



**Title:** Managing N and P in Manures and Biosolids in Virginia

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**Region:** Mid-Atlantic

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**Theme:** Nutrient and Pesticide Management

**Situation:** Significant amounts of N and P are applied to Virginia farmland in the forms of animal manures and biosolids. It is imperative to be able to characterize the availability of N and P in these residuals to ensure that surface and ground waters are protected when applying them as nutrient sources. State regulatory agencies, educators (e.g., extension agents, NRCS personnel, nutrient management planners), waste generators (e.g., poultry producers, wastewater treatment operators), and manure and biosolids applicators need to understand how waste characteristics, soil type, geographic region, cropping system, and management practices affect the availability and transport of N and P in order to design systems that increase nutrient use and reduce nutrient loss.

**Objectives:** The objectives of this program are: 1) use N mineralization data to develop biosolids organic N availability factors; 2) develop P availability coefficients for biosolids of varying treatment processes; 3) develop a P-Index that will be used to modify application rates of manures and biosolids; 4) develop and implement a program to train poultry producers in Virginia to understand P-based nutrient management planning; 5) provide training in the regulations governing, and the composting, marketing, and use of manure- and biosolids-based compost; 6) conduct research to characterize the relationship between soil P levels and the potential for soluble P losses in surface runoff; and 7) conduct research to evaluate the effects of selected chemical amendments on the solubility of P in poultry litter.

**Methods:** We plan and conduct educational seminars in conjunction with the quarterly Biosolids Use Regulations Advisory Committee (BURAC) meetings to share with regulators, educators, researchers, biosolids generators and applicators, biosolids users, and concerned citizens recent advances in biosolids use research. The topic areas include the effects of land application practices and new tools for assessing the bioavailability of constituents in biosolids on soil and water quality and human, animal, and plant health. The regular attendees represent a wider audience who themselves are sources of the information presented. We conduct workshops each year on composting and compost use as a waste management alternative to direct land application of manures and biosolids.

**Partnerships:** The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DCR-DSWC) serves in nutrient management educational, certification, and quasi-regulatory capacities; the Virginia Department of Health Serves as the primary biosolids use regulatory agency; and the Virginia Department of Environmental Quality serves as the primary regulatory agency for the permitting and monitoring of confined animal feeding operations, for the application of biosolids regulated under the Virginia Pollution Discharge Elimination System, and for the permitting and inspection of composting facilities.

**Research:** Field and laboratory experiments are being conducted to evaluate management strategies for manure applied to soils containing high concentrations of phosphorus. We are using a portable rainfall simulator to evaluate the relationship between soil test phosphorus levels and surface runoff losses of phosphorus from NRCS benchmark soils of Virginia. Goals of this project are to provide a scientific basis for establishing threshold soil P levels and to develop a reliable P indexing tool to assess agricultural fields for their vulnerability to P losses.

**Resources:** Staff (i.e., administrative assistants, technicians) members from the Department of Crop and Soil Environmental Sciences have contributed to the success of the educational programs. State funds directed toward cooperative extension programs have reduced the burden of obtaining all of funding through competitive grants. We also receive funding from the Virginia Tech College of Agriculture and Life Sciences to support our travel to multi-state meetings. Volunteers have contributed their time to assisting with the MACA annual workshop.

**Results:**

**Activities:** Virginia and Mid Atlantic Composting Association annual workshops; Wastewater Treatment Plant Operators annual workshop; Nutrient Management Certification Training Shortcourse; State-Wide Training Program for Virginia's Poultry Producers; Training program (state-wide) for VA-DCR and VA-NRCS field staff. **Participants:** Farmers; Biosolids generators and applicators; Citizen groups; Private Foundations; Local government representatives; State agency regulators and educators; Federal agency educators and service providers.

**Outcomes:** Wastewater treatment operators, animal producers, and waste managers have learned advantages of composting. Local governments have learned about effects of biosolids land application practices on water, soil, and air quality. Biosolids generators and applicators have become aware of the effects of land applying biosolids on environmental and health. The fears of concerned citizens regarding some aspects of biosolids use have been partially allayed. State regulatory agencies have adopted rules to promote the use of composting as a waste management tool. State regulatory agencies have modified regulations to provide lesser risk of water contamination by the land application of manures and biosolids. Biosolids generators have modified their treatment practices to reduce the risk of P impairment of surface water from land-applied biosolids. Biosolids application contractors have adopted practices stricter than the regulations require. Local governments have enacted ordinances that protect the quality of ground and surface waters. Waste managers have increased composting of animal manures and biosolids. The N and P contributions from manure- and biosolids-amended lands to the Chesapeake Bay and its Virginia tributaries has declined. The amount of N applied in biosolids to farmland in excess of crop N needs has steadily declined. An increase in composting of manures and biosolids has reduced landfilling costs while providing a beneficial product.



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