

HEALTHY SOIL REQUIREMENTS

Rodale Institute, a world-renowned organization, headquartered in Kutztown, PA, focuses on improving soil health for farming and vegetation growth. They say it best, “If we can agree that soil that is healthy is teeming with life, most of it microscopic, then we should be able to agree that we need to feed that life. Composted organic matter or manure is the best food source for these microbes.”¹

Penn State College of Agricultural Sciences defines Soil Health (also called ‘soil quality’) as “the capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental health and promote plant and animal health.” Soil properties that determine soil health include, soil texture, depth of soil, infiltration, bulk density, water-holding capacity, soil organic matter, pH, electrical conductivity, microbial biomass, carbon and nitrogen, and soil respiration.² In addition, soil organic matter content is considered one of the most important indicators of soil health.

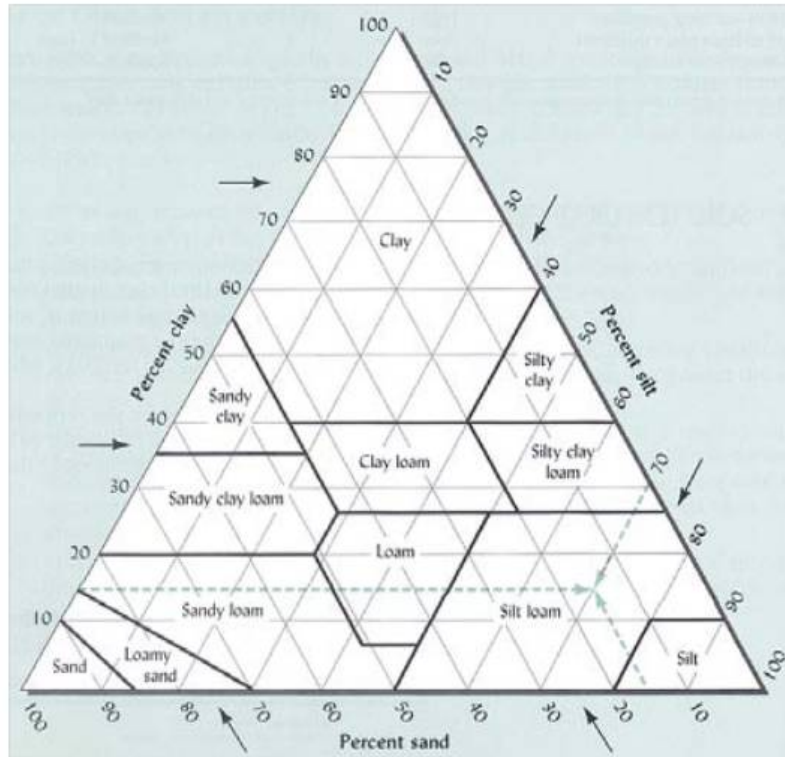
Both the USDA Natural Resources Conservation Service (NRCS)³ and the US Composting Council⁴ expound on the virtues of organic matter for soil health, quality, sustainability and contribution to watershed improvements.

If soil health is key to sustainability then implementation can be engineered into reclamation and restoration projects such as abandoned mine lands or infrastructure right-of-ways such as pipelines and roads. To obtain such a goal requires an understanding of soil characteristics and their relationship to land use, plant growth and environmental quality. Figure 1 summarizes soil characteristics in which the Organic (O) layer represents the top two inches and the surface soil layer (‘A’ horizon) can be up to a foot deep. Based on USDA soil texture (Figure 2), the optimal formulation for the ‘A’ horizon of a healthy soil is silty loam containing 15% clay, 15% sand and 70% silt.



Figure 1 – Soil horizon characteristics.

USDA Soil Texture Triangle



ftp://ftp-fc.sc.egov.usda.gov/NSSC/Educational_Resources/concepts2.pdf

Figure 2 – Soil Texture

Pennsylvania currently has over 150,000 acres of abandoned mine lands that need to be reclaimed⁵. Furthermore, it is home to over 450 of the most modern and progressive compost facilities⁶ that fall under the General Use Permit WMGR025. The Department of Environmental Protection (DEP) discusses the benefits of organic matter in Stormwater Best Management Protocols (BMP) and the Erosion and Sediment BMP documents, however DEP bid specifications do not require organic matter application. A typical bid specification (Figure 3) makes the requirement for soil analysis and application of a commercial fertilizer, limestone and an inoculant. This inoculant is made up of bacteria, which needs organic matter for optimal sustainability. The soil analysis should include the organic matter content and the C:N ratio that can be used to engineer the 'O' and 'A' horizon discussed previously.

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OSM 24(0522)101.1, Abandoned Mine Reclamation Project, Bennett Branch, Jay Township, Elk County. The principal items of work and approximate quantities include mobilization and demobilization; permanent swales with R4 rock check dams 360 linear feet; permanent access road 11,420 linear feet; grading 73.4 acres; seeding 73.4 acres; tree planting 3,300 trees. This bid issues on June 20, 2014, and bids will be opened on July 17, 2014, at 2 p.m. Bid documents cost \$10 per set and will not be mailed until payment has been received. This project is financed by the Federal government under the authority given it by the Surface Mining Control and Reclamation Act of 1977 (act) (30 U.S.C.A. §§ 1201—1308) and is subject to the act and to the Federal grant for this project. Contact the Construction Contracts Section at (717) 787-7820 or joelmiller@state.pa.us for more information on this bid.

Figure 3 – Typical Bid Announcement

The objective for land restoration and reclamation is to obtain sustainability for years if not decades into the future. The top few inches of ground can be ‘engineered’ to facilitate healthy soil if the BMPs are implemented. Simple soil engineering principals incorporated into bid specifications that include the beneficial use of compost on the top two-inch layer can be utilized to improve and sustain soil health in land restoration projects.

About the author – Lisa Van Houten is the Marketing Coordinator Consultant for Full Circle Mushroom Compost, LLC She has a BS degree in chemistry. In this capacity, she works with Community organizations, individuals, farmers, government representatives and the mining/natural gas/oil industry to assess proper use and application of pasteurized mushroom compost. She can be contacted at 610-331-1849 or by email at Lisa@FullCircleMushroomCompost.com.

¹ Rodale Institute 2014 publication *Crossover Technologies for Soil Health*

² *Agronomy Guide 2011-2012*, Penn State College of Agricultural Sciences, Pg 5-9.

³ USDA-NRCS (2014) publication list

<https://nrcspad.sc.egov.usda.gov/DistributionCenter/search.aspx?Keywords=soil%20health> (accessed 10 July 2014)

⁴ Faucette, B. (2014) *The Soil & Water Connection – A watershed Manager’s Guide to Organics*, 2014, US Composting Council

⁵ Phone conversation 7/25/14 with Director Eric Cavazza, PA-DEP Bureau of Abandoned Mine Reclamation (BAMR)

⁶ Phone conversation 7/30/14 with Terry Keene, Chairman Organics Committee for Professional Recyclers of Pennsylvania (PROP) includes facilities that process municipal yard waste (>400), food waste (55), mushroom substrate (10)