Turbulent Times: Income Trends & Production Costs

Bob Craven, University of Minnesota

This presentation will focus on the current financial situation for Minnesota farms and the outlook for 2015 and 2016. The profitability of MN farms will be investigated with a look at profitability for the median/top/bottom performers, by type of farm, and by size of farm. Additional characteristics important to farm financing will be discussed.

For crop farms we will review production costs for the median and top and bottom 20% of producers. The expected production costs and returns for both corn and soybeans for 2015 and 2016 will be explored. Finally the presentation will finish up with a look at machinery costs and machinery investment per acre.

Productive Agriculture, Conservation, and Water Quality: Opportunities and Challenges

Dr. Andrew Sharpley, University of Arkansas

Major initiatives have funded the implementation of conservation practices on agricultural lands in major watersheds over the last 10 years. These conservation practices focused on avoiding, controlling, and trapping nutrients and sediment runoff from vulnerable landscapes. The more widely adopted of these practices are cover crops and edge of field buffers, such as vegetative filter strips, herbaceous buffers, and riparian buffers. Cover crops protect the soil surface from erosion, can reduce nutrient runoff, and depending on the cover crop, fix nitrogen for the main crop or mine phosphorus (P) from high P soils.

Buffer can filter (up to 80%) sediment and associated particulate nutrients in runoff leaving a field before entering a stream. However, there are tradeoffs with many conservation practices that need to be considered, such that a single practice should not be considered as a solitary option to minimize nutrient runoff. For example, field research shows that buffers can eventually transition from a sink for P to a source of P, which can subsequently be difficult to manage. Also, for conservation practices that work to trap P on the landscape, there should be an associated change in nutrient...
management on the field to minimize or avoid the risk of sources being transported in runoff. The ‘4R’ program on nutrient management is a good example of this. This presentation will explore and discuss management options that should be considered as a suite of practices to minimize nutrient runoff.

10:10

**Dealing and Farming with Insect Resistance to Applied Crop Protection Products: A Southern Perspective**  
*Dr. Jeffrey Gore, Mississippi State University*

Integrated pest management (IPM) is an important concept for managing insect pests of multiple crops. However, IPM is not a "one size fits all" approach. Most crops grown in the southern U.S. are subject to intense insect pressure at some point during the season. Within a single growing season, key insect pests usually complete multiple generations on alternative hosts prior to the crop being planted resulting in high populations. Additionally, generations of those pests often overlap by the time they infest the crops resulting in sustained pressure over multiple weeks. In most cases, management of insect pests with multiple insecticide applications is the only viable option to prevent economic, and in some cases, complete losses. The result of those applications is intense selection pressure for insecticide resistance in both target and no-target pests.

Insect pests have a long history of rapidly developing resistance to applied insecticides in the southern U.S. IPM has been important for preventing catastrophic losses in many of those cases. This presentation will focus on specific cases of several insect pests in the southern U.S. that have developed resistance to insecticides and how IPM approaches were used to manage those populations.

**CONCURRENT SESSIONS I & II – ROOMS 200 AB & 200 CDE**  
*(Session I jointly offered with Applicator Recertification)*

1:00 & 4:10  
**Insecticide Failures? Let’s Talk Resistance**  
*Dr. Ian MacRae, University of Minnesota*

What are the dangers of following a seed treatment with a foliar application of the same insecticide? Why are we seeing less efficacy in some of our insecticide applications? Why do some insect pests seem to be getting more difficult to control? In this presentation we will discuss how insecticide resistance develops, managing insect pests when it does and some ways to avoid the problem.
1:00 & 4:10  **Soil Insecticides, Bt Traits and Corn Rootworm: Are We Coming Full Circle?**  
*Dr. Kenneth Ostlie, University of Minnesota*

Bt traits for corn rootworms were introduced with the expectation that traits would reduce the necessity for soil insecticide use. Initial success of traits did reduce use but this trend was soon reversed with the advent of Bt trait resistance in western corn rootworm. In this presentation, the status and performance of soil insecticides will be reviewed in view of increasing use of non-Bt-RW hybrids and their role in complementing Bt-RW traits.

1:55 & 3:15  **Cleaning Pesticide Residue from Agricultural Spray Equipment**  
*Dr. Vernon Hofman, North Dakota State University*

This presentation will discuss cleaning residue from sprayers when a different chemical is to be applied to another crop. The next crop to be sprayed may be very sensitive to the previous pesticide and cause severe damage if a small amount of residue is left in the spray system.

Cleaning the sprayer with the recommended cleaning agent before the next spray job is extremely important. Cleaning a sprayer with large amounts of water is often similar to washing greasy hands with only water. Sprayers use a complicated plumbing system and some parts of the spray system can easily be overlooked during the cleaning process. This can leave a small amount of residue in the sprayer and cause damage to the next crop. Pesticides need to be cleaned from all parts of the sprayer including the tank, spray boom, hoses, inductors, line screens and nozzle screens. Everything.

*Dr. Robert Koch, University of Minnesota*

To address insecticide use and water resource protection, the State developed best management practices (BMPs) for use of agricultural insecticides. These voluntary BMPs should be taken seriously, because if they prove ineffective at protecting surface waters, further restrictions on insecticide use and practices could be invoked. This presentation discuss management of soybean pests (aphids, mites and defoliators) in the context of the BMPs to identify practices that can be implemented to better protect surface waters. Finally, a connection will be made to show how these practices can also offer benefits by contributing to insecticide resistance management.
**Global Status of Herbicide Resistant Weeds**  
*Dr. Ian Heap, WeedScience LLC*

The phenomenon of herbicide-resistant weeds continues to challenge the long term viability of global cropping systems. There are currently 459 unique cases (species x site of action) of herbicide resistant weeds with approximately 11 new cases being reported every year. North America remains the region with the greatest problems with herbicide-resistant weeds, followed by Europe, Australia, Asia and South America. Not surprisingly regions that don’t use herbicides intensively, like much of Africa, have relatively few problems with herbicide resistance. The introduction of herbicide resistant crops have presented growers with a double edged sword, on the one hand providing them with new sites of action to control existing resistant weeds, but on the other setting growers up for selection of resistant weeds through reliance on specific sites of action.

Although much of the focus on herbicide-resistant weeds in North and South America is on glyphosate resistant weeds in Roundup Ready Crops, the greatest problems globally with herbicide-resistant weeds are to ALS inhibitor and ACCase inhibitor herbicides. In particular ALS inhibitor and ACCase inhibitor resistant grasses in cereals and ALS inhibitor resistant weeds in rice present the largest global economic impact of herbicide resistance. Weeds will evolve resistance to any weed control strategy (chemical, cultural, mechanical, or biological) that is used continuously without rotation or combination with other practices because it provides a consistent evolutionary direction. The best weapon we have against evolution is to change its direction as often as possible. The future of weed control is dependent on understanding evolutionary pressures and utilizing a diversity of weed control strategies in order to destabilize evolution.

**High-Yield Corn Systems**  
*Dr. Jeff Coulter, University of Minnesota*

Many view 300 bushels per acre as a high-yield target for corn, but is this appropriate? Potential yield depends on many genetic, management, and environmental factors. In this session, results from recent high-yield experiments from across the Corn Belt will be summarized. Emphasis will be placed on discussing 1) the corn yield levels that are possible, 2) how far current production differs from that which is possible, and 3) opportunities for integrating crop and nutrient management practices to create marked improvements in corn yield and nitrogen use efficiency.
High-Yielding Corn and Soybean Management
Dr. Ignacio Ciampitti, Kansas State University

Global food security must address the dual challenges of closing yield gaps (i.e., actual “on-farm” versus potential yield) while improving environmental sustainability. Intensifying crop production is essential for the challenge of food security. Crop management practices are often environment, hybrid/variety, and/or yield-level specific. Row spacing, plant population, nutrient management, and other agronomic practices can affect crop yields. By selecting appropriate management practices farmers can increase yields and close yield gaps. In addition, improving input utilization can help to increase yields at the cropping system-scale. Research studies were performed on understanding the effect of different cropping systems and input combinations on production and nutrient uptake/partitioning for both corn and soybean crops.

Timing of Nitrogen Application in Corn to Optimize Yields and Minimize Water Quality Concerns
Dr. Edwin Lentz, Ohio State University

Producers want to better utilize nitrogen to optimize corn yields and minimize environmental concerns. Nitrogen is a major input cost for corn production and the need to maximize its efficiency is important to offset the effects of lower grain prices. Applying nitrogen at the time the corn plant needs it is one way of improving efficiency. Ideally nitrogen should be applied many times between planting and tasseling: a small amount at planting and tasseling, and a much larger amount at growth stage V6 and V12. However, multiple applications increase costs caused by additional labor and application fees. Weather events may also prevent applications which may result in inadequate amounts of nitrogen at critical crop development stages. A producer also knows that excess nitrogen above the corn plant’s needs at a given time has the potential to be lost from the field causing a water quality concern as well as the loss of an economic input. This presentation will discuss the critical times that corn needs nitrogen and the tools available to minimize loss of nitrogen during the growing season. Ohio research data will be included that shows that split applications improve nitrogen efficiency and reduce the potential for nitrogen loss. At the end of day it does not matter when nitrogen is applied as long as it is still there when the corn plant needs it.
THURSDAY, DECEMBER 10, 2015
CONCURRENT SESSION I – ROOM 101 FGH

8:00 & 12:30  Know Your Micronutrients
Dr. Daniel Kaiser, University of Minnesota

There has been an increased focus on the use of micronutrients to achieve higher yield in corn and soybean fields. Research has not demonstrated a need for specific micronutrients to be applied to many crops in Minnesota. Understanding the susceptibility of crops to certain micronutrients and soil chemical properties that lead to deficiency of a particular micronutrient is important when determining what should be applied and where to ensure profitability of an application of a particular nutrient. This presentation will discuss what micronutrients are important, soil conditions that may lead to their deficiency, and outline visual symptoms on plants.

8:55 & 11:10  Nitrates in Drainage Water in Minnesota
Brad Carlson, University of Minnesota

Nitrates in surface water have long been identified as an issue. Efforts to reduce mass flow of nitrate are guided by the USEPAs Gulf Hypoxia Action Plan and Minnesota’s Nutrient Reduction Strategy. Artificial drainage systems installed in agricultural areas are a significant pathway for nitrates to move to surface water. This presentation will discuss the results of close to forty years of research conducted at the University of Minnesota’s Southern Research and Outreach Centers in Waseca and Lamberton. Much of the research shows that Minnesota’s Best Management Practices for Nitrogen fertilizer do a good job of minimizing nitrate loss, yet probably do not provide a solution to reducing nitrate flux to the point in which reduction targets are met. Data indicates much of the loss is due to mineralization from soil organic matter and is affected significantly by climatic variability. A full understanding of these dynamics will be essential to finding solutions which are effective.

10:15 & 1:25  Mineralization of Soil Nitrogen as a Component for Economically Sustainable Crop Production
Dr. Fabián Fernández, University of Minnesota

Nitrogen fertilizer is an expensive but essential input because corn is often very responsive to nitrogen fertilization. Decisions on how to best manage nitrogen are often influenced by economic and practical issues and those decisions can have long-term implications on sustainability, both in terms of environmental quality and profitability. In Minnesota, we have a large diversity of soils and conditions where corn is grown. The
amount of nitrogen needed in different situations is influenced by many different factors. This presentation will focus in one of these factors: Mineralization, or the natural conversion of organic nitrogen in the soil to ammonium; a plant available inorganic form. The amount of mineralization that occurs during a growing season can be very important in nitrogen management because the amount of nitrogen produced through this process can be substantial in many soils in Minnesota. The nitrogen that is thus provided through mineralization is nitrogen that does not need to be supplied by commercial fertilizers for that crop. The presentation will provide information on what factors influence mineralization, what amounts of nitrogen can be expected for different soils, and what can be done with management to enhance this process. The presentation will integrate basic and applied principles and ongoing research findings to illustrate what implications mineralization of soil organic nitrogen can have in present-day farming operations.

CONCURRENT SESSION II – ROOM 101 IJ

8:00 & 11:10  Management of SCN (Soybean Cyst Nematode) in 21st Century Agriculture
Dr. George Bird, Michigan State University

Dr. Bird's presentation will address the following four questions: 1) What is SCN? 2) How do I know if SCN is a problem on my farm or a client's farm? 3) How can high bean yields be produced in the presence of SCN: with special reference to aggressive SCN Types? and 4) What are the best ways to prevent SCN from spreading to non-infested fields and renovation of SCN infested sites? The presentation will conclude with a discussion on the role of cover crops in regards to reduction of risk to SCN and enhancement of soil health as a "Tool for Economically and Environmentally Sustainable Crop Production".

8:55 & 1:25  Winter Oilseeds as “Cash” Cover Crops for Sustainable Crop Production
Dr. Russ Gesch, USDA-Agricultural Research Service

With global human population expected to exceed 9 billion by 2050 increased pressure is being placed on agriculture to produce food, feed, fiber, and now bioenergy, while minimizing its impact on the environment. Obviously, this is a tall order to follow. Sustainable intensified agriculture is a concept of efficiently increasing production on existing arable lands in ways that minimize negative environmental impact and allow for sustainable food production. One of the ways to do this is to produce short-season winter annual oilseeds that take advantage of and efficiently use solar, water, and nutrient resources during the shoulder seasons (i.e., fall and spring) between primary summer crop production (e.g., corn and soybean). This can be done by double or relay
cropping soybean and other short-season summer annual crops with winter oilseeds to produce two crops in a single season. The USDA-ARS in collaboration with the UMN is developing new cropping systems that implement short-season winter annual oilseeds such as camelina (related to canola) as “cash” cover crops in rotation with corn, soybean, and spring wheat. The agronomics of these new cropping systems, their potential to provide new economic opportunities to growers, and the environmental benefits that they offer will be discussed in this session.

10:15 & 12:30 Herbicide-Resistant Weeds - Reliance on Herbicide Technologies Alone Won't Manage the Problem

Dr. Jeffrey Gunsolus, University of Minnesota

Weed management issues continue to get more complicated as giant and common ragweed, kochia and common waterhemp continue to expand their territory and biotypes resistant to multiple herbicide sites of action become a more frequent occurrence. Even with new herbicide-resistant crop technologies on the horizon we cannot address this problem by relying solely on herbicide technologies. This presentation will support this point of view by addressing facts that I wish more people knew about weeds and herbicide resistance. My goal is to lend support to the agricultural industries efforts in the search for innovative uses of chemical and non-chemical means of weed management diversification.

CONCURRENT SESSION III – ROOM 200 CDE

8:00 & 12:30 What’s Happening in Grain Markets?

Edward Usset, University of Minnesota

Corn, soybean and wheat prices are on their second year in a row of prices below production costs. What has driven prices so low, and what will it take to turn the corner on low prices?

8:55 & 11:10 Climate Change and Variability in the Midwest: Trends and Tools

Dr. Jim Angel, University of Illinois

Long-term climate change remains a clear challenge for agriculture, now and in the future. An equally large challenge is climate variability. Climate variability refers to the within-season climate extremes and the extremes from one year to the next. This includes events such as a wet year followed by a drought year, or a wet spring followed by a dry summer, or a mild winter followed by a late spring freeze.
In the past few years, USDA-funded project called “Useful to Usable: Transforming Climate Variability and Change Information for Cereal Crop Producers” has developed a number of tools for helping in pre-season and in-season decisions related to climate. These include: a) a trend analysis viewer of corn, soybeans, temperature, and precipitation at the county level, b) a climate pattern viewer based on El Nino and La Nina conditions; c) a tool for determining the feasibility and profitability of using post-planting nitrogen applications in corn; and d) the real-time tracking and forecasting of corn growing degree days with comparisons to the historical record. In this presentation, we will discuss both climate change and climate variability and how these tools can be used to help make practical decisions in this environment.

10:15 & 1:25  

**Foundations for Understanding and Managing Brown Stem Rot and Sudden Death Syndrome in Soybean**  
*Dr. Dean Malvick, University of Minnesota*

Stem and root diseases are common, yield-reducing problems for soybean. Brown stem rot (BSR) and sudden death syndrome (SDS) are especially common and problematic in many areas. Since BSR was first discovered, it has remained a persistent yet inconsistent drag on yields. SDS has more recently become a problem and is likely spreading in Minnesota. This presentation will focus on BSR, and will cover new and old research on these diseases. Come prepared to hear how we can use the accumulated knowledge to understand factors that influence disease risk, how these diseases influence crop performance, and how we can improve disease management. These fascinating and vexing diseases can be challenging to manage, but a combination of new and old approaches can reduce their impacts on soybean production.

**CONCURRENT SESSION IV – ROOM 200 AB**

8:00 & 11:10  

**Evaluation of Soil Health Tests**  
*Dr. Deborah Allan, University of Minnesota*

This presentation will briefly go over some background on soil health, defining its importance and research-tested indicators that have been used to assess and monitor soil health over the past twenty years. We will discuss the challenges of calibrating soil health measurements such as microbial activity or aggregate stability with measures of production like yield, and how researchers have approached these questions. Finally, we will present our results with Minnesota soils using the Solvita test for soil health when compared to other soil health indicators, and explain what is involved in the more comprehensive Haney Test.
What Lies beneath: Measuring and Managing Soil Moisture
Joshua Stamper, University of Minnesota

Soil water status can be one of the most limiting factors in agronomic production, but it is one of the most poorly understood branches of the agronomic sciences. In this presentation, we will discuss soil texture, evapotranspiration, available water holding capacity, soil tension, volumetric water content, and how we can quickly and easily ascertain these metrics. We will also discuss the utility of different types of soil moisture sensors that are currently on the market in MN, and the best ways to interpret the data that these devices give us to maximize crop yield and conserve natural resources.

Minnesota Buffer and Soil Loss law: An Overview
David Weirens, MN Board of Water and Soil Resources

Minnesota enacted a significant law this year that establishes new requirements to protect our water from erosion and runoff pollution. Under this law most lakes, rivers and drainage ditches are required to have a buffer of perennial vegetation. In addition, efforts to control erosion and sedimentation have been enhanced through this legislative action. Essential elements of these authorities include establishing timelines for implementation, landowner assistance, compliance and enforcement, flexibility, and funding. This presentation will discuss the benefits that buffers can provide, the provisions of the law, and the implementation plans of state agencies.

Nitrate in Groundwater - Well Testing Results and the Nitrogen Fertilizer Rule
Dan Stoddard, MN Department of Agriculture

In March 2015, the Minnesota Department of Agriculture completed the revision of the state Nitrogen Fertilizer Management Plan to reduce nitrate in groundwater. The MDA is now implementing the plan. This talk will provide the latest information on two areas of the plan. The first is the preliminary results from testing private wells for nitrate. The second is the development of a rule that would restrict nitrogen fertilizer application in the fall and to frozen ground in areas vulnerable to groundwater contamination, and require nitrogen fertilizer best management practices if they are not voluntarily adopted in areas with elevated nitrate in groundwater following a process that includes a local advisory team. The MDA recently released a request for comments on the draft rule