Science Societies

Perspectives on agroecology as the future of farming

By DJ McCauley

December 25, 2020

A recent commentary in Agricultural & Environmental Letters argues for a future of farming based on agroecological principles. This farmer has adopted more ecologically relevant farming practices, and his son will now know much more of what to expect in the future. Photo by Alan Franzluebbers.

- In a peer-reviewed commentary in *Agricultural & Environmental Letters*, several prominent scientists offer their comments on agroecology as the future of farming.
- The commentary is the team's response to the USDA request for input on the Agriculture Innovation Agenda.
- The main component of an agroecological approach is its focus on improving environmental outcomes from farming to ensure a sustainable future.

We should be seeking healing of our planet, not just less harm than in the past," says Nancy Creamer, one of the authors of a recent *Agricultural & Environmental Letters* (AEL) commentary. The USDA put out a "request for information" asking key stakeholders for input to develop the Agriculture Innovation Agenda. The authors published this commentary in response; it offers a unique perspective on how we can change tack to meet the USDA's proposed target of cutting the environmental impact of agricultural production in half.

The commentary lays out a vision of farming girded by a focus on systems thinking, placing environmental, plant, and human health at the forefront (**https://doi.org/10.1002/ael2.20034**).

Here, *CSA News* magazine discussed the paper with the lead author, Alan Franzluebbers, and his co-authors Ole Wendroth and Gary Feng. Franzluebbers is a research ecologist with the USDA-ARS in Raleigh, NC; Wendroth is the past president

of SSSA and professor of Plant and Soil Sciences at the University of Kentucky; and Feng is a USDA-ARS research soil scientist and modeler at the Genetics and Sustainable Agriculture Research Lab in Mississippi. All three are members of the Societies.

The following conversations were edited for length and clarity.

CSA News: Why did you decide to write this commentary for AEL?

Wendroth: That goes back to spring of 2020 when the [Agriculture] Innovation Agenda came up. It implies a 40% production increase by 2050 and an environmental footprint reduction by 50%. I would say it's a substantial goal. It's important that we, as scientists, have the responsibility to see how we can realize that, how we can put that to work. It's easy to put out a goal for higher yields—no doubt the breeders will come up with some new varieties, and maybe we come up with new effective fertilization schemes. But on the other hand, who is the advocate for protecting the environment? That's where scientists need to step in and find strategies to come closer to the goal. Farm economy and environmental quality do not need to point in two different directions.

CSA News: How do you define agroecology?

Source: iStock/Si-Gal.

Feng: Agroecology is a complex and open system. Agricultural production is affected by weather conditions, soil type, management practice, and cropping systems. There's a lot of interaction, and we have to take into account the interactive and long-term impact of all of the factors combined.

Franzluebbers: Agroecology involves food production—we are producing food, and we have to produce good quality food. But there can be agricultural production where we don't fight nature—we work synchronously with it. Agroecology is an umbrella term that covers conservation agriculture, no-tillage, cover cropping, organic agriculture, and regenerative agriculture. Regenerative agriculture is a current buzzword, and I resisted it for a long time because we don't need a new term, we need new realization. Agroecology is agricultural production in tune with nature, not in disharmony with nature. We desire more than nature can necessarily provide, so we need a balance to try and achieve that harmonization.

Wendroth: Agroecology is the discipline of investigating, studying, learning, and understanding the different processes of production, of transformation, of decay. It has a very strong cycling component. It considers all the inputs into a system and all the outputs from a system, at regular intervals. Good farmers are agroecologists—they make observations of the system after a cycle and look into what direction they move. Do their past decisions imply an improvement? What management decisions should be reconsidered? Farmers have the goal of agroecosystem stability on their minds.

CSA News: How do you take big-picture goals, like thinking of agriculture as part of the broader ecological system, and apply them?

Franzluebbers: We don't have all the solutions, but it should be regional. These principles are really key: we don't disturb the soil, we keep it covered, we have living roots year round, and we have diversity. To get these things on the ground, we have to have good examples. Some farmers around the country are using these principles, but it becomes a matter of farmers showing other farmers how to get things done. They can learn from each other. But I think we really wrote the article because the USDA, as an umbrella department, has a large role in influencing agricultural policy. [It] can offer incentives and encourage stewardship.

Wendroth: The fascinating thing about farming is, while buildings and machinery all lose their value, soil is the only production factor that keeps its value if we treat it responsibly. It can even increase in value! Increasing soil quality, maintaining soil health—I see that as a very important part of the Agriculture Innovation Agenda. It is a key point. The good thing is that there are so many different soil and land management systems, and we can learn from each other internationally. Even in the United States, farmers and scientists in different regions can learn from each other! We need to foster that culture—learning from each other, supporting each other in the struggle for sustainable management of the land.

CSA News: What do you hope people get out of the commentary?

Franzluebbers: The biggest thing I wanted people to see is that if we focus only on agricultural production like we've done the last 50 years, we will not change anything environmentally. I firmly believe farmers are so knowledgeable that it will be hard for them to produce much less than they do now if they turn their focus to greater environmental stewardship. They just need incentives to be able to focus on the environment because it affects all people, not just them! What we do with agriculture

affects all of us, from climate change to water quality, human nutrition to pollutants. Because it is a communal good, we need the USDA to focus on the environment. Farmers need to know when they use a particular management style that it's good for their family, for their neighborhood, their state, their region, their country.

Wendroth: Ideally, it would be great to see a support system for farmers, so they could take a risk of letting yield go, so they can look into new management alternatives that they know about or are eager to try out to increase soil health, to create resiliency in their systems. They could work with researchers who monitor the processes on-farm. How does this affect the environmental quality? After 10 years, we would know where we're going. Based on the many paths farmers and scientists explore, we can get together and decide on the paths that we want to walk in the future.

An agroecological approach focuses on improving environmental outcomes from farming to ensure a sustainable future. Shown here is Kernza, a new type of a grain with root system that helps store nutrients, retain water, and improve the soil structure, ensuring a sustainable food production. Photo

by Chathurika Wijewardana.

Feng: We outline the threats of the most adopted agricultural production system to the environment and sustainability of resources as well as solutions for future farming in the commentary. The take-home message is that agriculture should be viewed as a whole picture; it is a complex open agroecology system. We should not just focus on productivity and profitability—the interdisciplinary system approach is encouraged.

CSA News: How do you help people who don't live in rural or agricultural communities see the importance of agriculture?

Wendroth: I didn't grow up on a farm, but our neighbors were farmers—I was always over at their farm with many other teenagers to help during the harvest. Nowadays, that's not necessarily the case anymore. With mechanization, there is less need for on-farm hand work and the off-farm population to get involved. I occasionally talk to high school kids about soils and their fascination. Just going out and communicating about the reality of soils, letting them touch soils, explaining that soil is not dirt—it's something alive, supplying our need for food, and if intact, it's a great carrier of ecosystem resiliency—I find that extremely rewarding.

Franzluebbers: It's about education—not just one way, it's a dialogue. We need to have more involvement with younger people. Our members are really engaged, and that's what we need: more of that dialogue, that educational link. Our Societies do a lot of that, and I think we're on the right track.

CSA News: Is there anything you really think our members should know?

Feng: Conventional field trials rely on designing different treatments and then changing one or several factors while keeping the rest of the factors involved in the

open system the same. However, it's not always a simple additive effect: it's interactive. Advancements in science and technology provide us opportunities now, more than ever, to develop an innovative, integrated system approach.

Franzluebbers: The main point of the commentary was to shift more focus on the environment, rather than hiding it behind this dual purpose of agricultural productivity along with the environment. Focusing on the environment expresses our stewardship values and can lead to healing the planet. Good quality food production will come along with it—I'm totally confident in that.

Wendroth: One important question remains: How do we make this message heard? We agree on the point that production increase should not be our first goal; we'd rather like to look at reducing the negative environmental impact—the negative footprint of excessive production. But how can we communicate that to those who make decisions?

Dig Deeper

Agricultural & Environmental Letters commentary, "Focusing the Future Of Farming On Agroecology," at **https://doi.org/10.1002/ael2.20034**.

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