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Promoting Quality Compost

To ensure quality compost is used in various market settings, manufacturers of compost materials must educate the end user on product parameters and market uses alike.

By Ron Alexander

THE POPULARITY of compost production has grown exponentially over the past several years, a trend expected to continue. The acceptance of compost products in the landscape has grown similarly because quality compost provides excellent agronomic and horticultural benefits, in turn leading to field successes.

Compost use can be substantiated by the economic benefits it provides. Compost is typically less expensive than other soil amendments, and has the ability to improve soil characteristics to a degree that plant/crop death is reduced, thus decreasing replacement materials.

Several environmental benefits of compost products have also been identified including: reduced soil erosion, improved microbial population and improved cation exchange capacity. Benefits and successes aside, many green industry professionals have not tried compost. Maybe they're not confident in the results compost is said to provide, or maybe they don't know enough about the products or how they should be used.

Confidence in composted products will continue to increase with successful compost usage. This can be accomplished by the producing consistent, quality compost and by providing accurate, thorough product information to potential users.

Because growing conditions and plant needs differ, compost users should be supplied with accurate characterization data pertaining to the compost products they use. This data will enable a landscaper to use

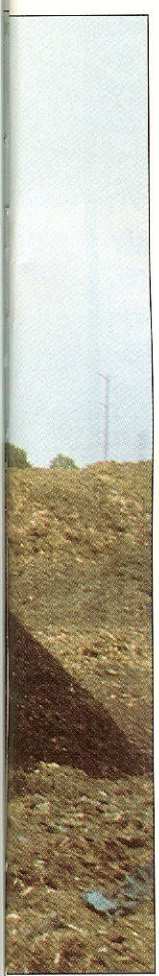
The quality of the end product in composting is an important ingredient for successful establishment in a landscape setting.

compost most suitable to individual growing conditions.

Specific characteristics of a compost product dictates how it can best be used, and in which applications and markets. By providing accurate characterization data, compost users can purchase the appropriate product for a given project or application.

BUILDING CONFIDENCE. To assist in cultivating user confidence and to further address the needs of compost end users, the national Composting Council in Alexandria, Va., and the Florida Department of Agriculture and Consumer Services funded an important project to develop a list of minimum quality compost parameters.

These parameters were designed with the intent of educating both current and potential users of the benefits and proper uses of compost. Because of the immature nature of composting, it's up to the manufacturers of compost to pass needed information on to end users so they become adept at properly using compost in a variety of market settings.



The first part of the project contained parameters representing the basic chemical, physical and biological data needed by compost users to assure successful compost use and overall satisfaction. Basic characterization data gives compost users greater confidence in using compost products because they'll know what is being purchased and have a better understanding of how it should be used.

A list of suggested compost parameters was developed by an expert review team of compost researchers, producers and marketers, as well as the Compost Council's Marketing Committee, to enhance compost use and improve user satisfaction. Quantitative data, with respect to the eight parameters outlined above, are tools which producers and marketers should use to help promote successful compost use and overall satisfaction. (See box above.)

COMPOST PARAMETERS*	RATIONALE FOR INCLUSION:
pH	Necessary for system management; effect on pH adjustment.
Soluble Salt Content	Necessary for system management; potential toxicity; effect on watering regime.
Nutrient Content (NPK minimally)	Necessary for system management; effect on fertilizer requirements.
Water Holding Capacity	Necessary for system management; effect on watering regime.
Bulk Density (lbs./yd.^{3})	Product handling and transportation issue, estimation/conversion of application rates.
Moisture Content	Product handling and transportation issue.
Organic Matter Content	Necessary for system management; relevant in determining application rates. Some use as measure of value.
Particle Size	Necessary for system management; effect on porosity. May determine usability in specific applications.

Additionally, qualitative data with respect to these parameters should be routinely provided to compost users, when appropriate, based on feedstock.

COMPOST PARAMETER*	RATIONALE FOR INCLUSION:
Trace elements/ heavy metals	Necessary for system management; effect on fertilizer requirements. Potential toxicity. Necessary to address and reduce public concern.

During the research and technical review process, both maturity and stability were also suggested as minimum compost parameters. However, unlike other parameters, industry standard test methodologies for these two areas do not currently exist. As testing guidelines are established the information will become part of the parameters.

UNDERSTANDING PARAMETERS. Each of the eight quantitative parameters are discussed in detail below including the rationale for its inclusion, specific testing methodologies and related information.

pH: pH is the numerical measure of the acidity, alkalinity or hydrogen ion activity of the soil. The pH scale ranges from 0 to 14, with a pH of 7 indicating neutrality. Most compost has a pH between 6 and 8.

Specific plant species will flourish when grown within a specific pH range. But, based on typical compost application rates, the addition of compost may affect the pH of a growing media. Consequently, pH is a necessary parameter to be aware of since it can affect maintenance practices.

pH is adjusted through applications of lime (alkaline) and sulfur (acidic). If liming agents are used in the production of a compost, the information should be provided to end users. While lime in the composting process may not dramatically affect the compost's pH, it will have a pronounced affect on calcium availability. Also, it's often difficult to adjust the pH of limed composts because of its higher buffering capacity.

Soluble Salts (salinity): Soluble salt concentration is the accumulation of soluble ions in a solution, and is measured by the ability to carry an electrical current. Many nutrients are supplied to plants in salt form and are not considered problematic in manageable levels, while other specific soluble salts can be more detrimental to plants (e.g. sodium and chlorine salts).

Most plant species have a salinity tolerance rating with predetermined maximum tolerable quantities. Excess soluble salts can cause phytotoxicity to plants, as in the case of fertilizer burn. Soluble salt levels are measured in mmhos/cm or dS/m. Compost may contribute to, or dilute, the cumulative soluble salt content of a growing media or soil. Thorough watering can reduce soluble salt content.

Nutrient Content (NPK): Nitrogen, phosphorous and potassium are the three nutrients used by plants in the greatest quantities, and are the nutrients most often applied through fertilization. These three nutrients are measured and expressed in a dry weight basis in the form of a percentage.

The content of these nutrients should be provided allowing users to make decisions regarding the addition of supplemental nutrition.

Although large quantities of nutrients are not typically found in compost, it is generally applied at higher rates than most fertilizers representing a significant cumulative effect.

COMPOST PARAMETERS	RATIONALE FOR CONSIDERATION:
Maturity	Necessary for system management; effect on seed germination/plant growth.
Stability	Necessary for system management; effect on nutrient availability (nitrogen), odor generation.

** Recommended Test Methodologies for all proposed parameters may be found in the national Composting Council's Recommended Test Methods for the Examination of Compost and Composting, Draft 4.3, Jan. 11, 1994.*

Water Holding Capacity: Water holding capacity is the ability of a given volume of compost to hold water under one atmosphere of pressure. It also measures the potential benefit of reducing the required frequency of irrigation, as well as gross water requirements.

The water holding capacity is important to allow end users to monitor, or estimate, the effect of the compost on crop watering regime and growing media. Water holding capacity is measured as a percent of dry weight.

Bulk Density: Bulk density is the weight per unit volume of compost and is used to convert compost application rates from tonnage to cubic yards. An application rate expressed in cubic yards per acre is extrapolated to express a rate represented as a depth in inches.

Bulk density is also used to determine the volume of compost which may be transported on a given occasion by a specific vehicle. A product's bulk density may also affect other handling issues. It is typically measured in grams per cubic centimeter and converted to pounds per cubic yard.

Debris management is a critical facet of the landscape industry. As outlets for compost grow, so too does compost's popularity.

Moisture Content: Moisture content is the measure of water in a compost product, expressed as a percent of total solids. In compost, it can affect bulk density and issues regarding transportation.

Moisture content is also relevant because it affects product handling and application. Dry compost can resist wetting and be dusty and irritating to work with, while wet compost can become heavy and clumpy, making its application more difficult and delivery more expensive.

Organic Matter Content: Organic matter content is the measure of carbon-based materials in compost, and is typically expressed as a percentage of dry weight. This figure may be needed to determine application rates for soil incorporation and topsoil production.

In these instances, standard agricultural soil test kits are used to determine the recommended application rate of compost. However, these rates determine organic matter quantity on a per acre basis.

Typically, rates are not designated for specific types of organic matter. Therefore, the organic matter content of the compost must be known to convert the application rate to a usable form.

Particle Size: The degree to which compost particle size is measured should be based on the end use of the product or your customer's specific needs. For most applications, merely specifying the product's maximum particle size or the screen size is sufficient. However, for specific applications, such as potting/nursery media component, a full particle size distribution may be required.

A compost's particle size distribution will affect the porosity of the media to which it is added. Particle size distribution measures the amount of compost meeting a specific particle size range by using a series of sieves (screens) to capture compost particles of specific size. Particle size distribution figures are expressed as the percent of material retained per sieve size.

The particle size of a compost

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product may also determine its ability to be used in specific applications. For example, a compost product with a maximum particle size of 1/2 inch or greater may not be acceptable as a turf topdressing, while a product with a maximum particle size of 3/8 inch or less is acceptable.

QUALIFIED PARAMETERS. Qualitative data with respect to the above-mentioned parameters should also be routinely provided to compost users, when appropriate.

Issuing qualitative data only as it pertains to trace elements/heavy metals can avoid the overkill an all-inclusive chemical analysis may create. A quality assurance statement is also offered in its place.

For example, "Our product meets the federal EPA's definition for an exceptional quality product." Or, "Our product is approved for unlimited distribution and therefore can be used on..." Data outlining the content of these specific elements should be made available upon request, and presented in a usable form. This data may be necessary to help specific end users adjust their fertilization programs.

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TRACE ELEMENT/HEAVY METAL CONTENT OF VARIOUS PRODUCTS (ppm or mg/km)

	503 EXCEPTIONAL QUALITY GRADE CONCENTRATION	CENTRUM VITAMINS	UREA*	SUPER PHOSPHATE*	10-10-10 FERTILIZER	PEAT MOSS*
Arsenic	41	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested
Cadmium	39	Not Tested	4.3	101	30	1.0
Chromium	1200	20	6.8	320	200	17.8
Copper	1500	1440	17	5.9	10	19.4
Lead	300	Not Tested	110	5.6	50	16.4
Mercury	17	Not Tested	Not Tested	0.10	Not Tested	0.10
Molybdenum	Not Applicable	20	15	7	Not Tested	2
Nickel	420	4	17	303	150	18.9
Selenium	36	20	Not Tested	Not Tested	Not Tested	Not Tested
Zinc	2800	11,550	2.5	1070	390	80.5

** Analysis pertaining to one specific product, not indicative of all similar products.*

Table 1. **Source: Robert O'Dette, Environmental Waste Recycling Inc.**

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Trace Elements/Heavy Metals: Heavy metals are trace elements whose concentrations are regulated due to the potential for toxicity to humans, animals or plants. Similar to general-use pesticides, the mere presence of these materials does not pose a risk. These elements are contained in just about everything, and only pose a risk if they are found in large quantities.

Keep in mind that the content of specific trace elements/heavy metals content found in many fertilizers is greater than those found in biosolids or municipal solid-waste composts. (See Table 1.)

Regulations governing the heavy metal content of composts derived from specific feedstocks have been mandated at both the state and federal levels. Only products which meet the federal EPA's Part 503 Regulation pollutant limits can obtain general distribution status.

Trace elements — referred to as heavy metals — are arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium and zinc. Many of these elements are actually needed by plants for normal growth. Measuring the concentration of these elements, as well as other plant nutrients, will provide valuable management data relevant to the fertilizer requirements of plants and subsequent fertilizer application rates.

When available in larger quantities, specific heavy metals and trace elements may cause phytotoxic effects in plants; specific plant species are more sensitive than others. These elements are boron, manganese, molybdenum, nickel and selenium. None of which are typically found in compost in detrimental quantities. The quantity of these elements are measured on a dry weight basis and expressed as mg/kg or ppm. As a customer, data on heavy metals should be made available to you upon request.

UNSPECIFIED PARAMETERS. Unspecified parameters are those not classified as quantitative or qualitative because of their inability to be measured by industry standard test methodologies.

Maturity: Maturity is the degree to which a compost product is free of phytotoxic substances which can cause delayed seed generation, plant damage or seed and plant death. Maturity is measured through plant bioassays, such as seed germination, root elongation and plant growth trials. Negative plant effects due to immaturity are caused by a buildup of short-chain volatile fatty acids (i.e. acetic, butyric).

Stability: Stability is the level of biologic activity in a moist, warm and aerated compost product. Unstable compost consumes nitrogen and oxygen in significant quantities to support biologic activity and generate heat, CO_2 and water vapor, but stable compost consumes almost no nitrogen and oxygen and generates almost no CO_2 or heat.

Unstable, active compost requires nitrogen when applied to soil and growing media. Without it nitrogen deficiency can occur which may be detrimental to plant growth. If stored and left unaerated, active compost can become anaerobic and emit foul odors.

Until industry standards are developed, stability and maturity should be measured for process control and qualifying the product's suitability for specific applications. Stability and/or maturity also affect other mainstream horticultural products, such as wood mulches.

Other compost characterization data may be necessary for certain products or specific end uses. For example, porosity and weed seed viability may be important to nurserymen, while flowability, odor presence, ash content or calcium carbonate equivalence may be important to landscapers.

CONCLUSION. This information has been presented to assist end users of compost products to become more educated consumers, as well as to provide important purchasing and use data. As customers, you have the right to know what you're purchasing. ▪

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