

# 2008 Nutrient Management Annual Report



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# 2008 Annual Report

The 2008 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.

The University of Maryland's College of AGNR Nutrient Management Programs have been helping citizens manage nutrients applied to Maryland soils since 1989. For more information on the College of AGNR, visit [www.agnr.umd.edu](http://www.agnr.umd.edu).

## 2008 Training and Cooperative Education Accomplishments

- The Maryland Department of Agriculture and the College of AGNR co-sponsored continuing education programs to assist certified nutrient management consultants in meeting their continuing education requirements. The 27 workshops were attended by 545 participants. Workshop topics included: "Sustainable Nursery Crop Production," "Corn Stalk Nitrate Testing," "Field Demonstration of Manure Spreader Calibration," "How to Write a Nutrient Management Plan," "NuMan Pro Software Training," "Nutrient Management Planning for Perennial Fruit Crops," "Nutrient Management Update," "Phosphorus Site Index (PSI)," "Revised Universal Soil Loss Equation (RUSLE 2) Training," "Practical Experiences in Nutrient Management," and "Pre-Sidedress Nitrate Testing."
- 28 attended "Fundamentals of Nutrient Management" — a course designed to help participants prepare for the MDA nutrient management certification exam.
- 43 farmers were certified through the Farmer Training & Certification (FTC) program to write their own nutrient management plans. To date, 273 farmers have become certified through the FTC program.
- 69 Nutrient Applicator Training sessions were held in 22 counties. 1,482 operators either received or renewed their nutrient applicator vouchers.





## Agricultural Nutrient Management

The Maryland Cooperative Extension's (MCE) Agricultural Nutrient Management Program, which is funded by MDA, focuses on reducing pollution in the Chesapeake Bay from plant nutrients applied to cropland. The Program 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 Agricultural Nutrient Management Program, visit [www.anmp.umd.edu](http://www.anmp.umd.edu).

### 2008 Priorities

Nutrient management planning priorities for the Agricultural Nutrient Management Program are stated in a formal agreement between MDA and the University of Maryland. The priorities for FY 2008 were as follows:

1. Farmers with pollution problems or those 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 existing clientele with an expired plan developed by MCE nutrient management advisors; and
4. First come, first serve for any other farmer who must comply with the Water Quality Improvement Act.

### Progress and Achievements

- Over 620 new nutrient management plans were written for 322 Maryland producers totalling over 37,000 acres. Over 4,190 plans were updated for 1,661 clients totalling approximately 308,500 acres (see Figure 1 on page 5).
- Plans for 74 Manure Transport Project clients were written, which allowed for the transport of manure to over 15,800 acres.
- The Pre-Sidedress Nitrate Test was performed for 118 producers totalling over 13,000 acres. This resulted in an estimated reduction of over 90,600 pounds (or approximately 7 pounds per acre) of nitrogen applied to Maryland cornfields.
- The Phosphorus Site Index was performed for 384 clients on 2,420 fields. Sixty percent (60%) of the fields (1,454 fields) scored "Low," meaning fertilizer P starter and manure utilization was not restricted. Only 2 percent (42 fields) scored "Very High"; therefore, all phosphorus fertilizer and manure inputs were not allowed on these fields.
- Nutrient management advisors performed 161 yield checks and calibrated 22 manure spreaders.

### Publications

- Nutrient Management Information Sheet NM-1, "Estimating Corn Silage Yield" was updated and re-released.

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- Bulletin EB-236, *Commercial Vegetable Production Recommendations*, was revised and distributed to Maryland Cooperative Extension offices in January 2008.

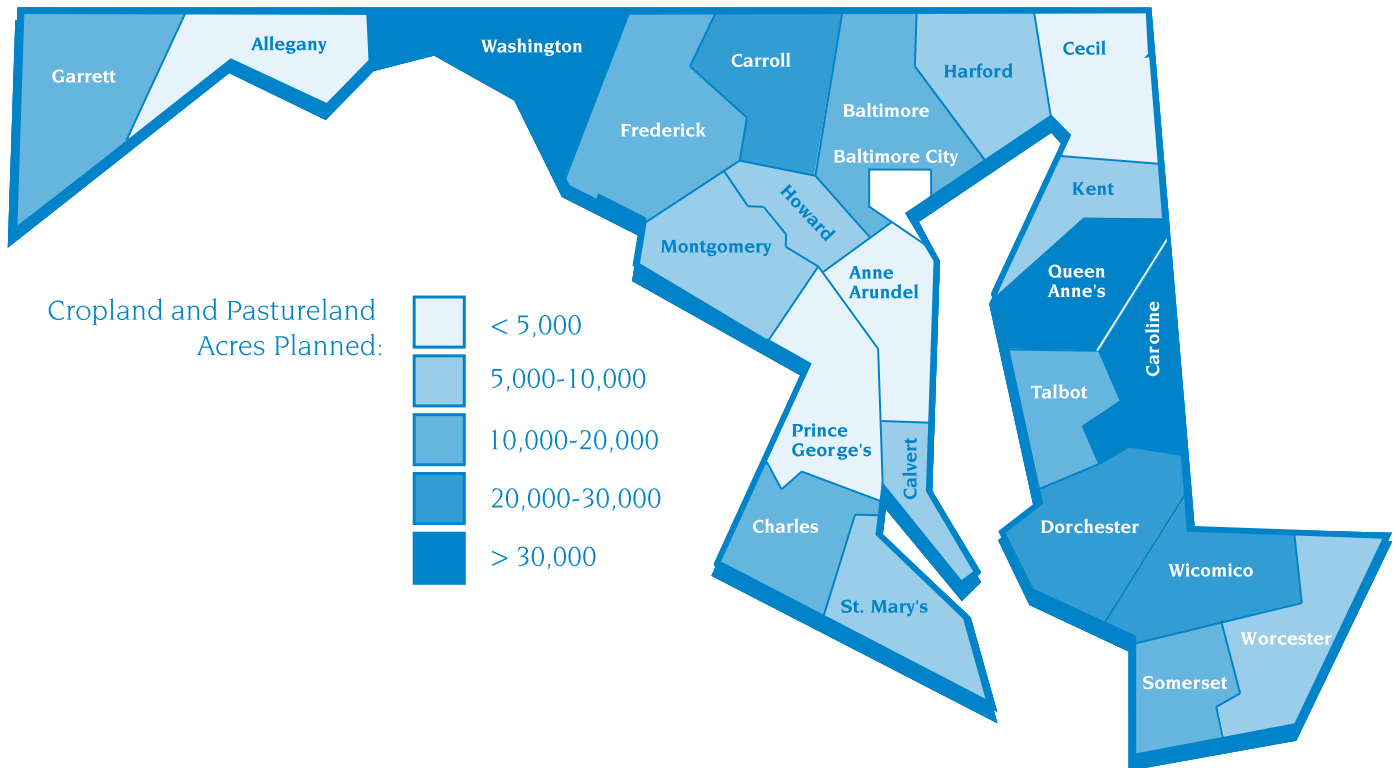


Figure 1. Farmland acres planned per county in 2008 by Maryland Cooperative Extension nutrient management advisors.

## Nutrient Management Research for Agronomic and Horticultural Crops

The following projects have recently begun:

- Bio-assessment of ecological function of agricultural ditches on the Delmarva peninsula.
- Enhancement of nutrient efficiencies on dairy farms in the Monocacy watershed.
- Inhibition of nitrate removal from cover crops by ammonia deposition in precipitation.
- Assessment of performance of nitrogen fertilizer enhancement products for corn.

The following projects are still in progress:

- Sustainable use of pelletized broiler litter in the Chesapeake Bay watershed.
- Effect of drainage ditch management on off-field nutrient transport; *in situ* treatment of agricultural drainage ditch water to remove nutrients and other pollutants.
- Utilization of variable rate nitrogen application in the Mid-Atlantic to increase nitrogen use efficiency in corn.
- Sustainable integration of value-added manure products into 21st century farming.

## Projects still in progress (continued):

- 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.
- Investigation of the effects of long-term winter cover crop usage on physical and chemical properties of no-till soils.
- Long-term re-evaluation of corn yield response to nitrogen fertilizer application rate.
- Comparison of mid- and late-season nitrogen tests on corn (i.e., chlorophyll meter readings, green leaf counts, optical sensor readings, and corn stalk nitrate test results) with soil test results for nitrate to determine if the nitrogen tests can predict the availability of adequate soil nitrate for planting winter wheat (or barley) without the use of fall nitrogen. Preliminary results show:
  - none of these corn-based methods can consistently predict the adequacy of residual soil nitrate for planting small grains without fall nitrogen.
- Development of a fall residual nitrate test (utilizing the pre-sidedress nitrate test) to predict fall nitrogen requirements for small grains.
- Determination of long-term effects of cropping system choice (forage versus grain) on soil phosphorus (P) concentrations ranging from optimum to excessively high.



*Dr. Jennifer Becker, Associate Professor & Extension Specialist in Bio-remediation and Waste Management, measures percent ground cover using the point intersection method. (Photo courtesy of Edwin Remsberg, AGNR Photographer)*

- Utilization of real-time measurements of nitrate in plant petiole sap of watermelons at a critical developmental period using a portable meter can reduce N fertilizer application by 30 percent without reductions in yield or fruit sugar content.

- Investigation of the effect of various types of conventional and conservation tillage equipment on both surface residue ammonia volatilization loss from surface-applied dairy manure as well as quantification of the costs and potential crop yield benefits associated with the use of conservation tillage implements.



*Watermelon research plots at the Central Maryland Research & Education Center, Upper Marlboro, MD. (Photo courtesy of Dr. Jerry Brust, Agent & Regional Extension Specialist, Vegetables)*

## Animal Nutrient Management

The University of Maryland's Department of Animal and Avian Science nutrient management research focuses on determining the phosphorus and nitrogen requirements of broilers and dairy and beef cattle. Researchers 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. For more information about the Department of Animal and Avian Science, visit <http://ansc.umd.edu>.

### Poultry

The following project has recently been completed:

- Documentation of the impact low feed protein concentrations have on breast yield and nitrogen excretions of broilers, turkeys, and laying hens.

The following projects are still in progress:

- 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.
- 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, which involves efficacy determinations and pelleting temperature survivability work.
- Investigation into proteases that might help improve protein energy availability from diets.

### Dairy

- Improvement of dairy herd nutrition by testing milk urea nitrogen.
- Use of animal nutrition, manure transport, and cover crops to reduce nitrogen losses to air and water on dairy farms in the Monocacy watershed.
- Research on nitrogen recycling in the gut of dairy cows.
- Provide certification training for dairy cattle nutritionists working in the region. This year eight Maryland nutritionists were certified through this training.





## 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).



*Dr. Andrew Ristvey, Agent & Regional Extension Specialist in Commercial Horticulture, conducts advanced nutrient applicator training. (Photo courtesy of John Lea-Cox, Associate Professor & Extension Specialist, Nursery Research)*

The following project has recently begun:

- Use of modeling to develop decision support tools to help growers and others in the green industry make informed management decisions that attempt to reduce nutrient and sediment loading into the Chesapeake Bay and its tributaries.

The following project has recently been completed:

- Development of the Knowledge Center for Water, Nutrient and Plant Health Management. There are currently 225 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>.

The following projects are still in progress:

- Investigation of the detection and remediation of *Phytophthora* species in nursery irrigation recycling ponds.
- Deployment of ECH<sub>2</sub>O™ sensors for water content, temperature, and salinity monitoring in soilless substrates. This technology will facilitate real-time monitoring of irrigation scheduling over the Internet using rugged sensor nodes that communicate via wireless networks.
- Determination of water, nitrogen, and phosphorus requirements of four native species at the Wye Research & Education Center's container production research facility.
- Installation of various wireless network sensors to improve irrigation scheduling and reduce nutrient leaching. One sensor network is at the Wye Research & Education Center; a second network was installed at Raemelon Farms to investigate precision water and nutrient management for soil-based systems; a third network was installed at Bauers' cut-flower greenhouses in Jarrettsville, MD, to look at monitoring and controlling fertigation events in hydroponic production.



## PLSC 489

PLSC 489, *Principles of Water & Nutrient Management for the Nursery and Greenhouse Industries*, is a course that places emphasis on the scientific principles behind best management practices for the nursery and greenhouse industries. The course was offered in the Spring 2008 semester through the University of Maryland via the Internet and face-to-face classes. A total of 14 participants took the course.

## 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 Maryland Cooperative 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 18 counties and Baltimore City.
- 1,100 active volunteers donated over 65,000 hours of volunteer service to the state of Maryland.
- 35 volunteers completed Master Composter training courses.
- Master Gardeners operated 14 compost demonstration sites and distributed over 400 compost bins around the state.

### Bay-Wise Landscape Management

Bay-Wise training in 2008 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).

- 66 new Master Gardener volunteers were trained in Bay-Wise Landscape Management techniques. To date, 696 Master Gardeners from 20 counties and Baltimore City have been trained in Bay-Wise techniques.
- 28 Bay-Wise Master Gardeners had their personal landscapes certified as Bay-Wise by the Urban Nutrient Management Program, bringing the total to 278.
- To date, 326 private properties were certified as Bay-Wise by Master Gardeners in several Maryland counties.



*Maryland Master Gardener training. (Photo courtesy of Edwin Remsberg, AGNR Photographer)*

## Maryland Urban Nutrient Management Workgroup

Faculty in the College of AGNR play a leadership role in the Maryland Urban Nutrient Management Workgroup, a group that guides policy within state government and through it, the Bay region.

Recent successes include an agreement between Bay partners (Maryland, Virginia, the District of Columbia, Pennsylvania, and the U.S. Environmental Protection Agency) and the do-it-yourself (DIY) fertilizer industry to reduce total phosphorus (P) imported into the Chesapeake Bay watershed from 3 percent to 1.5 percent. This reduction in P content in turf fertilizer has been adopted nationwide by Scotts and Preen®.

As a result, P imported into the watershed for use by homeowners as DIY products was reduced by half. Industry also agreed to include deflector technology on all broadcast fertilizer spreaders. Hence, P and nitrogen (N) loss to streets and sidewalks will be reduced to less than 10 percent of previous levels, nationwide.

Additionally, industry will consider promotions to encourage consumers to trade up to the new technology. This is a benefit of industry-government cooperation.



*Suburban Maryland neighborhood. (Photo courtesy of Ralph Adkins, AGNR)*

## In Closing

In 2008 the College of Agriculture and Natural Resources' Nutrient Management Programs continued to conduct research on nutrient utilization in crops, animals, and landscape plants as well as educate the public on sustainable horticultural practices. These research and education efforts allow the College's Nutrient Management Programs to continue achieving their goal of protecting the health of the Chesapeake Bay and Maryland's tidal and nontidal waterways while maximizing the state's economic potential.



## Photo Credits

### **Cover photos:**

Corn crop, Wye Research & Education Center (Edwin Remsberg, AGNR Photographer)

Beef cattle (Heather Hutchinson, Nutrient Management Specialist)

Bay-Wise demonstration landscape sign (Cindy Heffley, U.S. Fish & Wildlife)

University of Maryland College Park greenhouse facility (John Lea-Cox, Associate Professor & Extension Specialist, Nursery Research)

### **Page 3:**

Lief Eriksen, Nutrient Management Specialist, conducts manure spreader calibration training in Garrett County, MD. (Heather Hutchinson, Nutrient Management Specialist)

### **Page 7:**

Animal collage (Edwin Remsberg, AGNR Photographer)

### **Page 10:**

Bay grasses along the Chesapeake Bay. (USDA, Natural Resources Conservation Service)

### **Back Cover:**

University of Maryland “M” in front of Symons Hall. (Edwin Remsberg, AGNR Photographer)





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