Welcome to the 16th Annual Crop Production Clinics. As we look forward to the 2023 growing season, I hope you find relevant, timely information here at today's meeting that will benefit you whatever your role in agriculture, as a farmer, crop consultant, pesticide applicator, or agriculture industry professional.

The Clinics have a long history as a part of Nebraska Extension beginning in 1974 as the Crop Protection Clinics (1974 to 2008). In 2009 the Clinics were re-named the 'Crop Production Clinics' when content was expanded to include Soil Fertility, Irrigation, and Cropping Systems in addition to Pesticide Safety; Agribusiness Marketing and Management; and Insect, Plant Disease, and Weed Management.

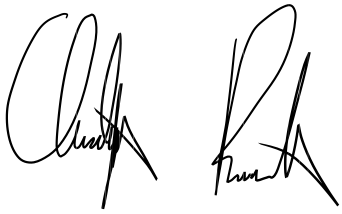
The *2023 booklet* contains summaries of the information presented at all the Clinic locations. The presentation will also available electronically at https://agronomy.unl.edu/cpc.

Again, this year we selected the Clinic locations and content with the intent to provide regionally relevant information. Our hope is to provide high-impact training for Nebraska's farmers and agricultural professionals. We are continually trying to improve the program. If you have any comments or suggestions about how continue to develop the Clinics, please let us know.

2023 Crop Production Clinics

Gering – January 4 – Gering Civic Center
North Platte – January 5 – Mid-Plains Community College – South Campus
Norfolk – January 10 – Northeast Community College
ENREEC – January 11 – Ithaca with Commercial Applicator Focused Sessions
Beatrice – January 12 – Holiday Inn Express
Kearney – January 18 – Younes Conference Center
Hastings – January 19 – Lochland Country Club
York – January 20 – Holthus Convention Center
Kearney – January 24 - Younes Conference Center with Nebraska Agri-Business Exposition

Sincerely,



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AGRIBUSINESS MANAGEMENT

Cost of Production, Trends, & Outlook for 2023

Glennis McClure - Nebraska Extension Farm & Ranch Management Analyst
Jessica Groskopf - Nebraska Extension Agricultural Economist
Brad Lubben - Nebraska Extension Agricultural Policy Specialist
John Westra - Director Panhandle Research, Extension and Education Center

Agricultural producers face challenging financial circumstances with rising input prices. The 2023 Nebraska Crop Budgets from the Center for Agricultural Profitability provide the estimated annual cost of production information. The crop budgets document the latest cash and economic crop costs, and margin trends, along with yield and price breakeven figures. With the 2023 enterprise budgets available in the Agricultural Budget Calculator (ABC) program, crop budgets can be modified to fit individual farm or field situations. This presentation will discuss the current 2023 crop budget uses and how users can create enterprise budgets based on the 2023 Nebraska Crop Budgets as a guide.

Cropland Cash Rental Rates & Considerations for Flex Leases in 2023

Jim Jansen - Nebraska Extension Agricultural Economist
Jeffrey Stokes - University of Nebraska-Professor of Agricultural Finance

Producers face uncertainty in setting cropland cash rental rates for their operations in 2023. Volatility in commodity prices, high input expenses, and statewide drought concerns make setting these rates difficult. Rental rates must account for these factors and their influence on profitability or yield. Flex lease arrangements allow cash rents to vary based on risk or production uncertainty. Final cash rental rates more accurately reflect the actual factors. This presentation covers changes in cash rental rates across Nebraska and introduces flexible lease arrangements to help operators make more informed decisions entering 2023.

INSECT MANAGEMENT

Wheat Insect Update

Jeff Bradshaw - Nebraska Extension Entomologist

The wheat stem sawfly epidemic continued for many of our wheat growers in 2022. When the adult wasps emerge from wheat stubble in the spring, they lay eggs in jointed wheat tillers wherein the sawfly larvae feed and develop. When the larvae prepare their overwintering chambers in early July, they cause the wheat to lodge. Wheat growers, particularly in the southern panhandle and northeast Colorado have seen tremendous losses from this pest in recent years. In fact, survey data throughout the region suggest that this insect continues to grow in abundance and geographic range as a wheat pest. This past growing season, CSU entomologists identified measurable infestations of wheat stem sawfly in northwest Kansas wheat fields. There still are no commercially viable chemical control options for this pest, primarily due to the long flight period of the adults and the cryptic feeding behavior of the larvae. We have seen a dramatic increase in the commercial availability of wheat varieties that are resistant to lodging. However, they all rely on a solid-stem strategy for resistance to sawfly larvae and do not fully recover yield lost due to sawfly larval feeding. We will discuss some insights that we've gained from some new research that began this year, insights from wheat variety evaluations, and new multi-state efforts that we hope to begin in 2023. Additionally, some wheat insects to watch for in 2023 are the Russian wheat aphid (and other cereal aphids) and please keep an eye out for the brown marmorated stink bug (a pest of several crops possibly including wheat, recently confirmed in Billings, MT).

The State of Western bean cutworm management in Western Nebraska

Jeff Cluever - Entomology Graduate Research Assistant
Jeff Bradshaw - Nebraska Extension Entomology Specialist

The Western bean cutworm (WBC) is a major pest of corn and dry bean. Integrated Pest Management (IPM) recommendations for the WBC in corn are based on scouting. However, this is not possible in dry bean owing to the architecture of the crop. Traditional recommendations in dry beans are to use pheromone traps in lieu of scouting. However, like most others, these recommendations are based on biological data alone. Thus, they neglect the practices, opinions, and decision-making processes of the stakeholders for whom the recommendations are created. We conducted a series of social and biological studies to address this issue. For biological studies, we assessed the effectiveness of four pheromone trap types in informing WBC management. Traps were placed upon seven fields in 2020 and 2021 in Scotts Bluff County. Cumulative WBC numbers up to peak flight were between 691.5 to 1,656 in 2020. In 2021, numbers were between 1,210 to 2,576 over four fields. Damage to the dry bean crops was between 0.16 to 0.86 percent of injured seeds by weight in 2020 and 0.00 to 0.63 percent in 2021. For social science data, we conducted a nationwide survey and a series of regional focus groups to obtain quantitative and qualitative data, respectively. From the survey, we learned that the Mexican Bean Beetle is still a pest of concern for dry bean growers, which may inform a stakeholder's pest management program. From the focus groups, we learned that the harvest method might predispose dry beans to WBC feeding. Without all data sources, our understanding of WBC IPM would be less clear. Thus, stakeholder participation is essential for the development of IPM programs.

Current research results in sunflower insect management

Luis Ochoa - Entomology Graduate Research Assistant
Jeff Bradshaw - Nebraska Extension Entomology Specialist

Sunflower seed quality is affected by a key insect pest, the red sunflower seed weevil (*Smicronyx fulvus* LeConte), which is effectively and routinely managed using insecticides. However, insecticide use can impact bee populations and their pollination services, potentially limiting yield. Sunflowers are largely self-pollinated. However, insect-mediated pollination can increase yield. The interaction between insecticide application, pest control, and bee pollination in sunflowers is not well documented. To evaluate this interaction and to explore management strategies, on-farm field trials were established in 2021 on 15 commercial sunflower fields in western Nebraska. Our experiment had four treatment strategies (two replicate fields per treatment) that were deployed based on the insecticide-treated area during sunflower anthesis: Conventional application – 100% of field treated (CA), border application (BA), early-blooming border application (EBA) and untreated control (UC). Pest incidence was not statistically different for CA, BA, and EBA, but they all had fewer weevils per head than the UC. Bee visitation rates for BA and EBA were higher compared to CA and UC. Results indicate that border applications may be as effective as conventional applications for pest suppression. Insecticide-treated flowers had significantly reduced pollinator-mediated seed set and mass; however, BA and EBA application strategies resulted in significantly higher bee abundance compared to a CA strategy. Additional data from 2022 are still being analyzed. These results will help growers and pest managers reduce insect pest damage, while conserving bee pollination, to maximize yield in Nebraska sunflowers.

Comparison of chemigation and aerial application for western bean cutworm management in corn

Andrea Rilakovic - Graduate Student

Recent research comparing efficacy of insecticides for western bean cutworm management in corn applied by air or chemigation.

Year in Review: What's New in Entomology

Samantha Daniel - Water & Crops Extension Educator

A summary of the new insect pest concerns, invasive species, and changes in insecticide regulations relevant to crop production in West Central Nebraska. Topics will include western bean, rootworm, Thrips in alfalfa, grasshoppers, Dectes, Japanese beetle, and wheat stem sawfly.

Spider Mites in Corn & Soybean

Samantha Daniel - Water & Crops Extension Educator

An update on Spider Mite management in corn and soybean.

Soybean Gall Midge: Research Update on a New and Emergence Pest of Soybean

Thomas Hunt - Nebraska Extension Entomologist
Justin McMechan - Nebraska Extension Crop Protection and Cropping Systems Specialist

Summary of research conducted during the 2022 growing season on the ecology, biology and management of soybean gall midge.

Corn insect management update

Robert Wright - University of Nebraska-Extension Entomologist

Update on management recommendations for corn rootworms and western bean cutworm.

Soybean insect management update

Wayne Ohnesorg - Nebraska Extension Educator & Entomologist
Ron Seymour - University of Nebraska-Lincoln-Extension Educator

Update on management of soybean defoliators, soybean gall midge, and other insects

Alfalfa insect management update

Ron Seymour - University of Nebraska-Lincoln-Extension Educator

Update on biology and management of alfalfa weevil, fall armyworm in alfalfa

PESTICIDE EDUCATION & ENVIRONMENTAL SAFETY

Pesticides: Human Health, the Environment, and the Law

Jennifer Weisbrod – Nebraska Pesticide Safety Extension Educator
Frank Bright - Nebraska Extension Assistant-Pesticide Safety Ed
Greg Puckett - Nebraska Extension Assistant-Pesticide Safety Ed

Pesticides provide major benefits to agricultural production. However, these benefits must be weighed against the hazards pesticides pose to humans, animals, and environmental resources. This presentation will review important pesticide safety concepts and provide updates on the Agricultural Health Study and pesticide regulatory changes.

Precision Conservation-Benefits for Farm Operations and Water Quality

Carla McCullough - Watershed Science Extension Educator

Learn how changing field management in problem spots using precision conservation can increase profitability and protect water quality.

DISEASE MANAGEMENT

Corn Disease Update

Tamra Jackson-Ziems - Nebraska Extension Plant Pathologist

Tar spot is an increasing concern in eastern Nebraska where it has been confirmed in cornfields in 31 counties and continues to spread westward. Moist conditions strongly favor the fungus causing the disease, thus it has been more common and severe in pivot-irrigated fields where the corn canopy is wetter for extended periods. Accurate identification of this and other diseases is critical for effective use of foliar fungicides and other management strategies, as needed. Severe weather with hail in 2022 damaged plants predisposing them to several bacterial diseases that were more common last year. Some other diseases also appeared to be at greater incidence in 2022, such as crown and ear rot diseases and will be discussed in this session, as well.

Specialty Crops Disease Update

Bob Harveson - Nebraska Extension Plant Pathologist

This presentation will be describing some of the projects conducted concerning diseases of specialty crops in Nebraska during 2022. They include managing bacterial and fungal diseases of dry beans and other new pulse crops such as chickpeas and cowpeas (black-eyed) peas. Additionally, we will introduce other diseases of sunflowers, potatoes, sugar beets, how to identify them and share their impacts on Nebraska production.

Soybean Disease Update

Dylan Mangel - Nebraska Extension Plant Pathologist

Soybean can achieve high yields, but plant diseases often keep the crop from reaching its true potential. This disease update will inform viewers of current soybean disease issues in Nebraska agriculture, including sudden death syndrome, Sclerotinia stem rot, and Phytophthora root rot. This presentation will also provide updates on Nebraska soybean cyst nematode progression and effective management options.

Wheat Disease Update

Stephen Wegulo - Nebraska Extension Plant Pathologist

In 2022, significant levels of wheat streak mosaic occurred in several fields in the southern Panhandle of Nebraska. The disease occurs as part of a complex of three viruses: Wheat streak mosaic virus (WSMV), Triticum mosaic virus (TriMV), and High Plains wheat mosaic virus (HPWMoV). This wheat disease update highlights the life cycle of WSMV, symptoms, risk factors, effect on grain yield, and management of the disease complex.

WEED MANAGEMENT

Soybean Response to Micro-Rates of Dicamba and 2,4-D

Stevan Knezevic - Nebraska Integrated Weed Management Specialist

Enlist E3 and Xtendflex soybean was available for planting during the 2022 season. To understand the potential impact of 2,4-D and dicamba drift onto non soybean, a field study was conducted to measure the impact of 2,4-D (Enlist One) and dicamba (Xtendimax) micro-rates on four soybean types (2,4-D, Dicamba-Tolerant, Round-up Ready, Liberty-Link and Conventional soybean).

Managing Herbicide-Resistant Weeds When Options are Limited

Nevin Lawrence - Weed Management Specialist

Gering Description: The latest Palmer amaranth management research will be presented for dry bean, sugarbeet, and alfalfa, along with some information on using cover crops, rotational strategies, and a weed wiper.

North Platte Description: The latest Palmer amaranth management research will be presented for corn, soybean, and alfalfa, along with some information on using cover crops, rotational strategies, and a weed wiper.

Weed Management Challenges and Recommendations in Corn-Soybean Cropping Systems in Nebraska

Amit Jhala - Nebraska Extension Weed Management Specialist

The presentation will include information about weed management challenges in corn-soybean cropping systems in Nebraska. Attendees will be updated with UNL research on weed management including chemical and non-chemical options. Recommendations will be provided for integrated management of herbicide-resistant weeds in corn-soybean cropping systems.

APPLICATION TECHNOLOGY

Best Practices for Pesticide Application: Pesticide Delivering Equipment

MIlos Zaric - Graduate Research Assistant
Chris Proctor - Weed Science Extension Educator

This session aims to help understand how to maximize pesticide efficacy while minimizing the unintended environmental contamination risks associated with pesticide applications. The discussion will include but will not be limited to the importance of droplet size, nozzle selection, and spray patterns for pesticide applications. In addition, the emphasis will be on where to find the reliable information required for the best practices for pesticide application.

WATER MANAGEMENT

Irrigation Scheduling Tendencies in Wet vs. Dry Years

Chuck Burr - Crops and Water Extension Educator
Derek Heeren - Associate Professor and Irrigation Engineer
Steve Melvin - Crops and Water Extension Educator

A review of soil water data logs from farmers in the Upper Big Blue Natural Resources District and the UNL Extension TAPS program indicates irrigators tend to over water more on wetter years and sometimes even underwater on dryer ones. This short presentation will discuss the findings and ways irrigators can overcome these tendencies.

Pivot Performance and How a Dry Year Can Affect It

Chuck Burr - Crops and Water Extension Educator
Derek Heeren - Associate Professor and Irrigation Engineer
Steve Melvin - Crops and Water Extension Educator

When properly designed and operated, center pivot irrigation systems can efficiently irrigate many different crops grown on diverse soils and terrains. However, a significant number of pivots receive less water flow as designed, resulting in low operating pressure. Inflow for the pivot could be low for several reasons based on the capacity of an aquifer, mismatched system components, the original design, etc. Inadequate inflow causes major problems of uniformity of water application and can limit the ability of the system to meet crop needs. Data from 66 pivots across Nebraska with AgSense Field Commander and Lindsay FieldNET monitoring equipment were obtained, analyzed, and compared to operating pressure and required inlet pressure for regulators. Pivots operating below pressure were also analyzed with topographical data. The findings showed that some pivots need corrective actions to prevent yield losses and lower operating costs. This data will be looked at considering last year's dry weather conditions. Dry years allow poor uniformity to be seen much easier and make it a good time to review aerial and yield maps to find problem pivots.

ET Gauge Use and Application

Gary Stone - Crops and Water Extension Educator

A hands-on presentation on the basic use of an ET gauge in crop water irrigation management.

Understanding Data from Soil Moisture Sensors: Lessons Learned from On-Farm Research

Xin Qiao - Assistant Professor and Irrigation Engineer

This presentation will discuss how to interpret commercial soil moisture sensor graphs from bean, corn, and sugar beet fields, using data generated from the on-farm research network: Peer-Learning Agricultural Network. Specifically, the information that can be concluded from soil moisture sensors and how it might help irrigation management will be discussed.

NUTRIENT MANAGEMENT

Managing Nitrogen in a Dry Year

Chuck Burr - Water and Crops Extension Educator
Bijesh Maharjan - Soil and Nutrient Management Extension Specialist
Amy Timmerman - Water and Crops Extension Educator
Todd Whitney - Water and Crops Extension Educator
Aaron Nygren - Water and Crops Extension Educator
Jenny Rees - Water and Crops Extension Educator
Nathan Mueller - Water and Crops Extension Educator
Ron Seymour - Water and Crops Extension Educator
Jeremey Milander - Water and Crops Extension Educator

This will be an interactive session focusing on using the UNL algorithm and calculator, setting realistic yield goals, how to credit organic matter, and important considerations for a dry year.

SOIL MANAGEMENT

Optimizing Corn Production Using Target Soil Test Values in a Long-Term Phosphorus Trial in Nebraska

Javed Iqbal - Soil and Nutrient Management Extension Specialist
Swetabh Patel

Do you wonder how corn responds to soil test phosphorus levels? This presentation will share data from a long-term P study to answer questions regarding phosphorus nutrition in corn.

On-farm Research to Evaluate Precision Technologies for Improved Nitrogen Management of Corn and Wheat

Chuck Burr - Crops and Water Extension Educator

This session will highlight research for 2022 using sensor and digital imagery technology for making nitrogen fertilization decisions in corn and wheat.

Optimizing Nitrogen Management in Sugar beet

Bijesh Maharjan - Soil and Nutrient Management Extension Specialist

The UNL research in the past three years has determined a need to revisit the current N recommendation in sugar beet. It's about time to discuss the on-farm implementation of what we have learned in our small plot studies.

ON-FARM RESEARCH

Area On-Farm Research Updates

Jenny Rees - Water and Crops Extension Educator
Sarah Sivits - Water and Crops Extension Educator
John Thomas - Water and Crops Extension Educator
Jeremy Milander - Water and Crops Extension Educator

Local on-farm research study results from 2023 will be discussed by farmer participants and UNL extension educators.

Historical and Novel Methods to Estimate Winter Wheat Yields

Amanda Easterly - Associate Research Professor

Understanding the yield potential of a crop can help guide crop input and marketing decisions. New methods using technology could replace old methods and be quicker and more accurate.

CROPPING SYSTEMS

Selecting cover crops for forage and biomass quality: Variety matters!

Katja Koelher-Cole - Soil Health Extension Educator

We will discuss the performance of cover crop varieties tested in 2022 for biomass production and forage quality. This will help in understanding what species and varieties are best suited to different cropping systems in Nebraska.

Building Healthy Soils Through Regenerative Agriculture

Carolina Córdova - Statewide Soil Health Specialist

Since a healthy soil is a pivotal component in the nexus of soil-plant-water-air-energy, how we treat the soil can massively impact global food security and the environment. Regenerative agriculture has at its core the intention to build and maintain healthy soils or restore degraded soils, which enhances land productivity and produces more nutritious food with a lower environmental footprint. During this talk, we will go over the Soil Health concept and principles, management practices that build or maintain healthy soils, and the importance to a land manager and the environment.

What Have We Learned About Nitrogen Limitation in NE Soybeans?

Nicolas Cafaro La Menza - Cropping Systems Specialist

Extent and severity of nitrogen limitation in NE soybeans and current research efforts to diagnose it.

What does soybean seed quality look like in Irrigated and Dryland Fields in Nebraska?

Nicolas Cafaro La Menza - Cropping Systems Specialist

Dryland and Irrigated soybeans differ in management and yield levels, but how do these differences affect the seed protein and oil composition?

2022 Wheat Production Issues Likely to Impact Wheat Yields Again in 2023

Cody Creech - Dryland Cropping Systems Specialist

The 2021-2022 wheat growing season was hampered by one bad thing after another. Unfortunately, the residual effect of these negative issues will follow the new wheat crop into this upcoming growing season.

Winter Barley Management and Production in the Panhandle

Amanda Easterly - Associate Research Professor

There is continued interest and demand for feed alternatives to corn and winter barley can be a good fit in dryland crop rotations. Although winter barley is well adapted to the area, there are several management decisions that can impact the success of the crop.

Considerations for Drill Interseeding Cover Crops in Corn

Victor de Sousa Ferreira - Graduate Research Assistant

Cover crop benefits are closely related to biomass production. With the short available season for cover crop establishment and growth following cash crop harvest other cover crop planting methods and timing have been investigated. Drill interseeded into corn can be successful but herbicide selection, seeding rate, species selection and interseed timing are all important factors influencing success. This session will highlight recommendations for Nebraska to improve drill interseeding success.

COMMERCIAL APPLICATOR TRAINING SESSIONS

Application Decision Making Considerations

Topics to be covered during this session will include: how to have conversations with supervisors about suspending applications during unfavorable spray conditions, label setback and buffer zone requirements, how to manage drift onto neighboring fields and sensitive crops, and how to confirm soybean fields with different herbicide traits before making applications.

Crop-Pest Biology

Topics to be covered during this session include how to identify crop stage to ensure on label pesticide application based on crop stage, hands-on weed id to improve record keeping by identifying weeds present at time of application.

Best Practices for Pesticide Application: Pesticide Delivering Equipment from Calibration to Application

Milos Zaric - Graduate Research Assistant
Bruno Lena - Crops and Water Extension Educator
Camila Chiaranda Rodrigues - Graduate Research Assistant

This session will discuss nozzle selection, boom height, sprayer calibration to improve application efficacy and ensure on-label applications.

Best Practices for Pesticide Application: Spray Tank Mixtures are Simply Complex

Amy Timmerman - Water and Crops Extension Educator
Jennifer Weisbrod - Pesticide Extension Educator
Milos Zaric - Graduate Research Assistant

This session will cover tank cleanout procedures, pesticide compatibility testing and mixing order, and how tank mixes can affect product efficacy.

Thank you to 2023 CPC Sponsors

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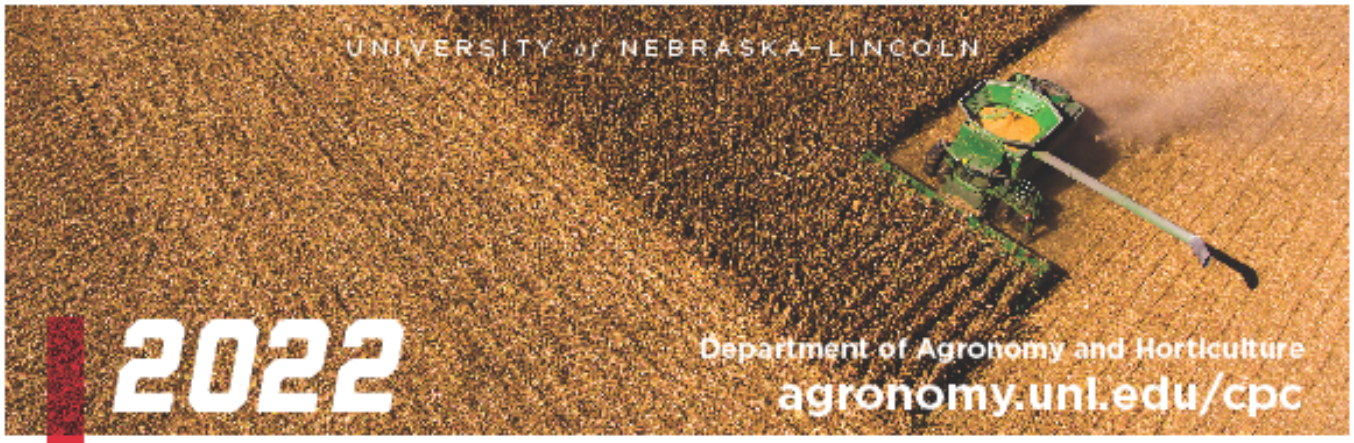

CROP PROTECTION CLINICS IMPACT REPORT

763 total participants; 7 locations; 1 online

- 26% Custom Applicator
- 25% Farmer/Landowner
- 24% Seed/Pesticide/Fertilizer Sales or Technical Support
- 16% Crop Consultant or Scout
- 5% Other
- 4% University, State or Federal Employee

30.2 million acres influenced

Estimated value of the knowledge gained is $8.4 per acre

- 75% increased general knowledge of crop management
- 72% increased knowledge of pest management
- 74% increased knowledge of disease management
- 49% increased knowledge of nutrient management
- 67% increased understating of their role in protecting soil/water quality
- 40% increased understating of agribusiness management
- 59% increased knowledge of pesticide application techniques that limit off target movement of pesticides

80 Nebraska counties represented; 48 Instructional hours; 60% above average

Topic areas covered included agribusiness management, application technology, crop production, disease management, forages, cover crops & agricultural technology, insect management, pesticide and environmental safety, soil management, water management and weed management.

How is Extension important to you?

"Very important to have no matter what I take from it."

"Helps guide important decisions for our farm throughout the year. Weed control, irrigation, farm program choices, etc."

"It is important to get an unbiased opinion on products and management. Extension research/projects provide the information."

What is one change that you are considering making as a result of attending this program?

"Implanting more specific nozzle for each application rather than 1 or 2 average nozzles."

"Planting green with our soybean crop."

"Adjust nitrogen application rates."

Feedback

"Liked to see more interaction, we all learn from each other."

"The best recertification program I have attended since I have been in the industry. Thanks."

"I am a farmer and adviser both. Enjoyed the participation of farm research."

EXTENSION