

## **AAPFCO SOIL AMENDMENT / COMPOST UNIFORM PRODUCT CLAIMS**

Compost and other soil amendments have been studied for hundreds of years by horticulturists, agronomists and agricultural professionals. A variety of verified product benefits (potential labeling claims) have been identified through research over this same period of time. Below is a list of compost benefits that have been verified and should be available for suppliers or manufacturers to use on their product labels. The list is supported by the attached bibliography of scientific publications and text.

**We propose the following as a minimum list of allowable product claims, which may be amended by suppliers or manufacturers with additional verifiable research data. It should also in no way restrict a specific supplier or manufacturer from making additional claims that are specific to a product, if they have research to support such claims.**

### ***Verified Compost Benefits***

1. Improves soil structure and porosity – creating a better plant root environment
2. Increases moisture infiltration and permeability, and reduces bulk density of heavy soils – improving moisture infiltration rates and reducing erosion and runoff
3. Improves the moisture holding capacity of light soils – reducing water loss and nutrient leaching, and improving moisture retention
4. Improves the cation exchange capacity (CEC) of soils
5. Supplies organic matter
6. Aids the proliferation of soil microbes
7. Supplies beneficial microorganisms to soils and growing media
8. Encourages vigorous root growth
9. Allows plants to more effectively utilize nutrients, while reducing nutrient loss by leaching
10. Enables soils to retain nutrients longer
11. Contains humus – assisting in soil aggregation and making nutrients more available for plant uptake
12. Buffers soil pH

Prepared for the US Composting Council by:  
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AAPFCO Industry Liaison and Professional Horticulturist

## **References for AAPFCO** **Soil Amendment / Compost Uniform Product Claims**

It should be noted that several of the following references provide documentation for many of the benefits of compost, but each reference may not have been repeated in all of the appropriate categories. It is also important to recognize that this is just a partial listing, and that hundreds of additional references could be cited to verify compost product claims.

### **1. Improves soil structure and porosity – creating a better plant root environment**

- Avnimelech, Y., D. Shkedy, M. Kochva, and Y. Yotal. The Use of Compost For Reclamation of Saline and Alkaline Soils. Compost Science and Utilization, Summer 1994.
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. Better Crops 74(1):4-5.
- Feustel, I.C. 1938. The nature and use of organic amendments, pp. 462-468. Soil and Men, 1938, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, D.C.
- Landschoot, P. and Andy McNitt. 1995. Improving Turf with Compost. Green Industry Composting. JG Press, Inc. Emmaus PA.
- Ozores-Hampton, M., H. Bryan, and R. McMilan. 1994. Suppressing Disease in Field Crops. Biocycle Vol. 35 No. 7 (p 60-61).

### **2. Increases moisture infiltration and permeability, and reduces bulk density of heavy soils – improving moisture infiltration rates and reducing erosion and runoff**

- Avnimelech, Y., D. Shkedy, M. Kochva, and Y. Yotal. The Use of Compost For Reclamation of Saline and Alkaline Soils. Compost Science and Utilization, Summer 1994.
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. Better Crops 74(1):4-5.
- Landschoot, P. and Andy McNitt. 1995. Improving Turf with Compost. Green Industry Composting. JG Press, Inc. Emmaus PA.
- Maynard, A.A. and D.E. Hill. 1994. Impact of Compost on Vegetable Yields. Biocycle Vol. 35 No. 3 (p.66-67).
- Mays, D.A., G.L. Terman and J.C. Duggan. 1973. Municipal compost: Effects on crop yield and soil properties. Journal of Environmental Quality 2:89-92.
- McConnell, D.B., A. Shiralipour, and W.H. Smith. 1993. Compost application improves soil properties. Biocycle 34 (4): 61-63.
- Porter, C. 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.
- USEPA. 1997. Innovation uses of compost: erosion control, turf remediation and landscaping. Solid Waste and Emergency Response (5306W). EPA530-F-97-043.
- USEPA. 1997. Innovative uses of compost: reforestation, wetland restoration, and habitat revitalization. Solid Waste and Emergency Response (5306W). EPA530-F-97-046.

### **3. Improves the moisture holding capacity of light soils – reducing water loss and nutrient leaching, and improving moisture retention**

- Cisar, J.L. and G.H. Snyder. 1995. Amending Turfgrass Sand soils to Improve Water Retention and Reduce Agricultural Leaching. Florida Water Conservation/Compost Utilization Program Final Report.
- Epstein, E., J.M. Taylor and R.L. 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.

- Feustel, I.C. 1938. The nature and use of organic amendments, pp. 462-468. Soil and Men, 1938, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, D.C.
- Maynard, A.A. 1995. Protecting groundwater while recycling nutrients. In: Farm Scale Composting. JG Press, Inc. Emmaus PA.
- Mays, D.A., G.L. Terman and J.C. Duggan. 1973. Municipal compost: Effects on crop yield and soil properties. Journal of Environmental Quality 2:89-92.
- McConnell, D.B., A. Shiralipour, and W.H. Smith. 1993. Compost application improves soil properties. Biocycle 34 (4): 61-63

#### **4. Improves the cation exchange capacity (CEC) of soils – improving their ability to retain nutrients for plant use**

- Brady, N.C. 1974. The Nature and Properties of Soils, 8<sup>th</sup> Edition. Cation Exchange Capacity (p.99-104).
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. Better Crops 74(1):4-5.
- Epstein, E., J.M. Taylor and R.L. 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.
- McConnell, D.B., A. Shiralipour, and W.H. Smith. 1993. Compost application improves soil properties. Biocycle 34 (4): 61-63.
- Soil and Water Conservation Society (in cooperation with the Natural Resources Conservation Service). 2000. Soil Biology Primer (p.5-8, 15).

#### **5. Supplies organic matter**

- Albrecht, W.A. 1938. Loss of soil organic matter and its restoration, pp. 347-360. Soils and Men, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, DC.
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. Better Crops 74(1):4-5.
- Feustel, I.C. 1938. The nature and use of organic amendments, pp. 462-468. Soil and Men, 1938, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, D.C.
- McConnell, D.B., A. Shiralipour, and W.H. Smith. 1993. Compost application improves soil properties. Biocycle 34 (4): 61-63
- Ozores-Hampton, M., H. Bryan, and R. McMilan. 1994. Suppressing Disease in Field Crops. Biocycle Vol. 35 No. 7 (p 60-61).

#### **6. Aids the proliferation of beneficial microbes**

- Albrecht, W.A. 1938. Loss of soil organic matter and its restoration, pp. 347-360. Soils and Men, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, DC.
- Dick, W.A. and E.L. 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.
- Epstein, E. 1997. The Science of Composting. Technomic Publishing Inc. Lancaster, PA.
- Soil and Water Conservation Society (in cooperation with the Natural Resources Conservation Service). 2000. Soil Biology Primer (p.5-8, 15).
- Hoitink, H.A. and M.J. Boehm. 1993. Mechanisms of Suppression of Soilborne Plant Pathogens in Compost-Amended Substrates. Science and Engineering of Composting, Renaissance Publications, Worthington, OH.
- Pera, A., G. Vallini, M. Ines Sireno, M. Lorella Bianchin and M. 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.

## **7. Supplies beneficial microorganisms to soils and growing media**

- Cole, M.A., L. Zhang and X. Liu. 1995. Remediation of pesticides contaminated soil by planting and compost addition. *Compost Science and Utilization* 34(4):20-30.
- Epstein, E., J.M. Taylor and R.L. 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.
- Epstein, E. 1997. *The Science of Composting*. Technomic Publishing Inc. Lancaster, PA.
- Hoitink, H.A. and M.J. Boehm. 1993. Mechanisms of Suppression of Soilborne Plant Pathogens in Compost-Amended Substrates. *Science and Engineering of Composting*, Renaissance Publications, Worthington, OH.
- Pera, A., G. Vallini, M. Ines Sireno, M. Lorella Bianchin and M. 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.
- Soil and Water Conservation Society (in cooperation with the Natural Resources Conservation Service). 2000. *Soil Biology Primer* (p.5-8, 15).

## **8. Encourages vigorous root growth**

- Avnimelech, Y., D. Shkedy, M. Kochva, and Y. 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, Inc. Emmaus PA.
- Chen, J., D.B. McConnell, C.A. Robinson, R.D. Caldwell, Y. Huang. 2003. Rooting foliage plant cuttings in compost-formulated substrates. *Hort. Technology* 13:110-114.
- Landschoot, P. and Andy McNitt. 1995. Improving Turf with Compost. *Green Industry Composting*. JG Press, Inc. Emmaus PA.
- Logsdon, G. 1995. Using Compost for Plant Disease Control. *Farm Scale Composting*. JG Press, Inc. Emmaus PA.

## **9. Allows plants to more effectively utilize nutrients, while reducing nutrient loss by leaching**

- Cisar, J.L. and G.H. Snyder. 1995. Amending Turfgrass Sand soils to Improve Water Retention and Reduce Agrichemical Leaching. *Florida Water Conservation/Compost Utilization Program Final Report*.
- Goldstein, W.A. 2002. A compost-based budget for sustainable farming. *Biocycle* 43(8): 59-62.
- Maynard, A.A. 1995. Protecting groundwater while recycling nutrients. In: *Farm Scale Composting*. JG Press, Inc. Emmaus PA.
- McConnell, D.B., A. Shiralipour, and W.H. 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.

## **10. Enables soils to retain nutrients longer**

- Cisar, J.L. and G.H. Snyder. 1995. Amending Turfgrass Sand soils to Improve Water Retention and Reduce Agrichemical Leaching. *Florida Water Conservation/Compost Utilization Program Final Report*.
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. *Better Crops* 74(1):4-5.
- Goldstein, W.A. 2002. A compost-based budget for sustainable farming. *Biocycle* 43(8): 59-62.
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- National Research Council. 1989. *Alternative Agriculture (Research and Science, p.141-144)*. National Academy Press, Washington, D.C.

## **11. Contains humus – assisting in soil aggregation and making nutrients more available for plant uptake**

- Avnimelech, Y. and A. 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, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. *Better Crops* 74(1):4-5.
- Feustel, I.C. 1938. The nature and use of organic amendments, pp. 462-468. *Soil and Men*, 1938, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, D.C.
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- McConnell, D.B., A. Shiralipour, and W.H. 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*.

## **12. Buffers soil pH**

- Brady, N.C. 1974. *The Nature and Properties of Soils*, 8<sup>th</sup> Edition. Buffer Capacity of Soils (p.385-387).
- Darst, B.C., and L.S. Murphy. 1990. Soil organic matter: An integral ingredient in crop Production. *Better Crops* 74(1):4-5.
- Dick, W.A. and E.L. 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, A.A. and D.E. Hill. 1994. Impact of Compost on Vegetable Yields. *Biocycle* Vol. 35 No. 3 (p.66-67).
- McConnell, D.B., A. Shiralipour, and W.H. Smith. 1993. Compost application improves soil properties. *Biocycle* 34 (4): 61-63.

## **13. Binds and degrades specific pollutants**

- Cole, M.A., L. Zhang and X. Liu. 1995. Remediation of pesticides contaminated soil by planting and compost addition. *Compost Science and Utilization* 34(4):20-30.
- Ettlin, L. and B. Stewart. 1993. Yard debris compost for erosion control. *BioCycle* 34(12): 46-47.
- Garland, G.A., T.A. Gist and R.E. Green. 1995. The Compost Story; from soil enrichment to pollution remediation. *Biocycle*. 36(10):53-56.
- Maynard, A.A. 1995. Protecting groundwater while recycling nutrients. In. *Farm Scale Composting*. JG Press, Inc. Emmaus PA.
- Soil and Water Conservation Society (in cooperation with the Natural Resources Conservation Service). 2000. *Soil Biology Primer* (p.5-8, 15).
- 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*.

In several instances, and in order to reduce the volume of data for AAPFCO to review, the attached back-up package of compost research/use data is in 'article' form (condensed from the actual research papers). These actual full-length research papers can be supplied if necessary, and upon request.

## Full Bibliography

1	Albrecht, W.A. 1938. Loss of soil organic matter and its restoration, pp. 347-360. Soils and Men, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, DC.
2	Avnimelech, Y. and A. Cohen. 1988. On the use of organic manures for amendment of compacted clay soils: Effects of aerobic and anaerobic conditions. <i>Biological Wastes</i> 26:331-339.
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4	Biocycle. 2002. Water savings From Compost Use. <i>Biocycle</i> (October). . JG Press, Inc. Emmaus PA.
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7	Chen, J., D.B. McConnell, C.A. Robinson, R.D. Caldwell, Y. Huang. 2003. Rooting foliage plant cuttings in compost-formulated substrates. <i>Hort. Technology</i> 13:110-114.
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9	Cole, M.A., L. Zhang and X. Liu. 1995. Remediation of pesticides contaminated soil by planting and compost addition. <i>Compost Science and Utilization</i> 34(4):20-30.
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13	Epstein, E. 1997. <i>The Science of Composting</i> . Technomic Publishing Inc. Lancaster, PA.
14	Ettlin, L. and B. Stewart. 1993. Yard debris compost for erosion control. <i>BioCycle</i> 34(12): 46-47.
15	Feustel, I.C. 1938. The nature and use of organic amendments, pp. 462-468. <i>Soil and Men</i> , 1938, 1938 Yearbook of Agr., US Govt. Printing Office, Washington, D.C.
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17	Goldstein, W.A. 2002. A compost-based budget for sustainable farming. <i>Biocycle</i> 43(8): 59-62.
18	Hoitink, H.A. and M.J. Boehm. 1993. Mechanisms of Suppression of Soilborne Plant Pathogens in Compost-Amended Substrates. <i>Science and Engineering of Composting</i> , Renaissance Publications, Worthington, OH.
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	rhizosphere microorganisms and root development of Sorghum plants in two different soils. <i>Plant &amp; Soil</i> 74:3-18.
28	Porter, C. 1999. California wineries take major steps to improve vineyards. <i>Biocycle</i> 40 (1): 59-62.
29	Soil and Water Conservation Society (in cooperation with the Natural Resources Conservation Service). 2000. <i>Soil Biology Primer</i> (p.5-8, 15).
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31	USEPA. 1997. Innovative uses of compost: bioremediation and pollution prevention. <i>Solid waste and emergency response (5306W)</i> . EPA530-F-97-0421.
32	USEPA. 1997. Innovation uses of compost: erosion control, turf remediation and landscaping. <i>Solid Waste and Emergency Response (5306W)</i> . EPA530-F-97-043.
33	USEPA. 1997. Innovative uses of compost: reforestation, wetland restoration, and habitat revitalization. <i>Solid Waste and Emergency Response (5306W)</i> . EPA530-F-97-046.