

Big Ag Redefines Regenerative Agriculture A Tale of Two Visions

By Paul W. Syltie, Ph.D.

The wave of the future in agriculture is regenerative, organic, and sustainable. There should be no question that this is the course that mankind should take to grow his food crops for maximum health of himself, his livestock, the soil, and the environment.

Big business serving farmers is recognizing this truth, and in the interest of retaining and expanding markets for their toxic, non-regenerative chemicals, they have devised a new strategy: change the definition of “regenerative” so it aligns more with their product line and sales initiatives.

I was brought face-to-face with this strategy recently when I happened to view an article with some embedded videos at www.bayer.com. The article is entitled “Farms of the Future — Adopting Systems of Solutions With Regenerative

Agriculture.” The presentation looked at four hypothetical farming situations in different parts of the world, and how



The application of pesticides and herbicides is thrust upon the new definition of regenerative agriculture.

Bayer’s vision leads these farmers into a regenerative world — based, of course, on the offering of their products every

step of the way during the growing process.

Illinois

Their regenerative view involves starting with their own GMO varieties that are tolerant of their own herbicides, with traits that resist insect pests. “Smart corn,” varieties of short stature, are planted using digitally controlled planters to adjust plant density to soil fertility variations across the field. Micronutrients and biostimulants are added at planting, and herbicides, fungicides, and insecticides are applied as needed. Potential problems are monitored by drones. Man-made climate change is assumed, so attention is paid to carbon credits that further add to the bottom line.

A crop called “cover cress” is then planted for organic matter improvement, and soybeans follow in the rotation; the cress can also be harvested for fuel alco-

See Attempt to Redefine Ag, page 2

Here's Why the US Is Losing Farms At An Alarming Rate

By Jeff Charles

*From Townhall, February 21, 2026;
www.townhall.com*

The United States lost about 15,000 farms last year as part of a disturbing trend that is reshaping the nation’s agricultural landscape.

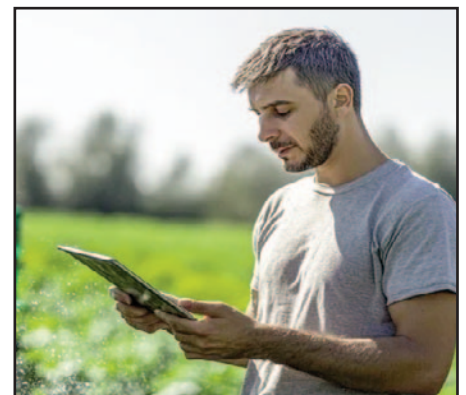
The Agriculture Department’s latest Land in Farms report showed that the total number of farms in the U.S. fell to about 1.86 million in 2025, down from roughly 1.88 million in 2024. No state reported a net increase in farm operations.

Since 2018, the U.S. has lost over

150,000 farms, representing an eight percent decline that has affected states like Texas and Minnesota.

Smaller operations represent most of the losses. Farms with only \$1,000 to \$9,999 in yearly sales saw the steepest decline. Only farms that make over \$1 million in sales grew.

There are a plethora of factors contributing to this trend. Rising costs, weaker prices, and structural change in the farm economy have figured into the decline, according to RFD-TV. Farmers are spending more for equipment, fuel, and fertilizer. Meanwhile commodity prices have dropped, creating what sev-



Beginning farmers face a tough road today to get established, with rising costs and low prices.

See Beginning Farmers Have, page 3

Attempt to Redefine Regenerative Ag

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hol generation. Large multi-row machinery expedite the processes.

Spain

In this hypothetical desert area, a greenhouse producer utilizes Bayer adapted tomato varieties, along with fungicides, nematicides, and insecticides to control crop pests, all produced by Bayer. Digital tools are used every step of the way. The crop is harvested using a robotic picking machine.

Brazil

A double-cropping soybean and corn rotation uses Bayer GMO varieties which are resistant to their special herbicides, to give control of certain insect pests. A biostimulant application further helps control insect and nematode infestations in fields which are digitally monitored. If threshold levels are reached, Bayer chemicals are applied. If carbon footprint goals are met, premium grain prices are received.

India

India is known for its prodigious rice output, with traditional landholders farming perhaps a hectare (about 2.5 acres) of land. On this small area Bayer can supply direct seeding rather than hand planting of sprigs using a drone, and Bayer rice varieties are sold that are herbicide tolerant. An array of fungicides and other chemicals are supplied as needed through digital integration of crop progress. A bizarre system of summoning a tractor for field operations can be used, like calling for an Uber ride. An effort to reduce CO₂ emissions is built into the system to reduce the carbon footprint.

The Traditional View

This is the vision of regenerative agriculture that Bayer and other agrichemical companies are trying to promote. Yet, it is hardly the vision that the founders of the regenerative approach had in mind. Let's take a look at the traditional definition of regenerative agriculture.

● **No till or low till.** Minimizing disruption to the soil ecosystem keeps plant

roots connected to unique communities of microorganisms that are key in the processes to build healthy soil and store carbon.

● **Cover crops.** Keeping the ground covered with plants at all times has many benefits: It allows for water and carbon to be absorbed by the soil which keeps the soil alive, helps eliminate soil erosion by preventing the soil from blowing or washing away, and prevents desertification. Having roots constantly to maintain soil structure and provide organic matter for fertility maintenance is essential for long-term productivity.

● **Diversified production systems.** Multiple crops rotated in fields, perhaps with integration of livestock, mimics natural ecosystems and enhances biodiversity which contributes to healthy soil.

● **Reduction or elimination of synthetic chemicals.** Utilizing synthetic chemical fertilizers discourages the plant

● **Planned grazing.** Planned or rotational grazing of grasses mimics the patterns of animal herds which ensures land is not overgrazed, and manure fertilizes the soil and contributes to carbon sequestration. Animals in pastured systems tend to be healthier and not need antibiotics to treat disease.

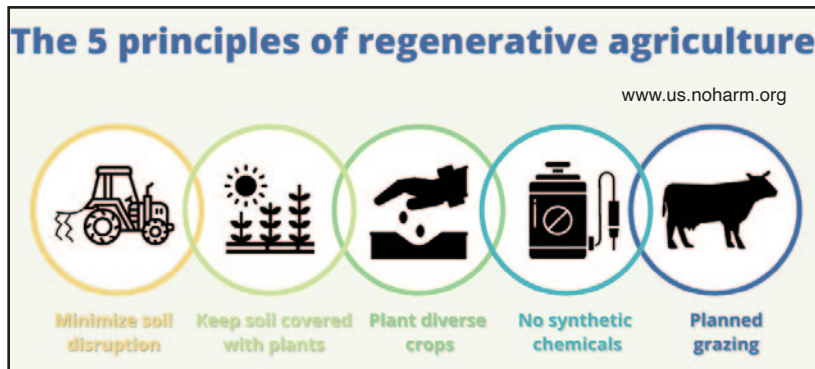
These tenets of regenerative agriculture are hardly compatible with the corporate agriculture view of oftentimes continuing to till aggressively, pushing the cropping system to exclude cover crops, maintaining a monoculture of one or two crops such as corn and soybeans in the Corn Belt, and failing to address the need for well-managed grasslands on sloping, erosion-prone soils — stressing instead crops that will continue to utilize the fertilizers, chemicals, and crop varieties that the agrichemical companies sell.

The best of all fertility amendments — manure and compost — are seldom if ever stressed, since these natural, organic inputs compete with the fertilizers and chemicals the companies promote. Occasionally a positive regenerative practice may be introduced, such as the “cover crop” mentioned earlier, but the overall objective of the agrichemical model is to sell GMO seeds, and chemicals that suppress the proliferation of stable soil communities.

Sir Albert Howard's Observations

These pillars of regenerative agriculture mirror closely what Sir Albert Howard, the “father of organic agriculture,” outlined in *An Agricultural Testament* (Oxford University Press, 1943):

- Mixed farming is the rule: a mixture of plants and animals on the land.
 - The soil is always protected from the direct action of sun, rain, and wind.
 - Rainfall is carefully preserved.
 - The forests and grasslands manure themselves.
 - Mineral matter is extracted from the subsoil to nourish crops.
 - The soil always carries a large fer-
- See *Regenerative Agriculture*, page 3



from detecting nutrients deeper in the soil and from making nutrients available. Microbial activity which moves nutrients to their available forms is discouraged by biocides, and places the cultural system on a “chemical treadmill” status, whereby the cropping system relies on continued commercial inputs rather than encouraging the soil to provide its own fertility inputs — such as nitrogen through natural fixation processes. Utilizing chemical pesticides further disrupts the soil microbial community and has other negative impacts on biodiversity, contributing to land and water pollution. Also, pesticide exposure through the food we eat, air we breath, and water we drink has been linked to health impacts that range from birth defects to cancers and neurological disorders.

Beginning Farmers Have a Tough Time

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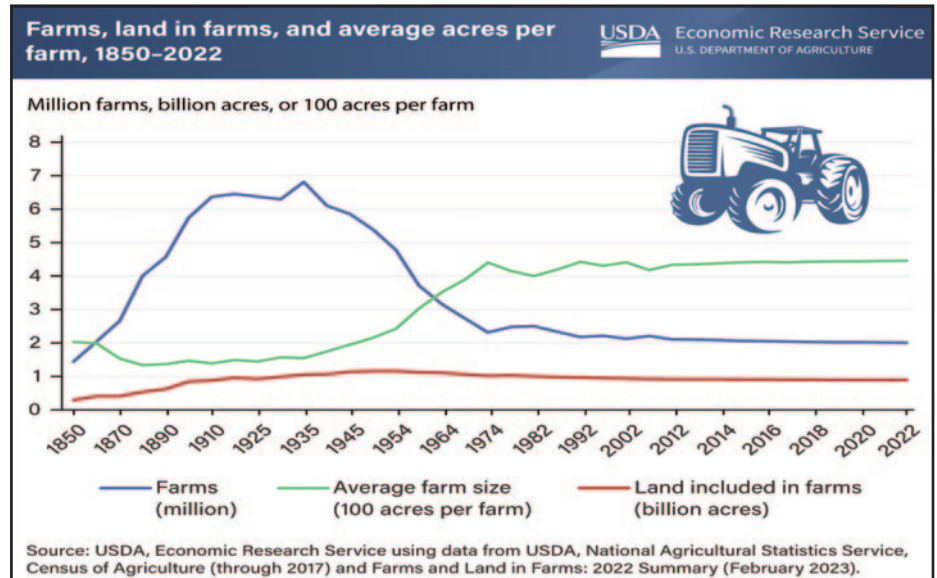
eral economists describe as a crop-sector recession.

Farm bankruptcies and forced sales have increased, along with land prices and interests. This is making it harder for younger and smaller operations to start new farms or to expand existing ones.

If this trend continues, it could mean that U.S. agriculture appears more productive on paper, but less diverse and more vulnerable to changes in the industry. As larger farms continue to grow and smaller ones vanish, production will be concentrated in fewer hands and regions. This will increase the impact of extreme weather, disease outbreaks, or government policy changes on the industry.

It would also have a detrimental impact on rural communities that depend on small and mid-sized farms for jobs. In the end, the U.S. could end up with an agriculture industry that is efficient, but less resilient.

Much of this problem could be



addressed by rolling back federal subsidies and mandates. The government already has far too much control over agriculture. Slashing unnecessary regulations that disproportionately weigh down smaller operations could go a long way toward evening the playing field.

Regulations tend to function as protectionist barriers that allow larger farms to flourish while effectively killing small farms. If this trend is to be reversed, it means doing away with government interference. □

Regenerative Agriculture

Continued from page 2

tility reserve.

● The crops and livestock look after themselves.

Unfortunately the approach of modern agricultural corporations is to maximize profits by selling as much as possible of their products to farmers. This motive often conflicts with the operations of biological systems, which were designed by the Creator to be self-sustaining — like Howard admitted — as long as the overseer of the land follows the rules or nature. It is indeed “a tale of two visions of regenerative agriculture.”

As mentioned by Ray Archuleta in the lead article of the last edition of *The Vital Earth News*, “Regenerative agriculture starts with a renewal of the human heart and mind. It’s a new way of thinking that loves, nurtures, and emulates the Creator’s intelligent design.”

Can we as farmers strive to emulate the original and highly preferred vision of farming under the umbrella of natural laws that will preserve the health of our

soils, our nation which depends on those soils, and ourselves?

There is hope on the horizon that the U.S. government will prioritize regenerative agriculture according to the original definition. According to the current Secretary of Health and Human Services, “Those deliberate choices [of using glyphosate and other chemicals and practices] locked farmers into chemical dependence and prioritized short-term output over long-term soil vitality and human health. We are now changing course — without destabilizing the food supply ... [to accelerate the] transition to regenerative agriculture by expanding farming systems that rebuild soil, increase biodiversity, improve water retention, and reduce reliance on synthetic chemicals, including pre-harvest desiccation” (www.realagriculture.com, February 23, 2026).

There is hope in returning regenerative agriculture to its traditional definition. Let’s follow that tradition the best that we can! □

WORDS ABOUT FARMING TO THINK ABOUT

1. “Farming looks mighty easy when your plow is a pencil, and you’re a thousand miles from the corn field.” — **President Dwight D. Eisenhower**
2. “No race can prosper until it learns there is as much dignity in tilling a field as in writing a poem.” — **Booker T. Washington**
3. “Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals, and happiness.” — **Thomas Jefferson**
4. “Those too lazy to plow in the right season will have no food at the harvest.” — **King Solomon**, Proverbs 20:4
5. “The farmer has to be an optimist or he wouldn’t still be a farmer.” — **Will Rogers**
6. “When tillage begins, other arts follow. The farmers, therefore, are the founders of human civilization.” — **Daniel Webster**
7. “I would rather be on my farm than be emperor of the world.” [From *Amanda Zaluckyj*, www.thefarmersdaughterusa.com].

15-Minute Soils Course

Lesson 63: Those Intriguing Cyanobacteria

We continue examining soil organisms that play a major role in the soil community, in this case cyanobacteria, also known as blue-green algae. They are called “blue-green” because of their green chlorophyll and bluish pigments.

These prokaryotic microbes constitute a widely diverse group of photosynthesizers which are extremely important in the earth’s oxygen economy. They produce an estimated 50% of the atmospheric oxygen annually due to their ubiquity in oceans and on land.

These microbes are classified in the phylum *Cyanobacteriota* within the bacterial kingdom, and take on a wide range of morphological forms, from unicellular to filamentous to colony forming. They are found in nearly every habitat on earth: deserts, oceans, fresh water, damp soil, as plankton, and even inside rocks and beneath the Antarctic ice sheets. Some populate lichens, or even live in the fur of sloths to provide camouflage color.

These ubiquitous organisms do not have typical eukaryotic cellular organelles like a nucleus and mitochondria, but function very well with thylakoid membranes which house the chlorophyll and photosynthetic machinery. They constitute the common algae blooms that thrive in waters that are polluted with nitrogen or phosphates, which can lead to eutrophication of lakes and even kill fish due to oxygen deprivation.

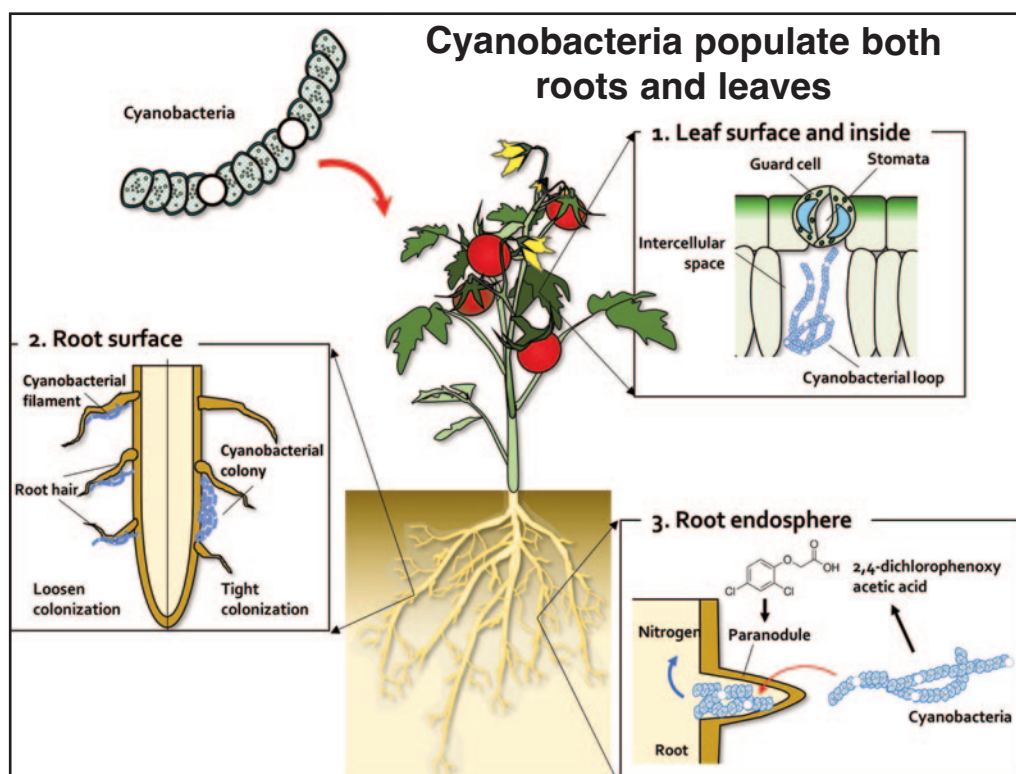
Cyanobacteria in Soils

Our main concern in this lesson is to understand the function of cyanobacteria in soils. These bacteria are profoundly important in the soil’s and plant’s carbon and nitrogen economies in that they perform key functions:

(1) Nitrogen Fixation. Cyanobacteria can convert atmospheric nitrogen (N_2) into plant-available ammonia, thus supplying part of the required N.

(2) Soil Structure Improvement. They contribute to the formation of soil aggregates, which enhance soil stability and aeration.

(3) Nutrient Cycling. Cyanobacteria are integral to nutrient cycling, helping to release



nutrients that are essential for plant growth.

(4) Biostimulation. Cyanobacteria are able to synthesize growth promoting compounds such as phytohormones and growth regulators.

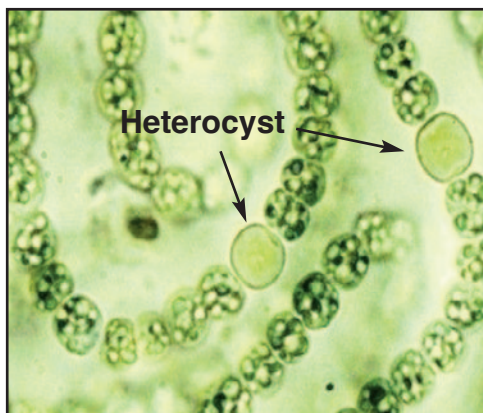
(5) Biocontrol of pests. These organisms are adept at competing with pathogenic microbes, and can produce pest-suppressing organic compounds.

15-Minute Soils Course

All of these functions of cyanobacteria reveal their essentiality within sustainable farming systems; in reality, all farming systems need them.

Nitrogen Economy With Cyanobacteria

Cyanobacteria fix gaseous nitrogen within heterocysts. These are modified, enlarged vegetative cells with thick cell walls and are pale yellow in color. These heterocysts form especially during periods of nitrogen starvation. They do not possess a functioning photosynthetic apparatus



because their primary function is the anaerobic fixation of atmospheric nitrogen using the enzyme nitrogenase, thus providing

other cells in their filament with nitrogen for biosynthesis. Nitrogenase is inactivated in the presence of oxygen, so the heterocyst with its thick cell wall creates an anaerobic environment.

Estimates of the amount of atmospheric nitrogen fixed by cyanobacteria within the rhizosphere of plants vary from 5, to up to 50 to 100 lb/acre, depending on the species of organism, crop, and soil conditions. This is an amazingly large amount that has been underestimated in the past, and points towards the need for farmers to encourage the growth of these organisms by following these practices:

(1) Maintain consistent soil moisture. This is easier to control under irrigation, but difficult for many on-farm situations, especially during drought. Cyanobacteria need moisture to thrive.

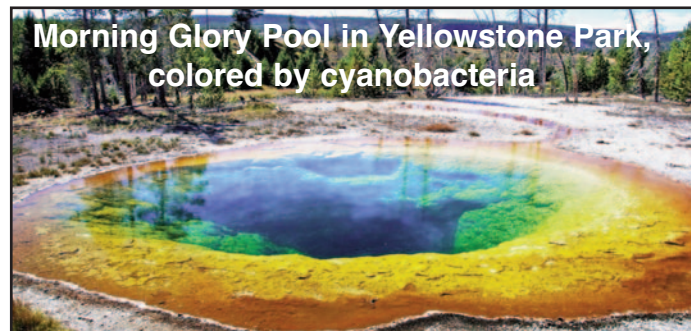
(2) Balance soil minerals. The Albrecht system of building and maintaining a balance of 60-70% calcium, 12-15% magnesium, 5-7 % potassium, and less than 0.5% sodium base saturation

will help achieve this goal. Like for all soil organisms, sufficient minerals in balance are important for optimal cyanobacterial growth.

(3) Maintain high organic matter levels. The cells of cyanobacteria require organic carbon to grow, so manure, compost, and crop residues will enable the fixing of more nitrogen.

(4) Add cyanobacteria inoculants. These inoculants may be hard to find, but they are effective if applied in many cases.

Cyanobacteria can also enter plant tissues through stomata, where they colonize the inter-



cellular spaces, forming loops and coils. □

See How Much You Learned

1. Cyanobacteria are found in most environments throughout the world. T or F.
2. Cyanobacteria populations are found in both _____ and _____.
3. The contribution of cyanobacteria to soil nitrogen can be up to a. 5 lb/acre, b. 50 lb/acre, c. 100 lb/acre, d. 300 lb/acre.
4. Soil structure is built by cyanobacteria. T or F.
5. The specialized cells of cyanobacteria that fix nitrogen are called _____.
6. Cyanobacteria are estimated to contribute to about 5% of atmospheric oxygen generation each year. T or F.
7. Farmers can get better use of cyanobacteria in their cropping systems by a. applying manure, b. irrigating their crops, c. applying pesticides, d. balancing minerals.

Answers: 1. T; 2. roots (or soil), leaves; 3. a, b, c; 4. T; 5. heterocysts; 6. F; 7. a, b, d.

Drones and AI to Change Agriculture?

By Marcus Chen

Abridged from Smarter Farming: How AI Drones Revolutionize Agriculture in 2026, www.dailytech.ai

AI drones for agriculture represent a significant leap forward in precision agriculture. Historically, farmers relied on manual observation, aerial photography, or satellite imagery – methods that were often time-consuming, less precise, and limited in their real-time data acquisition capabilities. AI drones, equipped with high-resolution cameras, multispectral sensors, and thermal imaging, can capture vast amounts of detailed data at an unprecedented speed and scale.

The “intelligence” provided by AI algorithms allows these drones to analyze this data on the fly or shortly after flight, identifying patterns and anomalies that would be invisible to the human eye. This enables farmers to make informed, data-driven decisions about irrigation, fertilization, pest control, and crop health, leading to reduced waste, lower costs, and increased yields.

The ability to monitor large fields efficiently from above is a game-changer, providing farmers with a comprehensive overview of their land that was previously

unimaginable. Furthermore, the insights derived from these AI-powered flights contribute to a more sustainable agricultural model, minimizing the environmental footprint of farming operations.

The practical applications of AI drones for agriculture are extensive and directly contribute to optimizing crop manage-



ment. One of the most significant benefits is enhanced crop monitoring. Drones can fly over fields at regular intervals, capturing high-resolution imagery. AI algorithms then analyze this imagery to assess crop health, identify areas that are underperforming, and detect early signs of disease or pest infestation. This allows farmers to intervene proactively, applying

treatments only where and when needed, rather than following a blanket approach.

This targeted application of pesticides, herbicides, and fertilizers is the essence of precision agriculture, leading to significant cost savings and a reduction in environmental impact. For instance, a drone might identify a small patch of crops affected by a common fungal infection. Instead of spraying the entire field, the farmer can precisely treat only that affected area, saving resources and minimizing chemical runoff.

Another critical application is in irrigation management. AI drones can map soil moisture levels across a field, identifying areas that are too dry or too wet. This data allows for precise irrigation adjustments, ensuring that crops receive the optimal amount of water, which is essential for healthy growth and maximizing yield. Farmers can create variable rate irrigation maps based on this data, controlling irrigation systems to deliver water only to the specific zones that require it. Furthermore, these drones can assist in planting and harvesting. They can provide detailed maps for optimal planting patterns, and assess crop maturity to determine the best time for harvesting. □

Bee Vectoring Technologies

By David C. Griescom

Advances in Crop Science and Technology, 2025, Vol. 13:1.

In recent years, the importance of pollinators, particularly honeybees, has gained significant attention due to their essential role in ensuring crop production and biodiversity. However, the challenges facing honeybees—such as pesticide exposure, habitat loss, and diseases—have raised concerns about their decline.

At the same time, there is a growing demand for more sustainable agricultural practices that reduce reliance on chemical pesticides. This is where Bee Vectoring Technologies (BVT) come in, offering a ground-breaking solution that harnesses the natural pollination process to deliver targeted crop protection.

Bee Vectoring Technologies is an innovative agricultural approach that uses

bees as “vectors” to deliver natural biocontrol agents, such as beneficial microorganisms, directly to plants. This process not only protects crops from pests and diseases but also reduces the need for synthetic pesticides, benefiting both the environment and farmers.

What is Bee Vectoring Technology?

Bee Vectoring Technology (BVT) is an integrated pest management system that utilizes honeybees and other pollinators to deliver beneficial microorganisms to crops in a highly targeted and efficient manner. The key idea behind BVT is to use bees as “messengers” or “carriers” for biocontrol agents, which are natural substances, such as beneficial fungi, bacteria, or viruses that can protect plants from pathogens and pests.

The process works as follows:

(1) Inoculation of Bees. Bees are trained to pick up the biocontrol agent,

which is applied to the bees’ bodies while they are in their hives or at a designated feeding station.

(2) Pollination and Delivery. As the bees visit flowers to pollinate crops, they inadvertently transfer the beneficial microorganisms onto the plants, targeting specific pests or diseases. This



allows the biocontrol agents to directly interact with the plants, offering protection from a variety of pathogens without the use of chemical pesticides.

(3) Crop Protection. The biocontrol agents, such as Trichoderma, Beauveria, or Bacillus subtilis work by outcompeting harmful pathogens, suppressing their growth, or inducing plant resistance. □

Lessons From *Farmers of 40 Centuries*

By Paul W. Syltje, Ph.D.

It is seldom that a book on permanent agriculture can have such influence as *Farmers of 40 Centuries*, written by F.H. King, former chief of the U.S. Department of Agriculture. In 1911 he published his findings on his extensive journeys to the Far East to expose farming practices that had enabled civilizations to survive and thrive indefinitely.

Dr. King traveled through Japan, Korea, and China, photographing fields and talking to farmers, noting the exact methods used. He wanted to discover how people could farm the same fields for 4,000 years without destroying their fertility. He especially wanted to see how Oriental farmers could support as many as 12 to 15 people on less than two acres, and do it generation after generation without buying fertilizer.

What Dr. King saw was a farming system where nothing was wasted. Fields were carefully terraced so there was little erosion. Silt that was carried into canals by heavy rains was scooped up and put back on the fields, usually after being composted with crop and food residues. Farmers worked on such wastes for up to six months in order to make

them the very best possible fertilizer for manuring the soil to feed the next season's crop.

Human wastes were almost the lifeblood of Oriental agriculture, said

other Western countries, where human wastes are a serious liability that must be disposed of through sewage disposal systems — and then the sewage sludge is laced with toxic chemicals and heavy metals that limit its value as a fertilizer. In 1908, Shanghai sold one contractor 78,000 tons of human waste for \$31,000 in gold!

By recycling their human and animal wastes back to the land from which the nutrients were taken by food crops, Far Eastern countries were able to maintain soil fertility indefinitely, in ways that did not compromise good sanitation for the health of large populations. Dr. King hardly ever saw a fly during his journeys. The principles these people employed carried forth their civilizations indefinitely, while the people raised large families for countless centuries.

We can learn from these people the lessons of recycling and regenerative, sustainable practices

which often conflict with our profit maximizing corporate visions. Modern Western agriculture tries to force biological processes into an industrial model, leading to the sacrifice of long-term sustainability of our soils, and the need to import many off-farm inputs. The farmers of 40 centuries can teach us a lot! □

Methods Used for Long-Term Farming Success

Crop diversity: Farmers cultivated a variety of crops, including rice, vegetables, and legumes, which helped in maintaining soil health and provided diverse food sources. Legumes were grown before paddy flooding to fix nitrogen in the soil.

Community life and cooperation. Farming was often a communal effort, with families working together to manage their fields and share resources.

Long-term planning. Farmers focused on sustainable practices that would benefit future generations, rather than short-term gains.

Sustainable Farming Practices

Nutrient Cycling. Human and animal waste enriched the soil, allowing the maintenance soil fertility over centuries without relying on artificial fertilizers.

Resource Efficiency. The farmers utilized every available resource, minimizing waste and composting organic materials and using crop residues to enhance soil health.

Labor-Intensive Methods. Large populations were maintained through labor-intensive agricultural practices. Oftentimes multiple crops per year were grown, maximizing land use.

Dr. King. Farmers made attractive screens near their fields so that passersby would honor them by leaving behind some human fertilizer. All town and city families saved their toilet wastes and sold them to farmers. Cities found their human wastes to be a valuable asset, not a liability as we find in the United States and

Statement of Purpose

Vital Earth Resources is a for-profit private corporation dedicated to the development, production, and sale of top-quality, ecologically sound horticultural and agricultural products. *The Vital Earth News* is a periodic publication of Vital Earth Resources to inform customers and other interested parties about our products and programs, and to educate our readership on critical issues facing growers today and on into the future.

For further information ...

Stay tuned to our website for the next edition of *The Vital Earth News*! You can find current and back issues at vitalearth.com/vernews, and keep up to date with the latest information, product news, and announcements at vitalearth.com/newsandevents. If you are interested in purchasing our products, or for other correspondence, please email us at info@vitalearth.com.

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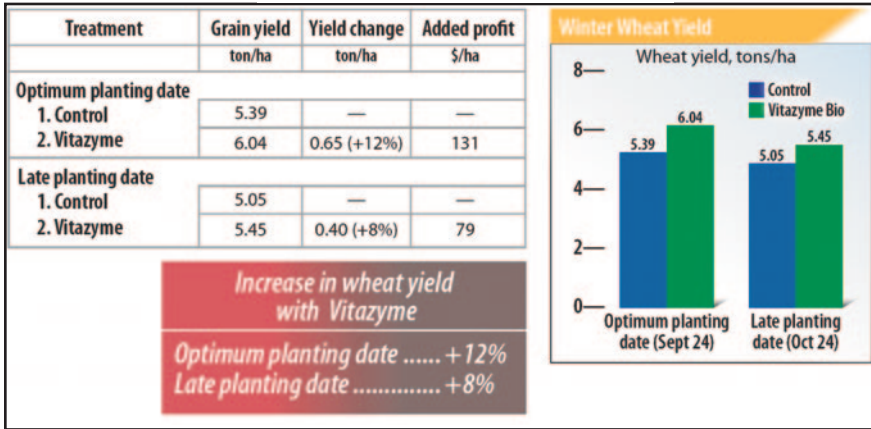
Thank you! The Team at Vital Earth Resources, Inc.



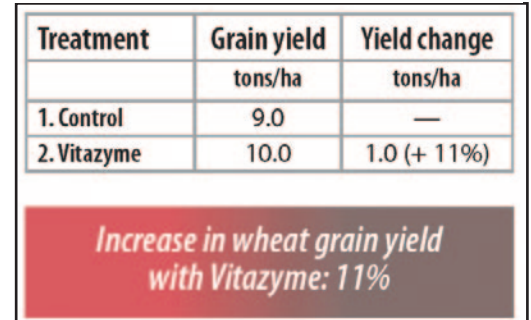
Wheat Trials in Ukraine Reveal Excellent Increases in Yield, Quality, and Growth

Winter wheat trials in Ukraine in 2025 showed the great potential of this bio-stimulant program to improve yields, quality, growth, and income for farmers.

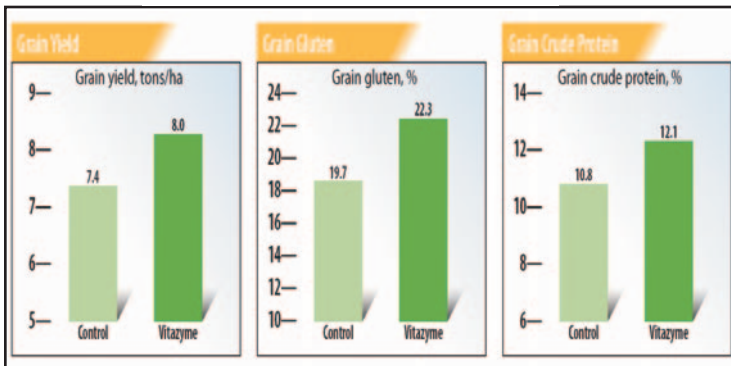
Vinnytsia Region



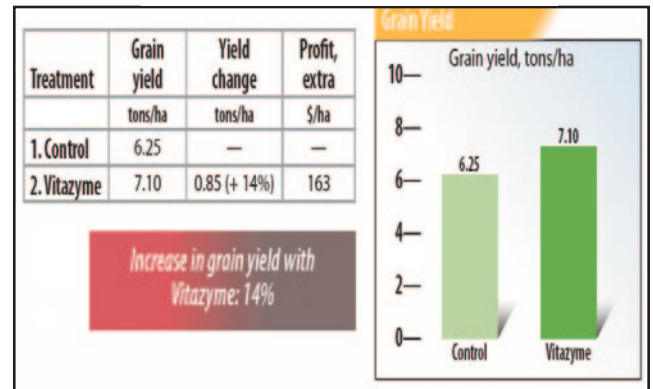
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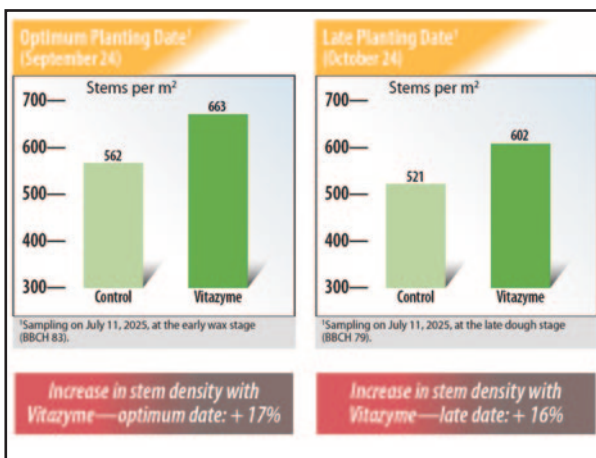


Vinnytsia Region



Vinnytsia

National Academy of Agrarian Sciences



Vinnytsia

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