



# 2015


## NUTRIENT MANAGEMENT ANNUAL REPORT

HELPING CITIZENS MANAGE NUTRIENTS SINCE 1989



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**T**he fiscal year 2015 (FY 2015) Nutrient Management Annual Report highlights the programs of the University of Maryland's College of Agriculture and Natural Resources (AGNR), which include nutrient management in field and vegetable crops, animal production, nursery and greenhouse industries, and urban environments.

The guiding principle behind nutrient management planning and implementation, as outlined in the Maryland Water Quality Improvement Act of 1998, is that nutrients applied in any form should balance with plants' nutrient needs. In agricultural production systems, managing nutrients to meet, not exceed, crop needs may increase profitability and improve the health of the Chesapeake Bay and its tributaries.

Regardless of land use, improperly or excessively applied nutrients can leach into the groundwater or exit landscapes via runoff from precipitation, and then migrate into Maryland's waterways. Once in the water, excess nutrients upset the Bay's ecological balance by causing algal blooms and contributing to eutrophication and degradation of wildlife habitat.

*For more information on the College of AGNR, visit [www.agnr.umd.edu](http://www.agnr.umd.edu)*





## Agricultural Nutrient Management

The University of Maryland Extension's (UME) Agricultural Nutrient Management Program (ANMP), which is funded by the Maryland Department of Agriculture (MDA), provides (1) nutrient management planning services to Maryland farmers through a network of nutrient management advisors located in all county Extension offices and (2) continuing education and technical support to certified nutrient management consultants and certified farm operators via nutrient management specialists.

### 2015 Priorities

A formal agreement between the MDA and the University of Maryland (UMD) details the nutrient management planning priorities for the ANMP. The agreement targeted several groups of farmers for assistance with developing or updating nutrient management plans in FY 2015:

1. farmers who have filed a notice of intent (NOI) as a Concentrated Animal Feeding Operation (CAFO) or who were designated a CAFO by the Maryland Department of the Environment (MDE) or the Environmental Protection Agency;
  - a. and whose Comprehensive Nutrient Management Plan (CNMP) was being prepared by their Soil Conservation District; or
  - b. who need an updated nutrient management plan to remain in interim compliance while they awaited the development of the CNMP by their Soil Conservation District; or
  - c. who had previously developed a CNMP with a nutrient management component that required updating.
2. farmers who have filed a NOI as a Maryland Animal Feeding Operations (MAFO) or who have been designated a MAFO by MDE who require a current nutrient management plan to complete permit requirements;
3. farmers with pollution problems or referred as non-compliant by MDA through an enforcement procedure;
4. farmers participating in the Manure Transport Project and those with a Maryland Agricultural Cost-Share (MACS) application pending for animal waste storage and poultry mortality composters;
5. updating nutrient management plans for the existing clientele with animal operations and expired plans developed by the nutrient management advisors; and
6. first come, first serve for any other farmer who must comply with the Water Quality Improvement Act.

## 2015 Progress and Achievements

Under the ANMP, UME nutrient management advisors:

- prepared nutrient management plans for 19 Manure Transport Project clients, allowing transportation and application of manure on 7,717 acres;
- wrote nutrient management plans or updated them to partially fulfill permit requirements for 162 CAFO or MAFO clients;
- conducted the Phosphorus Site Index for 229 clients on 1,265 fields;
- implemented the Pre-Sidedress Nitrate Test (PSNT) for 30 producers with a total of 4,741 acres. This resulted in an estimated reduction of over 4,700 pounds (or approximately 12 pounds per acre) of nitrogen;
- implemented the Fall Soil Nitrate Test (FSNT) for over 100 fields in 11 counties. This resulted in an estimated reduction of over 27,500 pounds of nitrogen;
- wrote 549 new nutrient management plans for 185 Maryland producers for approximately 16,000 acres. The nutrient management advisors updated 6,113 plans for approximately 1,500 clients farming 280,000 acres. (Figure 1).

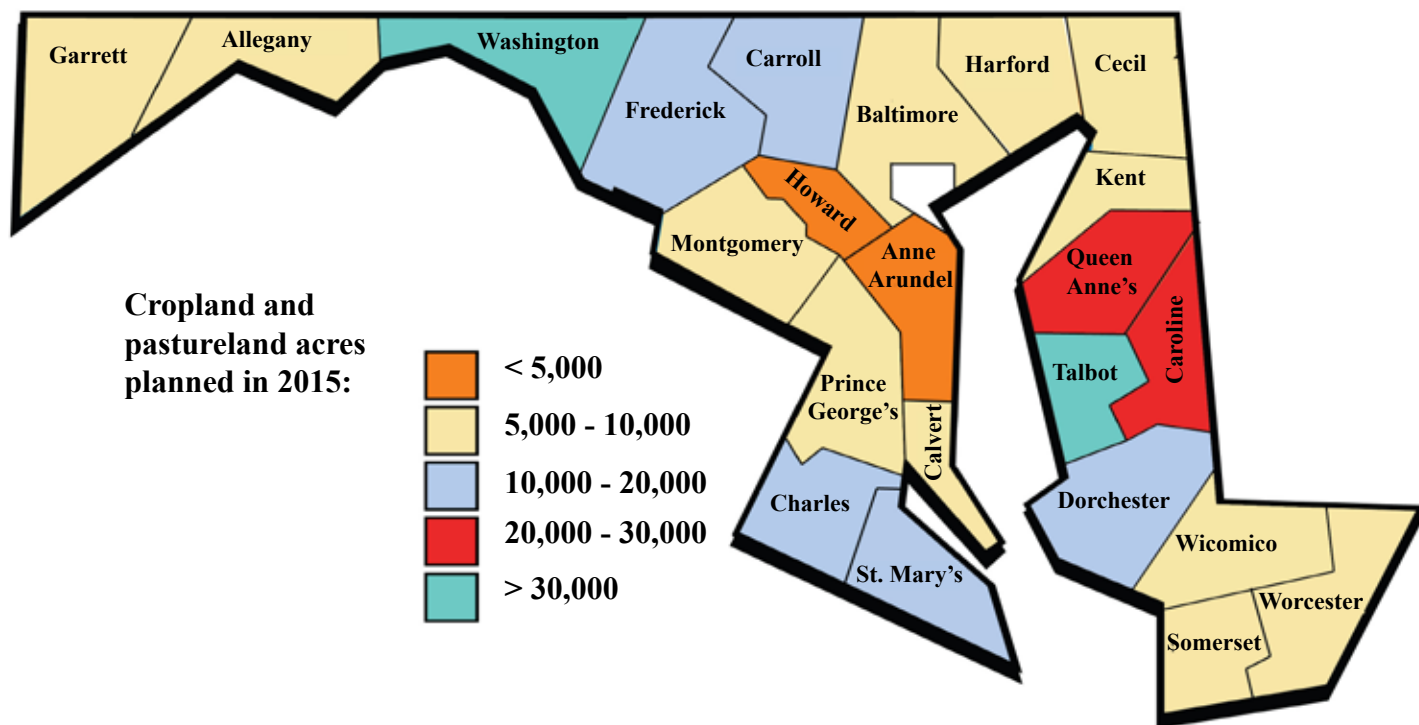


Figure 1. Farmland acres planned per county in fiscal year 2015 by University of Maryland Extension nutrient management advisors.



## Agricultural Nutrient Management (Continued)

### Continuing Education

MDA and the College of AGNR co-sponsored continuing education programs to help certified nutrient management consultants and certified farmers meet their continuing education requirements in 2015.

- Thirty-five (35) people attended the annual nutrient management field day, *Practical Experiences in Nutrient Management*. Workshop topics included:
  - plan writing for perennial fruit operations,
  - manure spreader calibration,
  - corn silage and corn grain yield checks,
  - field data collection for phosphorus risk assessments, and
  - drive-on scales for yield checks and equipment calibration.
- Three face-to-face workshops had 25 attendees. Workshop topics included:
  - *How to Write a Nutrient Management Plan and Revised Universal Soil Loss Equation Version 2 (RUSLE2)*.
- Three online sessions had 174 attendees. Sessions were offered via the University of Maryland's web conference system in 2015. The topics were:
  - *Soil Testing for Effective Nutrient Management*,
  - *Rational Use of Plant Analyses*,
  - *Low Residue Winterkilled Cover Crops*,
  - *Nitrogen Cycle: Beyond the Basics*,
  - *Tillage Impacts on the Soil-Crop System*, and
  - *Denitrification: Lessons from the Chesapeake Conservation Effects Assessment Project (CEAP)*.
- UME coordinated with other organizations to provide Maryland certified clients with continuing education opportunities, such as eXtension's Livestock and Poultry Environmental Learning Center (LPELC), the American Society of Agronomy's webinars, and the USDA-Natural Resources Conservation Service's (USDA-NRCS) East Technology Support Center webinar series.



For more information on the ANMP, visit <http://extension.umd.edu/anmp>

### Pre-certification Exam Training


Forty-four (44) individuals attended *Fundamentals of Nutrient Management*—a course designed to help participants prepare for the MDA nutrient management certification exam.



## Farmer Training and Certification

- Forty-two (42) farmers were certified through the Farmer Training and Certification (FTC) initiative to write their own nutrient management plans. To date, 565 farmers have been certified through this training initiative.
- After initial certification, University of Maryland nutrient management specialists assisted farmers with updating nutrient management plans and using *NuMan Pro* software.
- Plan writing help sessions were offered at five different locations to provide certified farmers with assistance in updating their nutrient management plans.

## ANMP Web Site

The ANMP web site (<http://extension.umd.edu/anmp>) provides users with access to general information about the program, training materials, publications and resources for developing nutrient management plans. The ANMP also maintains a web page listing training opportunities and current events on the social media site, Twitter ([www.twitter.com/UMANMP](http://www.twitter.com/UMANMP)). 

## Nutrient Applicator Training

Thirty-two (32) face-to-face Nutrient Applicator Training sessions were held, allowing 3,612 operators to either receive or renew their nutrient applicator vouchers.

## Nutrient Management Training for Lawn Care Professionals

Professional lawn care applicators are required to have both pesticide certification and nutrient application certification. Preparation for the nutrient management certification exam along with the exam itself was offered 27 times at various locations around the state. In FY 2015, 289 new individuals became certified bringing the total of certified lawn care applicators to 1,507.

Professional lawn care nutrient applicators are required to participate in continuing education classes. MDA and UME offered 46 re-certification classes. The emphases in FY 2015 were on reinforcing math skills for equipment calibration, preparing for a records review, and improving record-keeping for annual reporting.

## 2015 Mid-Atlantic Precision Agriculture Equipment Day

The University of Maryland and University of Delaware organized the 2015 Mid-Atlantic Precision Agriculture Equipment Day at the Somerset County Civic Center in August.

Topics included:

- soil sampling and precision agriculture;
- legal issues with unmanned aerial vehicles (UAV's);
- management of large data sets from yield monitors and grid soil sampling;
- ownership of data; and
- new approaches to poultry litter management.

There were 170 participants at the event.

## Poultry Farm Management Workshop

UME, in cooperation with Soil Conservation Districts, USDA-NRCS, Delmarva Poultry Industry, MDE and MDA, offered a Poultry Farm Management Workshop and Certification course designed to help new and existing poultry growers comply with their National Pollutant Discharge Elimination System (NPDES) CAFO permit.

Workshop topics included:

- basic farm management;
- brooding management;
- poultry welfare;
- basic poultry ventilation;
- site management and maintenance of poultry houses, pump rooms, manure sheds, composters;
- manure and mortality handling;
- vegetative environmental buffers;
- nutrient management and financial record-keeping;
- the CAFO permitting process; and
- farm inspection.

Maryland certified farmers, certified consultants and applicator voucher holders received four continuing education credits for attending this workshop. In 2015, poultry farm management workshops were held on Maryland's Eastern Shore with 24 participants.

## Nutrient Management Software

Nutrient Management Pro Maryland Professional Edition (NuMan Pro) software version 4.2 is under development with an anticipated release in FY 16. Soil data for all Maryland counties, recently revised by USDA-NRCS, will be integrated into NuMan Pro 4.2. Like its predecessor (NuMan Pro 4.0), NuMan Pro 4.2 will allow calculation of the University of Maryland Phosphorus Management Tool (UM-PMT).



# Nutrient Management Research for Agronomic and Vegetable Crops

Researchers in the University of Maryland's Department of Environmental Science and Technology and Plant Science and Landscape Architecture have on-going projects designed to improve the understanding and management of nutrients in crop production.

## Agronomic Crops: On-going Projects

- **Investigating nitrogen deep in agricultural soil profiles, innovative cover crop systems, and tillage to capture and recycle nitrogen for the benefit of water quality and crop production**

The long term goal of planting cover crops is to develop systems that pay for themselves by recycling nitrogen (and other valuable nutrients like sulfur) from deep in the soil profile.

Twenty sites in Maryland and Pennsylvania are involved in a study that compared nitrogen capture and recycling ability of forage radish, two small grains (triticale or rye), and a three-species cover crop mixture (ryegrass, legume and brassica species). The study also looks at comparisons of planting cover crops using various planting techniques, such as after corn silage, aerial seeding into standing crops, early-harvested short season hybrids and late spring interseeding. A second year of the study will commence in FY 16.

In a second study at the University of Maryland Central Maryland Research and Education facility in Beltsville, researchers conducted a study to determine at what depths forage radish and cereal rye could recover nitrogen. N-15, a naturally occurring nonradioactive isotope of nitrogen that can be traced through the plant-soil system, was applied at 3.3 and 6.6 feet for September 1 and October 1 planting dates. Preliminary data indicate that both forage radish and cereal rye cover crops were able to access the N-15 that was buried at 3.3 feet deep if they were planted September 1st. Very little of the tracer was taken up by cover crops planted October 1st. Neither of the cover crops was enriched in N-15 where the tracer was placed 6.6 feet deep. This isotope work will be expanded in FY 16.

- **Efficiency of fertilizer nitrogen use in corn**

It is difficult to accurately measure the uptake of fertilizer nitrogen by corn in a field situation. Nitrogen use efficiency (NUE) is a measurement that assesses how efficiently a crop utilizes nitrogen. Typically, NUE is evaluated by using a range of nitrogen rate treatments applied to the corn crop. Whole plant and grain samples are collected and each is analyzed for their nitrogen concentrations. This approach measures the total amount of nitrogen consumed but does not identify the sources, i.e. if the nitrogen was obtained from the fertilizer supplied or from either residual nitrogen present at corn planting or mineralization of organic matter during the growing season. To accurately identify the nitrogen contribution from fertilizer nitrogen, a study using labeled nitrogen (N-15) started in 2012. This three-year project not only measured nitrogen uptake for corn but also the uptake that occurred in the following rotation crops of winter wheat and double crop soybean. The field portion of this project concluded following the harvest of the 2014 double-crop soybeans. Data are being analyzed and a summary of the findings of this research should be available in 2016.



*Top photo: Deep nitrogen application for N-15 tracing*



*Middle photo: Radish aerially seeded into corn*



*Bottom photo: Radish, clover, and ryegrass cover crop mixture broadcast onto corn stubble*

# Nutrient Management Research for Agronomic and Vegetable Crops (Continued)

## Agronomic Crops: On-going Projects (Continued)

- **Response of irrigated, full-season soybean to poultry manure**
- **Continued assessment of the Fall Soil Nitrate Test (FSNT) for small grain production**

The primary objective of this study is to compare laboratory analysis of soil samples taken in the fall with the results from the Nitrachek quick test analysis. Preliminary results from the first year's samples (fall, 2013) indicated that the Nitrachek quick test analysis accurately predicts the need to apply fall nitrogen fertilizer for small grain production 90% of the time. Researchers have compared the two testing procedures for the fall 2014 soil samples and are analyzing the data.
- **Long-term cropping system effects on soil phosphorus**

This study began in 2001, and its current objective of comparing the influence of cropping system (grain system vs. forage system) on changes in soil phosphorus was concluded at the end of the 2014 season. Researchers currently are analyzing the large amount of data collected. Preliminary assessments indicate that changes in soil phosphorus occur very slowly, which means that it may take decades to bring fields with excessively high soil phosphorus down to optimum levels.

## Agronomic Crops: Completed Projects

### **Effectiveness of *in-situ* treatment of agricultural drainage ditch water to remove nutrients and other pollutants and reduce off-field nutrient transport**

Treatment filters were designed to chemically remove dissolved reactive phosphorus and particulates from the water column of agricultural drainage ditches. Researchers evaluated the effectiveness of two phosphorus-sorbing materials -- flue gas desulfurization gypsum (gypsum) and electric arc furnace slag (slag) in 1 or 2 structural designs -- a tile drained filter system, a cartridge filter system and a stormwater pond filter system. One or more structural designs and phosphorus-sorbing materials were evaluated at four sites: Marion Station, Westover, Barclay and Centreville.

Most of the filters did an adequate job at reducing load going downstream. While designs were not equally successful at all sites, data suggest that in many cases a 20 – 40% load reduction can be achieved with a properly designed ditch filter.



## Vegetable Crops: On-going Projects

### Grafting heirloom tomatoes for better quality and reduced nutrient use

Tomatoes are grafted by joining the top part of one plant (the scion) to the root system of another plant (the rootstock). The resulting plant is more vigorous and productive. Several studies over the last 10 years have shown the benefits of using grafting for soil disease control in tomato production. However, there is not much research that examines the influence of rootstocks in tomato high-tunnel production systems where disease is not a concern. In general, vegetable grafting can increase yield by improving crop tolerance to abiotic stresses because of the plant's ability to increase water and nutrient uptake via a more vigorous rootstock. Therefore, fertilization programs could be revised to show the improvement of nutrient uptake when growing grafted tomato plants.

Researchers undertook the second year of a grafting study designed to assess the possible benefits of grafting the heirloom tomato variety, Cherokee Purple, onto a more vigorous rootstock (Maxifort). The grafted variety was grown in a high-tunnel production system with 33% and 66% reductions in nitrogen fertilizer.

Grafting treatments consisted of two combinations: a scion/rootstock graft and a non-grafted control. Three levels of total nitrogen inputs were evaluated during the growing season: 60, 120 and 180 pounds of nitrogen per acre.

*To learn more about vegetable production practices and on-going vegetable research at the University of Maryland, visit <http://extension.umd.edu/mdvegetables>*

Preliminary data show:

- Looking across all fertility regimes, the grafted plants averaged 19% greater yields, with approximately 24% greater marketable yield (i.e., better quality fruit) compared with non-grafted plants.
- Grafted plants reached their nitrogen “economic return” limit between 60 and 120 pounds of nitrogen per acre compared to 180 pounds for non-grafted plants. Grafted heirloom tomatoes appear to use less nitrogen while increasing yield and maintaining quality.
- Potassium is critically important for producing high quality tomatoes. Potassium was 22% greater in grafted plants than non-grafted plants.

The focus of future studies includes:

Researchers will need data from different sites and years to determine the cost-effectiveness of grafting heirloom tomato plants in no or low-disease environments. In addition, further research is needed to determine optimal nitrogen, potassium and phosphorus inputs for grafted heirloom tomato plants in high tunnel systems. Hybrid tomato varieties will also be incorporated into the study to determine if there are any benefits from grafting.

# Turfgrass

New residential lots and other sites of recent construction activity are among the most challenging areas to establish turf. Poor soil chemical and physical conditions combined with less-than-optimal seeding times can result in low density lawns. Poorly established lawns increase the potential for runoff from landscaped areas and can drive some new homeowners to use more lawn fertilizer than homeowners residing in more mature developments.

Amelioration of poor-quality soils can be accomplished by amending soil with compost prior establishing turfgrass. Adding compost serves as a long-term source of slow-release nitrogen fertilizer, alleviates soil compaction, improves the water-holding ability of the soil, and reduces runoff by improving soil infiltration.

In plot studies conducted at the University of Maryland Paint Branch Turfgrass Facility, the percent of annual rainfall converted to runoff was always less for the sites prepared with compost than for the control sites. The study was expanded to lawns in a suburban setting to evaluate runoff volume, as well as sediment loss, nitrogen and phosphorus loss. A report of the completed study is anticipated next year.

## Emerging Waste-to-Energy Technologies

- **Anaerobic Digestion with Nutrient Capture**

A combined anaerobic digestion (AD) and nutrient capture system (NCS) for producing energy and recovering nutrients from poultry litter is being tested in collaboration with Planet Found Energy Development, LLC. AD is a well-established microbial-based manure management tool for agricultural livestock operations, but the digestion of poultry litter is far less common. The primary barrier to poultry litter AD is the necessity for dilution to mitigate the elevated ammonium levels found in poultry litter. In this project, nutrients will be removed from the poultry litter AD effluent through the production of a treated, high nitrogen-phosphorus ratio soil amendment and struvite (a magnesium ammonium phosphate mineral). Ammonia scrubbing and subsequent recirculation of the treated water to the front of the poultry litter digester will be incorporated, which will produce methane-enriched biogas for electricity production.

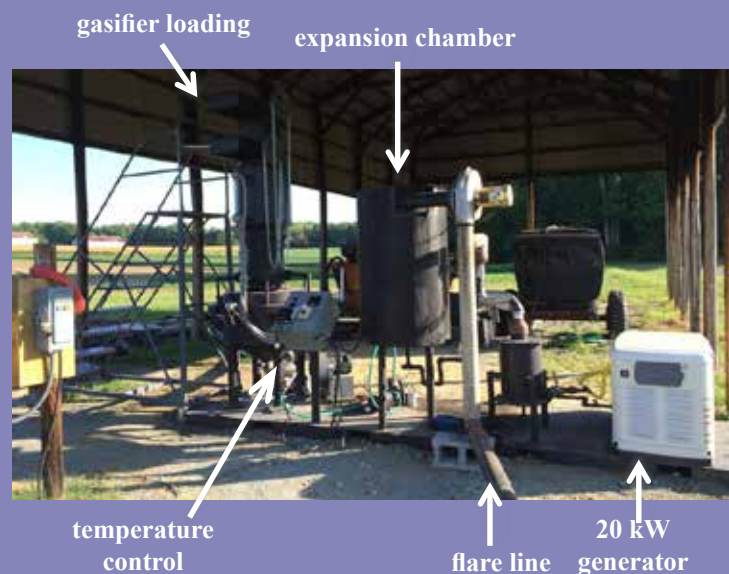


*Top photo: Anaerobic digester*

- **Gasification of Poultry Litter with Biochar Production**

This project focuses on investigation of the gasification (20 kW system) to transform poultry litter waste into energy, while reducing nutrients that flow into the Chesapeake Bay in collaboration with The Crimson Group, LLC. Gasification operates by using conventional thermo-chemical processes in which carbonaceous (carbon-rich) feedstock, in this case poultry litter with varying ratios of wood chips, are converted into a syngas, containing methane, hydrogen, carbon monoxide, and lesser amounts of carbon dioxide, and other trace gases, under oxygen-deprived conditions. Syngas can be used to produce heat or used in a generator to produce electricity. Various poultry litter sources and substrate ratios are being tested for energy content. The characteristics of biochar, the residual solid material remaining from this process, are also being investigated.

*Bottom photo: Poultry litter burner*



*(Top background photo courtesy of Anastasia Vvedenskaya; Bottom photos courtesy of Stephanie Lansing)*

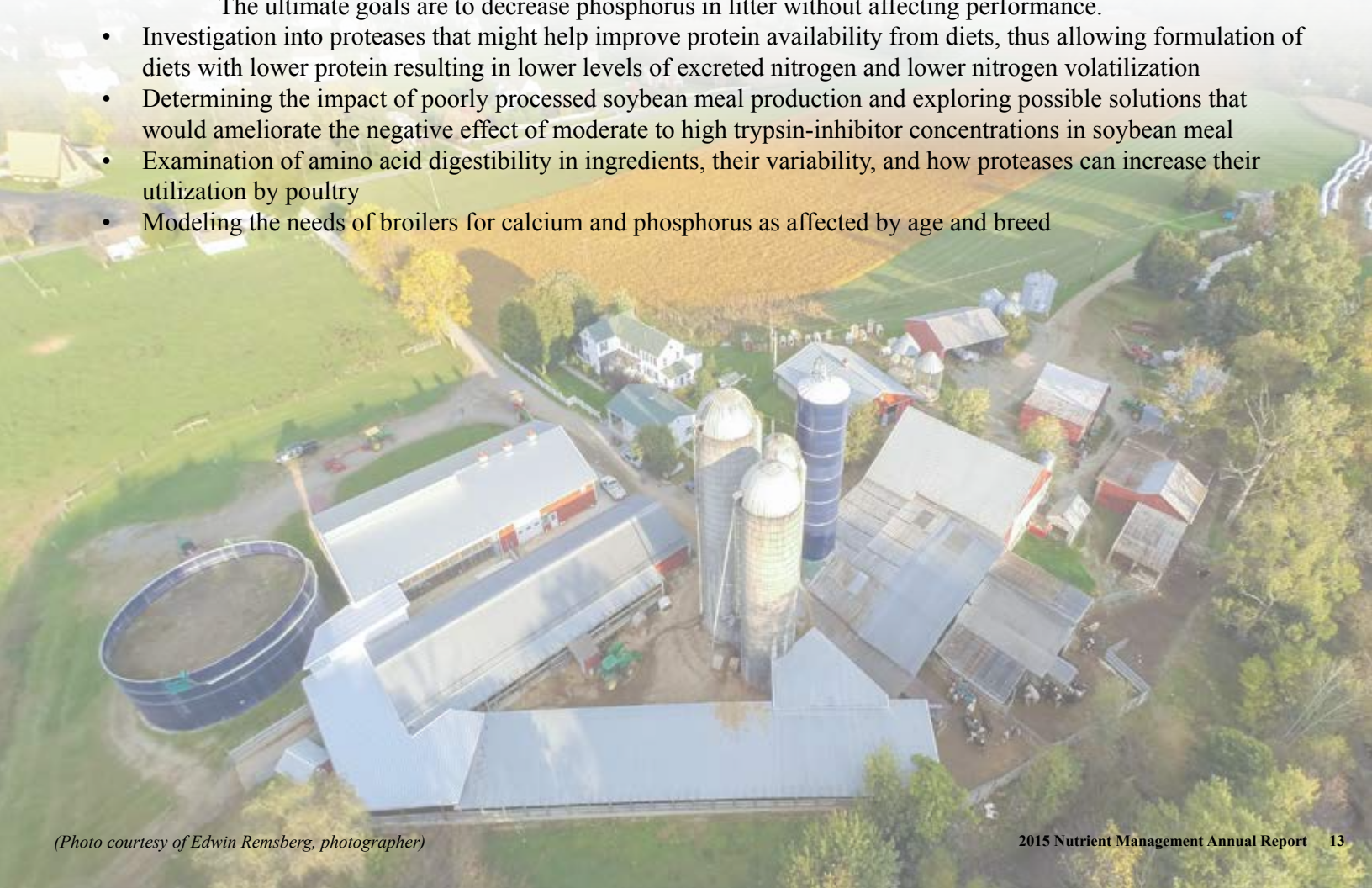
# Animal Nutrient Management

Researchers in the University of Maryland's Department of Animal and Avian Sciences are studying how nutritional factors and feed management interact to effect phosphorus and nitrogen digestibility and retention in animals.

*For more information, visit <http://ansc.umd.edu>*

## Poultry On-going Projects

- Causes and solutions for late lameness in broilers: the relationship between nutritional factors (calcium, phosphorus, micronutrients, vitamin D and/or K, phytase)
- Effectiveness of currently used and new forms of phytase enzymes in decreasing phosphorus in diets fed to broilers
- Impact of dietary concentrations of calcium, calcium source particle size and solubility, phytate and phosphorus on effectiveness of phytases
- Availability of calcium from limestone and impact of limestone particle size and solubility on calcium and phosphorus availability as well as effectiveness of different phytases
- Development of *in vitro* fast assays to determine calcium availability from limestone, based on correlations with *in vivo* work
- Development of methodologies that will allow determination of ingredient nutrient (calcium, phosphorus) digestibility in one assay, in the presence or absence of one or several enzymes
- Exploration of how management tools such as lighting programs and diet particle size can be used as tools to improve diet nutrient utilization by broilers. The goal of this research is to maintain or improve productivity while decreasing nutrient excretion and diet costs.
- Use of a dietary imprinting concept where changes in early nutrition of calcium and phosphorus could improve the broilers' ability to perform well when low phosphorus diets are fed in the finisher and withdrawal phases
  - This could allow producers to decrease the amount of phosphorus in the finisher and withdrawal phases that account for 55 to 70 percent of the feed broilers consume without negatively impacting performance. The ultimate goals are to decrease phosphorus in litter without affecting performance.
- Investigation into proteases that might help improve protein availability from diets, thus allowing formulation of diets with lower protein resulting in lower levels of excreted nitrogen and lower nitrogen volatilization
- Determining the impact of poorly processed soybean meal production and exploring possible solutions that would ameliorate the negative effect of moderate to high trypsin-inhibitor concentrations in soybean meal
- Examination of amino acid digestibility in ingredients, their variability, and how proteases can increase their utilization by poultry
- Modeling the needs of broilers for calcium and phosphorus as affected by age and breed



# Nursery and Greenhouse Nutrient Management Program

Under provisions of the Water Quality Improvement Act of 1998, Maryland's nursery and greenhouse operators must develop water and nutrient management plans to ensure that nitrogen and phosphorus are not lost to surface and groundwater from production sites in the state. The University of Maryland's Nutrient Management Program for the Nursery and Greenhouse Industry works with the industry to help develop these plans and promotes other sustainable practices that minimize environmental impacts through education and research. Data have been included in this report to reflect University of Maryland Extension programming during FY 2015.

## Training

A number of nutrient management training opportunities were offered for nursery and greenhouse operators and the landscape industry in 2014-15:

- **Farmer Certification Training:** Growers were certified to write their own nutrient management plans at trainings held east and west of the Chesapeake Bay. Nine operators and consultants attended these certification programs. Six growers were certified by MDA at the follow-up sessions in September and May in Annapolis.
- **Continuing Education Units (CEU):** The team also conducted five other nutrient management programs (for a total of nine CEU or voucher credits) throughout the winter and spring of 2015, reaching a total of 76 attendees.

*Photo: Lettuce varieties at a Baltimore, MD greenhouse.*

*(Photos courtesy of Anastasia Vvedenskaya, ANMP Communications Specialist)*

## Research and Extension

- **SCRI-Water3 - Reduce, Remediate, Recycle:** Informed Decision-Making to Facilitate Use of Alternative Water Resources and Promote Sustainable Specialty Crop Production: A new 5-year USDA-funded national specialty crops project began in 2014-15, with an interdisciplinary UMD team providing national support for Objective R1 – reduction of irrigation and agrochemical runoff (nutrients, herbicides and pesticides). The project involves deploying and supporting two sensor networks at two commercial nursery and greenhouse operations in Maryland and four networks at research facilities at UMD, Virginia Tech, Michigan State and Oregon State Universities. Another primary objective of this interdisciplinary research is to investigate and quantify relationships between irrigation and root disease management practices, to disrupt pathogen life cycles in production areas, and to reduce the requirements for remediation.  
*Further information about the project can be found at <http://watereducationalliance.org>*
- **Integrated Management of Zoosporic Pathogens and Irrigation Water Quality for a Sustainable Green Industry:** A team from UMD and two nursery operations (Moon, Tidal Creek) in Maryland and three nursery operations in Virginia (Colesville, Bennett's Creek and Lancaster Farms) completed the final year of this national specialty crops project. The team actively monitored containment ponds and irrigation systems for water quality and pathogen status at each operation in order to understand the dynamics of nutrient loading on water quality and pathogen survival. The project led to discovery of better disease management and recycling pond water strategies, which are key barriers to using recycled water for many growers.  
*A full description of the project results, final report and webinars can be found at <http://www.irrigation-pathogens.info>*
- **Water and Nutrient Management for Strawberry Operations:** The Walmart Foundation funded this new study to investigate the use and effectiveness of sensor networks for irrigation and frost protection in 2014-15. During the first year, networks were established on two commercial strawberry operations in Maryland (Butler's Orchard and Shlagel farms) as well as a replicated research sensor network at the Wye Research and Education Center. Throughout the study period, the growers received real-time information on environmental conditions enabling them to make better farm management decisions. In addition, each farmer provided resource use data (time, labor, water costs, fertilizers, etc.) for grower-controlled vs. sensor-controlled irrigation blocks in order to calculate enterprise (economic) production budgets.  
*Further information on this project can be obtained on the project outreach and information website at <http://sensingberries.net>*
- **Knowledge Center for Water, Nutrient and Plant Health Management:** The Knowledge Center currently has over 1,250 registered users. The Center has 26 learning modules on various aspects of substrate, irrigation, nutrient and pathogen management for nursery and greenhouse operations.  
*General information can be found at <http://waternut.org> and learning modules can be accessed at <http://waternut.org/moodle>*

# Urban Nutrient Management

## Home and Garden Information Center

The Home and Garden Information Center (HGIC) website was updated in 2015 with a new emphasis on Earth-Friendly gardening and many video clips and fact sheets related to soil testing and improvement, composting, and fertilizers.

- HGIC's Certified Professional Horticulturists answered 5,600 "Ask an Expert" online questions, 13 percent of which were related to soil, fertilizer, and composting.
- A new YouTube video was created and posted, entitled "Advanced Composting in the Derwood Demo Garden." *To view the video, visit <https://www.youtube.com/watch?v=WtYzHJSLBDw&list=PL13D4BEA3D39CE765&index=24>*
- Residents received education about Maryland's lawn fertilizer law, The Fertilizer Use Act of 2011. *MDA's Fertilizer Use Act information can be found online: <http://mda.maryland.gov/pages/fertilizer.aspx>*
- A Delmarva Gardens video on fertilizer spreader calibration was released in 2014 and received the 2015 Maryland National Association of County Agriculture Agents Communications Award. MDA's Nutrient Management division is currently using the video for training. *To view the video, visit <http://vp.telvue.com/preview?id=T01961&video=202642>*
- MDA educational materials and soil sample test kits were distributed.



*Photos from top to bottom: A composting demonstration by Denny May*

*(Photos courtesy of Susan Eisendrath)*

*For more information about the Home and Garden Information Center, visit <http://extension.umd.edu/hgic>*

## Master Gardener Program

The mission of Master Gardeners is to "educate Maryland residents about safe, effective, and sustainable horticultural practices that build healthy gardens, landscapes, and communities." This program is coordinated by the state office, housed at the Home and Garden Information Center, and administered through 21 County/City Extension offices across the state.

- Master Gardeners are trained by UME field and campus faculty and receive basic and advanced training in soils, fertilizers, and composting.
- Each year Master Gardener volunteers engage in over 100,000 hours of horticultural education. Of those volunteer hours, approximately 2200 hours are exclusively dedicated to the topics of soils, composting, and urban nutrient management.
- Master Gardeners devoted over 400 hours to educating residents about UME turf fertilizer recommendations. For example, at the Wicomico County Fair, 450 adults learned about Maryland's lawn fertilizer law and best lawn care practices through a hands-on display at the "Ask a Master Gardener" booth.
- Twenty-four (24) Master Gardener volunteers attended a two-day Master Composter training. Attendees of the training will contribute a minimum of 10 hours of volunteer work in compost education.

*For more information about the Master Gardener program, visit <https://extension.umd.edu/mg>*



## Grow It Eat It Program

The mission of this program - a collaboration between the HGIC and MG programs - is to help people improve human and ecological health by growing their own food using sustainable gardening practices.

- Master Gardeners engaged in 10,500 hours in backyard and community food production, in which best practices for soil health and nutrient management were prominent and widely discussed.
- Montgomery County Master Gardeners hosted two Grow It Eat It Open House events attended by 1164 adults and 164 children. The Montgomery County, Maryland Department of Environmental Protection's Division of Solid Waste Services (DSWS) provided 133 backyard compost bins and a limited number of compost thermometers.



*(Photo courtesy of Wendy Band)*

*For more information about the Grow It Eat It program, visit <http://extension.umd.edu/giei>*

## Bay-Wise Landscape Management

Bay-Wise training in 2015 focused on: the history and condition of the Chesapeake Bay; hydrology; wells and septic systems; lawn fertilizers; the Bay and the Fertilizer Use Act of 2011; critical areas and coastal zone management; soil compaction; stormwater management (including rain gardens, the SMART tool); integrated pest management; native plants; riparian buffers; and ecologically sound landscape maintenance.

- Fifty-nine (59) new Master Gardener volunteers received training in Bay-Wise Landscape Management techniques. To date, 1,224 Master Gardeners from 21 counties and Baltimore City have been trained in Bay-Wise techniques.
- Seven (7) additional Bay-Wise Master Gardeners had their personal landscapes certified as Bay-Wise demonstration sites by the Bay-Wise Landscape Management program, bringing the total to 572.
- To date, Master Gardeners in 19 Maryland counties certified 1,486 private properties (residential landscapes) as Bay-Wise. Master Gardeners throughout the state certified an additional 176 public landscapes as Bay-Wise.

*For more information about the Bay-Wise Landscape Management Program, visit: <http://extension.umd.edu/baywise>*



## Center for Educational Partnership's Community-based Gardens

The Center for Educational Partnership (CEP) supports urban agriculture and nutrition education in the Riverdale area of Prince George's County. There is a special focus on supporting local food production, school gardens, and youth development. Urban agriculture can increase local access to fruits and vegetables and improve nutrition knowledge, attitudes, and dietary intake. Community gardens help decrease storm water runoff and air pollution, while increasing urban biodiversity. This year, the gardens at the CEP, *Sheridan Street Community Garden* and *Field of Greens Community Garden*, held numerous community events:

- In November 2014, community members and students learned about growing techniques, assisted in garden debris removal, and composting CEP's First Annual Winter Work Day. There were 45 volunteers in attendance. The Urban Agriculture Coordinator of University of Maryland Extension – Prince George's County (UME-PGC) hopes to double this impressive number of volunteers for the Second Annual Event in November 2015.
- In April and May 2014, the Urban Agriculture Coordinator and Year 2 AmeriCorps VISTA service members of UME-PGC recruited their first youth organization for the youth garden area in Field of Green Community Garden. This pilot program was initiated with the International Rescue Committee and grant funds from Chipotle. Twenty-five (25) refugee students participated in growing potatoes, tomatoes, and flowers.
- In May 2015, the gardens at the CEP participated in the Prince George's County Department of The Environment Tree ReLeaf program. Through the Tree ReLeaf program, the Gardens were able to plant 45 native trees and shrubs that will ultimately improve soil health, increase flora and fauna biodiversity, and enhance the current food forest.



# Terp Farm

Terp Farm is the University of Maryland's sustainable farming operation dedicated to growing produce for the campus dining program, supporting educational opportunities for students, and providing food to those in need. In 2014, Dining Services, in collaboration with the College of AGNR and the Office of Sustainability, launched the three-year pilot program for the farm. The College of AGNR provided two acres at the University of Maryland Central Maryland Research and Education Center in Upper Marlboro, MD. There are two types of growing areas for crops: two acres of in-ground fields and a season-extending high-tunnel. Researchers at the facility shared technical advice and expertise with Terp Farm. The Farm helps fulfill a major component of Dining Services' Sustainable Food Commitment to purchase 20 percent local and sustainable foods by 2020. In its second season, Terp Farm continues to build its network of stakeholders who are all invested in sustainable food and agriculture. Terp Farm supports sustainability in all of its work:



- **Environmental sustainability:** Terp Farm makes all of its decisions with environmental impact in mind. Local food helps the environment by reducing transportation and following growing seasons. Crop rotations, cover crops, and composting build soil health. A pollinator garden and border plantings create a welcoming habitat for natural pollinators.
- **Economic sustainability:** Terp Farm does not sell produce for profit, but instead aims to grow enough produce to offset the costs of managing the farm. The high tunnel enables year-round food production and harvest. Terp Farm plans its plantings based on Dining Services chefs' needs.
- **Social sustainability:** One of Terp Farm's most important goals is education and outreach. Terp Farm has hosted five full-time summer student staff members, as well as students in courses from the Department of Plant Sciences and the Institute for Applied Agriculture. Individuals from other Living Learning programs, such as Honors Integrated Life Sciences and Upward Bound have volunteered at the farm. Terp Farm also demonstrates social sustainability by donating produce to hunger relief organizations – including the UMD Campus Pantry – and plans to donate 5 to 10 percent of future harvests.

The way Terp Farm manages soil quality is another important part of its commitment to environmental sustainability. Terp Farm receives its compost from the Western Branch Composting Facility, managed by Maryland Environmental Service. The composting cycle comes full circle: the Facility is responsible for composting the organic waste from campus dining facilities which then is used to grow vegetables to serve on campus. Terp Farm is committed to building the quality and resiliency of its soil through compost application, cover crops, and crop rotation.



(Photo courtesy of Kristin Fisher, Nutrient Management Specialist)

## IN CLOSING

In 2015, the College of Agriculture and Natural Resources' nutrient management programs continued to conduct research on nutrient utilization in agronomic and horticultural crop production and animal nutrition, as well as educate the public on fertilizer management and sustainable horticultural practices. These research and education efforts allow the College's nutrient management initiatives to continue achieving their goal of improving and protecting the health of the Chesapeake Bay and Maryland's tidal and nontidal waterways while maximizing the state's economic potential.

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