

# Nutrient Management Annual Report



**2010**



University of Maryland College of Agriculture and Natural Resources

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Helping citizens manage nutrients since 1989

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**T**he 2010 Nutrient Management Annual Report highlights the efforts of programs within the University of Maryland's College of Agriculture and Natural Resources (AGNR), including nutrient management in field and vegetable crops, animal production, nursery and greenhouse industries and home landscapes and park lands.

The guiding principle behind nutrient management planning, 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 is crucial to the health of the Chesapeake Bay and its tributaries.

Improperly or excessively applied nutrients can leach into the groundwater or exit the field 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).



## 2010 Training and Cooperative Education Accomplishments

### Continuing Education

- The Maryland Department of Agriculture (MDA) and the College of AGNR cosponsored continuing education programs to assist certified nutrient management consultants in meeting their continuing education requirements. The 23 workshops were attended by 363 participants. Workshop topics included: "Large Animal Mortality Composting," "Practical Experiences in Nutrient Management," "Advanced Nutrient Management Planning for Pastures," "How to Write a Nutrient Management Plan," "Phosphorus Site Index (PSI)," "PSI Field Training," "Sustainable Nursery Practices," "Managing Irrigation and Substrates in Greenhouses," "Opportunities for Nitrogen Conservation," "Explore the Features of RUSLE2," "Orientation to *NuMan Pro 3.0*," "Pre-Sidedress Nitrate Testing" and "Compost Field Day."

### Pre-certification Exam Training

- 81 individuals attended "Fundamentals of Nutrient Management"—a course designed to help participants prepare for the MDA nutrient management certification exam.

### Nutrient Applicator Training

- 33 Nutrient Applicator Training sessions were held and 699 operators either received or renewed their nutrient applicator vouchers.

## Farmer Training and Certification

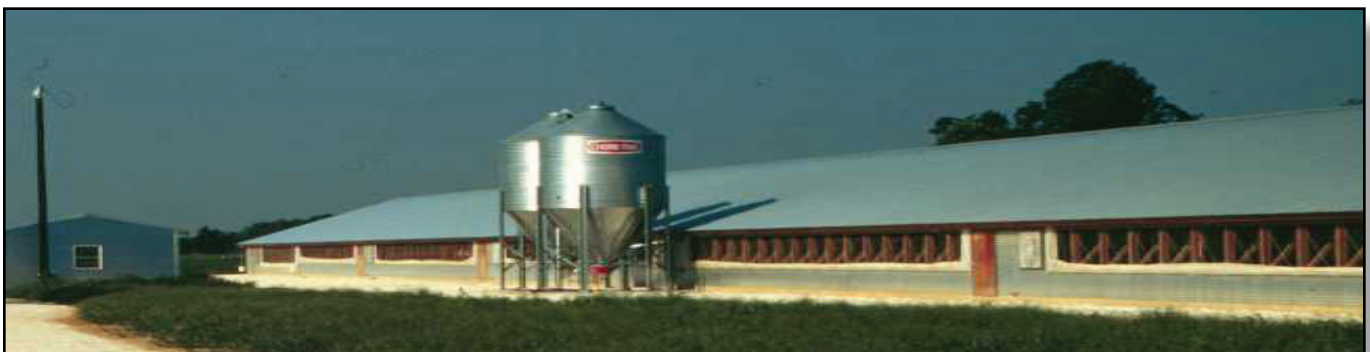
- 17 farmers were certified through the Farmer Training and Certification (FTC) Program to write their nutrient management plans. To date, 329 farmers have become certified through FTC.
- Upon certification, farmers receive assistance with plan updates and software use from University of Maryland Nutrient Management Specialists. In 2010, the University of Maryland Extension's Agricultural Nutrient Management Program held 10 plan update/software use training sessions in various locations around the state.

## Poultry Farm Management Workshop

The University of Maryland Extension, in cooperation with several agencies (i.e., Soil Conservation Districts, USDA-Natural Resources Conservation Service (NRCS), Delmarva Poultry Industry, Maryland Department of the Environment and MDA) offered a brand new Poultry Farm Management Workshop and Certification course designed to help new and existing poultry growers receive their National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit.

Topics discussed during the workshop included: basic farm management; site management and maintenance of poultry houses, pump rooms, manure shed, composters, etc.; manure and mortality handling; vegetative environmental buffers; nutrient management and financial recordkeeping; the CAFO permitting process; comprehensive nutrient management planning; and the Environmental Protection Agency inspection process. Six (6) continuing education credits and new nutrient applicator vouchers were awarded to Maryland certified farmers, certified consultants and applicator voucher holders for attending this workshop.

In 2010, two (2) poultry farm management workshops were held on Maryland's Eastern Shore with over 70 participants receiving their certification.



*Maryland poultry house (Photo source: UME ANMP)*

## Agricultural Nutrient Management

The University of Maryland Extension's (UME) Agricultural Nutrient Management Program (ANMP), which is funded by 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 state and regional nutrient management specialists. For more information on the ANMP, visit [www.anmp.umd.edu](http://www.anmp.umd.edu).

## 2010 Priorities

Nutrient management planning priorities for the ANMP are stated in a formal agreement between MDA and the University of Maryland. The priorities for Fiscal Year 2010 were as follows:

1. Farmers with pollution problems or referred as non-compliant by MDA through an enforcement procedure;
2. Farmers participating in the Manure Transport Project and those with a Maryland Agricultural Water Quality Cost-Share (MACS) Program application pending for animal waste storage or a poultry mortality composter;
3. Updating nutrient management plans for the existing clientele with animal operations and expired plans developed by UME nutrient management advisors; and
4. First come, first serve for any other farmer who must comply with the Water Quality Improvement Act.

## ANMP Web Site

The ANMP web site ([www.anmp.umd.edu](http://www.anmp.umd.edu)) was completely redesigned in 2010 using the College of AGNR's new Cascade Server content management system. This web site provides users with access to general information about the program, training materials, publications and resources for nutrient management plan development. The ANMP also expanded its Internet presence by creating a new web page on the social media site, Twitter ([www.twitter.com/UMANMP](http://www.twitter.com/UMANMP)).

## Nutrient Management Publications

The following new publications were released this year:

- Soil Fertility Guide Modules (EC-1) *Calibration of Manure Spreaders: Uniformity, Spread Patterns and Effective Swath Width*; (EC-2) *Calibration of a Manure Spreader Using the Weight-area Method*; (EC-3) *Calibration of a Liquid Manure Spreader Using the Load-area Method*; (EC-4) *Calibration of a Manure Spreader Using the Load-area Method (with Drive-on Scales)*; and (EC-5) *Calibration of a Manure Spreader Using the Load-area Method (with Estimation of Density and Load Weight)*.

The following publications were revised this year:

- Nutrient Management Information Sheet (NM-8) *Corn Stalk Nitrate Test*
- Bulletin EB-236 *Commercial Vegetable Production Recommendations*

## Progress and Achievements

- Plans for 21 Manure Transport Project clients were written, which allowed for the transport of manure to over 2,080 acres.
- The Phosphorus Site Index was performed for 388 clients on 2,331 fields.
- Nutrient management advisors performed 67 yield checks and calibrated 24 manure spreaders.
- The Pre-Sidedress Nitrate Test was performed for 152 producers totalling over 20,700 acres. This resulted in an estimated reduction of over 280,800 pounds (or approximately 13.5 pounds per acre) of nitrogen applied to Maryland cornfields.

## Progress and Achievements (continued)

- 548 new nutrient management plans were written for 227 Maryland producers for more than 28,500 acres. 5,671 plans were updated for 1,460 clients for approximately 287,500 acres (see Figure 1 below).

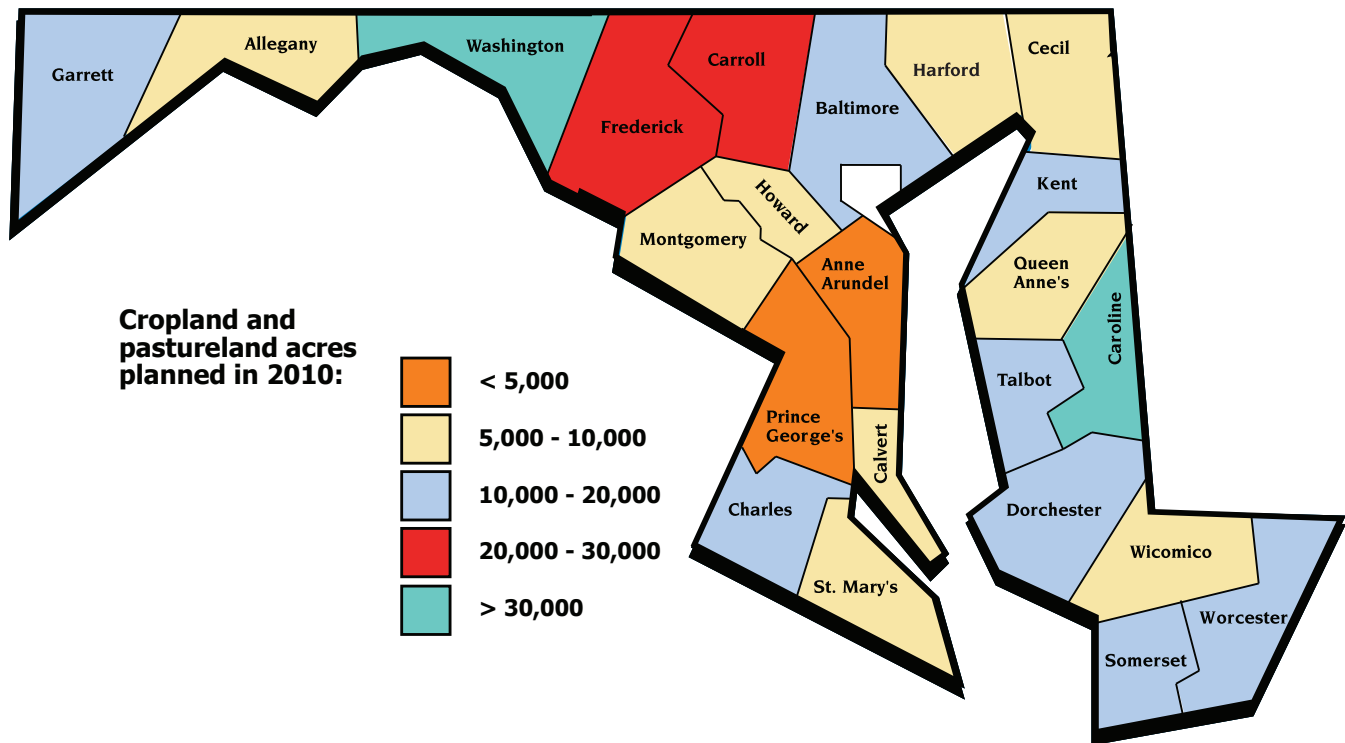


Figure 1. Farmland acres planned per county in 2010 by University of Maryland Extension nutrient management advisors.

## Nutrient Management Software

The latest version of Nutrient Management for Maryland Professional Edition (*NuMan Pro*), version 3.0, was released in December 2009. In addition to all of the features found in *NuMan Pro 2.0*, this latest version includes the following new features and capabilities:

- enhanced functionality to make plan development more efficient (e.g., incorporate multiple manures into the manure history and the Phosphorus Site Index);
- expanded crops list (e.g., recommendations for 60 new crops); and
- incorporation of the most recent research data (e.g., new ammonium conservation factors and tillage options).

In 2010, the UME ANMP conducted the following software training:

- two webinars, “Orientation to *NuMan Pro 3.0*,” to introduce nutrient management consultants to the newest version of the nutrient management planning software; and
- three workshops, “Learn to Use *NuMan Reporter* and File Your Annual Implementation Report (AIR),” to assist producers with using the *NuMan Reporter* software to complete and file their AIR.

## Nutrient Management Research for Agronomic and Vegetable Crops

### Agronomic Crops

*The following projects are ongoing:*

- Development of a second-generation phosphorus site index for predicting the relative risk of phosphorus (P) transport from agricultural land.
- Investigation of the effects of long-term winter cover crop usage on physical and chemical properties of no-till soils.
- Exploration of soil carbon sequestration and applied nutrient fate in multiple crop rotation systems.
- Long-term evaluation of corn yield response to nitrogen fertilizer rates.
- Study of the performance of stabilized nitrogen fertilizer products (i.e., Agrotain™, N-Serve™, Agrotain Plus™ and Nutrisphere-N™) for corn.
- Determination of the economic optimum nitrogen rate for corn varieties.
- Development of a fall residual nitrate test to predict fall nitrogen requirements for wheat.
- Examination of long-term effects of cropping system choice (forage versus grain) on soil phosphorus (P) concentrations ranging from optimum to excessively high.
- Bio-assessment of ecological function of agricultural ditches on the Delmarva peninsula.
- Sustainable use of pelletized broiler litter in the Chesapeake Bay watershed.
- Integration of value-added manure products into 21st century farming.
- Effect of drainage ditch management on off-field nutrient transport; *in situ* treatment of agricultural drainage ditch water to remove nutrients and other pollutants.
- Determination of transport mechanisms for nutrients leaving stockpiled poultry litter and means to inhibit losses.
- Evaluation of variable rate nitrogen application in winter wheat using active optical sensors.
- Utilization of variable rate nitrogen application in the Mid-Atlantic to increase nitrogen use efficiency in corn.
- Use of rainfall simulation to estimate relative nutrient loss efficiencies from various best management practices used in nutrient management planning.
- Utilization of conservation tillage to reduce nutrient losses from poultry litter applied in grain crop production systems.
- Evaluation of commercially-available nitrogen stabilizing products.


### Vegetable Crops

*The following projects are ongoing:*

- Utilization of real-time measurements of nitrate in plant petiole sap of watermelons at a critical developmental period using a portable meter can reduce nitrogen (N) fertilizer application by 25-40 percent without reductions in yield or fruit quality.
- Determination of appropriate amount of N needed to grow ethnic vegetables that meet taste and quality expectations of customers. Results to date show that the following ethnic vegetables should be grown with 30-50% less N to achieve quality yield: Callaloo, melons (Amarillo Oro, Petit Gris de Rennes, Thai Golden Round, Baghdad Long, Thai Long, Tigger), and eggplant varieties (Red China, Thai Round Purple, Malaysian Dark Red).
- Determination of the amount of manure or cover crop needed in organic systems to produce vegetables.

## Vegetable Crops (continued)

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



## Economic Factors in Nutrient Management

In April 2010, researchers in the Department of Agricultural and Resource Economics (AREC) at the University of Maryland collected information from Maryland agricultural producers regarding nutrient management and conservation efforts. The University of Maryland Best Management Practice (BMP)/ Cost Share Survey of 2010 was conducted by the Maryland Field Office of USDA's National Agricultural Statistics Service (NASS).

Based on survey responses and expanding this information to the population of farm operations in the state of Maryland, there are approximately 12 percent of farms that are not required to have a nutrient management plan. Of the remaining 88 percent of farm operations in the state of Maryland, the survey indicated that 65 percent have a nutrient management plan while the rest do not. Of those respondents who had plans, UME had the largest role in preparing plans (approximately 60 percent of plans). Independent crop consultants and chemical dealers/employees had the second and third largest percentages (14 and 10, respectively). The Department of AREC continues to analyze data from this survey and the final report will be available in FY2011.

For more information on Agricultural and Resource Economics, visit [www.arec.umd.edu](http://www.arec.umd.edu).



## Animal Nutrient Management

Researchers in the University of Maryland's Department of Animal and Avian Sciences are studying how nutritional factors (i.e., feeding methods, ingredients used, performance target levels, dietary supply of calcium and Vitamin D, and enzymes such as phytase for non-ruminant animals) interact and affect phosphorus availability and retention in animals. For more information, visit <http://ansc.umd.edu>.

### Poultry

*The following projects are ongoing:*

- Use of early nutrition to improve broilers' ability to (1) perform well when low phosphorus diets are fed in the finisher and withdrawal phases and (2) deposit breast muscle such that breast yield does not change when low protein diets are fed in the finisher and withdrawal phases. The birds in this study have been moved from batteries to floor pens, and they will be taken to processing to obtain yields.
- Documentation of changes in Delmarva broiler litter phosphorus and nitrogen. This work has been ongoing since 2000, prior to phytase being used in broiler diets and is being performed every two years.
- Comparison of currently used and new forms of phytase to study efficacy determinations and pelleting temperature survivability.



## Poultry (continued)

- Investigation into proteases that might help improve protein energy availability from diets.
- Examination of amino acid availability and metabolic energy levels in ingredients as affected by proteases.
- Determination of the impact of feed management and organic acids on efficacy of enzymes.

## Nursery and Greenhouse Nutrient Management

### Water and Nutrient Management Research

Under provisions of the Water Quality Improvement Act of 1998, Maryland's nursery and greenhouse operations must develop water and nutrient management plans to assure that nitrogen and phosphorus are not lost to surface and groundwater from production sites in the state. The University of Maryland's Nutrient Management Planning 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. For more information on the Nursery and Greenhouse Program, visit [www.nursery.umd.edu](http://www.nursery.umd.edu).



*Commercial cut flower production in Maryland (Photo courtesy of Edwin Remsberg, AGNR Photographer)*

### *The following projects are ongoing:*

- Monitoring wireless network sensors at various locations to improve irrigation scheduling and reduce nutrient leaching. One sensor network at the Wye Research & Education Center is quantifying water and nutrient use/runoff; a second network at Raemelon Farms is looking at 3-dimensional water movement from drip irrigation in new plantings; a third network at Waverly Farm is investigating irrigation scheduling with compost amendments. Other sensor networks are located at the Bauers' cut-flower greenhouse in Adamstown, MD and the Hale and Hines Nursery in McMinnville, TN and are providing data on irrigation scheduling and use.

- Development of the Knowledge Center for Water, Nutrient and Plant Health Management. There are currently over 620 registered users in the Knowledge Center. General information on the project can be found at <http://waternut.org>, and learning modules can be accessed at <http://waternut.org/moodle>. In 2010, a peer-reviewed journal article was published in *HortTechnology* discussing the development and impact of the Knowledge Center.

## Urban Nutrient Management

### Master Gardener Program

In order to help alleviate concerns about the potential impact of fertilization of urban lands on water quality in Maryland, the University of Maryland Extension relies upon its Master Gardener program to “educate Maryland residents about safe, effective, and sustainable horticultural practices that build healthy gardens, landscapes, and communities.” For more information about the Master Gardener program, visit [www.mastergardener.umd.edu](http://www.mastergardener.umd.edu).

- Currently there are active programs in 19 of 23 counties and Baltimore City.
- 1,433 active volunteers donated over 89,270 hours of volunteer service to the state of Maryland.
- Master Gardeners operated 14 compost demonstration sites to educate homeowners about recycling yard and food waste. 314 compost bins were distributed around the state.
- With the help of college student videographers, the Home and Garden Information Center (HGIC) produced three new video clips related to soil and fertilizer: (1) “Side-dress Your Veggies,” (2) “How to Collect a Soil Sample” and (3) “No-till Gardening.” These videos, which to date have been downloaded over 5,000 times, can be accessed at [www.youtube.com/user/UMDHGIC](http://www.youtube.com/user/UMDHGIC).



*Maryland Master Gardener Coordinator, Jon Traunfield, demonstrates salad table gardening. (Photo courtesy of Edwin Remsberg, AGNR Photographer)*

## Bay-Wise Landscape Management

Bay-Wise training in 2010 focused on: the history and condition of the Chesapeake Bay; hydrology; wells and septic systems; lawn fertilizers and the Bay; Asian tiger mosquito control; critical areas and coastal zone management; hazardous household products; water conservation; integrated pest management; and ecologically sound landscape maintenance. For more information about the Bay-Wise Landscape Management Program, visit [www.baywise.umd.edu](http://www.baywise.umd.edu).

- 60 new Master Gardener volunteers were trained in Bay-Wise Landscape Management techniques. To date, 863 Master Gardeners from 20 counties and Baltimore City have been trained in Bay-Wise techniques.
- 52 additional Bay-Wise Master Gardeners had their personal landscapes certified as Bay-Wise by the Urban Nutrient Management Program, bringing the total to 374.
- To date, 646 private properties (residential landscapes) have been certified as Bay-Wise by Master Gardeners in several Maryland counties. An additional 78 public landscapes have also been certified as Bay-Wise by Master Gardeners throughout the state.

## In Closing

In 2010 the College of Agriculture and Natural Resources' Nutrient Management Programs continued to conduct research on nutrient utilization in crops and landscape plants as well as educate the public on farm management and sustainable horticultural practices. These research and education efforts allow the College's Nutrient Management Programs 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.

## Photo Credits

### Front Cover (clockwise from top left):

- Manure spreader calibration (*Heather Hutchinson, UME Nutrient Management Specialist*); Poultry research (*Edwin Remsberg, AGNR Photographer*); Commercial cut flower production (*Edwin Remsberg, AGNR Photographer*); Maryland corn (*USDA-NRCS*).

### Back Cover:

- Symons Hall at the University of Maryland (*Edwin Remsberg, AGNR Photographer*).



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