VIRGINIA Ag Expo 2013 EXTRA

Virginia Cooperative Extension
Virginia Tech • Virginia State University

VIRGINIA GRAIN PRODUCERS ASSOCIATION

Virginia Soybean Association

Dear Agriculture Enthusiasts,

Ed Jones

On behalf of Virginia Cooperative Extension, I would like to invite you to the 2013 Virginia Ag Expo to be held August 1 at Land of Promise Farms in Virginia Beach, Va. Our theme this year is Agriculture: Bringing Promise to Our Future.

We are proud to co-sponsor this premier agricultural event with the Virginia Grain Producers Association and the Virginia Soybean Association. These strong partnerships — along with the support we receive from agribusinesses and state government agencies — allow us to continue this valuable tradition.

As in years past, Ag Expo will highlight the latest technology in agricultural production and current research findings from faculty members from the College of Agriculture and Life Sciences, the Virginia Agricultural Experiment Station, and Virginia Cooperative Extension.

More than 140 exhibitors will be on hand to display and demonstrate products and services that can help agricultural producers continue to succeed. Check out the latest models of tractors and sprayers and compare seed varieties, fertilizers, and crop production products.

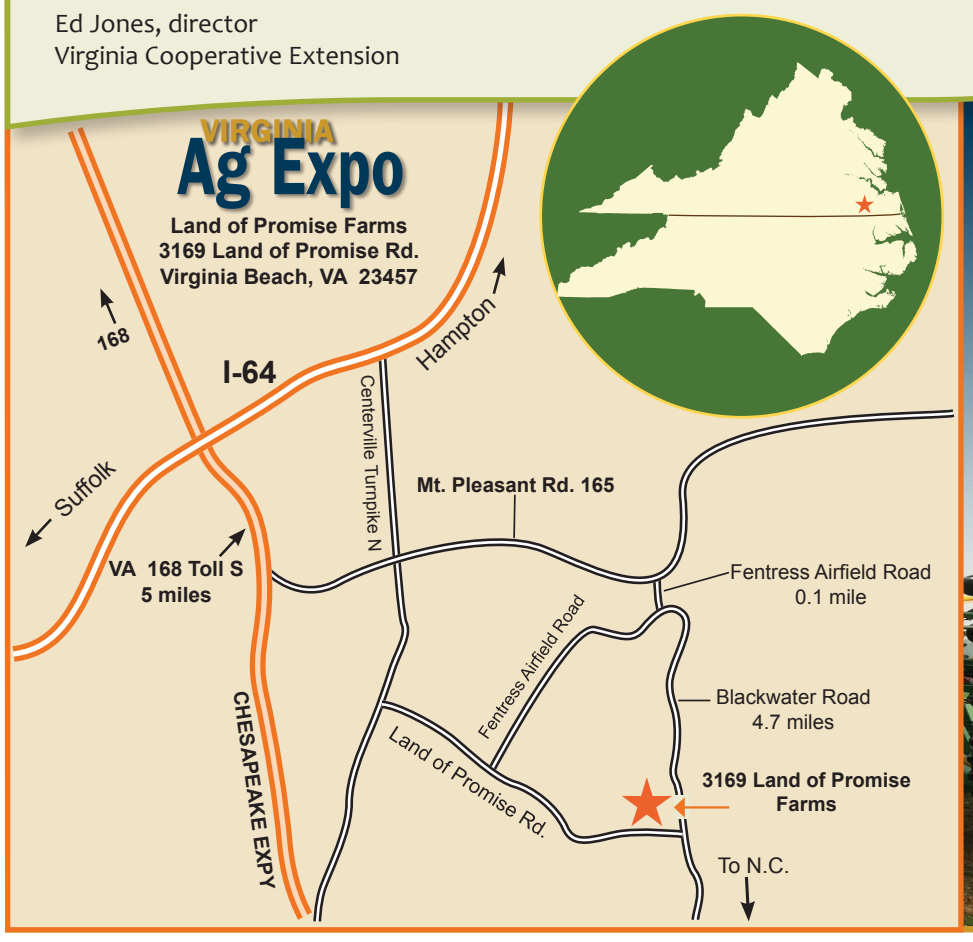
Ag Expo also allows us to showcase a sampling of the work being done at our Agricultural Research and Extension Centers and on campus. This publication provides a preview of some of the research that will be featured and an overview of other Extension programming happening around the state.

Virginia Cooperative Extension strives to extend the knowledge discovered at our land-grant universities to improve the lives of Virginians and beyond. We are committed to helping Virginia farmers bring promise to all our futures by improving farm profits, agribusiness development, and personal quality of life.

We would like to thank the Horsley family for hosting this year's expo and the City of Virginia Beach and the Virginia Beach Department of Agriculture for their support and involvement. We hope you join us for the day, enjoy the expo, and take home a wealth of information you can use in your day-to-day farming operations.

Sincerely,

Ed Jones, director
Virginia Cooperative Extension



VIRGINIA Ag Expo

Agriculture: Bringing Promise to Our Future

August 1, 2013

Gates open at 7:30 a.m.

Field tours begin at 8 a.m.

Located at Land of Promise Farms, Virginia Beach, Va.

More than 140 exhibitors and sponsors will be showcasing the latest equipment, technology, goods, and services.

Field tours will include:

- Contemporary issues in the swine industry
- High-yield corn management
- Potassium fertility in soybean
- Vegetable and small-fruit production
- Cotton and grain sorghum
- Aerial imaging for agricultural crops

There is no charge to attend the expo and no need to preregister.

Lunch will be available from local civic organizations and food truck vendors offering a wide array of items, including barbecue, seafood, chicken, hamburgers, hot dogs, and complete dinners.

For those using GPS for directions to reach the expo, enter the following address into your system: Land of Promise Farms, 3169 Land of Promise Rd., Virginia Beach, VA 23457.

For more information, contact the Virginia Grain Producers Association at 804-726-6022 or the Virginia Soybean Association at 757-564-0153.

Kudzu Bug:

A New Invasive Insect Pest of Soybean

Ames Herbert, Extension Entomologist, and Professor, Department of Entomology, Tidewater Agricultural Research and Extension Center

Kudzu bug, a native of Asia, was first discovered in Georgia soybean fields in 2009. Adults and nymphs have an affinity for feeding on soybean plants, sucking the fluids from stems, petioles, and leaves. Large populations can develop quickly and, if left uncontrolled, can cause significant yield reductions. Since its discovery in Georgia, KB has spread rapidly throughout South and North Carolina and is now well-established in parts of south-central and southeastern Virginia.

In the Virginia soybean field surveillance program conducted in summer 2012, adult KBs were observed in soybean fields in 19 counties, but they were not seen until well into the season. More than likely, those adults had migrated from the South. A few nymphs were also found in several locations, but no fields became infested at treatable levels.

The situation has been very different this year. Adults have been reported from many counties in southern Virginia since May, so it is likely that KB successfully overwintered in a large area of the state. For the first time, infestations are now occurring in soybean fields in Virginia. As of this report (June 7), adults are feeding on seedling plants in many fields and laying egg masses. When these eggs hatch, growers will be challenged with management decisions. Researchers predict that KB infestations will persist through the summer as populations move into soybean fields that are in reproductive stages. They undergo two complete generations per year, so both the full-season and double-crop planting systems are at risk.

Russ Ottens, University of Georgia, Bugwood.org

Fortunately, specialists in Georgia and South Carolina — where they have several years of experience and research — have developed management recommendations.

- Infestations are most likely to be encountered in the earliest-planted, full-season, earliest-maturity-group soybean fields because those will flower first.
- The threshold is based on numbers of nymphs — not adult activity — so the focus should be on the nymphal stage of this insect in soybeans. Fields should be treated when the average reaches one nymph per net sweep or if nymphs are easily found on stems, leaf petioles, or leaves.
- Several good insecticide options for controlling KB are available.

The email-delivered "Virginia Ag Pest Advisory" provides weekly pest updates and management recommendations. Anyone who wishes to receive the report can email Ames Herbert (herbert@vt.edu) or Sean Malone (smalone@vt.edu).

Jeremy Greene, Clemson University, Bugwood.org
kudzu bug Megacopta cribraria
soybean Glycine max Adult(s)

VirginiaTech
College of Agriculture and Life Sciences

Alumni Organization

The College of Agriculture and Life Sciences Alumni organization and the Horsley family of Land of Promise Farms in Virginia Beach, hosts of the 2013 Virginia Ag Expo, invite all Virginia Tech alumni and friends to a dinner and program.

Wednesday, July 31, 2013

Agriculture: Bringing Promise to Our Future

Special guest speaker

Matt Lohr '95

Commissioner, Virginia Department of Agriculture and Consumer Services

With updates from
Alan Grant, Dean, College of Agriculture and Life Sciences
Ed Jones, Director, Virginia Cooperative Extension

Wine and beer social 6 p.m.
Dinner 6:30 p.m.
Program 7:30 p.m.

Military Aviation Museum
1341 Princess Anne Road
Virginia Beach, VA 23457
www.MilitaryAviationMuseum.org

$35 (21 and older) $30 (13-20) $25 (6-12) Free (5 and younger)
All-American backyard cookout by Black Angus Catering

R.V.S.P. by July 19, 2013

For more information and to register, visit www.cals.vt.edu/alumni/events/.

Questions?
Contact Jamie Lucero, director of alumni relations, at jlucero@vt.edu or 540-231-9666.

Ag Expo Host:

Land of Promise Farms

Land of Promise Farms Partnership in rural Virginia Beach, home of the Horsley family, will host the 2013 Virginia Ag Expo. Don and Diane Horsley and their sons, Shane and Ryan, have built a successful farming operation through hard work, innovation, and resourcefulness. The family enjoys sharing in the day-to-day farm work, as well as its challenges and rewards.

Land of Promise Farms is located approximately 20 miles from the Atlantic Ocean and 8 miles from North Carolina. Heirs of the Baxter family sold farmland (located then on Butts Road in what was formerly Princess Anne County) to the Pinkston family many years ago. In addition to the land, the property included a 1793 three-story historic home (open for the expo), a two-story farmhouse, two tenant houses, a dairy barn, and two out buildings. "Land of Promise" was the name of the post office at the end of Butts Road, so Pinkston decided to name the property and dwellings Land of Promise Farms.

In 1959, Diane's parents, Ralph and Irene Frost, purchased the farm from Pinkston. Frost and his three employees operated the farm until his semiretirement in 1988. Upon Diane's graduation from Radford University in 1970 (home economics) and Don's graduation from Virginia Tech (animal science), they married and returned to Virginia Beach to live and work on the farm where they raised their sons. After Shane and Ryan earned master's degrees in animal science from Virginia Tech, both sons returned to the area and continue to be involved in the family's farming operation.

The Frosts enrolled Land of Promise Farms in the Virginia Beach Agricultural Reserve Program in 1997. The Horsley family has since purchased and enrolled adjacent properties, now part of Land of Promise Farms, into the Agricultural Reserve Program.

The Horsleys' 5,300-acre farming operation produces corn, soybeans, and wheat, and the family integrates other enterprises into its farming operation, including a farrow-to-finish swine operation and a small herd of Angus cattle. They sell many of their pigs to 4-H and FFA members to raise and exhibit at livestock shows. Due to their excellent reputation for producing competitive show pigs, the Horsleys have customers in six states. They also grow sweet corn and offer a U-pick pecan business that capitalizes on the "Buy Fresh Buy Local" mission.

"As we reflect on this year's theme, Agriculture: Bringing Promise to Our Future, we hope that at this family friendly Ag Expo, you will glimpse the possibilities of present agriculture and the excitement that the future holds for agriculture, especially Virginia agriculture," said Don Horsley. "We sincerely welcome each of you to the 2013 Virginia Ag Expo and to Virginia Beach."

ARECs Improve Livelihood of Virginia's Farmers Through Research

Amy Loeffler, Office of Communications and Marketing, College of Agriculture and Life Sciences, Virginia Tech.

Virginia Tech's 11 Agricultural Research and Extension Centers provide valuable laboratory space, arable land, and facilities to help farmers in the commonwealth develop and maintain sustainable farming methods while maximizing revenue. ARECs play an important role in answering long-term research questions, but they are also helpful for critical, of-the-moment concerns that may require a quicker resolution. In this capacity, ARECs serve as an agriculture help line of sorts, tackling issues related to livestock, forest products, safety, horticulture, human nutrition, food safety, and environmental quality by providing critical and cost-saving answers.

The following represents a snapshot of ongoing research at three of the centers and how it benefits farmers.

Improving Swine Production in Tidewater

Hogs are one of the top 20 agriculture products produced in Virginia, according to the Virginia Department of Agriculture and Consumer Services. At the Tidewater AREC's swine unit, animal scientists conduct research directed at strategies to improve fertility and productivity of breeding herds and growth performance in market pigs.

A recent study found that supplementing the essential mineral selenium to breeder boars in the form of selenized yeast made it more available to body tissues and improved sperm count as compared to supplementing with the traditional form of inorganic selenium. This is important because more than 80 percent of matings in commercial swine breeding herds is by artificial insemination, using a limited number of boars whose semen is extended into multiple doses.

Other ongoing work at the swine unit investigates ways to reduce the negative effects of aflatoxin, vomitoxin, and zearalenone — naturally occurring mycotoxins that can be present in feed grains and can impair performance of breeder sows and growing pigs. Although the pig research is distinctly different from the crop work at the AREC, the underlying philosophy is similar — to improve overall sustainability of production agriculture.

Former student researcher Lindsay Kelly inspects grower pigs in a mycotoxin performance trial at the Tidewater AREC swine unit.

Eastern Shore AREC Develops Bioreactor to Curb Nitrogen Runoff

Zach Easton, kneeling, assistant professor of biological systems engineering at the Eastern Shore AREC, explains how his bioreactor curbs nitrogen and phosphorous runoff into the Chesapeake Bay. With Easton are Mary Leigh Wolfe, head of BSE, and Saied Mostaghimi, director of the Virginia Agricultural Experiment Station.

When farmers in the vicinity of the Eastern Shore AREC were told to reduce nitrogen runoff into the Chesapeake Bay, researchers began investigating a cost-effective system that farmers could use to protect water quality while maintaining agricultural output. They developed a bioreactor that reduces the amount of nitrogen in runoff to comply with the new environmental mandate that requires farmers to curb nitrogen and phosphorous in groundwater by as much as 30 percent.

The new bioreactor surpassed that, removing up to 90 percent of nitrogen and 45 percent of phosphorus at a cost of about $260 an acre — a one-time expense over its 20-year lifespan. This is a cheaper alternative to other water treatment methods because of its limited footprint that allows more cropland to remain in production as well as its ability to treat ground and surface water.

To learn more about the agricultural research and Extension centers, visit www.vaes.vt.edu/arecs

Chuanxue Hong, right, professor of plant pathology, physiology, and weed science at the Hampton Roads AREC, works with growers like Chris Brown, president of Lancaster Farms Inc., a wholesale nursery in Suffolk, Va., to improve irrigation practices and save money.

Research in Hampton Roads Adds Profitability and Sustainability to the Ornamental Horticulture Industry

The Hampton Roads AREC plays a significant role in horticulture production in the state and beyond. In fact, a chlorination protocol developed at the facility has been a key component of the horticultural sanitation program at every major plant-production facility in the commonwealth. This research has already helped growers in Virginia improve irrigation practices, save money, and become more competitive in the global market.

Faculty members at the Hampton Roads AREC are leading a national research consortium, developing science-based best management practices for plant-damaging water molds such as Phytophthora and Pythium. Problems with pathogens arise when nurseries and greenhouses pump water from reservoirs and retention ponds to irrigate their plants. While recycling water can be a money saver, the damage from waterborne pathogens can be costly for farmers.

For example, a malfunctioning chlorine injector used for sanitation recently cost one Eastern Virginia nursery about $143,000 during a three-week period. Had it affected the entire operation, the nursery would have lost an estimated $715,000 to waterborne pathogens.

One current project seeks to help farmers design or modify water recycling systems that will not recycle and spread destructive pathogens while it improves water-use efficiency and protects precious water resources. A one-time investment such as this adds lifelong profitability and environmental sustainability to individual farmer's crops and to the horticulture industry as a whole.

Thinking About Corn Harvest

Wade Thomason, Extension Grain Specialist and Associate Professor of Crop and Environmental Sciences

Bobby Grisso, Associate Director for Agricultural and Natural Resources and Extension Engineer, Biological Systems Engineering

	Combine losses, % of yield	
Type of loss	**Average**	**Expert**
Ear loss	4.0	1.0
Threshing loss	0.7	0.3
Loose kernel loss	1.4	0.5
Total	6.1	1.8

By the time Virginia Ag Expo occurs, corn will be mature or nearly so. Yield will be set, and there will be very little that can be done to improve it. However, there are opportunities to ensure we don't lose that yield, particularly related to combine settings at harvest.

Come harvest time, all corn producers hope for fields that are standing well, drying down quickly, and that have good ear coverage. These conditions make relatively high harvest efficiency easy to achieve. But less-than-ideal conditions require more attention to machine settings to avoid potential problems with harvest losses.

Harvest losses can be significant, as illustrated in the table on the left, adapted from the University of Kentucky publication, "Corn Harvesting, Handling, Drying, and Storage." At 150 bushels per acre, a 6 percent loss is equal to **9 bushels per acre!**

A few years ago at the Virginia Grain Producers Association/Virginia Soybean Association annual meeting, Brian Hefty, from Ag Phd TV, spoke about "$100 per hour jobs" on the farm. His message was that some tasks are much more important to the overall profitability of the operation and that those tasks should be prioritized and handled by the best person for the job. Reducing losses costs very little in terms of labor or added expense, so this is definitely one of those jobs!

Some machine loss at harvest is unavoidable, but minimizing that loss can have a significant impact on the bottom line. Important steps in achieving this goal are:

- Take time before harvest to prepare and repair machinery.
- Evaluate harvest losses and where they are occurring.
- Know how to correct any problems identified.

Improving In-Season Nitrogen Management for Corn

Wade Thomason, Extension Grain Specialist and Associate Professor of Crop and Soil Environmental Sciences

Mark Reiter, Soil and Nutrient Management Specialist and Assistant Professor of Crop and Soil Environmental Sciences, Eastern Shore Agricultural Research and Extension Center

High nitrogen (N) fertilizer costs, the relatively large amount of N required by corn, and public concerns over N losses from farm fields all highlight the need to improve corn N rate recommendations. However, the total amount of N needed in a particular field or even in a portion of a field is difficult to estimate in advance, and it changes each year.

Fertilizer needs change annually because N availability is very dynamic. In warm, wet conditions, N mineralizes readily, and relatively more N is released from the soil system for plant growth. In cool or dry conditions, the rate of mineralization is much slower.

Also, heavy rains can result in N leaching below the plant root zone and denitrification — the conversion of N to ammonia gas that is lost to the atmosphere — can occur when soils are saturated. Having a better understanding of which of these factors are influencing N availability and crop uptake in season will help improve our estimates of N fertilizer needed.

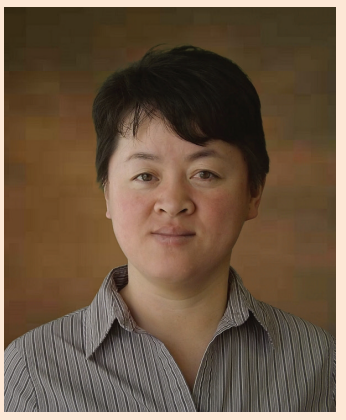
Traditionally, researchers have recommended a yield-goal-based approach for N management in corn, with a recommended ratio of 1 pound of N per bushel of expected yield. So, if the expected yield for the field is 160 bushels per acre, a total N application rate of 160 pounds of N per acre was recommended. In studies being conducted across Virginia, this approach is being compared to three others methods that all involve site-specific inputs in addition to expected yield.

One method depends on optical sensors (the GreenSeeker or OptRx system) that measure spectral reflectance from the crop canopy at the time of sidedress application. Based on extensive calibration data, the sensors use that value to derive a recommended N fertilizer rate based on relative soil N supply and plant growth.

The other two methods are based on computer simulation model Nutrient Expert for Hybrid Maize, developed by the International Plant Nutrition Institute, and Maize-N, developed by the University of Nebraska. Both require the user to input field-specific soil physical and chemical parameters such as soil texture and routine soil test levels. They also require information about the specific corn hybrid in the field, plant population, and previous agronomic practices. In addition, the Maize-N program parameters depend on current and historic weather data to derive recommended N fertilizer rates.

Initial season results from these studies will be discussed on the 2013 Ag Expo field crop tour.

New Faces at Virginia Tech



Bo Zhang has joined the Department of Crop and Soil Environmental Sciences to lead Virginia Tech's soybean breeding program. She earned a bachelor's degree in horticulture from Shenyang Agricultural University, a master's in biochemistry and molecular biology from the Chinese Academy of Agricultural Sciences, and a doctorate in cell and molecular biology from the University of Arkansas. Before coming to Virginia Tech, she was an assistant professor at the Agricultural Research Station at Virginia State University. Zhang has also worked for Bayer Crop Science as a molecular lab supervisor and for Hancunhe Vegetable Model Company as an assistant manager. She is a member of the American Society of Agronomy and Crop Science Society of America and the Gamma Sigma Delta International Agriculture Honor Society.

Paul Marek will join the Department of Entomology in August as an assistant professor in insect systematics. He will teach Insect Biology and Insect Systematics. Biological systematics is the study of the classification of organisms and the evolutionary relationship among them. Marek earned his bachelor's degree in biology from Loyola University of Chicago, a master's in systematic biology and ecology from San Francisco State University, and a doctorate in biology from East Carolina University. Marek has worked as an adjunct professor for Pima Community College, a curator for the San Francisco State University Entomology Museum, and a research associate at the University of Arizona. He has served as scientific advisor for the National Geographic Channel's series "The Wild West" and has been interviewed by National Public Radio's "Science Friday" for his research on bioluminescent and bioflourescent millipedes.

Increasing Early Season Vegetative Growth and Yield of Double-Cropped Soybean

David Holshouser, Extension Agronomist and Associate Professor of Crop and Soil Environmental Sciences, Tidewater Agricultural Research and Extension Center

Kevin Dillon, Graduate Research Assistant, Crop and Soil Environmental Sciences and Tidewater Agricultural Research and Extension Center

Soybean and winter wheat production are crucial to Virginia's agriculture industry. In 2012, Virginia harvested 42 bushels per acre of soybean on 580,000 acres ($329 million value) and 65 bushels per acre of wheat on 240,000 acres ($109 million value). Clearly, the winter wheat-soybean double-cropping system is of great value to Virginia agriculture.

However, the late planting date of soybean (usually late June to early July) reduces soybean yield and, therefore, profitability. Most of this yield reduction is due to the inability of a soybean crop planted in late June to develop enough leaf area to fully capture the available sunlight. If farmers could somehow increase the early season vegetative growth, they could increase double-crop soybean yield potential.

Furthermore, there is a greater probability that insects or disease will reduce double-crop soybean yield due to delayed maturity and a potentially greater incidence of the pests later in the year. In particular, more foliar disease could be present in double-crop soybean relative to full-season soybean due to more favorable environmental factors for disease development (cooler temperatures, higher relative humidity) in September, when double-crop soybean are producing pods and filling seed.

Considering the value of Virginia's wheat and soybean crops and the need to make the system more profitable, Virginia Tech initiated research in 2012 to increase early season vegetative growth and yield of double-cropped soybean. Experiments were conducted at Painter, Suffolk, and Mt. Holly in 2012 and will be repeated at three sites in 2013. Three specific research objectives are described below.

Objective 1: Evaluate seeding rate, seed-applied inoculant, starter nitrogen applied at planting, cultivar growth habit, and foliar fungicide application on soybean vegetative response and seed yield in a wheat-soybean double-crop system.

These experiments are sometimes referred to as maximizing yields through inputs or "kitchen sink" studies because using many inputs can be considered "throwing in everything but the kitchen sink."

For instance, greater seeding rates, seed-applied inoculant, and a small amount of starter nitrogen could potentially increase the early season growth of soybean and, therefore, increase leaf area, which could in turn increase yield. Likewise, an indeterminate variety might continue to grow in height after the plant flowers, potentially increasing leaf area and yield. Foliar fungicide application could then protect this potentially greater-yielding crop from foliar disease.

The intriguing question regarding such inputs is this: How do they interact? In other words, if each of these five inputs could increase yield by 2 bushels per acre, will the final yield using the five inputs together be 10 bushels per acre more than doing nothing? Or could it be 15 bushels or only 4 bushels more per acre? When other researchers have tried such an experiment, the final results are usually less than expected, but no one has tried this in double-cropped soybean.

The 2012 results are still being analyzed, but the most influential factor that affected yield was foliar fungicide. Research results show a yield increase from foliar fungicide application in two of the three locations. An example is shown in figure 1. (Data for other interesting interactions with variety and starter fertilizer are not shown here, but researchers will be available at Ag Expo to discuss their findings.)

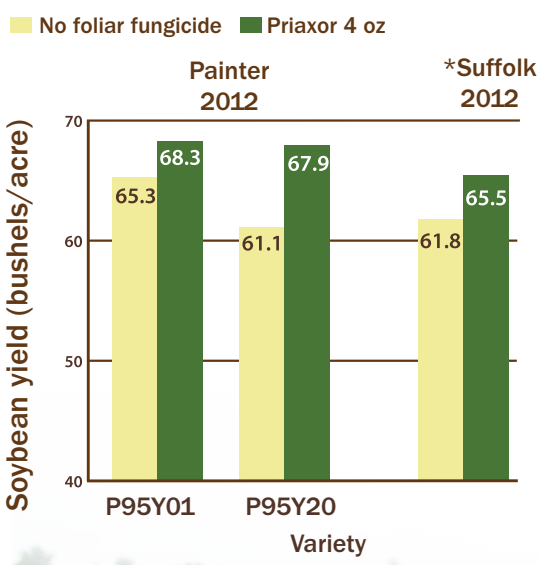


Figure 1. The effect of soybean variety and foliar fungicide on soybean yield at Painter and Suffolk, Va., in 2012. Variety did not affect foliar fungicide response at Suffolk; therefore, yields are averaged over variety.

***Variety did not affect yield response to fungicide**

Objective 2. Evaluate vegetative growth response and yield with starter fertilizer and Bradyrhizobia japonicum inoculation.

The kitchen sink study used 25 pounds of nitrogen as a starter. In this study, 0, 12.5, 25, 37.5, or 50 pounds of nitrogen were evaluated as a starter with or without inoculant. This will give researchers a better idea of not only how soybean responds to starter nitrogen, but also if the starter nitrogen affects the nitrogen-fixing mechanism of the crop.

Last year, research showed no interaction with inoculant but did indicate a gradual decrease in yield as the starter nitrogen rate was increased (see figure 2). With this said, soybean yield at Mt. Holly increased using 12.5 pounds of nitrogen, likely because Mt. Holly was the only location where early season growth was reduced (due to drought). Actually, growth at Mt. Holly was more representative of double-cropped soybean than the other two locations. In Painter and Suffolk, growth was greater than what would normally be seen with double-cropped soybean. Did growth increase with nitrogen? Maybe. Did it result in a yield increase? Perhaps, but only at the lowest rate. Like all research, experiments need to be repeated in order to be sure the results can be replicated.

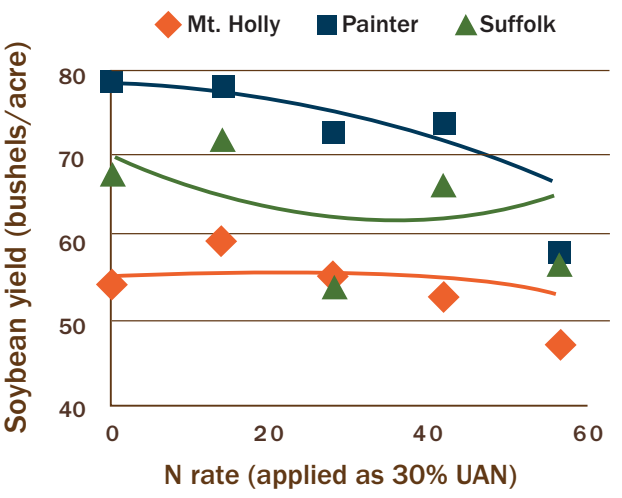


Figure 2. The effect of nitrogen (N) rate applied as a starter fertilizer injected 2 inches below soil surface and between 15-inch soybean rows on soybean yield at Mt. Holly, Painter, and Suffolk, Va., in 2012. Inoculants did not affect the N rate response; therefore, yields are averaged over inoculant treatments.

2013 Ag Expo

At this year's Ag Expo, soybean varieties were again treated with and without fungicides. Those in attendance can walk the fields to see firsthand how fungicides affect the varieties. There will also be a display at the Virginia Cooperative Extension exhibit. Drop by to discuss all of these results in more detail with the faculty members.

Acknowledgements

Virginia Tech and Virginia Cooperative Extension would like to thank all soybean farmers for supporting this research. The United Soybean Board, through the USB Graduate Student Fellowship, supports Kevin Dillon. Grants from the Virginia Soybean Board have financed other costs of conducting this research.

Objective 3: Evaluate the effect of fungicide application on disease incidence, yield, and seed quality.

Like the second objective, the researchers wanted to evaluate foliar fungicides and how they interact with varieties more fully. Unlike the kitchen sink experiments, they used 10 maturity group (MG) IV and 10 MG V varieties instead of two. This topic was presented at last year's Ag Expo; unfortunately, those plots were rendered unusable due to a high root knot nematode infestation.

Experiments were still conducted at the other three locations. In two of the three locations, fungicide application at the R3 (beginning pod) or R5 (beginning seed) stages increased yields (see figure 3); however, there was no interaction within varieties. This was unexpected, because interactions were suspected at several on-farm tests last year. However, this is a very large data set that needs additional analysis. Weekly disease ratings and detailed weather information should help to validate the experimental model of Pat Phipps, professor emeritus of plant pathology at the Tidewater Agricultural Research and Extension Center, that will help predict when and where to use foliar fungicides.

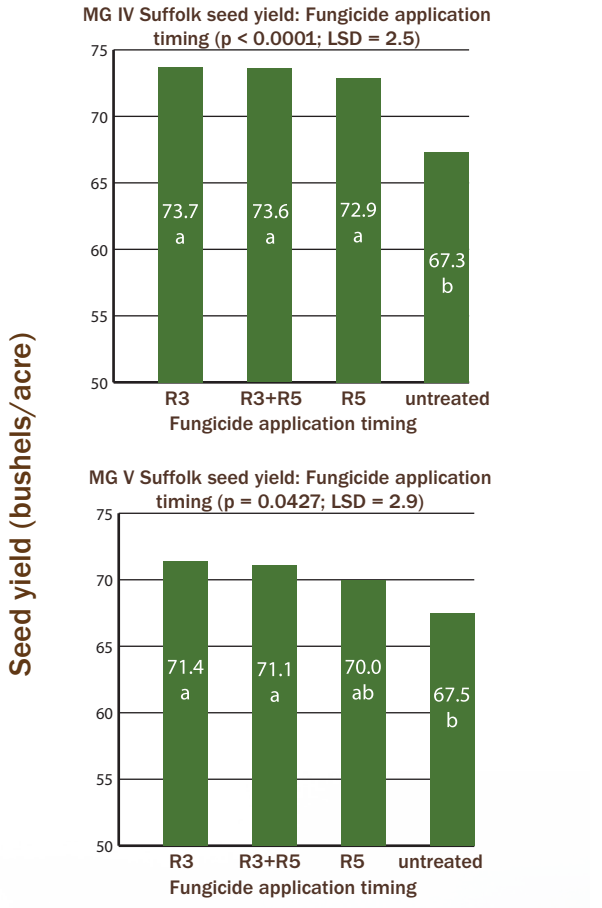


Figure 3. The effect of foliar fungicide application timing on maturity group (MG) IV and V soybean at Painter and Suffolk, Va., in 2012. Yields are averaged over 10 MG IV and 10 MG V varieties.

Revisiting Potassium Fertility in Soybean

Mark Reiter, Soil and Nutrient Management Specialist and Assistant Professor of Crop and Soil Environmental Sciences, Eastern Shore Agricultural Research and Extension Center

David Holshouser, Extension Agronomist and Associate Professor of Crop and Soil Environmental Sciences, Tidewater Agricultural Research and Extension Center

Anna-Beth Stewart, Graduate Research Assistant, Crop and Soil Environmental Sciences, Tidewater Agricultural Research and Extension Center

Virginia Tech and Virginia Cooperative Extension's soil testing guidelines are well-established and verified due to many years of research. When considering soil testing categories, soils testing low and medium will see significant yield reductions if no fertilizer is applied. Soils testing high will not usually experience a yield reduction, but nutrients will be "mined" from the soil. Therefore, fertilizer recommendations for high-testing soils are to replace nutrients removed by crops and to spread out costs and fertility needs for future crops. Soils testing very high will not usually have positive crop reactions to fertilizer and can generally be mined without yield reductions.

However, many of the original experiments to establish fertilizer recommendations were conducted in fields that produced much lower yields than are experienced today, they were planted with different varieties, and they were grown using different management practices. Consequently, soil testing guidelines need occasional updating using modern production practices to verify their accuracy.

Potassium is second only to nitrogen in the total amount required by the soybean crop. It is common to apply potassium to soybean acreage on a yearly basis due to relatively high potassium use by soybean and other crops. Many farmers regularly harvest 50 to 60 bushels per acre of soybean, which removes approximately 70 to 85 pounds of potassium oxide per acre. Using current Extension recommendations, a soil testing high would require 30 pounds of potassium oxide per acre for nutrient replacement for full-season soybean. Any nutrient removal higher than this level would be mining the soil for the remainder of the nutrient.

A similar question and problem persist for producers utilizing a wheat-soybean double-crop rotation. The Extension recommendation for potassium was made before farmers commonly yielded 80-plus bushels of wheat per acre. Establishing an accurate mass balance is a necessity for these wheat-soybean rotations, for farmers harvesting straw, and for those farmers consistently yielding high with irrigated land. Years of mining a soil for nutrients rather than maintaining soil nutrient concentrations over time will eventually cause dropped soil test results, yield losses, and large fertilizer bills within a single year.

With these issues in mind, research (supported by the Virginia Soybean Board) has begun to re-evaluate Virginia Tech's current potassium recommendations in soybean. The goal is to determine the optimum potassium rate needed for Coastal Plain and Piedmont soils that represent the Mid-Atlantic and Southeast U.S. for full-season and double-cropped soybean systems.

This year, experiments were established throughout Virginia on soils testing low, medium, and high in potassium. Soybean was planted in full-season (May) and double-crop (late June) systems. With the double-cropped systems, two separate experiments were conducted: small-grain straw was either left or removed. Treatments consisted of six potassium rates (zero, 25, 50, 100, 150, and 200 pounds of potassium oxide per acre) hand-applied to soybean using granular muriate of potash (0-0-60). Within two weeks of planting and before fertilizer application, soil samples were collected at depths of zero to 6 inches, 6 to12 inches, and 12 to 24 inches and analyzed for nutrient content. In addition, trifoliate leaves from soybean in full flower were collected and analyzed for elemental concentration. This fall, crop yield from these plots will be measured and related to soil test and tissue sample levels.

One of these experiments is being conducted at Land of Promise Farms in Virginia Beach and will be highlighted on the Ag Expo field crop tour. Those attending the expo are welcome to see the plots and discuss the research with Anna-Beth Stewart, graduate research assistant, and Mark Reiter, Extension specialist.

This study will continue in 2014. From the two years of data, faculty members hope to establish better recommendations for our high-yielding wheat and soybean crops.

Virginia Agricultural Exports Reach All-Time High in 2012

Watson Lawrence, Agriculture and Natural Resources Extension Agent, Chesapeake

Virginia agricultural exports reached an all-time high of $2.61 billion in 2012, up almost 12 percent from last year's record of $2.35 billion. Agricultural exports are a bright spot in Virginia's economy, contributing to more revenue for farmers and more jobs along the business chain.

China is the largest buyer of Virginia products at $638 million, followed by Canada at $205 million and Morocco at $139 million. Emerging countries around the world are in the market for more U.S. agriculture products.

Soybean and soybean meal led exports; demand for these two products more than doubled between 2001 and 2012. The largest segment of soybean exports went to China, where rising incomes have led to a major shift in Chinese diets to include more livestock products.

Corn acreage grown as livestock feed has increased, displacing some of China's soybean acreage. Soybean in China is traditionally grown for human consumption — a cultural difference between American and Chinese diets. The elimination of import quotas on raw soybean and the surge in livestock feeds utilized have contributed to strong demand for American soybean and soybean meal used in livestock feeds.

Other growing Virginia exports include lumber, logs, and wood pellets; manufactured leaf tobacco; soybean oil; wheat, corn, barley, and other grains; pork; animal feed; processed foods and beverages (including wine); animal fats and oils; cotton; seafood; and raw peanuts.

Virginia's trade offices in key countries — coupled with other factors, such as quality producers, agribusinesses, and exporters, as well as excellent sea, air, and land port systems — have added to Virginia's strong position in the global marketplace.

Virginia farmers continue to increase productive capacity and efficiency. More market opportunities coincide with the entrepreneurial spirit of farmers who prefer less dependency on farm programs.

While growth of exports is encouraging news for the farming community, rising production costs present a significant challenge. But expanding markets help spur growth, which provides opportunities for farms able to enlarge their operations.

Agriculture and forestry continue to be Virginia's largest industries, with a combined economic impact of $79 billion annually: $55 billion from agriculture and $24 billion from forestry. The industries also provide approximately 500,000 jobs in the commonwealth.

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Scouting From the Sky –

Using Unmanned Aerial Vehicles to Aid Specialty Crop Producers

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What if,
in the future, farmers could deploy a remote-controlled helicopter from the back of a truck, allowing them to easily and affordably view their crops from above? What insight could this provide to the grower?

A transdisciplinary team of researchers is working to answer that question.

Horticulturists and engineers from Virginia Tech, University of Florida, University of Arkansas, and Oregon State University are investigating the use of small, lightweight, unmanned aerial vehicles (UAV) to assist in inventory management and stress detection of nursery crops. This is accomplished with a remote-controlled, battery-operated, multirotor aerial platform (costing $10,000 to $20,000) equipped with a camera mounted to a self-leveling gimbal.

Researchers preplan the flight mission using free software to set waypoints — points the UAV will fly to and capture images from. Then the UAV is turned on, lighting blue and red light-emitting diodes (LEDs) that allow the pilot to easily track the UAV in the sky and know its orientation. A shortwave radio transmits the waypoints, and the pilot uses a remote control to lift off the small (approximately 3 feet in diameter), round vehicle in seconds.

Once in the air, the pilot sets the UAV to autopilot, allowing it to fly the preplanned flight path while remotely snapping images every time the UAV pauses at a waypoint. The UAV captures visual or multispectral images of acres of fields at elevations up to 300 feet during the approximately 15-minute flight. At the end of the flight plan, the always-visible UAV returns to the point of takeoff with the flick of a switch and the pilot turns off autopilot and lands the UAV.

The images are then downloaded to a computer. In many instances, visible imagery is collected from an off-the-shelf camera and can be viewed immediately. Images from other sensors, such as multispectral or thermal camera, must be downloaded and processed or rendered, which can take minutes to hours before they can be viewed.

Currently, images can be used to examine irrigation patterns, soil drainage, soil variability (based on appearance), and to identify areas containing off-color or unhealthy-looking crops.

Research is underway to count containerized or field-planted nursery crops utilizing commercially available or user-generated software. To date, researchers have been able to count well-spaced shrubs and trees with greater than 90 percent accuracy using commercially available software. Software with novel algorithms, being developed by the University of Florida, has been successful (approximately 90 percent accurate) in identifying and counting tightly spaced shrubs with touching or overlapping canopies when approximate canopy width is known.

Researchers are also investigating the use of thermal imagery to identify water stress of containerized crops. This information could inform growers how to more effectively use emerging technologies to monitor irrigation, potentially making it more affordable by reducing the quantity of sensors needed when using precision irrigation systems.

The use of UAVs remains a hot topic with the media in terms of privacy and use; however, the authors think this could be an invaluable tool for agricultural producers because it allows imagery to be captured cost-effectively by the farmer on an as-needed basis.

Agricultural researchers envision a multitude of applications for aerial data collection. More information, including press articles, scientific publications, presentations, and videos of ongoing research using the UAV in nursery crop production can be found at the University of Arkansas Nursery Automation website at www.aragriculture.org/horticulture/nursery_automation/.

Grain Sorghum Making Gains

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According to the “Crop Production 2012 Annual Summary,” released Jan. 11, 2013, by the U.S. Department of Agriculture’s National Agricultural Statistics Service, the production of key U.S. crops corn and soybean was down significantly in 2012 as a result of the historic drought conditions — particularly in the Midwest. But unlike corn, which reported a 13 percent drop from 2011, grain sorghum production in 2012 was up 15 percent from the previous year. With an average yield of almost 50 bushels per acre from 4.96 million acres harvested last year — up 4.8 bushels per acre since 2011 — the estimated production in 2012 was 247 million bushels.

Sorghum production in the Virginia-Carolinas region has grown as well, from a few thousand acres in 2011 to more than 70,000 acres in 2012. Sorghum is generally a versatile plant that is capable of tolerating drought, soil toxicity, and a wide range of temperatures, and it competes well with weeds.

Worldwide, top producers of sorghum include the U.S., Nigeria, India, and Mexico, with the U.S. also serving as a major exporter of sorghum for Spain, Japan, and Mexico. Historically, Kansas and Texas are top sorghum-producing states, followed by Oklahoma, Colorado, South Dakota, Louisiana, and Nebraska. In all, 14 states now produce sorghum, including Virginia, North Carolina, and South Carolina.

More than 90 percent of grain sorghum in the U.S. is used as a component of livestock feed, but its lack of gluten makes sorghum desirable for certain food products, such as flour and snacks. Sorghum is even being used in beer production: The Lakefront Brewery in Milwaukee, Wis., brews a gluten-free sorghum beer called New Grist. It is not incidental that humans consume 50 percent of the sorghum produced globally.

Sorghum is increasingly being used for ethanol production, including the traditional production from starch in the grain — sugar from pressed juice of the so-called “sweet sorghums” — and cellulose from high biomass.

The recent attractiveness of sorghum for Virginia farmers has come from Murphy-Brown’s program to expand grain sorghum production in the Virginia-Carolinas region. The program, which began in 2012, purchases grain sorghum at 95 percent of the flat price of corn; it is expected to continue into the future. This — combined with the fact that sorghum has a similar growth habit to corn but requires fewer inputs, has better drought-tolerance and insect- and disease- resistance, and is a needed grass for rotation with legumes — can make sorghum even more attractive for the growers of this region.

Much was learned from research conducted on sorghum 10 to 15 years ago at Virginia Tech and North Carolina State University, but more work is needed in order for Virginia’s growers to be competitive if they choose to grow sorghum. At Virginia Tech, a research team is in place to help growers with questions related to sorghum production — hybrid selection, crop planting, maintenance, and harvest — and the team works cooperatively with researchers at North Carolina State University and Clemson University in a multistate, sorghum research approach.

Will Virginia farmers be planting more sorghum in the future? Only time will tell.

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