

## SCIENTIFIC VERIFICATION: BENEFITS OF COMPOST USE IN LANDSCAPES, FARMING, REMEDIATION & EROSION CONTROL

Below is a partial list of scientifically verified horticultural and environmental benefits of compost use, with citations for published documentation.

### Scientifically Verified Compost Benefits (citations below)

1. Improves soil structure and porosity – for better plant root growth, reduced runoff and erosion
2. Reduces density of clay soils – increasing moisture infiltration, reducing erosion and runoff
3. Improves moisture-holding capacity of sandy soils – reducing water loss and nutrient leaching.
4. Supplies and supports proliferation of beneficial microorganisms in soils and growing media
5. Supplies organic matter and humus – aiding soil aggregation and plant nutrient uptake
6. Improves soils cation-exchange capacity (CEC) – improving nutrient retention
7. Helps plants to more effectively utilize nutrients
8. Buffers soil pH – improves nutrient availability and soil aggregation
9. Binds and degrades specific pollutants

Compost partially derived from food waste contains more nutrients for plant uptake, in essence a higher NPK\*<sup>1</sup> value.

\*1 = Nitrogen, Phosphorous, Potassium

- 1. Improves soil structure and porosity – for better plant root growth, reduced runoff and erosion**
  - Avnimelech, Shkedy, Kochva, and Yotal. The Use of Compost For Reclamation of Saline and Alkaline Soils. Compost Science and Utilization, Summer 1994.
  - Biocycle. 2002. Water savings From Compost Use. Biocycle (October). JG Press, Emmaus PA.
  - Chen, McConnell, Robinson, Caldwell and Huang. 2003. Rooting Foliage Plant Cuttings in Compost-formulated Substrates. Hort. Technology, 13:110-114.
  - Darst and Murphy. 1990. Soil Organic Matter: An Integral Ingredient in Crop Production. Better Crops, 74(1):4-5.
  - Landschoot and McNitt. 1995. Improving Turf with Compost. Green Industry Composting. JG Press, Emmaus PA.
  - Logsdon, G. 1995. Using Compost for Plant Disease Control. Farm Scale Composting. JG Press, Emmaus PA.
  - Ozores-Hampton, Bryan, and McMilan. 1994. Suppressing Disease in Field Crops. Biocycle, Vol. 35 No. 7:60-61.

## **BENEFITS OF COMPOST CONT.**

### **2. Reduces density of clay soils– increasing moisture infiltration, reducing erosion and runoff**

- Avnimelech, Shkedy, Kochva, and Yotal. The Use of Compost For Reclamation of Saline and Alkaline Soils. Compost Science and Utilization, Summer, 1994.
- Darst and Murphy. 1990. Soil Organic Matter: An integral Ingredient in Crop Production. Better Crops 74 (1):4-5.
- Maynard and Hill. 1994. Impact of Compost on Vegetable Yields. Biocycle, 35 (3):66-67.
- Mays, Terman and Duggan. 1973. Municipal Compost: Effects on Crop Yield and Soil Properties. Journal of Environmental Quality 2:89-92.
- McConnell, Shiralipour, and Smith. 1993. Compost Application Improves Soil Properties. Biocycle, 34 (4):61-63.
- Porter. 1999. California Wineries Take Major Steps to Improve Vineyards. Biocycle, 40 (1):59-62.
- USEPA. 1998. An Analysis of Composting as an Environmental Remediation Technology. Solid Waste and Emergency Response (5305W) EPA530-R-98-008.

### **3. Improves moisture-holding capacity of sandy soils – reducing water loss and nutrient leaching.**

- Cisar and Snyder. 1995. Amending Turfgrass Sand Soils to Improve Water Retention and Reduce Agrichemical Leaching. Florida Water Conservation/Compost Utilization Program Final Report.
- Epstein, Taylor and Chaney. 1976. Effects of Sewage Sludge and Sludge Compost Applied to Soil on Some Soil Physical and Chemical Properties. Journal of Environmental Quality, 5:422-426.
- Maynard. 1995. Protecting Groundwater While Recycling Nutrients. Farm Scale Composting. JG Press. Emmaus PA.
- Mays, Terman and Duggan. 1973. Municipal Compost: Effects on Crop Yield and Soil Properties. Journal of Environmental Quality, 2:89-92.
- McConnell, Shiralipour and Smith. 1993. Compost Application Improves Soil Properties. Biocycle, 34 (4):61-63

### **4. Supplies and supports proliferation of beneficial microorganisms in soil and growing media**

- Cole, Zhang and Liu. 1995. Remediation of Pesticides Contaminated Soil by Planting and Compost Addition. Compost Science and Utilization, 34(4):20-30.
- Dick and McCoy. 1993. Enhancing Soil Fertility by Addition of Compost. In: Science and Engineering of Composting. Hoitink and Keener (Ed), 622-644. Renaissance Publications, Worthington, OH.
- Epstein, Taylor and Chaney. 1976. Effects of Sewage Sludge and Sludge Compost Applied to Soil on Some Soil Physical and Chemical Properties. Journal of Environmental Quality, 5:422-426.
- Hoitink and Boehm. 1993. Mechanisms of Suppression of Soilborne Plant Pathogens in Compost-Amended Substrates. Science and Engineering of Composting, Renaissance Publications, Worthington, OH.
- Ozores-Hampton, Bryan, and McMillan. 1994. Suppressing Disease in Field Crops. Biocycle, 35 (7).
- Pera, Vallini, Ines Sireno, Lorella, Bianchin and de Bertoldi. 1983. Effect of Organic Matter on Rhizosphere Microorganisms and Root Development of Sorghum Plants in Two Different Soils. Plant & Soil, 74:3-18.

### **5. Supplies organic matter and humus – aiding soil aggregation and plant nutrient uptake**

- Albrecht. 1938. Loss of Soil Organic Matter and Its Restoration, pp. 347-360. Soils and Men, 1938 Yearbook of Agriculture, US Govt. Printing Office, Washington, DC.
- Avnimelech and Cohen. 1988. On the Use of Organic Manures for Amendment of Compacted Clay Soils: Effects of Aerobic and Anaerobic Conditions. Biological Wastes 26:331-339.
- Darst and Murphy. 1990. Soil Organic Matter: An integral Ingredient in Crop Production. Better Crops 74(1):4-5.
- Maynard. 1995. Protecting Groundwater While Recycling Nutrients. Farm Scale Composting. JG Press, Emmaus PA.
- McConnell, Shiralipour, and Smith. 1993. Compost Application Improves Soil Properties. Biocycle, 34 (4):61-63.
- USEPA. 1998. An Analysis of Composting as an Environmental Remediation Technology. Solid Waste and Emergency Response (5305W) EPA530-R-98-008.

### **6. Improves soil cation-exchange capacity (CEC) – improving nutrient retention**

- Brady, N.C. 1974. The Nature and Properties of Soils, 8th Edition. Cation Exchange Capacity (p.99-104).
- Darst and Murphy. 1990. Soil Organic Matter: An integral Ingredient in Crop Production. Better Crops, 74(1):4-5.
- Epstein, Taylor and Chaney. 1976. Effects of Sewage Sludge and Sludge Compost Applied to Soil on Some Soil

## BENEFITS OF COMPOST CONT.

Physical and Chemical Properties. *Journal of Environmental Quality*, 5:422-426.

- McConnell, Shiralipour and Smith. 1993. Compost Application Improves Soil Properties. *Biocycle*, 34 (4):61-63.
  - Soil & Water Conservation Society. 2000. *Soil Biology Primer* (p.5-8, 15).
- 7. Helps plants to more effectively utilize nutrients**
- Cisar and Snyder. 1995. Amending Turfgrass Sand soils to Improve Water Retention and Reduce Agrichemical Leaching. Florida Water Conservation/Compost Utilization Program - Final Report.
  - Darst and Murphy. 1990. Soil Organic Matter: An integral Ingredient in Crop Production. *Better Crops*, 74(1):4-5.
  - Goldstein. 2002. A Compost-Based Budget for Sustainable Farming. *Biocycle*, 43(8):59-62.
  - Maynard. 1995. Protecting Groundwater While Recycling Nutrients. *Farm Scale Composting*. JG Press, Emmaus, PA.
  - McConnell, Shiralipour and Smith. 1993. Compost Application Improves Soil Properties. *Biocycle*, 34 (4):61-63.
  - National Research Council. 1989. *Alternative Agriculture Research and Science*, (p.141-144). National Academy Press, Washington, D.C.
- 8. Buffers soil pH –improves nutrient availability and soil aggregation**
- Brady. 1974. *The Nature and Properties of Soils*, 8th Edition. Buffer Capacity of Soils (p.385-387).
  - Darst and Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. *Better Crops* 74(1):4-5.
  - Dick and McCoy. 1993. Enhancing Soil Fertility by Addition of Compost. In. *Science and Engineering of Composting*. H. Hoitink and H.M. Keener (Ed), 622-644. Renaissance Publications, Worthington, OH.
  - Maynard and Hill. 1994. Impact of Compost on Vegetable Yields. *Biocycle*, Vol. 35, No. 3:66-67.
  - McConnell, Shiralipour, and Smith. 1993. Compost Application Improves Soil Properties. *Biocycle*, 34 (4):61-63.
- 9. Binds and degrades specific pollutants**
- Cole, Zhang and Liu. 1995. Remediation of Pesticides Contaminated Soil by Planting and Compost Addition. *Compost Science and Utilization*, 34(4):20-30.
  - Ettlin and Stewart. 1993. Yard Debris Compost for Erosion Control. *BioCycle*, 34(12): 46-47.
  - Garlan, Gist and Green. 1995. The Compost Story From Soil Enrichment to Pollution Remediation. *Biocycle*, 36(10):53-6.
  - Maynard 1995. *Protecting Groundwater While Recycling Nutrients*. Farm Scale Composting. JG Press. Emmaus PA.
  - Soil and Water Conservation Society with the Natural Resources Conservation Service. 2000. *Soil Biology Primer*
  - USEPA. 1997. *Innovative Uses of Compost: Bioremediation and Pollution Prevention*. Solid Waste and Emergency Response (5306W). EPA530-F-97-0421.
  - USEPA. 1998. *An Analysis of Composting as an Environmental Remediation Technology*. Solid Waste and Emergency Response (5305W) EPA530-R-98-008.