Dear Agriculture Enthusiasts,

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
Ames Herbert, Extension Entomologist, and Professor, Department of Entomology, Teledwater 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, petals, 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.

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 small-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

Russ Ottens, University of Georgia, Bugwood.org

Kudzu Bug: A New Invasive Insect Pest of Soybean

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 its farming operation in the day-to-day farm work, as well as its challenges and rewards.

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.

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 1999. The Horsley family has since purchased and added adjacent properties, now part of Land of Promise Farms, into the Agricultural Reserve Program.

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“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.”
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 In-Season Nitrogen Management for Corn

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

Mark Rolier, 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.
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

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 seed 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? When other researchers have considered this question, they used many inputs can be considered “kitchen sink” experimentation.

Objective 2: Evaluate vegetative growth response and yield with starter fertilizer and Bradyrhizobium 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 increase in yield as the starter nitrogen rate increased (see figure 2). This study, 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.

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 0 and 10 Maturity Group (MG) IV and V soybean 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 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 fungicides.

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.

<table>
<thead>
<tr>
<th>Variety</th>
<th>No fungicide</th>
<th>Priason 4 oz</th>
<th>Suffolk 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painter 2012</td>
<td>67.3</td>
<td>64.3</td>
<td>66.3</td>
</tr>
<tr>
<td>Suffolk 2012</td>
<td>67.4</td>
<td>63.1</td>
<td>65.8</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Variation</th>
<th>R3</th>
<th>R5</th>
<th>R3+R5</th>
<th>untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painter</td>
<td>71.0</td>
<td>72.6</td>
<td>70.8</td>
<td>67.2</td>
</tr>
<tr>
<td>Suffolk</td>
<td>71.2</td>
<td>73.4</td>
<td>72.9</td>
<td>67.3</td>
</tr>
</tbody>
</table>

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.
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 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 urea of potassium (0-0-60). Within two weeks of planting and before fertilizer application, soil samples were collected at depths of zero to 6 inches, 6 to 12 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.

Revisiting Potassium Fertility in Soybean

Virginia Agricultural Exports Reach All-Time High in 2012

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. Virginia is the largest buyer of Virginia products at $638 million, accounting for $55 billion from agriculture and $24 billion from forestry. The Virginia Soybean Association is soybean farmers’ voice in Richmond and in Washington, D.C. By joining the VSA, you also gain membership to the American Soybean Association. VSA and ASA leadership is made up of soybean farmers like you. You may not have time to take a trip to see your representatives, but your membership helps grower-leaders educate federal and state policymakers, which can help influence important decisions that drive profitability on your farm.

Membership in VSA and ASA provides additional benefits, too. These include leadership development for grower-leaders and scholarship opportunities for college students. ASA also partners with Ford, Chrysler, and Cabela’s to offer discounts to members.

Virginia Ag Expo EXTRA

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www.vasoybean.com or call 757-564-0153

Virginia Soybean Association Reach All-Time High in 2012

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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, tags, 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 farmers able to adapt their operations.

Agriculture and forestry continue to be Virginia’s largest industries, with a combined economic impact of $79 billion annually: $515 billion from agriculture and $24 billion from forestry. The industries also provide approximately 50,000 jobs in the Commonwealth.

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Scouting From the Sky

Using Unmanned Aerial Vehicles to Aid Specialty Crop Producers

Jim Owen Jr., Nursery Crops Extension Specialist and Assistant Professor of Horticulture, Hampton Roads Agricultural Research and Extension Center

Reza Ehsani, Associate Professor of Agricultural and Biological Engineering, University of Florida Citrus Research and Education Center

Jim Robbins, Horticulture Extension Specialist, University of Arkansas Division of Agriculture

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 (UAVs) to assist in inventory management and stress detection of nursery crops. This is accomplished with a remote-controlled, battery-operated, multrotor aerial platform costing $5,000 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 cameras, must be downloaded and processed or rendered, which can take 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 Florida Nursery Automation website at www.nurseryautomation.org/.
The Virginia Ag Expo would like to thank its 2013 sponsors and exhibitors: