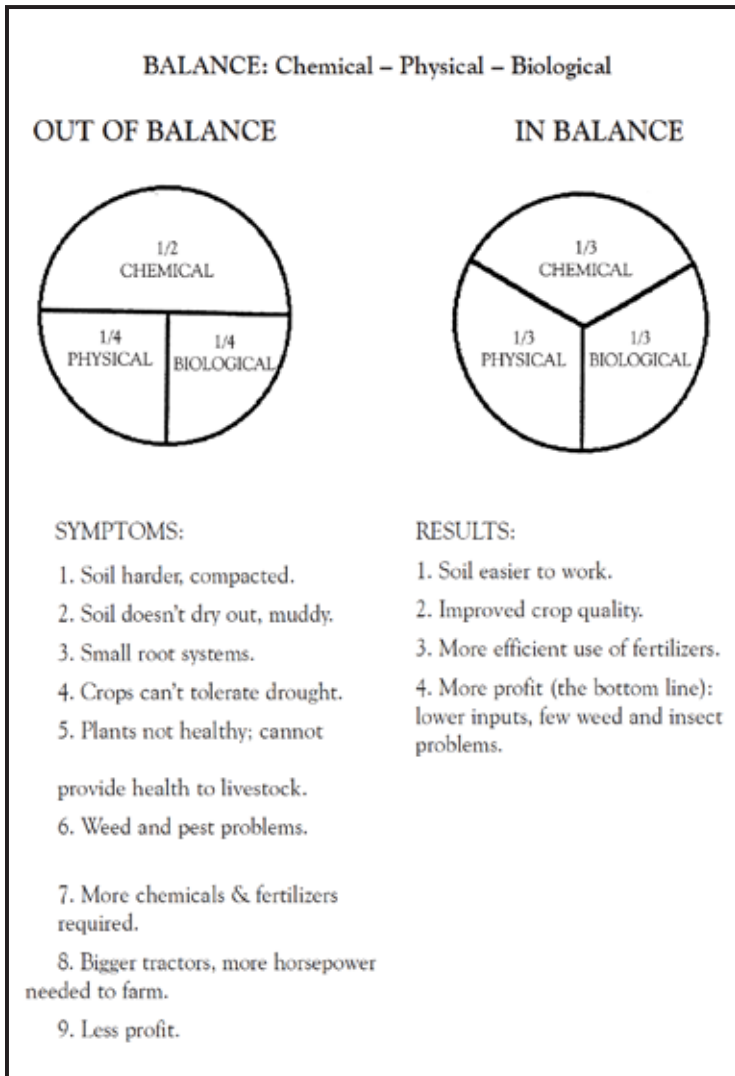
Again, doing your research and asking for help are key steps. Established regenerative soil testing companies, soil health agronomists and neighbors who cover crop and soil test in your region can be the more beneficial leads for starting a soil testing program. Without measurement, even something as mundane as cover cropping with a rye grass can lead to a negative result.

“When guys plant to corn into a high carbon cover crop and don’t terminate it effectively, they have carbon penalty issues,” Hora said. “They throw off the (mineral) ratios and they lose yield. A lot of the guidelines around planting cover crops are really not conducive to first-time users. Don’t just go off the NRCS recommendation. Talk to local farmers. Get advice from an agronomist who actually makes those cover crop decisions, both in the fall and in the spring.”

That’s common advice, and valuable, especially from Hora, who is just starting to assist a 25,000-acre operation transition to regenerative practices. That’s no small operation, and transitioning it is not without its complexities.

Especially on large, commercial operations, Hora says, farmers tend to blindly use one application technique across vast swaths of land. Conversely, by soil testing multiple locations and knowing where the fertilizer nutrients are to be applied, the grower can begin to map out areas which need more, less or even none at all.

But just like any farmer or orchard owner, the work first involves simplifying the steps. First, those managing the transition must understand the overall economic goal — expand profitability — while then thinking differently about how they manage to their farm goals, and the tactics they use to get there. Most start by covering bare ground with cover crops, even between perennials or fruit trees. Doing so helps a soil health program, as proven by the earlier cited 2020 Rodale Study, which proved that regenerative practices showed real gains from long-term data on soil organic matter, soil organic carbon, soil nitrogen, and soil pH (soil reaction) within the surface soil.



# Regenerative Fertilizer

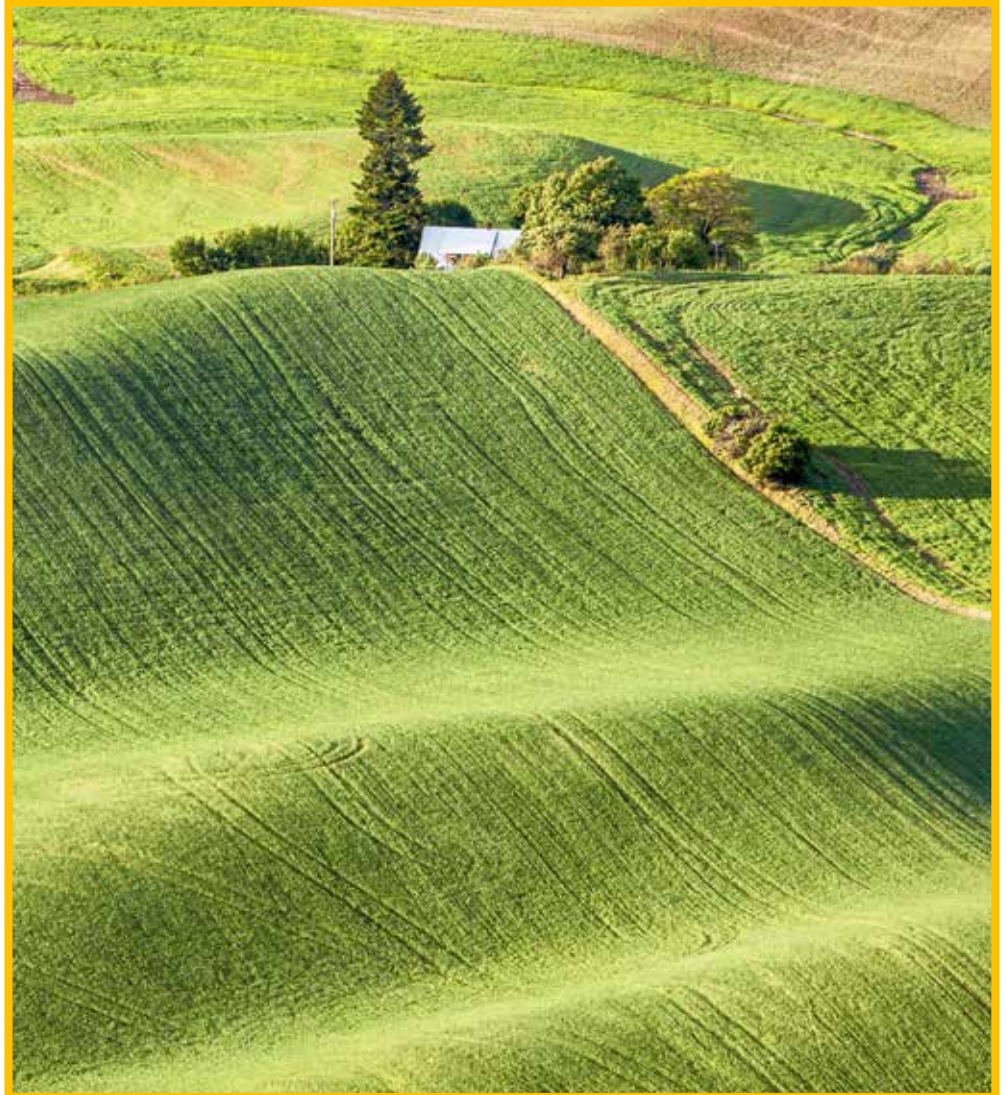
Transitioning farms back into balance is hard work. A lot needs to change to make the soil resilient and able to provide nutrients and avoid disease.

Part of the solution is to use carbon-based fertilizer. Carbon provides balance and buffering and is the building block for life — soil life in particular.

Pacific Gro provides amino acid nitrogen, fish oil and chitin — all carbon compounds.

This Seafood for the Soil feeds the soil biology — which multiply and increase in diversity. Beneficial fungi recover in depleted soils, occupy functional niches, crowd out pathogens, and build humus.

Pacific Gro is a core input in programs that promote biological means to grow healthy crops in healthy soil.



### **Pacific Gro Oceanic Hydrolysate 2-1-0.3**

Made from salmon, shrimp and crab shell.  
Provides plant-available calcium and other marine nutrients.

### **Pacific Gro Sea Phos Hydrolysate 1.7-7-0**

High phos. formula, for starter blends and when available phosphorous and calcium are needed.

Please contact us for advice on biological and organic farming, and to find a crop consultant dealer serving your area.



**PACIFIC GRO**  
Seafood for the Soil®

503-867-4849  
[www.pacificgro.com](http://www.pacificgro.com)

Those results then, of measuring chemistry and biology, will be the new measuring sticks the success of a regenerative system, one that naturally fights disease and pests, protects soil biology, helps balance soil chemistry, improves profits and builds long-term resilience. And if done correctly, these measurements will be tied to an increase in economic benefits — money in your pocket, and less hidden environmental costs happening on your property.

As mentioned before, balance is not just about minerals, either. Knowing how to measure soil biology, and why it is important, will also help farmers and fruit growers ensure a true regenerative farming system is in place. Biology, which can be as small as a microscopic biome or as large as a cattle herd, is one of the key elements of a healthy ecosystem. In fact, when organic fertilizer is added within a regenerative farming system it is actually feeding microbial life so they can thrive and do the laborious work of helping plants grow by converting complex molecules into digestible nutrients.

So then, how much life is needed in the soil? A better question might be, what is a good representation of biology in the soil in a healthy field? This graphic gives one idea of a ratio that would be healthy to find in the areas where your root zones are developing. As you walk the field, dig your hand down. Are you finding earthworms and fungi and life?

## NEW LOSS PREVENTION TACTICS

Even in non-conventional growing systems, not all signs of life are positive. Disease and pest control are still an important risk-management task. The tactics in these systems are just a bit different. These non-toxic systems aim to correct the cause of the problem — imbalanced soil — and not just address the symptoms of weeds and pests.

In conventional systems, biocides are actually resetting their biological life after spraying and killing. Studies by Rodale and the University of Missouri have shown one spray of RoundUp herbicide can decrease biological life by up to 50 percent in the root zones. USDA microbiologist Robert Kremer found in his studies that the herbicide upsets the balance of beneficial microorganisms to harmful ones. According to Kremer, glyphosate can be toxic to rhizobia, a type of bacterium that fixes nitrogen in the soil. It can also affect the availability of manganese, which is another essential nutrient.

Why is all that important? As Kremer found, when products throw off the balance of soil chemistry and remove soil biology, we actually can attract more pests and weeds in the long run. Another way to look at this: a healthy plant in a healthy ecosystem will have more of a natural resistance than an unhealthy plant in an artificial ecosystem.

Back in 2010, according to Wilt, the Oregon blueberry farmer, Spotted Wing Drosophila (*Drosophila suzukii*) began plaguing the U.S. fruit crops. They were hitting everything, he said — peaches, cherries, blueberries. Fruit growers all across the country began spraying large amounts of pesticides in order to manage the pest.

Not Wilt. His healthy, high Brix and pest-free blueberry crops stood out and growers began to take notice. He did not have any insect pressure. Why weren't his crops taking a hit? Growers wanted to know — as it so happens, nitrate fertilizer attracts insects — and so Wilt's consulting company, Western AgLands, was born.

In his work as a consultant, he usually asks a grower to start with a soil test. They're limited in what they tell you, he admits, but they give you a place to work from. Just because minerals show up in the test, doesn't mean they're going to shuttle up into the plant. That's where biology comes in.

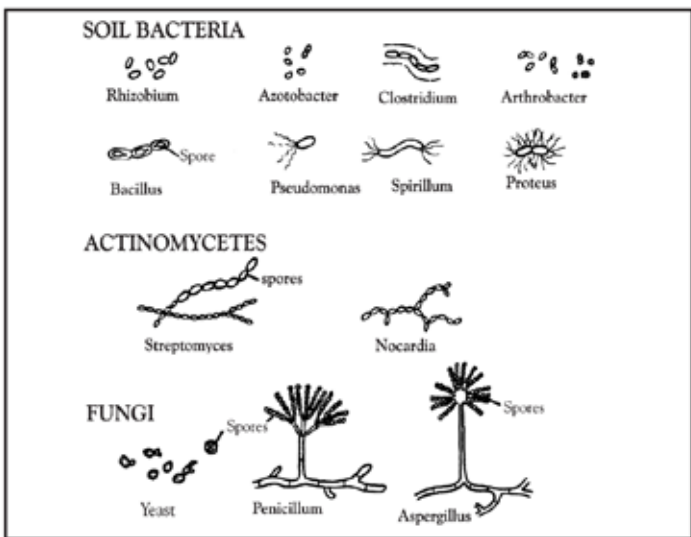
Wilt's philosophy is this: Don't feed the plant. Feed the microorganisms in the soil. Use cover crops to your advantage. Keep roots, and the carbon sugars they exude, in the soil. Use things like rock phosphate, lime, gypsum and rock powder when necessary, but don't underestimate the ability for well-fed biology to mine minerals from the soil that aren't even showing up on tests.

Avoid salt fertilizers. "They're rougher than hell on soil biology and carbon," he said.

By consistently taking the burden of pest and weed control entirely away from nature, farmers are actually training their plants not to ask the soil for help, and putting all the burden on the farmer's pocketbook to provide food, pest and disease defense.

ORGANISM	NUMBER PER ACRE	LBS PER ACRE
Bacteria	800,000,000,000,000,000	2,600
Actinomycetes	20,000,000,000,000,000	1,300
Fungi	200,000,000,000,000	2,600
Algae	4,000,000,000	90
Protozoa	2,000,000,000,000	90
Nematodes	80,000,000	45
Earthworms	40,000	445
Arthropods	8,160,000	830

(Adapted from: L.M. Thompson & F. Ticeh, *Soils & Soil Fertility*, 4th ed., 1978, p. 111.)





**“OUR SOILS HAVE BECOME VERY LAZY,” DODD SAID. “THEY DEPEND ON HIGH AMOUNTS OF INPUTS. GMOS HAVE MADE US REALLY LAZY. WE BECAME TRACTOR DRIVERS.”**

Dodd pointed out that even glyphosate use can be greatly reduced just by altering the methods of application, using fulvic and humic acids, for example, along with a herbicide. Adding vinegar to lower the pH of a glyphosate application is also a common way growers can then use less herbicide.

Dodd also argued that yield shouldn't be the only metric of success. Profit per acre should be # 1. Nutrient density and environmental impacts should be considered as well. Using biological methods will be crucial in food production systems of the future. GMO- and biocide-based systems aren't working.

As we transition to a regenerative system, we are then retraining the soil and the plant to work together, and giving them the offensive and defensive tools they need, like smart inputs including fish fertilizers, organic composts and cover crops.

“The microbes are there, but they don't have anything to feed on so they can solubilize these minerals,” Dodd continued. “The soil is alive but we have to feed it. It's like livestock — you spoon feed it as much as possible. Mother Nature is very forgiving if you treat her right.” That means feeding the biology after harvest and before or during planting. For transitioning farmers: The first step is changing a mindset where one has to take education seriously and seek out biological farmers who've been doing it for a long time, and apply a method that will generate the economic results they desire. It is catching on.

“We are seeing different pockets where we are seeing it work, and I'm seeing it in my area (Washington County, Iowa) expand a lot,” Hora said. “A lot of my neighbors are using cover crops. It's becoming where it's not weird and it's normal to see.”

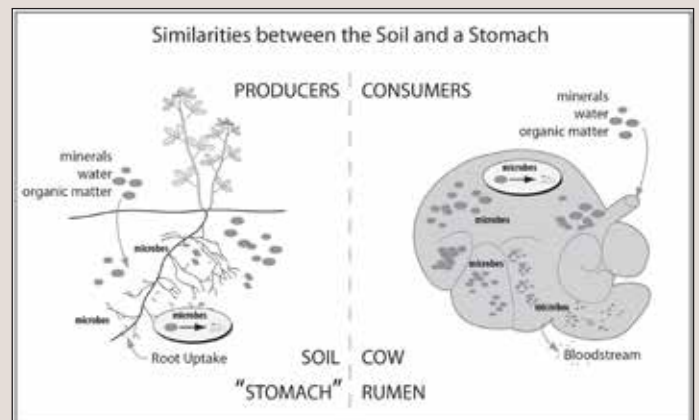
*This white paper was written in collaboration between Acres U.S.A. and Pacific Gro. The accuracy of the information herein has been verified and checked. It's sole intent is to inform growers of all types of the advancing techniques used to grow healthy food and crops for consumers. Contact [info@acresusa.com](mailto:info@acresusa.com) to learn more about this service. To learn more about Pacific Gro, [click here](#).*

# A PRIMER ON BIOLOGICAL/ REGENERATIVE FARMING

Regenerative agriculture is based on a range of food and farming systems that use the photosynthesis of plants to capture carbon dioxide and store it in the soil. These systems are based on a scientific fact: soil holds almost three times the amount of carbon than the atmosphere and biomass (forests and plants) combined, so let's trap it and use it, and not waste it.

To many, this explanation can seem a bit vague or obtuse. To simplify the explanation of a regenerative system, it can be common to compare it to a biological system. In order to create a healthy human or healthy livestock, we give them minerals, water and organic matter on a daily basis, which a host of microbial life turns into available nutrients, which are then picked back up and used by us, the human.

A plant works no differently within the soil. We add the same elements that give us health — balanced minerals, water and organic matter — and the soil life converts them into available nutrients for the plant, which digests them and turns them into flowers, fruit or vegetables.







Bob Wilt had 200 organic acres in berry production. However, a flood of foreign imports from Chile, Peru, Bosnia and Poland have rendered wholesale berries, even high-end organics, unprofitable for many U.S. growers. Wilt removed two-thirds of his berries, and planted hemp and wheat, complemented with cover crops, as placeholders until he settles on a long-term strategy.

Wilt said it doesn't matter to wholesale distributors how good the berries taste or how nutrient dense they are. They are just interested in the label that comes from organic certification. "You could have blue-painted sheep pellets for all they care, just as long as it's labeled organic," he said. "I never could get an extra penny for flavor or nutrition."

That doesn't mean Wilt is changing the way he farms, but he is rethinking his business tactics. Instead of the wholesale market, he's focusing on value-added berry products. For now, that means drying them and making antioxidant rich powders.

Wholesalers may not care, but Wilt said consumers do and he's now marketing directly to them. Yet, that may be changing.

General Mills, one of the nation's largest food companies, has pledged to "advance regenerative agricultural practices" on 1 million acres of farmland by 2030. Other companies such as Danone and Nestlé are also committing to shift their supply chain to regenerative agriculture. Perdue Farms has also responded to consumer demand by removing all antibiotics from their chicken farms, and shifting toward more organic, regenerative and pasture-raised animal farming.

Future carbon sequestration markets and more government support are likely. American Farmland Trust estimates that roughly tripling cover crop adoption from the current 15.4 million acres to 44.4 million acres could reduce CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) emissions by 14.5 million metric tons annually.

## A DEVELOPING REGENERATIVE ECONOMY

PREPARED BY ACRES U.S.A., THE VOICE OF ECO-AGRICULTURE

ACRES<sub>USA</sub>®