

Composting and Compost Use for Water Quality

**Kathryn Haering, Research Support Specialist; and
Gregory Evanylo, Professor and Extension Specialist,
Dept. of Crop and Soil Environmental Sciences, Virginia Tech, Blacksburg, VA.**

Compost is a biologically stable organic material created by the controlled, aerobic, thermophilic, microbial decomposition of organic materials. Many people associate composting only with backyard compost piles, but large-scale composting of animal manures and litter, biosolids, yard waste, food waste, paper mill sludge, and other organic wastes can transform these potentially polluting materials into value-added products. The finished product is reduced in both volume and mass, and has enhanced friability, which improves handling and can facilitate transport of composted materials out of areas where direct application of manure, biosolids, and other wastes may not be environmentally sound.



Cornell Waste Management Institute

During the composting process, nitrogen availability of the composted material is typically lowered. The availability of P, however, is generally unchanged, which decreases the ratio of plant available N:P in the composted material. This may increase potential P risk to surface water if compost is applied at rates necessary to supply N. Nitrogen management of composted materials is different from that used for soluble N sources (such as fertilizers and some manures) because compost N requires longer time periods to become available for plant uptake.

Waste reduction and nitrogen stabilization are not the only benefits of compost utilization. Compost used as a soil amendment can improve soil structure, reduce compaction, and increase water infiltration, thereby decreasing soil erosion and the runoff of both soluble and particulate materials. Compost increases soil nutrient holding

capacity, reduces the need for commercial fertilizers, and can bind heavy metals and degrade volatile organic compounds and complex organics. These attributes of compost application can help prevent water quality degradation.

In addition to its use as a soil amendment, compost may also be used as a topdressing for turf, roadside, or forest land, or as a mulch or in berms for erosion and stormwater control. The composting process can be used to remediate soils contaminated with organic compounds such as industrial wastes, petroleum products, and explosives.

The following links are for websites which describe the use of composted organic materials for environmentally beneficial purposes. We have included both general links and those which specifically pertain to compost use in EPA Region III. We hope that practitioners, policy makers, regulators, and editors will be able to use the information contained in these links to learn more about large-scale use of compost and to implement the use of compost as a means to reduce potential environmental problems.

Federal Agency Resources

EPA Compost Page <http://www.epa.gov/compost/index.htm>

This page contains a brief description of possible uses of compost for environmental purposes, and links to pages with further information. EPA also has links to publications available on line for innovative and environmentally related uses of compost:

- **Bioremediation and Pollution Prevention**
<http://www.epa.gov/epaoswer/non-hw/compost/bioremed.pdf>
Includes information on use of compost for soil bioremediation, storm water management, and disposal of volatile organic compounds.
- **Erosion Control, Turf Remediation, and Landscaping**
<http://www.epa.gov/epaoswer/non-hw/compost/erosion.pdf>
- **Reforestation, Wetlands Restoration, and Habitat Revitalization**
<http://www.epa.gov/epaoswer/non-hw/compost/reforest.pdf>
- **Composting of Soils Contaminated by Explosives**
<http://www.epa.gov/epaoswer/non-hw/compost/explos.pdf>
- **Disease Control for Plants and Animals**
<http://www.epa.gov/epaoswer/non-hw/compost/disease.pdf>
- **Compost Use on State Highways**
<http://www.epa.gov/epaoswer/non-hw/compost/highway/index.htm>
- **The Effects of Composted Organic Materials on the Growth Factors for Hardwood and Softwood Tree Seedlings**
<http://www.epa.gov/epaoswer/non-hw/compost/trees.pdf>
- **Composting Yard Trimmings and Municipal Solid Waste**
<http://www.epa.gov/epaoswer/non-hw/compost/cytmsw.pdf>

USDA Agricultural Research Service (ARS) <http://www.ars.usda.gov/main/main.htm>

Enter “compost” into keyword search to find relevant research projects.

USDA Natural Resources Conservation Service (NRCS) National Water Management Center Water Quality page
<http://wmc.ar.nrcs.usda.gov/technical/wq.html>

Specific pages on this site include:

- **Composted Manure Used Along Roadways Controls Erosion** (article)
<http://wmc.ar.nrcs.usda.gov/technical/WQ/compostedmanure.html>
- **Use of Compost as an Erosion Control Technique** (list of references pertaining to this topic) <http://wmc.ar.nrcs.usda.gov/technical/WQ/erosiontechnique.html>

USDA Cooperative State Research Education and Extension Service (CSREES)
<http://www.csrees.usda.gov/>

Enter “compost” into search engine to find relevant pages.

USDA CSREES National Water Quality site
<http://www.usawaterquality.org/default.html>

Presentations, abstracts, and descriptions of research projects using compost to improve water quality can be found by entering “compost” into search engine.

State Agencies

Delaware

**Delaware Department of Natural Resources and Environmental Council (DNREC)
Division of Air and Waste Management Solid and Hazardous Waste page**
http://www.dnrec.state.de.us/dnrec2000/divisions/awm/hw/_vti_cnf/sw/programdesc.htm

Maryland

Maryland Department of the Environment (MDE) Solid Waste home page
http://www.mde.state.md.us/Programs/LandPrograms/Solid_Waste/index.asp

Maryland Department of Agriculture (MDA) State Chemist (compost testing and regulation) http://www.mda.state.md.us/sc/plants-pests/state_chemist2.php

Pennsylvania:

Pennsylvania Department of Environmental Protection (DEP) Bureau of Waste Management <http://www.depweb.state.pa.us/landrecwaste/site/default.asp>

Specific pages on this site include:

- Proper use of compost as an erosion and sedimentation control practice
http://www.dep.state.pa.us/dep/deputate/airwaste/wm/RECYCLE/Compost_sum/Use_Mulch.htm
- Technical reports on recycling, including large-scale composting
http://www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/Tech_Rpts/Proj_Sum.htm#anchor2633001
- Information on municipal composting, including a link to guidelines for large-scale yard waste composting
http://www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/Compost_sum/Municipality.htm

Virginia

Virginia Department of Environmental Quality (DEQ) Waste Management page
<http://www.deq.virginia.gov/waste/homepage.html>

West Virginia

West Virginia Department of Environmental Protection Division of Water and Waste Management
<http://www.dep.state.wv.us/item.cfm?ssid=11>

West Virginia Department of Agriculture Regulatory and Environmental Affairs (compost testing and registration)
<http://www.wvagriculture.org/Division%20Web%20Pages/regulatory.html>

University and Extension

Compost research at Delaware Valley College

<http://campus.devalcol.edu/linded/compost.htm>

Description of research project on use of biosolids compost as a soil amendment and topdressing for turfgrass.

Maryland Cooperative Extension Publications

<http://www.agnr.umd.edu/MCE/Publications/>

- **Guidelines for In-house Composting of Catastrophic Poultry Mortalities**
<http://www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=557>

- **Composting Catastrophic Event Poultry Mortalities**
<http://www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=35>
- **Composting of Dead Birds**
<http://www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=145>
- **Guidelines for Application of Digested Sewage Sludge and Composted Sewage Sludge to Agricultural Land**
<http://www.agnr.umd.edu/MCE/Publications/PDFs/FS336.pdf>
- **Using Composted Sewage Sludge in the Production and Maintenance of Ornamental Plants**
<http://www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=192>

Penn State Organic Materials Processing and Education Center (OMPEC)

<http://server.age.psu.edu/extension/ompec/>

Describes Penn State University composting research projects, including use of composted university cafeteria wastes for landscaping.

Virginia Cooperative Extension Waste Management page .

<http://www.ext.vt.edu/cgi-bin/WebObjects/Docs.woa/wa/getcat?cat=ir-nrem-wm> .

Contains links to various articles on compost use, including:

- **Virginia Organics Recycling and Composting Directory**
<http://www.ext.vt.edu/pubs/compost/452-230/452-230.html>
Lists compost suppliers, raw material suppliers, and various informational and educational links
- **Virginia Yard Waste Management Manual**
<http://www.ext.vt.edu/pubs/compost/452-055/452-055.pdf>
Manual for large-scale yard waste composting for both public and private composters. Has chapter on compost end-use, including large-scale applications. Specifications for compost quality and amount of compost needed for particular uses are included
- **Publication on On-Farm Composting**
<http://www.ext.vt.edu/pubs/compost/452-232/452-232.pdf>

West Virginia University's Extension Nutrient/Waste Management Page

<http://www.wvu.edu/~agexten/wastmang/> .

- **On-farm composting information**
<http://www.wvu.edu/~agexten/ageng/resource/orgwast.htm>
- **Program for Handling Yard Waste in West Virginia**
http://www.state.wv.us/swmb/YD_WASTE.PDF
Document prepared by the solid waste management board of the Dept. of commerce, Labor, and Environmental Resources section on compost end-use, including large scale applications.

Organizations and Associations

U.S. Composting Council

<http://www.compostingcouncil.org/index.cfm>

Trade and professional organization that promotes compost use. Located in Holbrook, NY.

Specific articles on this site include:

- **Standard specifications for compost for erosion/sediment control**
http://www.compostingcouncil.org/pdf/Erosion_Specs.pdf
- **Selecting organic amendments for landscapes**
http://www.compostingcouncil.org/pdf/ORGANIC_SOIL_AMENDMENTS.pdf

Mid-Atlantic Composting Council

<http://www.midatlanticcompost.org/>

The Mid-Atlantic Composting Association (MACA) is an association of composters (commercial and backyard), state and federal agency personnel, university researchers, public utilities, and other interested parties.

- **Mid-Atlantic Composting Council Newsletter Archive**
<http://www.midatlanticcompost.org/article.html>

Professional Recyclers of Pennsylvania (PROP) Organics Council

<http://www.pacompost.org/>

PROP is a non-profit association of recycling professionals, and PROP's organics council serves members involved in composting and other organic recycling efforts. The site is the homepage of PROP's organics council, which serves members involved in composting and other organic recycling efforts. Has list of links to various resources, including PROP's organic council meeting minutes, links to regulations and standards specifications, news on organics recycling, Pennsylvania's composting directory, etc.

Journals

Biocycle, Journal of Composting and Organics Recycling

<http://www.jgpress.com/biocycle.htm>

This professional journal focuses on collection of organic materials, composting operations, and related subjects.

Compost Science and Utilization

<http://www.jgpress.com/compostscience/index.html>

This quarterly, peer-reviewed journal focuses on management techniques to improve compost process control and quality and on utilization of composted materials.

A searchable archive of articles

<http://pqasb.pqarchiver.com/jgpress/>

for both Biocycle and Compost Science and Utilization is available.

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2002-51130-01522. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture

Be sure to check out the

Mid-Atlantic Regional Water Program

website for updates and additional information.

<http://www.mawaterquality.org>

Land Grant Universities and USDA's Cooperative State Research, Education and Extension System (CSREES), working with EPA Region 3, have formed a partnership to advance water quality protection and restoration efforts in the Mid-Atlantic by providing water quality science support, training and education.