

Cultivating Sustainability: A Training for Agronomy Professionals

“Sustainability” is a term you likely encounter in your personal and professional lives. But how do you apply this concept in your daily work as a Certified Crop Adviser (CCA), consultant, or agricultural professional?

In this ten-part training series, funded by CHS Inc., you will learn how the concept of sustainability is being increasingly researched and applied by numerous practitioners in production agriculture. From 4R nutrient management to integrated pest management (IPM), precision agriculture, conservation tillage, cover crops, and soil health, this series explores the ins and outs of sustainable agronomy via presentations, the Fieldprint® platform, and a virtual-farm sustainability tour. Gain access to resources that you may not have known were out there, making you a more efficient and effective agronomy adviser.

By the end of the series, you can expect to be knowledgeable in the latest concepts in sustainable agronomy and have a clear idea of how to implement sustainable management practices for the benefit of you and your grower clients.

Webinar #1: Launching Sustainability

Presenter: Matt Liebman, PhD, Professor, Iowa State University

BIO: Matt Liebman is a professor of agronomy and the H.A. Wallace Chair for Sustainable Agriculture at Iowa State University. He is a fellow of the American Society of Agronomy and was a member of the National Research Council committee that produced the 2015 report titled “A Framework for Assessing Effects of the Food System.” His research, teaching, and outreach activities focus on ways to use ecological processes to improve farming systems. His specific interests include diversified crop rotations, weed ecology and management, and the use of native prairie species for soil, water, and wildlife conservation and biofuel production. Matt is a member of the board of directors for Wheatsfield Cooperative Grocery in Ames, Iowa, which has 71 employees and more than 5,600 owner-members.

Agricultural Sustainability and Resilience – Principles and Practices

Sustainable farming systems are intended to minimize the use of non-renewable resources, decrease the emission of pollutants into water and air, retain and regenerate soil, and protect human health and wildlife. They are also intended to maintain or increase farm productivity and profitability while reducing reliance on purchased inputs. In the face of new challenges to agricultural systems, including large financial risks, a high frequency of extreme weather events, and a growing number of pest species exhibiting resistance to management practices, there is increasing need to make farming systems more resilient to shocks and stress factors. This webinar will examine key components of sustainable and resilient farming systems and will provide two detailed examples of how sustainability and resilience can be improved in the central Corn Belt.

- What is agricultural sustainability?
- What are the requirements for sustainable farming systems?
- What is resilience and why is it important for farming systems?
- Biodiversity is a key component of strategies for improving agricultural sustainability and resilience.
- Two examples of farming systems intended to increase agricultural sustainability and resilience in the central Corn Belt.

- Extended crop rotations systems integrated with livestock.
- Prairie conservation strips in cropland.

Presenter: Doug Peterson, Iowa/Missouri Regional Soil Health Specialist, USDA-NRCS

BIO: Doug Peterson has been an NRCS employee for over 29 years. He started his career as a Soil Scientist. He has been a District Conservationist in both a grassland based county in south Missouri and a large cropland county in north Missouri. He has also been a State Grassland Conservationist and a State Soil Health Specialist. Currently he is a Regional Soil Health Specialist for Missouri and Iowa teaching NRCS staff and producers around the mid-west about soil health, how it impacts virtually all natural resource processes, and what type of management it will take to effectively improve our soils health, function and productivity. He attended college at Missouri Western State University graduating in 1986 with a B.S. degree in Agriculture with an emphasis in Economics and Agronomy and grew up on a crop and livestock farm near Newtown in north Missouri. Today he continues to operate a cow/calf and contract grazing operation with his father, Steve. Currently they run about 250 cows. They utilize Management-intensive Grazing and Holistic High Density Grazing to improve soil health, eliminate the need for most purchased fertilizer and limit hay needs to about one bale per cow per winter.

Doug's NRCS training coupled with his real world hands on experience make him a unique speaker that is relatable to both agency personnel and producers.

Basic Soil Health Principles and Profitable Soil Health Practices

Historical farming practices such as tillage are deeply ingrained into agricultural society. However, many of those historical practices are not based on the science of agronomy. We will review basic soil function and the four basic principles used to restore soil function and soil health. Then we will discuss conservation practices that make sense from a profit standpoint.

- Historical Perspectives
- Understanding Aggregate Stability
- Principles of Soil Health
- Comparison of ROI for different conservation practices
- No-Till
- Cover Crops
- Bio-reactor
- Terraces

Webinar #2: Applying 4R Principles as Part of a Sustainable Production Plan

Presenter: Dr. John Grove, Director, University of Kentucky Research and Education Center

BIO: John Grove is Director of the University of Kentucky Research and Education Center at Princeton, Kentucky and a Professor of Agronomic Soil Science at the University of Kentucky, responsible for research in soil fertility and plant nutrition management for grain crops. He taught nutrient management at both undergraduate and graduate levels. He was born in Michigan and joined the UK faculty in 1981, after training in chemistry, soil chemistry and agronomy at Michigan State and the University of Georgia. His research interests are in the management of the chemical and physical properties of agricultural soils. His research program is directed towards an improved understanding of:

1) spatial and temporal dynamics in soil nutrient cycling and crop nutrition; 2) water and atmosphere quality as related to inorganic/organic nutrient source management (rate, timing and placement); and 3) crop and tillage rotations with particular emphasis on the no-tillage crop establishment/soil management system. He has directed/co-directed 30 graduate students (14 PhD and 16 M.S.) to successful conclusion of their programs.

Making soil tests, tissue analyses and sensors work for sustainability. The objective of this presentation is to better understand these diagnostic tools in terms of use and misuse.

- Soil Testing – Understanding correlation and calibration of soil test results
- Plant Tissue Analysis – What plant tissue analysis can do – and what plant tissue analysis
- Chlorophyll Meters, Canopy Sensors, Yield Monitors and Precision Nutrient Management – New tools, big promises, bigger challenges
- Putting a sustainable nutrient management diagnosis program in place. Taking responsibility for your sustainable nutrient management decisions.

Presenter: Brett Roberts, CCA-IL, USDA-NRCS, State Conservation Agronomist

BIO: Brett graduated from Southwest Missouri State University (Missouri State University) in 1983 with a Bachelor of Science in Agronomy and completed a Master of Science Degree in Agronomy from the University of Illinois in 1995. Brett has been employed by NRCS for the past 28 years. All of which has been spent in Illinois. Brett has worked in three different field offices and has been the State Conservation Agronomist since 1995. Brett is responsible for how agronomy is used in applying conservation practices to address resource concerns such as erosion, soil health, and water quality issues relating to sediment and nutrients. Brett represents NRCS on the Illinois CCA Board and served on the 4R Specialty Credential development committee. Brett is a member of the following organizations: American Society of Agronomy, Weed Science Society of America, and Certified Crop Advisor

Nutrient management planning has evolved to a point where economics, environmental quality, and crop productivity has converged. Local climate, geology, soils and other physical features of the landscape can overwhelm the best designs of a sound 4R based nutrient management plan if not properly considered. The discussion will mention some of the more important features that will vary considerably geographically.

- Site features that need to be assessed that relate to potential surface or groundwater vulnerability
 - Depth to groundwater
 - Depth to shallow bedrock (fractured) Susceptibility for runoff and erosion
 - Soil Management
 - Crop rotation
 - Tillage system
 - Opportunities for cover crops
 - Opportunities for buffer type practices
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Webinar #3: 4R Nutrient Management: Decision Making with Gathered Data

Presenter: Kirsten Workman, CCA-NR, Agronomy Specialist, University of Vermont Extension

BIO: Kirsten works with farmers to implement practices that improve crop production and protect water quality. After graduating from Pacific Lutheran University with an Environmental Studies degree, she started her career in Washington State working for the Mason Conservation District and Washington State University Extension. After 10 years of working with West Coast farmers, she joined the University of Vermont Extension staff in 2011, and works to provide practical information that producer's value. She helps farmers understand the importance of nutrient management and assists them in preparing and implementing comprehensive nutrient management plans. Currently, her work also focuses on cover cropping and reduced tillage systems for Vermont farms and better ways to apply manure in these systems with new injection technology. On-farm demonstration projects and research projects, as well as her work with the Champlain Valley Farmer Coalition, Inc. have helped her provide valuable information, technology and techniques to her farmer clients. She enjoys learning from and with a diverse group of farmers in the Lake Champlain basin. In addition to being a Certified Crop Adviser, she is also working on a master's degree in Plant & Soil Science (Agronomy) at University of Vermont. Her research project aims to provide farmers with information about successful cover cropping systems that make the most of their livestock manure while reducing nutrient runoff and increasing soil health.

Kirsten lives on a historic farm in Vermont's scenic Lake Champlain basin with her husband, son and daughter. She enjoys exploring the forests, fields and waters of Vermont with her family and is glad to have access to some prime Vermont farmland, where she is able to raise more (and larger) livestock than she was able to in the temperate rainforest of the Puget Sound.

Nutrient Management can be frustrating and time consuming, making us wonder if it is worth all the effort sometimes. This presentation will discuss strategies for making the most of 4R Nutrient Management, using it as a decision making tool and asset for the farm, as well as highlight which practices can be used to put the plan into action. We will also talk about how to use all that data you've collected to make sound decisions on the farm.

- Developing a Nutrient Management Plan
- Environmental Risk Analysis & Guiding Documents
- Practices to Make it Work
 - Conservation Practices for Environmental and Farm Benefit
 - Tips for Successful Adoption by your Customers and Clients
 - Celebrating Success
- Monitoring & Adjustments

Webinar #4: Integrated Pest Management: Plant Pathology & Insects

Presenter: Dr. Kiersten A. Wise, Associate Professor and Extension Grain Crops Specialist, University of Kentucky – Research and Education Center, Department of Plant Pathology

BIO: Dr. Kiersten Wise is an Associate Extension Professor of Plant Pathology at the University of Kentucky. Her crop responsibilities cover corn, sorghum and forages. Her Extension program focuses on developing economical and sustainable disease management practices for agronomic field crops. Kiersten grew up in Iowa and earned her B.S. in Plant Health and Protection from Iowa State University.

She next received an M.S. in Plant Pathology from the University of Georgia and completed her PhD work at North Dakota State University in Plant Pathology. She was an Associate Professor of Plant Pathology and Extension Specialist for Field Crop Diseases at Purdue University before joining the University of Kentucky in 2017.

Integrated Pest Management: Plant Pathology

This presentation will cover the range of management methods for corn and soybean diseases and discuss ways farmers can use integrated management to achieve sustainable and economical disease management.

- Disease Management Challenges
- Understanding Disease Development
- Field History
- Scouting
- Genetic Resistance
- Cultural Practices
- Chemical Practices
- Biological Control
- Integrating Disease Management Methods
- Fungicide Resistance Management
- Example of Sustainable Disease Management Program
- Future Challenges

Presenter: Dr. Adam Varenhorst, Assistant Professor & SDSU Extension Field Crop Entomologist

BIO: In 2015, Dr. Varenhorst was named, South Dakota State University Entomology Specialist where he can focus his career on helping growers protect their crops and livelihoods from pests. Varenhorst received a master's and doctorate degree in entomology from Iowa State University in Ames. He focused his research on the management of soybean aphids by using selective insecticides and host plant resistance.

Integrated Pest Management: Insects

This presentation will cover insect pest management in a manner that is sustainable through the incorporation of an integrated pest management program. The presentation will highlight how an insect resistance management plan fits with an integrated management program to manage pests while preventing resistance. It will also discuss how resistant pest population management can affect pollinators.

- Overview (How does IPM fit into sustainability insect management planning?)
- Development of Resistance
- Identifying Resistance
- Insect Resistant Management (how to prevent resistance)
- IPM Framework
- Best Management Practices
- Scouting Pre- and Post-Treatment
- Recognize & Report

- How does resistance affect pollinators

Webinar #5: Precision Applications: Data Gathering/Planning

Presenter: Richard Jenny, CCA-MN, Agronomist, AGVISE Laboratories

BIO: For the past 17 years, I've worked as an agronomist for Agvise Laboratories in our Benson, MN facility, covering southern MN and SD. My lab clients are mainly crop consultants, agronomist and retail fertilizer dealerships. I've been involved with soil sampling and nutrient management for over 30-years and for nearly 25-years involved with both grid and zone soil sampling.

Precision Applications: Soil Sampling

This webinar will go over the concepts of grid and zone soil sampling in the Northern Great Plains. It will also cover the sampling trends since 2000 and explain the agronomics of precision soil sampling.

- Trends in Precision Soil Sampling
- Grid and Zone Soil Sampling
- Early Summer Soil Sampling

Presenter: Kelly Sharpe, CCA-ND, Owner, GK Technology Inc.

BIO: Kelly is owner in GK Technology Inc., an Agriculture GIS software and mapping services company based out of Halstad, MN. Job duties are primarily agronomy, sales and support. GK Technology specializes in image processing, variable rate prescriptions, topography and drainage, tile design, drainage controls, sugar beet yield monitor/mapping and site-specific services.

Precision Applications: Data Sources & Imagery

This presentation will cover the wide array of input options for creating management zones. Look at some different uses and options for how to use these zones. Finish up by showing how grids and zones can come together to make a stronger precision program.

- Input Data Sources – Zones
 - Imagery
 - Timing & Resolution
 - Topography/Veris / EM38
 - Yield Data
 - Yield Data Zones vs Analysis
- Crops & Data Utilization
 - Crops
 - Imagery
 - Fertility / Seed / Yield Goals / Herbicide / Irrigation / Fungicide & Insecticide
 - Topography
 - Fertility / Irrigation
 - Veris / EM38
 - Fertility / Herbicide / Irrigation

- Yield Data
 - Fertility / Seed / Analysis
 - Grids and Zones come together
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Webinar #6: Precision Applications: Decision Making

Presenter: Nathan Kosbau, Regional YieldPoint Specialist, CHS

BIO: Nathan was raised on a specialty crop farm in Northern Minnesota. He graduated from the University of Minnesota in 2008 with degrees in Agronomy/Plant Genetics and GIS. Nathan started his career with Prairie Lakes Coop in 2008 to begin “shaping” their precision agronomy strategy and further promote the products and services they sell. In 2012, Nathan was hired by CHS Country Operations as a Regional YieldPoint Specialist to further develop precision ag technology and train local cooperatives how to add value to their farmers operation.

In this webinar we will cover how big data is created and its relationships to create better prescriptions through farm planning. We will review the concepts of imagery, sampling and other input sources to determine what is the best method to create a prescription map for a grower. We will visit on the relationships between hardware, software and agronomic input data and how unlikely data pieces can help lead solutions.

- What is big data?
 - Cropping plans for growers
 - Review of Crop Plans
 - Creating crop plan routines
 - Creating Application Maps
 - Fall Application and Sources of N management
 - Summer Application/Side-top dress
 - Grower Applied prescriptions
 - Seed
 - Fertilizer – including manure
 - Creating New data
 - Tracking harvest data
 - Opportunities with Moisture mapping
 - Profitability mapping –showcasing the difference
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Webinar #7: Real-World Application: Putting it All Together

Presenter: Martin Adkins, State Resource Conservationist – IA, USDA-NRCS

BIO: Marty Adkins serves as Assistant State Conservationist for Partnerships for the USDA Natural Resources Conservation Service in Iowa. In this position he works to develop partnerships and alliances with other organizations in all sectors to benefit conservation. During his 36 year career with NRCS he has served in a variety of capacities at the state and local levels. He holds a B.S. degree in Agronomy from Iowa State University.

Protecting and building soil health has important agronomic benefits. Improved soil health leads to better water infiltration, water storage and nutrient retention. But there's more to this picture. The same practices that benefit soil health can also improve water quality, reduce downstream run-off impacts, provide livestock feed, help wildlife and pollinators, AND improve farmers' economic bottom line.

- Soil biota play an important role in improving soil aggregate stability, storing organic carbon and cycling nutrients.
- To help soil biota thrive and improve soil health, it is important to minimize soil disturbance, provide for plant diversity, keep living roots growing throughout the year and keep the soil covered as much as possible.
- The use of no-till/strip till, cover crops, crop rotations and other conservation practices help accomplish these goals.
- The steady use of these practices over time will help soils better infiltrate and store water, helping soils and crops better withstand weather extremes.
- These same practices can provide other benefits:
 - Nesting habitat and winter cover for wildlife
 - Nutrient retention for more efficient crop production
 - Reduced nutrient losses to improve water quality
 - Nectar sources for bees and other pollinators
 - Low-cost feed for cattle and other livestock
 - Habitat for natural predators of crop pests
- These practices can also improve farm profitability, by reducing tillage costs, increasing fertilizer use efficiency, reduced feed costs and stabilized crop yields during very wet and dry growing seasons.

Webinar #8: Assessing Crop Production Impacts on Field- and Farm-level Sustainability

Presenter: Chris Boomsma, PhD, Education Manager, American Society of Agronomy

BIO: Dr. Christopher Boomsma is an Education Manager at the American Society of Agronomy and the Soil Science Society of America. Prior to this role, he was the Director of Field Phenotyping at Purdue University. He previously worked for Dow AgroSciences as a research agronomist and crop physiologist. His projects at Dow AgroSciences focused on corn hybrid yield testing and agronomic evaluation, nitrogen use efficiency and drought tolerance genetic improvement, and precision agriculture. He has a PhD in Agronomy from Purdue University and a B.A. in Plant Sciences from Dordt College. He enjoys spending time with his wife and two children, volunteering for various religious and community organizations, and participating in nearly anything related to watersports.

Crop production practices impact an operation's sustainability in general and its environmental impact in particular. While it is relatively easy to speculate on the general effect of a single practice on the environment, it is relatively difficult to assess the impact of multiple practices in a data-driven manner and then choose a suite of management practices that improve an operation's overall sustainability. This webinar will use Field to Market's Fieldprint Platform to demonstrate how a software tool based on sound science and farmer-generated data can be used to assess the environmental impacts of

commodity crop production and identify opportunities for continuous operational improvement. Field to Market Fieldprint platform overview

- Field to Market Fieldprint output overview and interpretation
- Multi-field sustainability comparisons
- Questions and comments

Webinar #9: Improving the Sustainability of Crop Production: An Interactive Webinar Series Review and Discussion

Presenter: Chris Boomsma, PhD, Education Manager, American Society of Agronomy

This webinar will summarize and review key points from each of the webinars presented earlier in the series. A systems-level approach to improving the sustainability of crop production will be discussed based on the material presented in prior webinars. Techniques for implementing key lessons from the webinar series will be heavily discussed. Substantial time will be provided for participant questions, comments, and critiques.

- Webinar series review
- Webinar series key points
- Implementation
- Questions, comments, and discussion

Webinar #10: Integrated Pest Management: Weeds and IPM Systems Summary

Presenter: Vince Davis, Technical Service Representative, BASF Corporation

BIO: Vince Davis is a Technical Service Representative for BASF. Vince resides south of Madison, Wisconsin and primarily services the states of Wisconsin and North Central Illinois. In this role, he utilizes his 20+ years agronomic experience to educate, train, and troubleshoot with agronomist and farmers regarding crop protection programs. Vince has served in his current role with BASF for three years. Prior to BASF, Vince was the Extension Weed Science specialist with the University of Wisconsin-Madison for four years having responsibility for agronomic row crops, and prior to that he was the Extension Soybean specialist with the University of Illinois-Champaign Urbana for two years. Vince received his Master's and Ph.D. degrees in Weed Science from Purdue University, and B.S. in agronomy from Western Illinois University.

Learn to apply Integrated Pest Management (IPM) concepts specifically for weed control. By understanding how weeds develop resistance, one can customize a number of best management practices for an effective weed control program.

- Introduction
- Definition of IPM
 - Basic IPM concepts
 - Economic Injury Level and Economic Threshold
 - Steps in the IPM process

- Pest monitoring
- Elements of IPM for weed control
 - Weed identification
 - Timing of control
 - IPM components
 - Mechanical
 - Cultural
 - Biological
 - Chemical
 - Herbicide classification
 - Selectivity, contact/systemic, site-of-action
- Managing weed resistance
 - How weeds develop resistance
 - Factors contributing to resistance
 - Mechanisms of resistance
 - Noteworthy BMPs for managing herbicide resistance
- Putting it all together
 - Customizing and effective weed management program