2014 CROP PEST MANAGEMENT SHORT COURSE PROGRAM

Abstracts

WEDNESDAY, DECEMBER 10, 2014
GENERAL SESSION – ROOM 101 FGH

8:00  How Minnesota Corn Producers Manage Fertilizer Nitrogen – Insights for Dealers
      Dr. Michael Schmitt, University of Minnesota
      Crop producers place great faith in their agricultural professionals to guide them in making their fertilzer management decisions. Thus, the more ag professionals understand producer decision-making, the better they can serve their needs. While crop yield and field economics has routinely driven this decision-making progress, other factors like environmental stewardship, time management and peace-of-mind also enter into the decision process. This presentation will share results from a recent survey of Minnesota crop producers regarding fertilizer management practices and what factors are considered in fertilizer N decision-making. Often times many factors are integrated into this decision process with the goal of minimizing risk.

9:10  Open Ag Data Alliance: Simplifying Data In Ag
      Aaron Ault, Purdue University
      Aaron Ault, an active farmer and project lead for the Open Ag Data Alliance (OADA), will discuss the state of data in the agriculture industry and how OADA is helping the ag industry to move toward better privacy, security, and interoperability that will enable the next frontiers of big data science while reducing the hassle of data management for both farmers and ag professionals.

10:10 Causal Factors of Honey Bee Colony Declines: Are Neonicotinoid Insecticides Involved?
      Dr. Galen Dively, University of Maryland
      Honey bee colony losses and declines in native pollinators have caused much concern worldwide. Annual surveys conducted since the appearance of colony collapse disorder (CCD) in 2006 continue to show consistent losses of colonies exceeding 30%. The consensus among bee scientists is that honey bee colony declines are the result of multiple stressors, working independently, in combination, or synergistically to impact honey bee health. Many stress factors have been identified, including parasitic mites, pathogens, poor nutrition, pesticide exposure, management stress, and loss of foraging habitat. Despite the lack of evidence implicating pesticides as the sole causal factor, neonicotinoid insecticides have been widely implicated in adversely affecting honey bee health due to their extensive use worldwide, systemic activity, and presence in pollen and nectar. This presentation covers the potential routes of pesticide exposure to bees, exposure of imidacloprid to bees via different application methods, and results of a three-year study of the chronic sublethal effects of imidacloprid on whole honey bee colonies.
1:00 & 4:10  **Sprayer Technology and Pesticide Applications in the 21st Century**  
*Dr. Greg, Krugger, University of Nebraska-Lincoln*

Pesticide application equipment, including nozzles and sprayer modifications, have rapidly changed the way pesticide applications can be made. It is important to understand when and how to implement these technologies to stay in compliance with new pesticide labels as well as get the most of the pesticides being applied. With every pesticide application, an applicator must consider a lot of different factors in a short period of time. A discussion around when and what to consider for products such as Enlist Duo and other new products as well as things to consider to optimize control from older products will be presented. As herbicide-resistance has appeared in various weed species, herbicide applications have become more complex again. Applicators must consider all of the things that they did prior to the advent of the Roundup Ready crops while keeping in mind that there is a greater emphasis from the EPA and others to maintain environmentally friendly practices.

This session will have a strong focus on nozzles, adjuvants and other application parameters and how they influence droplet size, efficacy and off-target movement. There will be discussion on the implementation of new herbicide-resistant traits with a focus on basics of spray applications.

1:00 & 4:10  **Reassessing Corn Rootworm Management in the Face of Lower Commodity Prices**  
*Dr. Ken Ostlie, University of Minnesota*

Winter and spring weather certainly benefited corn growers. In the face of reduced pressure and lower commodity prices, growers may be reassessing management strategies for corn insects. In this session we will review regional research, examine the latest trends in trait performance and resistance, and focus on management strategies that can reduce input costs.

1:55 & 3:15  **Take Control of Weed Management, Acceptance – Are We There Yet?**  
*Lisa Behnken and Fritz Breitenbach, University of Minnesota*

Controlling weeds to protect crop yield is a must. And, timely removal of those weeds is a critical component of a sustainable weed management program. Over-reliance on postemergence herbicide programs has become a problem. It limits options, increases the risk for poor timing, and frequently results in ineffective weed control. This results in increased early weed season competition, number of weed species to manage with postemergence herbicides, weed seed bank, risk of developing resistant weeds, less time to effectively control weed populations, and in many cases an over-simplified weed management program.

So, are we still in denial? The game has changed, resistant weeds are a reality. Giant ragweed and common waterhemp are becoming more difficult to control and the weed seed bank is increasing in many fields. How clean were your fields this fall? We have to Take Control now. How will you do a better job managing weeds before they manage you? What non-chemical weed control strategy will
you implement on your farm? Start now, with weed mapping. This is a good tool to help identify where populations of weeds are and what they are. Target fields or spots in fields that need to be the priority. Implement your plan, start strategically with those priority spots and fields and then implement on all fields. Accept the challenge, Take Control. In this session we will share weed management plans and challenge you to Take Control and implement a plan.

1:55 & 3:15  **Big Data from Multistate Research on Soybean Aphid Management**  
*Dr. Kelley J. Tilmon, South Dakota State University*

This presentation will describe some advances in soybean aphid integrated pest management based on multi-state research projects involving several states in the North Central Region. Multistate research projects provide robust data based on a wide range of conditions and is ideal for formulating regional management recommendations and educational materials. Research topics discussed will include aphid-resistant soybean varieties and insecticidal seed treatments.

**CONCURRENT SESSIONS III & IV – ROOMS 101 FGH & 101 IJ**

1:00 & 1:55  **Agronomy with $3.00 Corn**  
*Dr. Jeff Coulter, University of Minnesota*

Low grain prices and comparatively expensive agronomic inputs are making it challenging for profitable corn production in the Upper Midwest. In this presentation, numerous agronomic factors, including hybrid selection, seeding rate, crop rotation, fertilization, and other agronomic input and management decisions will be evaluated with regard to the frequency and level of yield response and the associated economic impact. This will help crop advisors and growers recognize key opportunities and limitations for increasing corn yield and profitability within their cropping systems, while also limiting economic and environmental risks.

1:00 & 1:55  **Palmer Amaranth, Invasive Plants - What the Heck is Going On?**  
*Dr. Roger Becker, University of Minnesota*

Invasive plants? We have managed weedy problems long before the term invasive plants became fashionable in legislative parlance and in natural areas circles. Palmer amaranth is on our borders. Horror stories abound in the South. Procedures are in play to add palmer amaranth to the Minnesota Noxious Weed Law as an ‘eradicate’ species. Canada thistle still is pervasive in Minnesota despite being the founding member of the 1895 Minnesota Noxious Weed Law. Soybean aphid monitoring has become the norm, and buckthorn crossed over from natural areas to an agricultural issue. What the heck is going on? Come and fine out. This, and other weeds of interest will be the topic of discussion.

3:15 & 4:10  **Historical and Projected Future Climatic Changes in the Great Lakes Region**  
*Dr. Jeff Andresen, Michigan State University*
Climate in the Great Lakes region has varied markedly in the distant past as evidenced by a number of paleclimatological records. Instrumental observations of climatological variables are available for approximately the past 150 years and allow more detailed identification and investigation of temporal and spatial trends across the region. Major temperature trends since the beginning of the 20th century include steady or slowly warming temperatures from approximately 1900 to 1940 followed by a cooling trend from the early 1940’s to the late 1970’s which was in turn followed by a second warming trend that began around 1980 and has continued to the present. Much of the warming trend during the past 2-3 decades has been associated with warmer minimum temperatures during the winter and spring seasons. Another important trend regionally has been an increase of precipitation since approximately 1940, which was associated with increases in both the number of wet days and in the number of heavy precipitation events. Most recent projections of future climate change for the region in the future include increases in mean annual temperatures of 2-10°F, wetter winters, potentially drier summers, increases in the length of the frost-free season, fewer cold air outbreaks, and more summertime heat waves. Finally, some climate projections also call for potential increases in the number of extreme weather events, which although typically low in number are associated with a significant fraction of related impacts.

**Remote Sensing for Crop Pests**

*Dr. Robert Koch and Dr. Ian MacRae, University of Minnesota*

Interest in unmanned aerial vehicles (UAVs) and remote sensing is growing fast in the agricultural sector. These technologies hold promise for increasing the efficiency of scouting crops for pests. However, research-based information on capabilities and limitations of these technologies for particular pests has been limited. This presentation will provide an overview of the fundamentals of remote sensing and how insects can affect plant spectral reflectance. Updates will be provided on recent research conducted on soybean aphid, potatoes and wheat.

**THURSDAY, DECEMBER 11, 2014**

**CONCURRENT SESSION I – ROOM 101 FGH**

8:00 & 12:30  **Getting the Big Picture of Sulfur Fertilizer Needs for Minnesota Crops**

*Dr. Daniel Kaiser, University of Minnesota*

Many farmers in Minnesota have increased their use of sulfur in crop rotations. The number of fields that actually need sulfur is likely less than the number that are actually applied. Application of sulfur where it is not needed may be due to a poor understanding of how to best target sulfur fertilizer application for maximum economic benefit. This presentation will include a discussion of the current status of sulfur research focusing on key areas where sulfur may cycle within cropping rotations and the overall fate of sulfur fertilizer. Key areas will include potential sulfur availability from plant stover and sulfate carried over from one year to the next. Information surrounding updates to the sulfur fertilizer guidelines for corn will be presented with the goal of better identifying where sulfur may provide the greatest effect for increasing crop yield and the overall economics of a crop rotation.
Managing Nitrogen Based on Data not Anecdotes
Dr. Fabián Fernández, University of Minnesota

Nitrogen fertilizer is an expensive input in today's farming operations. At the same time, this nutrient is essential for corn production as this crop is generally very responsive to nitrogen fertilization. Decisions on how to best manage nitrogen are often influenced by economic and practical issues. Because nitrogen management is really risk management, our decisions should be backed by sound principles derived from unbiased data and proven over the years, not just tradition or anecdotal accounts. Our decisions can have long-term implications on sustainability, both in terms of environmental quality and profitability. Often discussions on nitrogen management revolve only around the topic of rate of application. While applying the correct amount of nitrogen is certainly important to ensure 1) adequate availability to the crop and 2) minimize the amount of leftover nitrogen at the end of the season, this is certainly not the only topic we should consider. Beside nitrogen rate, other variables such as source of nitrogen and the time and method of application along with knowledge of previous prevailing weather conditions need to be considered to improve the efficient use of this important input. In this presentation we will integrate these variables with basic principles derived from years of data collection from research activities that have real-life application.

An Update on the Response Trial Database for Corn N Rate Recommendations - the MRTN Approach
Dr. John Sawyer, Iowa State University

The current approach (initiated in 2005) for determining corn nitrogen rate recommendations across the corn belt (seven states) is unique because it directly uses a large database of corn nitrogen rate response trials (yield increases to multiple nitrogen rates and response models). Currently, the seven states have a combined approximate 1,500 trials in the database, with on-going data updates. This "big data" is used in the current recommendation system, called the Maximum Return to Nitrogen (MRTN), with implementation via the online tool called the Corn Nitrogen Rate Calculator (CNRC). Nitrogen recommendations are tailored by querying state or sub-state specific response trial data based on user input, with recommendations available for continuous corn and corn following soybean, and rate adjustment for user selected nitrogen and corn prices. This nitrogen rate response database and MRTN approach may be the first instance of directly using a large database for making crop input management decisions.

Input and Management Based Soybean Production Systems with Yield Enhancers and Protectors
Dr. Seth Naeve, University of Minnesota

We farm in a dynamic world. The economics, biology, and chemistry of farming seem to be ever shifting. The recent pull-back in commodity prices allows for a new perspective on crop inputs. In soybean, we are moving from a 'yield at any cost' strategy to a more conservative perspective that should also include long-term risk management (primarily around resistant pests). This represents a significant philosophical shift in our thinking of crop production and farm management. While not new,
This management based production system requires a larger upfront investment of time and energy than our current standard, input based production system.

This session will focus on the final results from the nine state soybean production project lead by Seth Naeve. Multiple yield enhancing and yield conserving (used prophylactically) products were evaluated on soybean as single products and as parts of larger input systems in 2012-2014. Some clear winners and losers have been identified. More importantly, the results give important clues about the importance of an effective management strategy for soybean production in this new era.

8:55 & 12:30  
**Maximizing Soybean Yield: Genetics, Nutrition, and Management**  
*Dr. Larry Purcell, University of Arkansas*

Crop growth and yield depends upon the capture and efficient use of resources including light, nutrients, and water. Management of soybean for maximum yield should ensure that soil moisture and nutrients are not limiting, that biotic pests (i.e., nematodes, disease, insects, weeds) are eliminated or effectively controlled, that row spacing allows full light-capture by beginning of flowering, and that planting date and a proper maturity group are selected such that flowering begins near the summer solstice. A key factor for maximizing soybean yield is recognition that most fertility recommendations are far below the nutritional requirements for yields in excess of 85 bushels/acre. In many cases, it appears that yields approaching 100 bushels/acre or more may require N fertilization, but it is doubtful that this is economical and it is not likely to be environmentally sound.

10:15 & 1:25  
**Corn Development, Management and Water Use Efficiency**  
*Dr. Roger Elmore, University of Nebraska*

Corn growth and corn development are not the same. In this session, we'll discuss the differences and apply that information to specific management decisions - like planting date, row spacing, and plant density. We'll investigate the impact of these practices on water use. In addition, we'll discuss what we can learn and apply from crop models.

**CONCURRENT SESSION III – ROOM 200 CDE**

8:00 & 12:30  
**Know Your Weeds: Exploiting Seed-Bank Depletion and Emergence Patterns to Improve Herbicide-Resistant Giant Ragweed Control**  
*Jared Goplen, University of Minnesota*

Herbicide-resistant kochia, common waterhemp, common ragweed, and giant ragweed have been identified in Minnesota, and are affecting an increasing number of acres. Herbicide-resistant weeds are both an economic and agronomic concern. Many of these weeds are resistant to multiple herbicide chemistries, which limit options for weed control and decrease profitability. With increasing economic consequences and prevalence of these resistant weeds, integrated strategies are needed to improve weed control. This presentation will discuss current research focusing on giant ragweed biology, and how gaining a better understanding of its life cycle can be used to improve control. This presentation
will discuss how various crop rotations which include corn, soybean, wheat, and alfalfa affect the level of seed-bank depletion, as well as how these crops and crop rotations affect the emergence levels and patterns of giant ragweed. Results from this research suggest that when giant ragweed is completely controlled in any crop, the seed-bank is 96% depleted within two years. Emergence patterns differed depending on the crop planted, with 50% emergence typically occurring by May 23. Additionally, fewer giant ragweed seedlings emerged in wheat and alfalfa compared to corn and soybean. This presentation will discuss how these results can be used as part of a weed management plan to improve control herbicide-resistant giant ragweed.

8:55 & 11:10  **Why Grain Prices are at 5 Year Lows**  
*Dr. Edward Usset, University of Minnesota*

Corn, soybean and wheat prices are at five-year lows. Come learn why prices are down, and listen to some predictions for the year ahead. Dr. Usset serves as a Grain Marketing Specialist for the Center for Farm Financial Management at the University of Minnesota.

10:15 & 1:25  **What's New With the Corn Leaf Diseases Goss's Wilt, Northern Leaf Blight, and Rust**  
*Dr. Dean Malvick, University of Minnesota*

Across Minnesota's 8+ million acres of corn in production, several leaf diseases have been causing problems and concern over the past few years. Goss's wilt, northern leaf blight, and rust have been especially noteworthy. This presentation will focus on basic and new regional information on these diseases that informs our understanding of why and when these diseases occur and what we can do to manage them. Goss's wilt has been the most concerning of these diseases, although it has been inconsistent across the landscape. Highlights will be presented and discussed from many recent studies relating to risk and development of Goss's wilt, pathogen survival and aggressiveness, crop rotation, and management tactics that have been conducted in Minnesota and other states. Northern leaf blight caused concern in a number of fields this year in southern MN as well as other Midwestern states. Potential reasons for the outbreaks will be discussed in terms of resistance in hybrids, races of the pathogen, and what we know and don't know about factors favoring this disease. Finally, the development of common rust on corn raised many questions again in 2014. This presentation will briefly cover why rust developed, what levels can cause yield loss, differences between common and southern rust, and disease management options.

**CONCURRENT SESSION IV – ROOM 200 AB**

8:00 & 11:10  **How is Phosphorus Moving from Fertilizer and Manure Sources to Surface Waters**  
*Dr. Paulo Pagliari, University of Minnesota*

This presentation will be broken up into three sections. In the first section, this presentation will revisit the basic concepts of soils available phosphorus, the different inorganic phosphorus pools in the soil; and the distribution of organic phosphorus in soil in the different pools. In the second section, we will review how phosphorus behaves in the soils in both the inorganic and organic phases. The third and
The final part of this presentation will outline how phosphorus can move through the soil profiles, moves into water bodies, and the consequences of elevated phosphorus in aquatic systems. A summary of changing practices needed to keep phosphorus in the fields where it belongs will also be reviewed.

8:55 & 12:30  **Big Picture" Trends in Nitrogen Fertilizer Use, Water Quality, and Response Strategies**  
*Bruce Montgomery, Minnesota Department of Agriculture*

Public concern about excessive nitrates in water supplies appears to be at an all-time high. This presentation will attempt to characterize some of the major drivers taking place over the past few decades in terms of behavioral use patterns, trends in fertilizer sales and efficiencies, current nitrate knowledge in terms of severity and trends, and how the MN Department of Agriculture (MDA) is proposing to move forward with addressing impacted areas from agricultural activities. Over the past three years, the MDA has developed a comprehensive response plan which includes a blend of both regulatory and non-regulatory actions. This process was conducted in partnership with numerous agricultural groups, SWCDs, state agencies, environmental groups, and the UM.

We will discuss the key elements of this plan, how it will work, and the potential role of key information providers such as the local dealerships. As part of the plan, the MDA recently announced the development of proposed rules that could potentially impact a number of fall application practices in sensitive areas. Finally, the Clean Water Amendment has provided some critical funding for research and implementation projects.

10:15 & 1:25  **Research on Winter Rye Cover Crops in Corn-Soybean Rotations in Iowa**  
*Dr. Tom Kaspar, USDA-ARS National Laboratory for Agriculture and the Environment*

Almost 95% of the harvested crop acres in Iowa are in either corn or soybean production. Therefore, the time that cover crops have to grow and provide benefits is cold and short. One of the most widely used and best adapted cover crop for corn-soybean rotations in Iowa is winter rye. Winter rye can be planted relatively late in the fall, is winter hardy, and grows well in cold weather. Our research in Iowa has shown that winter rye can consistently provide reasonable amounts of growth in most years. A cereal rye cover crop can also substantially reduce erosion and losses of nitrogen in tile drainage. Additionally, over the long-term a winter rye cover crop can improve soil health by increasing soil organic matter, nitrogen storage and recycling, and earthworm populations.