

# Mid-Atlantic Crop Management School



**November 19 – 21, 2024**

*Princess Royale Oceanfront Resort, Ocean City, MD*

## ***About the School***

The school offers a 2 ½-day format with a variety of breakout sessions. Individuals needing training in soil and water, nutrient management, crop management and pest management can create their own schedule by choosing from **5** program options offered each hour. Emphasis is placed on new and advanced information with group discussion and interaction encouraged.

## ***Who Should Attend***

This school is designed for anyone interested in crop management issues, including:

- agronomists
- crop consultants
- extension educators
- farmers and farm managers
- pesticide dealers, distributors, and applicators
- seed and agrichemical company representatives
- soil conservationists
- state department of agriculture personnel

## ***Continuing Education Credits***

The 2024 Mid-Atlantic Crop Management School will offer CCA continuing education units (CEUs) approved by the Certified Crop Adviser Program in the following categories:

- Crop Management
- Pest Management
- Soil & Water Management
- Nutrient Management
- Professional Development
- Sustainability

Total CEUs earned will depend on course selection. This school also provides Pesticide Recertification Credits for DE, MD, NJ, PA, WV, and VA and continuing education for Nutrient Management Consultants in DE, MD, PA, VA, and WV.

## ***Registration Information***

The early-bird registration fee (recommended to ensure a place in the sessions of your choice) is **\$350** if received by **October 25<sup>th</sup>**; **\$410** if received by **November 8<sup>th</sup>**. Registration will close on **Friday, November 8<sup>th</sup> at 11:59 p.m. ET or when enrollment reaches capacity**. Payment of registration fee entitles you to participation in 2½ days of sessions, materials, 3 continental breakfasts, 2 lunches, and refreshment breaks. Eventbrite processing fee is included within the registration fees listed above.

**\*New for 2024: GUEST TICKET** – Your registration does not include meals for any additional people joining the event. If you are bringing a guest with you, such as a spouse, and they plan to join the group for meals, you

must add the Guest Ticket to your registration and pay an additional fee. All attendees must present their name badges during the provided meals.

**\*2024 Reception** – The Mid-Atlantic CCA Board is hosting an off-site evening reception again in 2024. The event is free of charge and open to any attendees of Crop School. The CCA of Excellence Award will be presented at the event and 10-, 20-, and 30-year Certified Crop Advisors will be recognized. If you are a current CCA or interested in becoming a CCA, please attend this event to learn more about the benefits of this certification. Seating is limited, you can reserve your spot at the reception at the end of this registration.

The reception will be held on Wednesday, November 20th from 6:15 – 8:15 PM at Thompson Island Brewing Company, located at 30133 Veterans Way, Rehoboth Beach, DE 19971. There will be an open bar and heavy appetizers provided. This event has been generously sponsored by:

**Premier** - Keith Campbell Foundation

**Gold** - AgroLab Matrix Sciences, Fulton Bank, Horizon Farm Credit, Maryland Grain Producers, Maryland Soybean Board, McConnell Agronomics

**Silver** - Alleghany Services, Chorman Spraying, Growmark FS

**Bronze** - Corteva Agriscience, Nagel Crop Insurance

**Enrollment in Crop School and the reception are on a first-come, first-served basis.**

All registrations must be completed online and be paid by credit card at the time of registration.\*

Visit <http://go.umd.edu/24crop> to complete your registration online and make your session selections. Once you complete the online registration, you will receive a confirmation email providing verification of your session schedule and receipt of payment.

*\*If you are unable to provide credit card payment, please contact Ms. Taylor Robinson at [taylormr@umd.edu](mailto:taylormr@umd.edu) to discuss alternative payment options.*

**Questions about registration or payment** should be addressed to Ms. Taylor Robinson at [taylormr@umd.edu](mailto:taylormr@umd.edu) or (410) 827-8056.

#### **Cancellation Policy:**

- Cancellations must be processed through Eventbrite prior to registration closure on November 8<sup>th</sup>.
- Any cancellation requests after November 8<sup>th</sup> can be emailed to [taylormr@umd.edu](mailto:taylormr@umd.edu).

#### ***Hotel Reservation Information***

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The Princess Royale Oceanfront Resort is located at 91<sup>st</sup> Street in Ocean City, MD. **Contact the hotel directly to make your reservation.**

Either call 1-800-4-ROYALE (1-800-476-9253) or visit <https://bookings.princessroyale.com/> and identify yourself by group name: 24MIDATLANTIC.

Reserve your room no later than **October 18<sup>th</sup>, 2024** to guarantee the rates below.

- \$119 per night (plus applicable fees & taxes) – Pool view
- \$169 per night (plus applicable fees & taxes) – Oceanfront

#### ***I. Registration***

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General registration will begin 8:30 am on November 19. Registration packets and information regarding CEUs and re-certification credits will be available at the registration desk. A continental breakfast will be available. There will be no general session and all breakout sessions begin at 10:00 am on November 19.

## **II. Crop Management Sessions**

Each Session is Worth 1 CEU in Crop Management unless noted.

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**Malting Barley Potential in the Mid-Atlantic** -- The booming craft malting and brewing industry has recently sparked interest in locally grown malt in the eastern US. While the small grains breeding program at Virginia Tech has historically focused on feed and forage barley, a new initiative aimed at development of two- and six-row winter malt barley cultivars adapted to the eastern climate began in 2010. Adaptation to the climate and disease pressures of the mid-Atlantic was obtained through crosses between North American and European malting varieties into eastern adapted feed barley germplasm. After 10 years of breeding, selection and evaluation, 'Avalon' was publicly released as the first winter two-row malt barley specifically adapted to the Eastern US in 2020. In 2024, Avalon, was added to the list of recommended barley varieties for malting by the American Malt Barley Association. The story of how 'Avalon' was developed and our future efforts for malt barley development will be told. Considerations and recommended practices for growing winter malting barley in the eastern US will be given. *Instructor: Dr. Nicholas Santantonio, Virginia Tech. Tuesday 10:00am and 11:00am.*

**Covering More Ground with Narrow Row Corn** -- Reducing crop stress to increase productivity is always a major goal in agriculture. Changing row spacing in corn to more uniformly distribute plants within a field has been one tactic used, though questions have arisen regarding the benefits from this practice. Additionally, it is often wondered if other agronomic decisions (e.g., hybrid selection, seeding rate) should change when using narrow row practices. Work conducted in Ohio and Pennsylvania suggests some benefits to yield can be seen, though responses may be geographically specific. This presentation will highlight results from field trials conducted in recent years, and work to present pros and cons of adopting narrow row practices in corn production. *Instructor: Dr. Alexander Lindsey, Ohio State University. Tuesday 1:00pm and 2:00pm.*

**Complimenting Production Systems Using Annual Forages** -- Annual forages are a great way to complement many forage cropping systems, such as warm or cool-season grasses, or other annual systems. These annuals can have many advantages including adding cover crops, improving soil properties, and increasing available forage. These annuals can also complement crop production acres, having the same benefits, while increasing the potential return on investment through grazing rental. This presentation will provide some insights into these topics as well as the management of other forage systems *Instructor: Dr. Bronc Finch, University of Arkansas. Tuesday 3:10pm and 4:10pm.*

**Yield Monitoring Technology to Support On-Farm Decisions** -- Yield monitoring technology serves as a pivotal tool in modern agriculture, enabling farmers to make data-driven decisions that enhance productivity and sustainability. This presentation explores the integration of yield monitoring systems in on-farm decision-making processes. Additionally, it discusses the limitations and challenges of yield monitors to inform on-farm research. *Instructor: Dr. John Fulton, Ohio State University. Wednesday 8:00am and 9:00am.*

**Managing Crop Response to Phosphorus in variable environments: Across-and Within-Fields** -- This presentation will discuss how we can work to manage different crops to variable environments and soils. We will discuss factors to consider when soil sampling, considering rates, sources, and placement of phosphorus fertilizers, as well as managing in season. This presentation will also have insights from field trials conducted in Kentucky, Oklahoma, Illinois, Maryland, and Mississippi in corn, soybeans, and winter wheat. *Instructor: Dr. Vaughn Reed, Mississippi State University. Wednesday 10:10am and 11:10am.*

**PWM and Targeted Spraying Technology for Crop Protection** -- Pulse Width Modulation (PWM) and targeted spraying technology represent significant advancements in crop protection, offering precision and efficiency in pesticide application. This presentation will overview and examine the integration of PWM systems with targeted spraying techniques to optimize the use of agrochemicals. While several benefits exist for PWM technology, understanding the basics and setting the sprayer and controller up correctly is important for proper operation. Setting up PWM technology differs from current flow-based sprayer setups. *Instructor: Dr. John Fulton, Ohio State University. Wednesday 1:00pm and 2:00pm.*

**Corn and Soybean Planting Order Decisions Impact Farm Gross Revenue** -- The corn-soybean rotation is a common practice in the Midwest, enhancing yields. However, choosing which crop to plant first affects farm gate revenue. Simulating planting dates for 310 fields across the US, we found that delaying planting after May 1 reduced yield and suppressed gross farm revenue. Planting order matters due to varying yield rates within the nominal planting time-frame. State-specific management practices further impact revenue. US farmers should consider comparative yield trends and projected crop prices from their fields when deciding planting order. *Instructor: Dr. Shawn Conley, University of Wisconsin, Madison. Wednesday 3:10pm and 4:10pm.*

**Level Up! Interpreting Results of Crop Yield Trials For Improved Decision Making** -- There is value in performing applied crop yield trials across numerous scales: field-length strips on private farms or small plots at University research center. These scales could extend to treatment structure, with over twenty varieties in a variety trial or five simple fertilizer treatments, or span geographical scale, employing numerous locations within one state, a few locations across the region, or numerous states across the US. Regardless of scale, yield trials must be executed according to acceptable experimental design procedures to utilize statistics to analyze data and provide confidence in the hypothesized results, which is critical when the interpretation of these results ultimately change farmer behavior and management decisions. This presentation will highlight results from local crop yield response research performed in recent years that spans the aforementioned scales (small plot, field-length strips, national collaborative protocols), while highlighting common facets of each protocol and practicing data interpretation. After this presentation, consultants and farmers will have increased confidence when interpreting research results that leads to more informed management decision making. *Instructor: Dr. Nicole Fiorellino, University of Maryland. Thursday 8:00am and 9:00am.*

**Planting Timing Interactions with Nutrient Uptake in Maryland and Delaware** -- Earlier planting of soybeans should provide additional vegetative growth and leaf area to boost yields. However, the definition of early planting can vary by region and needs further examination across the climates of the Mid-Atlantic (Coastal to Appalachian). We examined planting dates between early April to late May across Maryland and Delaware for final yield and any pressures from earlier planting. Tissue samples at the R2 growth stage for each site and timing were also taken to observe how planting timing may interact with nutrient uptake. While yields showed little variation across the region, there were some patterns in leaf tissue concentrations based on planting timing. *Instructor: Dr. Jarrod Miller, University of Delaware. Thursday 10:10am and 11:10 am.*

### ***III. Nutrient Management Sessions***

Each Session is Worth 1 CEU in Nutrient Management

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**Geophysical methods in support of field-scale nutrient risk assessments** – In low-relief agricultural fields with artificial open ditching, hotspots of rapid groundwater drainage from coarse-textured inclusions may promote subsurface phosphorus (P) loss. Addressing subsurface P loss requires field-scale mapping of soil texture. Geophysical methods, such as electromagnetic induction (EMI) and towed electrical resistivity (ER), offer minimally invasive, rapid, and cost-effective solutions to map soil texture variation, often difficult to capture using discrete soil sampling methods. Interpreting measured electrical conductivity can be challenging due to the influence of various factors such as soil moisture, texture, and salinity. However, geophysically inferred soil maps can guide the strategic collection of a minimal number of soil and hydrologic samples, confirming that conductivity variations accurately reflect soil texture (and soil drainage by extension). A case study on the Delmarva Peninsula showed that the EMI and towed ER conductivity soil maps delineated two within-field locations with contrasting drainage patterns for an artificially drained field. This case study highlights the potential for near-surface geophysical methods to aid nutrient risk assessment and reviews best practices for data acquisition, validation, and interpretation. *Instructor: Mr. Joshua Thompson, Rutgers University - Newark. Tuesday 10:00am and 11:00am.*

**Nitrogen Considerations for Rye Cover Crops** -- Soils across the Southeast typically have low organic matter contents and are susceptible to soil erosion that reduces productivity. Conservation practices, such as high residue cover crops combined with conservation tillage can offset these negative aspects and improve soil health to potentially increase soil productivity. However, growers adopting these practices are not always prepared for the

time and management needed to obtain the benefits and control the costs to maximize their return on investment (ROI). Management factors, such as planting date and N fertilization each affect cover crop performance; therefore, an understanding of how these management factors affect cover crop biomass production is critical for growers to decide how they invest their resources into cover crops. Evaluations of interactions among these factors ensure incorporating these production practices into existing crop production systems are justified. *Instructor: Dr. Kip Balkcom, USDA-ARS. Tuesday 1:00pm and 2:00pm.*

**Chasing Accurate and Precise Nitrogen Recommendations in Corn**-- This presentation will discuss the state of N fertilization in corn, how we may be able to use variable rate technology to increase NUE, but there are still issues with understanding the response. We will also talk about the fate of the application of N, and how changes we make now can limit the impact on the environment *Instructor: Dr. Vaughn Reed, Mississippi State University. Tuesday 3:10pm and 4:10pm.*

**Where did we go wrong with variable rate P and N?** – Variable rate application of phosphorus and nitrogen fertilizers is a strategy with the potential to increase crop yields, boost profits, and reduce environmental impact. In this talk, we will explore the science behind precision nutrient management and address questions about the development of variable rate recommendations. We will also discuss practical strategies for implementation and highlight the potential benefits for producers. *Instructor: Dr. Joshua McGrath, USDA-ARS. Wednesday 8:00am and 9:00am.*

**Managing Hidden Hunger in Soybeans** -- Hidden hunger is a widespread concern and common yield-limitation in soybean production. Proactive tissue testing with proper sampling techniques and result interpretation is critical for diagnosing any yield limiting nutrient deficiencies. Potassium (K) deficiency is particularly common and can cause major yield losses, even without any visual symptoms indicating a problem. *Instructor: Dr. Carrie Ortel, Virginia Tech. Wednesday 10:10am and 11:10am.*

**Managing Nutrient Applications and Removal in Forage Production Systems** -- Forage production, specifically hay production, has arguably some of the greatest nutrient removal rates among cropping systems. With the increased fertilizer prices over the past few years, forage budgets for fertilizer may have been limited to smaller amounts, or single nutrients. Recently, the repercussions of limited fertilizer budgets have started to appear, with decreased yields/availability, stand degradations, and decreased soil test values. This presentation will provide information on the amount of nutrients removed by forage production systems, insight into management schemes to mitigate biomass yield and stand losses, and improve soil nutrient levels. *Instructor: Dr. Bronc Finch, University of Arkansas. Wednesday 1:00pm and 2:00pm.*

**Effects of Long-Term Cover Crop Usage on Crop Yields, Nutrient Cycling, and Soil Quality** -- Cover crops are widely recognized for their environmental benefits, but they also offer substantial agronomic and economic advantages. This presentation will share findings from our 10-year study at the Virginia Tech Eastern Shore Agricultural Research and Extension Center, where we evaluated cover crop nutrient (N, P, K, S) accumulation with delayed termination and their impacts on corn yield and soil quality. The results highlight how integrating cover crops can enhance productivity, sustainability, and economic returns in row crop production. *Instructor: Mr. Joseph Haymaker, Virginia Tech. Wednesday 3:10pm and 4:10pm.*

**Fine-tuning Lime Recommendations for Better Yields** -- Lime requirements across the region and the US vary across state lines. We will review the methods and rationale behind the current lime recommendations. Results of a recent national survey showed serious inconsistencies in the amount of lime recommended for similar soils. We will highlight regional and national efforts to better standardize methodology that will lead to more accurate and consistent lime recommendations across the US, as appropriate. Our ultimate goal is to provide science-based and transparent methods for making lime recommendations to ultimately help growers better manage soil pH to improve crop yields. *Instructor: Dr. Amy Shober, University of Delaware. Thursday 8:00am and 9:00am.*

**Considerations for Selecting Large-Scale Compost and Soil Health Amendments** -- With the introduction of the NRCS soil carbon amendment practice standard many producers are considering what they might be looking for in a soil amendment. This discussion will focus on some key considerations in adopting a carbon amendment. We will examine some common feedstocks for compost, including litter, yard waste, food residuals, bio-solids, and mortalities among others, as well as the process of composting, including ideal aeration and moisture content

during composting and pile management. Finally, we'll discuss the properties of a finished compost, including carbon to nitrogen ratio, nutrient availability and pH considerations, physical properties of a potential amendment, and how to make sure the compost is finished properly. *Instructor: Mr. Chris Brosch, Delaware Department of Agriculture. Thursday 8:00am and 9:00am.*

**Salinity Assessment in Mid-Atlantic Coastal Soils using Routine Agronomic Soil Test** -- Saltwater intrusion is impacting fields along the Delmarva Peninsula of the US East Coast. While the saturated paste extraction is the standard for measuring soil salinity, it has not been examined for coastal soil salinity in humid regions. This study aimed to explore accessible soil tests to identify coastal salinity issues in grain crop fields of the Delmarva Peninsula. Soil samples were collected from thirteen fields with known salinity issues affecting crop production between 2020 and 2022. The feasibility of using routine soil test methods Mehlich-3 and ammonium acetate, were compared to the saturated paste extraction method. There was strong positive relationship for sodium ( $\text{Na}^+$ ) when saturated paste extraction was compared to either Mehlich-3 ( $r^2=0.82$ ) or ammonium acetate ( $r^2=0.77$ ), but poor relationships for calcium, magnesium and potassium ions. This indicates that Mehlich-3 could assess soil  $\text{Na}^+$  levels without the need for saturated paste extraction, which is time consuming and expensive. Furthermore, studies of expected field responses to salinity are needed to validate these findings. *Instructor: Dr. Sapana Pokhrel, University of Delaware. Thursday 10:10am and 11:10am.*

#### **IV. Pest Management Sessions**

Each Session is Worth 1 CEU in Pest Management unless noted.

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**The 4 Pillars of Managing Deer Damage** -- This presentation outlines the strategies and considerations for managing deer damage in agricultural settings, particularly focusing on the impact of deer on crop yields. The management approach is based on four key pillars: habitat management, lethal control, repellents, and fencing. The presentation explores deer biology and behavior, emphasizing their significant consumption rates and the impact on crops like soybeans. *Instructor: Dr. Luke Macaulay, University of Maryland Extension. Tuesday 10:00am and 11:00am.*

**Managing Nematodes in Corn and Soybean** -- There are several plant-parasitic nematodes that can impact corn and soybean production across the United States and Mid-Atlantic region. The most common and yield-limiting nematodes include the southern root-knot nematode (*Meloidogyne incognita*) and soybean cyst nematode (*Heterodera glycines*) in soybean and stubby-root nematode (*Paratrichodorus* spp.) and lesion nematodes (*Pratylenchus* spp.) in corn. Management strategies include host plant resistance, crop rotation, and nematicides. There are a few nematicides, both chemical and biological agents, marketed for nematode control in corn and soybean, but there is limited information on field efficacy and yield protection. This presentation will cover field identification of some plant-parasitic nematodes and management strategies, with the main emphasis on the field efficacy of seed- and soil-applied nematicides. *Instructor: Dr. Travis Faske, University of Arkansas. Tuesday 1:00pm and 2:00pm.*

**Planting green: An integrated weed management tool?** -- Delaying termination of cover crops has the potential to improve weed suppression potential in no-till systems. But this practice must be integrated with herbicide program approaches to achieve season-long weed control. This talk will present management tips for getting the most weed control value out of both cover crops and herbicide inputs. These management tips are based on results from collaborative IWM research projects within the Mid-Atlantic region. *Instructor: Dr. John Wallace, Penn State University. Tuesday 3:10pm and 4:10pm.*

**Having the Final Say: Managing Weed Seeds at Harvest** Weeds that escape in-season control measures set seed, which are commonly spread out by the combine during harvest and make matters worse for subsequent seasons. Harvest weed seed control (HWSC) is a set of practices that kill, condense, or remove seeds with harvest operations. For HWSC to be effective, weed seeds must be retained on the plant at the time of harvest, enter the combine, and exit the combine through the HWSC device. Previous research indicates that many herbicide resistant and problematic weed species retain significant portions of their seed at harvest time. Recent research shows that >95% of seed that enter the combine will enter the HWSC in a well-tuned combine. The two devices and methods most likely to be adopted are seed impact mills and chaff lining. This presentation will cover what

we have learned about both methods from on-farm and on-station research in the region over the last 4 years, including efficacy, farmer experiences, and things to think about when considering adoption. *Instructor: Dr. Michael Flessner, Virginia Tech. Wednesday 8:00am and 9:00am.*

**Ecologically-Based Integrated Pest Management of Major Pests of Field Corn** -- Understanding how various pest species interact with crops, their environment, and each other can provide valuable insight for effective implementation of integrated pest management. A complex of stink bug species and the corn earworm are the most common pests of field corn in the Mid-Atlantic and Southeastern US. This presentation summarizes several studies seeking to better understand the spatial ecology and interaction of these pests, with the goal of utilizing this understanding to more effectively manage them. *Instructor: Dr. Tim Bryant, Virginia Tech. Wednesday 10:10am and 11:10am.*

**Emerging Vegetable and Row Crop Pests in the Mid-Atlantic** -- This presentation will feature an interactive audience-choice discussion of emerging vegetable and row crop pest topics relevant to the Mid-Atlantic U.S. The audience selects which topics to focus on for a 5-10 minute discussion. *Instructor: Dr. Tom Kuhar, Virginia Tech. Wednesday 1:00pm and 2:00pm.*

**Adaptive Disease Management Strategies for Broccoli** -- This session will cover strategies for managing *Alternaria* leaf spot/head rot and clubroot in broccoli. Disease symptoms, pathogen biology, and the efficacy of control strategies will be reviewed. Results from field trials will be discussed. Growers will receive updated disease management recommendations. *Instructor: Dr. Douglas Higgins, Virginia Tech. Wednesday 3:10pm and 4:10pm.*

## ***V. Soil and Water Management Sessions***

Each Session is Worth 1 CEU in Soil and Water Management

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**A Rapid Approach for Estimating the Impact of Legacy Soil Phosphorus in the Chesapeake Bay Watershed** -- Agricultural phosphorus (P) loss from fields and water quality degradation continues to be an issue in the Chesapeake Bay watershed. Since many of the soils in the watershed have high P levels, information is needed on how long it will take to reduce soil P and how much related P loss will decrease. We used the Annual P Loss Estimator (APLE) model to estimate soil P drawdown and P loss for cropland in Maryland. Based on APLE results, reducing soil P throughout the state to agronomic levels could reduce P loss to the Chesapeake Bay by 42%. However, it may take 30-40 years to reach this 42% target. Combining soil P drawdown with aggressive soil conservation could reduce P loss by 63%. Overall, there appears to be a potential to substantially reduce P loss in Maryland to the Chesapeake Bay, but it will require a continued effort to reduce both soil P and P transport from all cropland. *Instructor: Dr. Peter Vadas, USDA-ARS. Tuesday 10:00am and 11:00am.*

**The Long and Short of Maximizing Cover Crop Benefits in Agronomic Systems** - Cover crops provide numerous ecological benefits to agronomic systems. However, the magnitude and timeline of these benefits can vary widely based on how these systems are implemented and managed. This presentation will cover results from several long- and short-term cover cropping studies, including a 24-yr cover crop / crop rotation study in TN and the new Southern Cover Crop Variety Trial, which covers a 10-state region in the South. Attendees will leave with a better understanding of which species / varieties fit best by region and agronomic system, what ecological and economic benefits they might see from implementing these systems, and how long they can expect to wait before seeing benefits. *Instructor: Dr. Virginia Sykes, University of Tennessee. Tuesday 1:00pm and 2:00pm.*

**Soil Management Impacts on Ecosystem Functions - Integrative Livestock Systems** -- Integrated livestock systems add a level of diversity but also complexity to systems management. Systems that utilize perennial or high-residue no-till annual forages may build soil organic matter, and thus, enhance aggregate stability, water retention, nutrient cycling, and carbon storage. The root systems provides an additional level of stability and protection to the soil to reduce erosion potential while the inclusion of grazing animals can provide nutrient cycling potential. Examples of this have been seen from a variety of climates including a watershed in Iowa 75% decrease in estimated soil erosion. Integrated crop-livestock systems in the Texas Panhandle increased soil organic matter content by 27%, an increase in long-term C storage by 27%, and an increase in water stable

aggregates, reducing inputs and potential soil losses. In concert with the increased soil organic matter was also an increase in microbial communities contributing to the improved aggregate stability. Overall, the added diversity of an integrated system can result improved soil health and more resilient systems. *Instructor: Dr. Lisa Fultz, USDA-ARS. Tuesday 3:10pm and 4:10pm.*

**Adaptive Grazing Management with Virtual Fence** -- Adaptive management has become crucial for ranchers and rangeland managers facing climate change. Learning from previous management actions, incorporating monitoring data, and predicting climatic factors such as seasonal changes in precipitation can help managers deal with the increasing variability characteristic of a changing climate. Traditionally, on-the-ground monitoring has been a key piece of adaptive management, to provide feedback on utilization by livestock, changes in plant cover, and overall range health. Increasingly, technologies such as virtual fencing and near-real time GPS monitoring for livestock are gaining popularity. We sought to explore how these emerging technologies, along with remote sensing and on-the-ground monitoring, can be incorporated into an adaptive grazing management plan. Our objectives were to a) provide adequate nutrition for cattle in our arid environment by utilizing precision ranching technologies that allowed us to contain livestock in previously ungrazed pasture with aging physical fence, and b) use the technologies to monitor and manage grazing pressure across the landscape. We used virtual fence to contain two independent herds of cattle in four ~2400 ha sub-pastures within a 9600 ha pasture. We monitored grazing patterns using LoraWAN GPS collars to identify weekly grazing hotspots, measured utilization on the ground at these hotspots, and virtually fenced out cattle from the hotspots if utilization exceeded a threshold. Throughout the grazing period, cattle appeared to “self regulate”, tending to move off previously grazed hotspots on their own. Following our protocol, we fenced off several hotspots for precautionary soil protection and to better understand cattle response to virtual fencing in the middle of a grazing period. Cattle quickly adapted to these changes. After providing an overview of virtual fence, this talk will discuss the preliminary findings of this project, as well as highlight some of the benefits and challenges of incorporating precision ranching technologies into a grazing management program. *Instructor: Dr. Lara Macon, USDA-ARS. Wednesday 8:00am and 9:00am.*

**The Interplay Between Soil Biology and Soil Health** -- Dr. Yarwood is a microbial ecologist that has studied soil biology under different agricultural management practices. She will give an overview of some of the ways she approaches looking at soil microorganisms and differences that they have seen between different types of management. She will address how and when this information can be used to predict function and when it can't and discuss how better technologies in the future may improve our understanding of the soil biota. *Instructor: Dr. Stephanie Yarwood, University of Maryland. Wednesday 10:10am and 11:10am.*

**Irrigation Scheduling for Row Crops: Myths and Realities** -- Many farmers across the USA lack experience in irrigation water management and adoption of the state-of-the-art technologies and practices to increase irrigation water use efficiency. Several federal and state-funded projects are being implemented to demonstrate and train farmers and consultants on irrigation scheduling strategies; however, the main question is are we using the right approach when running training on irrigation scheduling. The presentation will highlight different commercial tools available for irrigation scheduling, highlight the importance of adopting best irrigation management practices to increasing resilience in agriculture, compare different irrigation scheduling methods and the information that can be extracted from those to better irrigate crops. In addition, the presentation will highlight several extension strategies currently used to increase knowledge and skills on the use of technology-based irrigation management strategies. *Instructor: Dr. Brenda Ortiz, Auburn University. Wednesday 1:00pm and 2:00pm.*

**Controls on Cover Crop Biomass, Heterogeneity, and Agroecosystem Implications** -- Winter cover crops are a critical conservation practice to improve ecosystem services in croplands. Cover crop biomass can retain nitrogen that might otherwise be lost over winter and spring months, and nitrogen can become available for the subsequent cash crop as terminated cover crops decompose. In this presentation, I will explore some research on the drivers of and models predicting cover crop biomass accumulation and N accumulation, a project on drivers of cover crop biomass heterogeneity in the Delmarva peninsula using remotely-sensed data, and some preliminary data on the effect of cover crop heterogeneity on soil nitrogen and moisture in the spring. Findings from some of these projects will be used to inform decision support tools such as the "cover crop N calculator" through the



Precision Sustainable Agriculture network. *Instructor: Dr. Alexandra Huddell, University of Delaware. Wednesday 3:10pm and 4:10pm.*

## **VI. Alternative Session**

CEUs for each session are provided after the abstract

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**Developing Enterprise Budgets for Specialty Crops** -- Budgeting for alternative crops can be difficult due to varying revenue sources, inputs, machinery expenses, and much more. This discussion will discuss the basics of developing enterprise budgets and how to build them for alternative crops. Resources for developing alternative crop budgets will also be discussed. *Instructor: Mr. Nate Bruce, University of Delaware. Tuesday 10:00am and 11:00am. (1 CEU in Professional Development)*

**TAPS: Irrigation Technology, Data Management, and Decision Making** -- Testing Ag Performance Solutions (TAPS) hosts annual Farm Management Competitions where producers make real-time decisions on key factors like crop cultivar, seeding rate, irrigation, nitrogen application, crop insurance, and marketing. These decisions are implemented in replicated plots within the same field, allowing for direct comparison of their impact on production, efficiency, and economic outcomes. To support decision-making, participants are given access to cutting-edge precision technologies, tools, methods, and resources, including in-situ and edge-of-field sensors, remote sensing products, crop and input models, and marketing insights. This presentation will share insights and observations from the past eight years of the TAPS program, including case studies on producer decision-making, performance outcomes, and the effectiveness of various irrigation technologies. *Instructor: Dr. Daran Rudnick, Kansas State University. Tuesday 1:00pm and 2:00pm. (1 CEU in Soil and Water Management)*

**You've Got to Fight For Your Right-to-Farm: Understanding how Court Decisions Impact state right-to-farm laws** -- With increasing neighbor conflicts, the Maryland courts have recently clarified the state's right-to-farm law. This session will cover right-to-farm laws in the region, what court decisions tell us about those laws to protect operations better, and, at the same time, what this means in nutrient management. *Instructor: Mr. Paul Goeringer, University of Maryland. Tuesday 3:10pm and 4:10pm. (1 CEU in Professional Development)*

**The Contribution of Pollinators to Crop Production** -- A very large proportion of the crops we produce and consume depend on animal pollination. In this talk, I will give an overview of the production and economic roles of pollinators on crop production, and will present results on some studies we have been doing on the topic in the Mid-Atlantic. *Instructor: Dr. Anahí Espíndola, University of Maryland. Wednesday 8:00am and 9:00am. (1 CEU in Crop Management)*

**Utility of Anaerobic Soil Disinfestation in Specialty Crops** -- Anaerobic Soil Disinfestation (ASD) has been shown to suppress certain weed species, nematodes, and soil-borne pathogens. ASD is facilitated by adding carbon-rich amendments or macerated debris to the soil, tarping with a vapor impermeable plastic film and saturating the soil under the film with water, which rapidly creates an anaerobic environment that kills many of the obligate aerobic plant pathogens. Several studies reported that the changes in microbial composition, release of volatile organic compounds (VOC), decreased soil pH and reduced soil conditions, all aid in pest suppression during. Carbon input, temperature, incorporation technique, soil type, and weed species were all identified as critical variables affecting pest management via ASD. The ASD method is not reliant on the sun's rays and appears to destroy pathogens deeper in the soil profile than solarization due to both the anaerobic conditions and the release of various VOC. These combinations of factors are believed to kill nematodes, soil-borne pathogens, and potentially weed species. This presentation will cover basics of ASD implementation and results of field trials in watermelon, pepper, tomato, eggplant and sweet potato. *Instructor: Dr. Matthew Cutulle, Clemson University. Wednesday 10:10am and 11:10am. (1 CEU in Soil and Water Management)*

**Management of Slugs using Slug Parasitic Nematodes** -- Slugs are a key pest of seedling corn and soybean in no- or reduced-till cropping systems. Their management might be improved through the use of slug-parasitic nematodes. Nematodes are a highly diverse group of nearly-microscopic worms. You might be familiar with some nematodes that attack plants, such as soybean cyst nematode, but there are other nematodes that parasitize slugs and could be used to provide biological control. In this class we will discuss the biology of these wormy allies and how they might be utilized to provide biological control of slugs. Participants will also get a chance to see

and handle some local slug-parasitic nematodes during class. *Instructor: Dr. Michael Crossley and Ms. Thabu Mugala, University of Delaware. Wednesday 1:00pm and 2:00pm. (1 CEU in Pest Management)*

**Soil Testing of Delaware's Turfgrass Systems: What Does the Data Tell us?** – Historical nutrient recommendations for turfgrass systems are flawed. These recommendations were adapted from commodity crops where yield is of highest concern. In turfgrass systems, yield is mostly irrelevant and applying fertilizer based on yield goals can be potentially detrimental from a quality, economic, and environmental perspective. My current research is seeking to determine more accurate methods of interpreting soil tests specifically for turfgrass systems. We will discuss the preliminary data, how it came about, and how we can potentially use it to manage our fertilizer applications going forward. *Instructor: Mr. John Emerson, University of Delaware. Wednesday 3:10pm and 4:10pm. (1 CEU in Nutrient Management)*

**Utilization and Efficacy of Bt Sweet Corn** -- This presentation focuses on the different Bt traits in sweet corn varieties, their current efficacy for controlling insect pests, and how Bt sweet corn is used to monitor insect resistance in other Bt crops. *Instructor: Dr. Galen Dively, University of Maryland. Thursday 8:00am and 9:00am. (1 CEU in Crop Management)*

**Permitting Food Processing Residuals in Maryland** -- Although land application of food processing residuals (FPRs) on farms in Maryland has been an ongoing practice, the local opposition from neighbors has greatly increased over the last 2 years. As a result of pressure from neighbors and County Commissioners in several counties, the Maryland Legislature passed House Bill 991 and Senate Bill 1074, signed into law May 9, 2024, authorizing the Maryland Department of Agriculture (MDA) to permit FPRs. Effective July 1, 2024, MDA will now be responsible for issuing permits for the transport, storage and land application of FPRs. Learn more about how MDA will accept applications and issue permits, inspect land application and storage sites, inspect records, and process fees to better understand this entirely new aspect of Maryland Nutrient Management. *Instructor: Mr. Dwight Dotterer, Maryland Department of Agriculture. Thursday 8:00am and 9:00am. (1 CEU in Professional Development)*

**Building Relationships Between ASA and CCAs: Utilizing the Results from the 2024 Needs Assessment to Move Forward** – In July of 2024, CCAs were invited to provide feedback on various aspects of the CCA program through a needs assessment executed by the American Society of Agronomy. This session will dive into the results of the survey and discuss how the ICCA and ASA boards will use the data to work toward improving the overall CCA experience. *Instructor: Mr. Andy Knepp, ICCA and ASA Boards. Thursday 10:10am and 11:10am. (1 CEU in Professional Development)*

**The Economics of Carbon Markets and Consumer Demand for Low-Carbon Footprint Products in the Mid-Atlantic** – This session will explore the economics of carbon markets and carbon sequestration, focusing on how these markets work and their role in mitigating weather variability. The market dynamics driving carbon pricing in agriculture and the economic incentives that encourage carbon sequestration will be reviewed. The policy landscape of carbon markets and sequestration initiatives in select Mid-Atlantic states will be examined, highlighting state-level programs and incentives impacting agricultural producers and land managers. Despite the potential for farmers, ranchers, and landowners to generate carbon credits through emissions-reducing or carbon-sequestering practices, transaction costs and other barriers present significant challenges. These considerations will be explored alongside strategies for overcoming them. Finally, consumer demand for food products with a low carbon footprint will be addressed, focusing on emerging trends in sustainable products and the willingness to pay premiums for them. Attention will be given to marketing strategies that appeal to eco-conscious consumers and the broader implications for market development and long-term sustainability in agriculture. *Instructor: Dr. Kofi Britwum, University of Delaware. Thursday 10:10am and 11:10am. (1 CEU in Soil and Water Management)*

# 2024 Crop Management School Workshop Schedule

**Tuesday, November 19, 2024**

Time	Palmetto 2 & 3 (upstairs)	Palmetto 4 & 5 (upstairs)	Barbados & Cayman (downstairs)	Dominica & Eleuthera (downstairs)	Palmetto 1 (upstairs)
Session	Crop Management	Nutrient Management	Pest Management	Soil & Water	Alternative
10:00 - 10:50	Malting Barley Potential in the Mid-Atlantic <i>Nicholas Santantonio</i>	Geophysical methods in support of field-scale nutrient risk assessments <i>Joshua Thompson</i>	The 4 Pillars of Managing Deer Damage <i>Luke Macaulay</i>	A Rapid Approach for Estimating the Impact of Legacy Soil Phosphorus in the Chesapeake Bay Watershed <i>Peter Vadas</i>	Developing Enterprise Budgets for Specialty Crops <i>Nate Bruce</i>
11:00 - 11:50	Malting Barley Potential in the Mid-Atlantic <i>Nicholas Santantonio</i>	Geophysical methods in support of field-scale nutrient risk assessments <i>Joshua Thompson</i>	The 4 Pillars of Managing Deer Damage <i>Luke Macaulay</i>	A Rapid Approach for Estimating the Impact of Legacy Soil Phosphorus in the Chesapeake Bay Watershed <i>Peter Vadas</i>	<i>Developing Enterprise Budgets for Specialty Crops</i> <i>Nate Bruce</i>
11:50 - 1:00	<b>LUNCH BREAK</b>				
Session	Crop Management	Nutrient Management	Pest Management	Soil & Water	Alternative
1:00 - 1:50	Covering More Ground with Narrow Row Corn <i>Alexander Lindsey</i>	Nitrogen Considerations for Rye Cover Crops <i>Kip Balkcom</i>	Managing Nematodes in Corn and Soybean <i>Travis Faske</i>	The Long and Short of Maximizing Cover Crop Benefits in Agronomic Systems <i>Virginia Sykes</i>	TAPS: Irrigation Technology, Data Management, and Decision Making <i>Daran Rudnick</i>
2:00 - 2:50	Covering More Ground with Narrow Row Corn <i>Alexander Lindsey</i>	Nitrogen Considerations for Rye Cover Crops <i>Kip Balkcom</i>	Managing Nematodes in Corn and Soybean <i>Travis Faske</i>	The Long and Short of Maximizing Cover Crop Benefits in Agronomic Systems <i>Virginia Sykes</i>	TAPS: Irrigation Technology, Data Management, and Decision Making <i>Daran Rudnick</i>

# 2024 Crop Management School Workshop Schedule

## Tuesday, November 19, 2024 (continued)

Time	Palmetto 2 & 3 (upstairs)	Palmetto 4 & 5 (upstairs)	Barbados & Cayman (downstairs)	Dominica & Eleuthera (downstairs)	Palmetto 1 (upstairs)
2:50 - 3:10	<b>BREAK</b>				
Session	Crop Management	Nutrient Management	Pest Management	Soil & Water	Alternative
3:10 - 4:00	Complimenting Production Systems Using Annual Forages <i>Bronc Finch</i>	Chasing Accurate and Precise Nitrogen Recommendations in Corn <i>Vaughn Reed</i>	Planting green: An integrated weed management tool? <i>John Wallace</i>	Soil Management Impacts on Ecosystem Functions - Integrative Livestock Systems <i>Lisa Fultz</i>	You've Got to Fight For Your Right-to-Farm: Understanding how Court Decisions Impact state right-to-farm laws <i>Paul Goeringer</i>
4:10 - 5:00	Complimenting Production Systems Using Annual Forages <i>Bronc Finch</i>	Chasing Accurate and Precise Nitrogen Recommendations in Corn <i>Vaughn Reed</i>	Planting green: An integrated weed management tool? <i>John Wallace</i>	Soil Management Impacts on Ecosystem Functions - Integrative Livestock Systems <i>Lisa Fultz</i>	You've Got to Fight For Your Right-to-Farm: Understanding how Court Decisions Impact state right-to-farm laws <i>Paul Goeringer</i>

# 2024 Crop Management School Workshop Schedule

Wednesday, November 20, 2024

Time	Palmetto 2 & 3 (upstairs)	Palmetto 4 & 5 (upstairs)	Barbados & Cayman (downstairs)	Dominica & Eleuthera (downstairs)	Palmetto 1 (upstairs)
<b>Session</b>	<b>Crop Management</b>	<b>Nutrient Management</b>	<b>Pest Management</b>	<b>Soil &amp; Water</b>	<b>Alternative</b>
8:00 - 8:50	Yield Monitoring Technology to Support On-Farm Decisions <i>John Fulton</i>	Where did we go wrong with variable rate P and N? <i>Joshua McGrath</i>	Having the Final Say: Managing Weed Seeds at Harvest <i>Michael Flessner</i>	Adaptive Grazing Management with Virtual Fence <i>Lara Macon</i>	The Contribution of Pollinators to Crop Production <i>Anahí Espíndola</i>
9:00 - 9:50	Yield Monitoring Technology to Support On-Farm Decisions <i>John Fulton</i>	Where did we go wrong with variable rate P and N? <i>Joshua McGrath</i>	Having the Final Say: Managing Weed Seeds at Harvest <i>Michael Flessner</i>	Adaptive Grazing Management with Virtual Fence <i>Lara Macon</i>	The Contribution of Pollinators to Crop Production <i>Anahí Espíndola</i>
9:50 - 10:10	<b>BREAK</b>				
<b>Session</b>	<b>Crop Management</b>	<b>Nutrient Management</b>	<b>Pest Management</b>	<b>Soil &amp; Water</b>	<b>Alternative</b>
10:10 - 11:00	Managing Crop Response to Phosphorus in variable environments: Across- and Within- Fields <i>Vaughn Reed</i>	Managing Hidden Hunger in Soybeans <i>Carrie Ortel</i>	Ecologically-Based Integrated Pest Management of Major Pests of Field Corn <i>Tim Bryant</i>	The Interplay Between Soil Biology and Soil Health <i>Stephanie Yarwood</i>	Utility of Anaerobic Soil Disinfestation in Specialty Crops <i>Matthew Cutulle</i>
11:10 - 12:00	Managing Crop Response to Phosphorus in variable environments: Across- and Within- Fields <i>Vaughn Reed</i>	Managing Hidden Hunger in Soybeans <i>Carrie Ortel</i>	Ecologically-Based Integrated Pest Management of Major Pests of Field Corn <i>Tim Bryant</i>	The Interplay Between Soil Biology and Soil Health <i>Stephanie Yarwood</i>	Utility of Anaerobic Soil Disinfestation in Specialty Crops <i>Matthew Cutulle</i>
12:00 - 1:00	<b>LUNCH BREAK</b>				

# 2024 Crop Management School Workshop Schedule

Wednesday, November 20, 2024 (continued)

Time	Palmetto 2 & 3 (upstairs)	Palmetto 4 & 5 (upstairs)	Barbados & Cayman (downstairs)	Dominica & Eleuthera (downstairs)	Palmetto 1 (upstairs)
Session	Crop Management	Nutrient Management	Pest Management	Soil & Water	Alternative
1:00 - 1:50	PWM and Targeted Spraying Technology for Crop Protection <i>John Fulton</i>	Managing Nutrient Applications and Removal in Forage Production Systems <i>Bronc Finch</i>	Emerging Vegetable and Row Crop Pests in the Mid-Atlantic <i>Tom Kuhar</i>	Irrigation Scheduling for Row Crops: Myths and Realities <i>Brenda Ortiz</i>	Management of slugs using slug parasitic nematodes <i>Michael Crossley and Thabu Mugala</i>
2:00 - 2:50	PWM and Targeted Spraying Technology for Crop Protection <i>John Fulton</i>	Managing Nutrient Applications and Removal in Forage Production Systems <i>Bronc Finch</i>	Emerging Vegetable and Row Crop Pests in the Mid-Atlantic <i>Tom Kuhar</i>	Irrigation Scheduling for Row Crops: Myths and Realities <i>Brenda Ortiz</i>	Management of slugs using slug parasitic nematodes <i>Michael Crossley and Thabu Mugala</i>
2:50-3:10	<b>BREAK</b>				
Session	Crop Management	Nutrient Management	Pest Management	Soil & Water	Alternative
3:10 - 4:00	Corn and Soybean Planting Order Decisions Impact Farm Gross Revenue <i>Shawn Conley</i>	Effects of Long-Term Cover Crop Usage on Crop Yields, Nutrient Cycling, and Soil Quality <i>Joseph Haymaker</i>	Adaptive Disease Management Strategies for Broccoli <i>Douglas Higgins</i>	Controls on Cover Crop Biomass, Heterogeneity, and Agroecosystem Implications <i>Alexandra Huddell</i>	Soil Testing of Delaware's Turfgrass Systems: What Does the Data Tell us? <i>John Emerson</i>
4:10 - 5:00	Corn and Soybean Planting Order Decisions Impact Farm Gross Revenue <i>Shawn Conley</i>	Effects of Long-Term Cover Crop Usage on Crop Yields, Nutrient Cycling, and Soil Quality <i>Joseph Haymaker</i>	Adaptive Disease Management Strategies for Broccoli <i>Douglas Higgins</i>	Controls on Cover Crop Biomass, Heterogeneity, and Agroecosystem Implications <i>Alexandra Huddell</i>	Soil Testing of Delaware's Turfgrass Systems: What Does the Data Tell us? <i>John Emerson</i>

# 2024 Crop Management School Workshop Schedule

**Thursday, November 21, 2024**

Time	Palmetto 2 & 3 (upstairs)	Palmetto 4 & 5 (upstairs)	Barbados & Cayman (downstairs)	Dominica & Eleuthera (downstairs)	Palmetto 1 (upstairs)
Session	Crop Management	Nutrient Management	Alternative	Nutrient Management	Alternative
8:00 - 8:50	Level Up! Interpreting Results of Crop Yield Trials For Improved Decision Making <i>Nicole Fiorellino</i>	Fine-tuning Lime Recommendations for Better Yields <i>Amy Shober</i>	Permitting Food Processing Residuals in Maryland <i>Dwight Dotterer</i>	Considerations for Selecting Large-Scale Compost and Soil Health Amendments <i>Chris Brosch</i>	Utilization and Efficacy of Bt sweet corn <i>Galen Dively</i>
9:00 - 9:50	Level Up! Interpreting Results of Crop Yield Trials For Improved Decision Making <i>Nicole Fiorellino</i>	Fine-tuning Lime Recommendations for Better Yields <i>Amy Shober</i>	Permitting Food Processing Residuals in Maryland <i>Dwight Dotterer</i>	Considerations for Selecting Large-Scale Compost and Soil Health Amendments <i>Chris Brosch</i>	Utilization and Efficacy of Bt sweet corn <i>Galen Dively</i>
9:50-10:10	<b>BREAK</b>				
Session	Crop Management	Nutrient Management	Alternative		Alternative
10:10 - 11:00	Planting Timing Interactions with Nutrient Uptake in MD and DE <i>Jarrold Miller</i>	Salinity Assessment in Mid-Atlantic Coastal Soils using Routine Agronomic Soil Test <i>Sapana Pokhrel</i>	Building Relationships Between ASA and CCAs: Utilizing the Results from the 2024 Needs Assessment to Move Forward <i>Andy Knepp</i>	-	The Economics of Carbon Markets and Consumer Demand for Low-Carbon Footprint Products in the Mid-Atlantic <i>Kofi Britwum</i>
11:10 - 12:00	Planting Timing Interactions with Nutrient Uptake in MD and DE <i>Jarrold Miller</i>	Salinity Assessment in Mid-Atlantic Coastal Soils using Routine Agronomic Soil Test <i>Sapana Pokhrel</i>	Building Relationships Between ASA and CCAs: Utilizing the Results from the 2024 Needs Assessment to Move Forward <i>Andy Knepp</i>	-	The Economics of Carbon Markets and Consumer Demand for Low-Carbon Footprint Products in the Mid-Atlantic <i>Kofi Britwum</i>



## *2024 Planning Committee*

### **Executive Committee**

Dr. Nicole Fiorellino – University of Maryland  
Dr. Jarrod Miller – University of Delaware  
Dr. Amy Shober – University of Delaware

### **CEU Coordinator**

Ms. Sydney Riggi – University of Delaware

### **Evaluation Coordinator**

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### **On-Site Facilities Coordinator**

Mr. Joe Hatton – West Virginia Department of Agriculture

### **Program Teams**

#### **Crop Management**

Dr. Nicole Fiorellino (Leader) – University of Maryland  
Dr. Jarrod Miller – University of Delaware  
Mr. Mark Townsend – University of Maryland

#### **Nutrient Management**

Dr. Mark Reiter (Leader) – Virginia Tech  
Dr. Amy Shober – University of Delaware  
Ms. Maegan Perdue – University of Maryland

#### **Pest Management**

Dr. David Owens (Leader) – University of Delaware  
Dr. Alyssa Koehler – University of Delaware  
Dr. Mark VanGessel – University of Delaware  
Ms. Emily Zobel – University of Maryland  
Dr. Kurt Vollmer – University of Maryland

#### **Soil and Water Management**

Dr. Sarah Hirsh – University of Maryland  
Mr. Isaac Wolford – USDA NRCS  
Dr. Dana Rushovich – USDA-NRCS  
Mr. Clinton Gill – Delaware Department of Agriculture

#### **Alternative Session**

Mr. Andrew Kness (Leader) – University of Maryland  
Ms. Erika Crowl – University of Maryland





The Mid-Atlantic Crop Management School is sponsored by the University of Delaware Cooperative Extension and University of Maryland Extension, in conjunction with the Mid-Atlantic Certified Crop Advisor (CCA) Board, and the United States Department of Agriculture-Natural Resource Conservation Service (USDA-NRCS).

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