**2025 Norman E. Borlaug International Dialogue**
**Session Title**: Fields of Renewal: Innovation for Soil, Ecosystem and Security
**Date**: October 23, 2025

**Speakers**

- Facilitator: Simon Heck | Director General, International Potato Institute
- Neil Bentley | Vice President, Market Management, Agricultural Solutions, North America, BASF
- Violet Grgich | President, Grgich Hills Estate Winery
- Rattan Lal | 2020 World Food Prize Laureate and Distinguished University Professor and Director of the Lal Carbon Center, The Ohio State University
- Paul Temple | Farmer, United Kingdom and Chair, Global Farmer Network

**Transcript**
Simon Heck:

Good morning and welcome to our panel on fields of renewal and welcome to our distinguished and exciting panelists. Before I introduce them briefly, let's remember that this panel is really centrally addressing the theme of this year's dialogue of soils and the healthy soil and regenerative agriculture as a foundation and at the heart of resilient, productive and sustainable agri-food systems. It's not the first time this dialogue talks about soils. It was actually in this very room, I believe a year ago, where we also had a panel talking about soil health for people and planet. And I think one of our panelists already was part of that discussion then.

So what we do today is really also taking a bit stock of the very latest and recent progress on developing innovations and adopting innovations. And to see into the future what kind of innovations and what kind of approaches to incentivize the adoption of soil health practices and regenerative agriculture practices look most promising. And what can we do to accelerate the adoption? That's really the theme of this panel.

My name is Simon Heck. I'm the Director General of the International Potato Center based in Lima, Peru, one of the CGIAR research centers. We work on potato, but we know that potato need healthy soils to prosper and to be really sustainable and profitable to farmers as well. I have with us here a number of very distinguished panelists, which I want to introduce to you briefly starting here at the far end with

Neil. Neil Bentley is the Vice President for Marketing Management Agricultural Solutions North America at BASF, and he leads there the development of innovations, including on sustainable farming, digital agriculture and concern about conservation and sustainability within that very large company's portfolio. Welcome, Neil.

Next to him, we have Violet Grgich, who is the President of Grgich Hills Estate Winery. And a company that's really renowned and recognized for setting standards and being a model on organic regenerative practices. And congratulations on that Violet. She also is known as a humanitarian supporting community, both locally and globally. And she is also linked here to our World Food Laureate from 2023, Heidi Kuhn and her Roots of Peace. Welcome, Violet.

Next to her, professor Ratan Lal, the 2020 World Food Price Laureate and the Distinguished Professor of Soil Science at Ohio State University, Director of the Carbon Center named after him, the Lal Carbon Center, one of the globally most recognized and distinguished scientists on soil and a pioneer on soil carbon sequestration and regenerative agriculture. It's our pleasure to have you Professor Lal.

And finally next to me, Paul Temple, a farmer from the United Kingdom and the chair of the Global Farmer Network that's based here in Des Moines, Iowa. Paul is a third generation farmer committed to conservation agriculture on his own farm and from what I read also really opening his farm gates to young people to educate them and to spread the news of regenerative agriculture and the role of science for that. So Paul, that's much appreciated and welcome to you.

And Paul, if I may, I want to start with the first question actually for you. As chair of the Global Farm Network, you work with farmers from around the world. What is the single biggest barrier preventing the adoption of regenerative agricultural practices by farmers? And what's the latest approach to overcome those barriers?

Paul Temple:

Well, thank you very much, and it is a real pleasure to be here, especially on the behalf of the Global Farming Network. We're embracing the term regenerative. The biggest single barrier is probably mindset. There is no single blueprint for

regenerative farming. It will be different in every single farming circumstance and our network shows that because we all have different farming circumstances.

But it is about how you approach the subject, and that's where you have that challenge. And in many ways I can use my own experience as to how I changed my approach and the way I looked at farming. Because I am someone who has embraced science his entire life, I have been part of trials and looked at the latest advances, I had a very good friend and farmer who was engaged in science and kept telling me to go and look at what he was doing with his conservation agriculture NOTAL in the UK, which was quite unique. And for some extraordinary reason, it took me five years to get to his farm, but it only took ten minutes on his farm to see the difference it was making. I've since that point realised it was my perspective. I felt that I was doing a good job, high production, it was reliable, why should I change?

It's getting farmers to look at the concept of change which is the barrier. I think regenerative farming is a really positive challenge for farming, because the rest of the world is looking at farming and it gives us a term to embrace and show the industry in a forward thinking positive light.

Simon Heck:

Excellent. If I can just follow-up a little bit on that. In terms of are there any gaps that you think either locally or globally through that network we can address realistically in the near future to really accelerate and to spread that experience you had?

Paul Temple:

Yes. I mean we have huge opportunity with our ability to communicate with smartphones and networks and social media. How we use that effectively will be the challenge because there's so many avenues. But one thing I've seen with our own network of farmers from across the world is if you are willing to share your experiences, farmers can learn from other farmers, and they will take that at face value far quicker than any other route. So that's our route to success in most ways.

Simon Heck:

Excellent. And let's move on to Professor Lal, who as I said, right, a real pioneer of research on regenerative agriculture. And you must have also observed as a scientist, the kind of progress or lack of progress made in this area. If you look at the most recent trends, what do you see as the main progress that's now being made? And where are still do we have gaps? And how can we overcome that gap?

Rattan Lal:

Thank you very much. First of all, it's a great honor and privilege to be here. It's really greatly appreciated. The regenerative agriculture and agroecology were the two term that came up through World Food Systems Summit in 2021. And the idea was that agriculture has a large footprint, and yet we need it to feed the growing population.

So how can the agriculture be transformed in a way that it not only produces food, but also restores the environment? That the word regenerative means. And regenerative idea, concept, philosophy is not a one practice. There are many practices. In fact, I had a list of 20 of them that could come.

So sometimes it's understood that perhaps it's one practice. No, there are many practices coming on it. One of the practice I'd like to mention is conservation agriculture. Conservation agriculture, some people think are three pillars. I would like to make it five pillars.

No plowing, leaving the crop ready to mulch. Number three, complex crop rotation, integration crops with trees and livestock and integrated soil fertility and nutrient management. So if you adopt that, that's where the potential and limitations come from. Resource poor farmers cannot afford to leave the mulch on the ground. Sometimes they cannot grow a cover crop, and that's the limitation.

But if they did that, agriculture has a lot of potential regenerative to sequester carbon in soil. Our estimate in the Midwest United States indicates that if we did conservation agriculture by itself, about half a ton of carbon per hectare per year. If you combine it with cover crops, maybe seven hundred fifty kilograms. If you combine also with the livestock, maybe about one metric ton of carbon per hectare per year could be sequestered in soil. So in a way, carbon has become a new crop with the idea that farmers can get another income from it.

The question is what the price that farmers should receive. My hope and estimate is 50 US dollars per credit. If farmers get that money, then they have an incentive and a reason to adopt the so called regenerative agriculture.

Simon Heck:

Thank you very much on that last point, right, that how to incentivize the kind of adoption and behavior change and the role of science in making visible what's otherwise invisible. And once it's visible, it becomes marketable as well. As a scientist, if I may, what would be the kind of scientific approach to further develop measurements both of the value of soil health? What kind of methodologies do we have perhaps today? And how do you see that develop into the future?

Rattan Lal::

The traditional methodology of soil sampling and analysis is kind of cumbersome. It's also very expensive. It's very difficult to sometime implement on large scale. So we are hoping to develop methodology which is simple, probably a cell phone-like device to have a rough estimate of what soil health is, aerial photographs, satellite imagery. I think we want to keep it simple.

But what can happen to promote this concept, we need a very close partnership with private sector and with policymakers, both of them. Private sector because they can help translate science interaction, invest in research and development and education in part. Policymakers, we need soil protection policy so that prime agricultural land is protected. Right now, there are many dangers to it. Urbanization is one of them.

So somewhere we should have a policy not only to protect against degradation, like erosion, salinization, but protection against encroachment by urbanization. So prime land in every country should be demarcated so it cannot be taken away for other purposes. And that policy could also help farmers given some incentive to adopt practices which restore soil health and make agriculture a solution to mitigation adaptation of climate change.

Simon Heck:

Very good. Thank you. You mentioned private sector and I want to move to Neil from BASF. Neil is in charge of innovation around that. What do you see as the most promising innovations today that could lead to really a step change in the adoption of soil health management practices and regenerative agriculture more widely?

And how do we adapt an innovation, a technology to the local conditions. We heard from Paul, right, how every solution needs to be locally sensitive and practical. At the same time, we want to scale out and be relevant at large scale in your company through your networks, how do you manage that?

Neil Bentley:

It's a really great question. Have to kind of scoot up in my seat because it's such an exciting topic really to bring energy to and maybe starting off with I grew up in Southern Minnesota in a town called New Richland and this is an area known for its rich soils that really help promote crop yields and overall community success, and I saw firsthand as I was growing up that the connection between soils, agriculture and communities are really tied together. And it's so important to contemplate that. And so we've done some studies here recently really illustrating what do farmers think sustainability is. And 77% of farmers say sustainability is soil health.

62% of farmers say it's being able to pass my farm on to the next generation. And then over half of farmers start to get into practices on no till cover cropping and other practices that we've talked about. But yet 40% of the world's land is considered degraded in terms of the United Nations survey. So that's 30% of cropland and 10% of pasture land. So this is an increasingly humongous and immense topic that we all have to deal with.

And I think that's where innovation really can help us get to the bottom of this. And that's where we invest each and every day. So we say farming is the biggest job on earth, and innovation is going to drive farming into the future. And so if we just think about traditional innovation in terms of seeds, traits, crop protection products, we're going to continue to see development in those areas that will enable higher yields, better harvestability, economics that can drive reinvestment in soil health. We're going to also see over the meantime breakthroughs in biological products.

Biological products that really help develop plants from an earlier stage that are driving increased yields and overall resource utilization that are improving plant health and soil health. But probably the most dynamic change, and I think we've heard it through various panels over the past, few hours, is that around artificial intelligence and data. Whether that's autonomy and being able to make more precise applications or that is through AI R&D efforts that are bringing innovations to the market more completely and more quickly, or it's using digital twins from an artificial intelligence perspective to be able to actually model and optimize outcomes from the very beginning. So if you take those traditional innovations, I think they're really important, but we also talk about business model innovations, and how we really drive connectivity to the practices that farmers are utilizing. And we see that here in North America, especially, where we're seeing the connectivity of clean fuels like ethanol to the actual reduction in carbon intensity and carbon footprints and rewarding farmers in this way are helping not only connect rural agriculture with, the best practices that generate soil health, but also ultimately those, incentives that will drive more income back to the farm.

So it's these areas that I think are going to be really critical. And as we scale globally, it's that digital divide that I think is the area that we can leapfrog. Our largest single network of digitally connected customers is in India. And here, there's a tremendous opportunity for us to take not only the technology we see in artificial intelligence now and bring it to those customers, but continue to innovate and advance at an even faster level. And so I think that's the place that we can really bring this together and continue to move forward.

Simon Heck:

Very good. I like how you point out that science needs to be connected to the incentives, not just for adoption, but for continued innovation. It's a process, it's a two way process if can say that together with the farmers and the users. Other panelists, you're welcome to also chip in and comment on that, how that may resonate with your own experience on your farms. But let me also come to Violet now and we have a bit more time for that in the second round.

Violet, from your perspective as an entrepreneur and as a successful farmer in the wine industry. How would you respond to that sentiment or perception that

regenerative farming may not be profitable in the short run, that it's more of a long term benefit? Does that ring true to you or how does that resonate with you?

Violet Grgich:

Absolutely not true. And it's very interesting because possibly for us we had an easier journey. We started farming organically in 2000. And by the way, we are 100% estate grown. That means all of our wine comes from grapes that we have grown ourselves on our own land and literally taken care of continuously.

So organic farming in 2000, we started biodynamic farming in 2003 in order to actually save a vineyard that was planted in 1959. My father saw this vineyard replanted after he immigrated from Croatia and was horrified because they pulled up a great vineyard. But we were able to purchase that vineyard years later. But it was, excuse me, having issues from red leaf virus. So when the leaf turns red, it doesn't get enough chlorophyll, doesn't make enough sugar, so it doesn't produce mature grapes with enough sugar to make wine. And my cousin, Ivo Yaramaz, who's really driven this whole regenerative agriculture for us, found biodynamic farming. It literally turned over in one year the health of our vines. But we also found over the years that there were still issues with biodynamics, particularly the fact that it was more theoretical rather than practical. And so my cousin started investigating regenerative organic.

And literally in one year of regenerative organic farming, we saw more really concrete and fabulous results in one year than we had a fifteen years of organic and biodynamic farming. Really shown by an increase in soil organic matter, almost 1%, which apparently is unheard of. And we did 1% in one year past the fifteen years. So immediately saw health of the soil, health of the vines, less pests, less insects. We found that in 2022, when we had an atmospheric rainfall, our neighbors who tilled their soil were flooded. We had eight to 10 inches in one day. Our neighbors were flooded. All of their topsoil was literally flowing into our vineyard. And our vineyard, which had no standing water, no tilling, was literally absorbing all of that water. Fortunately, my cousin who is somewhat technology defective managed to get a video of it, so we actually have proof.

We also found that in the fires of 2017 and 2020, we lost no grapes due to smoke taint. So just that alone cost our industry millions of dollars. These are all things that

happened very shortly after we adopted these practices. In fact, very recently, we had ten days during harvest of 15 degree weather for ten days. Our neighbors whose fine wines go from $400 to $600 a bottle lost almost all of their crop. It didn't just dry up, it burned to a crisp. We lost nothing and in fact picked grapes that were incredibly healthy, full of life, perfect. And the difference was my cousin measured our soil temperature at 85 degrees. Our neighbor's soil temperature was 175 degrees. That alone, that year cost Napa Valley millions of dollars. It saved us hundreds of thousands of dollars.

We didn't have to wait years for this to take effect. This took effect very quickly. And in fact, the first year after organic farming, I remember seeing birds and hearing birds in our vineyards that I hadn't seen before. And I also heard from a photographer that they found a rare bird they'd never seen in Napa twice in our vineyards. So there are reasons, and again, when it comes down to profitability, all of this, in order to produce great wines, you have to have great quality.

You not only have to pick your grapes, but they have to be of great quality. And we have the documentation, and you can try our wines and see for yourself.

Simon Heck:

Wonderful, excellent and very inspiring example, How at the very local level and using community and family to really be confident about and to gather evidence. So one question perhaps maybe how to share that story more widely and it reminds me of when Paul started to say he took him five years to visit his neighbors and ten minutes to be inspired and convinced. How we manage that and how do we make use of those great examples? How do we spread the news?

Violet Grgich:

We spread the news by being an example. For example, our next door neighbors whose grapes burned to a crisp have adopted regenerative organic practices. We take every opportunity to talk about this and show the results. And literally for us, our whole mission is peace through agriculture. Because both of my parents grew up in World War II, nearly lost their lives on a number of occasions.

But for us, we see that, as farmers, when we can actually spread the word about a farming system that is profitable, that brings healthy and more nutritious values to people and their lands, that could help create peace and bring people together.

Simon Heck:

Excellent. And Paul is the chair of the Global Farmer Network. Do you see a role for your network to support this?

Paul Temple:

Absolutely, and all farming organizations have a role, but our network is so useful to me and for many others within it because we're seeing in real time not only what works but what doesn't work. Willingness of farmers to share this is so important because that's how you learn in a practical circumstance. Once you take things out of a controlled environment and into a field in an annual season, it is so difficult to replicate trials in a meaningful way. So the balance of trial work and properly carried out trials within laboratories, but alongside the experience of farmers experiencing one set of weather conditions in a year are absolutely invaluable. And I think it's more important than ever before because not this harvest but the harvest before, we had the worst wheat yield since 1983.

And this year, and it's my fault because in March I said the most reliable crop I had was grass, and subsequently we've had the worst grass crop in my entire farming career. So our need to accelerate and challenge ourselves as to how we're going to do this in the future is more important than ever before. The final thing that I think is really important, this is for the next generation to engage in, because they're smarter communicators than I am, I can assure you. And it's their future. What I say is I'm on the same page as my son and daughter. I don't know any more about this than they do.

I find it really exciting that we’re in this together.

Simon Heck:

Excellent. So farmers really being hungry for innovation and driving it too and through trial and error and but trying to be systematic about it. Professor, if I can link

the academia into that as a partner to the farmers. Do you see there's more progress now in that partnership between academic research and the farmers' innovation?

Rattan Lal:

Certainly, conservation agriculture is being now adopted about 10% globally out of 1.5 billion hectares. We need to do more than we can. But the real transformer people that will bring change is really farmers. And some of the farmers have done a great job. They are the great steward.

If I may deviate a little bit, I was very delighted to hear 1% per year increase in organic matter. Wow. I would request you to accept me as your student. So Please consider I can come and learn from you. Mhmm.

Because your numbers are at least 10 times bigger than mine. Mhmm. So what it let's take 1% per year. So in twenty years, your soil will have a 20% organic carbon. You are farming peat.

Wow. That mean you could sell that peat for herbs. Absolutely. Think Maybe please

Violet Grgich:

you could make whiskey.

Simon Heck:

So whole new opportunities coming up.

Violet Grgich:

It's a lot more profitable than peat itself.

Rattan Lal::

I think the issue here is, let's be credible. Right. Let's make real numbers, because inflated number doesn't do any good anybody. So when you add organic matter into the science and what you're doing is correct, it decomposes. So what you added is

normally about 15% of that stays behind at the end of the year, and that is what increases.

And I think that is where the confusion comes in. But we need farmers like you. That's exactly what regenerative is that we need. But we need credible number so that there's no mislead. Now if the numbers are correct, the global soils, especially with farmers like her, a global soil between now and 2100 have a potential drawdown atmospheric CO2 by at least 150 parts per million.

And that the potential of agriculture. Excellent. Regenerative agriculture done properly, but I must indicate that the focus is here on the environment soil restoration, 40% of the degraded soil that we talked about, and how to restore them, how to put carbon back and how to reward farmer for growing carbon and soil, then we can make agriculture a solution to the environment.

Simon Heck:

Very good. Thank you so much. Neil, as a corporate entity, I know you invest a lot in research and gathering evidence. How well is that linked into the efforts by the smaller enterprises as well as by public sector research? And how can we strengthen that partnership?

Neil Bentley:

Yeah, it's a great question and so collaboration, I think that's one of the main elements that we see in this entire event is how we bring networks together of people who can really make a difference. And at BASF a couple of things that we're doing. One, we're creating partnerships and collaborations with entities that celebrate conservation, that celebrate regenerative farming practices and soil health, and we continue to hear fantastic stories from producers from all ranges of production, from pasture land to cropland, who have transformed their soils like you have, Violet, and seen tremendous differences in the yields, the water holding capacity, their ability to transcend droughts and rains, which are only becoming more volatile and frequent each and every year. That's the first point.

The second point is around you manage what you measure or you measure what you manage. I mean, you just we have to think about which way that goes, within

our organization, we're also now extending the types of trials that we're doing, not just to measure efficacy, not just to measure output, but to actually start to contemplate what the next level benefits are beyond weed control, insect control, disease control, plant health. It is about how we give back. We improve carbon intensity, where we reduce carbon intensity, we improve carbon in the soil, organic matter, we improve water holding capacity, we improve the overall soil health. And so as we continue to move forward, we're not just able to talk about what a product does to help you drive your crop yield, but also how that practice can be implemented that ultimately will help your soil health. And so having that confidence in knowing that there are tried and true research and developed technologies that will ultimately have an impact, I believe can create confidence in farmers to actually apply those technologies.

We move it from hearsay, we move it from trial and error to actually applied research that ultimately has an outcome.

Simon Heck:

Very good. And Violet, if I can come back to you and as much as we admire the success of your winery, and are there still some economic barriers remaining to further optimize regenerative agriculture in your business model? And what how would we address those remaining barriers?

Violet Grgich:

I don't believe we're really seeing any significant barriers if we're talking about the economic outcomes. So every year there are new challenges. Right now, the biggest challenge for the wine industry other than decreasing consumption is red blotch virus, and we are all working together to work with universities and find out solutions for how we can manage this virus. But we found very early on, my cousin expected us to be spending more per year on our farming costs.

We actually found out within a year that we were spending less. So for every acre, it costs us about $11,000 to farm regeneratively. Average Napa Valley is about 15,000. So we own about 413 acres, 350 of which are planted. So if you multiply that times 4,000, that's a lot of money that you're saving.

So every year we're continuing to increase those savings, lower our cost of goods and increase profitability, but also be able to put some of that money back into additional research, working with universities, working with our neighbors in particular, to see how we can work together as each, every year will bring something.

Simon Heck:

Excellent. Very good to hear that as we come towards the end of our session. Just want to share one experience I had not long ago in Gujarat, India. I attended a similar forum and one of the participants said that soil health needs to become more than an environmental priority. It needs to become a pathway to prosperity.

Do you agree with that statement and are we on that pathway? And how can we accelerate progress towards that?

Rattan Lal::

Soil health has really become a very important topic these days. And I think it has become a broader scope also, because we are trying to link now soil health to human health. To plants and animal health, and eventually, planetary health. I should mention this that the reason agriculture has a bright future is good farmers and private sector and the policymakers.

If they can put their heads together and support farming community to do good agriculture, we really have a broad future ahead. In that case, can transform all the issues that we have now. The climate change, water quality, biodiversity, the soil degradation, and even advancing the sustainable development goals and poverty and hunger, improve water quality. Our future really depends on good farmers, private sector taking interest and policymaker trying to make policies which are pro nature, pro agriculture and pro farmer.

Simon Heck:

Thank you. Other views on that statement I shared about the pathway to prosperity? Are we on that pathway already?

Paul Temple:

Well, if you talk to a lot of row crop farmers at the moment, they wouldn't feel they're on the pathway to prosperity. And I think that is part of the challenge in this. We tend to be looking at the here and the now. What we should be trying to do is look through the cycles that we're currently stuck into five to ten years' time. One of the reasons I changed was genuinely financial because of Brexit and the changes and coming out of the common agricultural policy.

I knew I was going to have to change the financial arrangement within our business. So there's the finance side of it, it has to be addressed as well. And I think there's an open conversation and that's why I think both upstream and downstream it's really important that we all talk about this, because we can learn from one another and in many ways normalize the language rather than look like it's something unique over there.

Simon Heck:

Very good. Now we have about three minutes left, and we want to have one statement from each of you about what's the one important next steps we need to take right now to improve and to restore soil health globally? Neil can we start this way? Sure. This time around?

Neil Bentley:

I come back to it's the connection of the economics and the practices that make all of the difference. So as we accelerate innovation, as farmers continue to adopt more regenerative practices, they should be rewarded for that. And I believe that the markets are developing that will enable farmers to be rewarded for that. But if we can accelerate that through policy, if we can accelerate that through collaboration, I think it will only motivate farmers to continue to adopt technologies more quickly that will help improve soil health.

Simon Heck:

Thank you. Violet?

Violet Grgich:

I think the biggest thing is to really stop poisoning the soil and treating soil for what it is, which is an actual living, breathing thing. When you treat everything that is alive, and you create balance and harmony between that, you create something much better. And I mean, that's always the essential. The essential is stopping poisoning your earth, thinking about life. Making friends of everything, including the soil and microbes and plants and other people.

Rattan Lal:

I agree, soil is a living thing. And soil as a living thing has rights. All living things have rights. Soil has the rights to be protected, restored, thrive and managed judiciously. Simply because you own it, it cannot be treated as a property to do with it what you wish to do with it.

And that is a educational part, is very critically important. This fragile resource is finite. It's a very vulnerable to land misuse and solve mismanagement, and therefore it require extra care to protect it, restore it and make sure that it creates the ecosystem services, which are essential for humanity and nature.

Simon Heck:

Very good. And, Paul?

Paul Temple:

Well, I'd concur with what's been said, genuinely I find it really exciting, because I'm seeing changes in my soil year on year. I haven't the experience to judge it, but I think the fact that we can make changes and differences through how we farm and how we look at soil is genuinely the most exciting thing. I constantly try and correct people when they use the term land rather than soil. We just need to address the fact that we're dealing with a living thing. I was taught physics and chemistry in my agricultural education, and now I'm finally learning biology.

And those three sciences need to come together.

Simon Heck:

Thank you. And, you know, science has a role to play to make the invisible visible and to really also then allow society to attach value to soil. I remember when we started yesterday morning, one of those introductory videos said we are not the owners of the soil, right? We are the custodians of the soil. And I think out of that the responsibility to invest in it in terms of our businesses and our science, our capacity is a very direct responsibility that we all share.

So thank you very much for your insights and let's have a strong round of applause for our panelists.