COMPOST STANDARDS FOR Horticultural Industries

Composting is looked upon by many as an effective means of stabilizing sludge and garbage. But it is also a manufacturing process—an efficient means for converting organic waste materials into a marketable product called compost. To the horticultural industries, compost is as old as the “Garden of Eden” and as new as “tomorrow.” However, technological advances in the science of composting have accelerated the process and increased the availability of the material. But if compost is to be used by the horticultural industries, it must be of uniform quality, have minimal odor, maintain consistency from day to day and be readily available.

Producing quality compost for most of the horticultural industries requires establishing standards, close supervision and quality control from beginning to end. It requires maximizing biological systems to degrade cellulose, fats, oils and proteins to minerals, carbon dioxide and water within a mass of lignins that resist decomposition. Every effort should be made to avoid using liming or acidifying agents on organic materials prior to composting to insure process efficiency and a product that will have wide horticultural applications.

Non-spec or unacceptable compost is almost as costly to produce as quality compost, but there is little market for it, while the horticultural market for quality compost has yet to be saturated. The use of non-spec compost is generally limited to reclaiming disturbed soils, capping landfills, improving crop land for non-food crops, and dumping in landfills. These are disposal outlets and not income-producing markets.

Horticultural outlets that can provide a ready market for quality compost include: nurseries, landscape contractors, greenhouse growers, and urban gardeners. At the present time these markets utilize mostly peat moss, pine bark, composted hardwood bark and spent mushroom soil. These materials are used to improve soils and in blending potting media. In most instances, all or nearly all of these organic materials are imported from surrounding states and/or from other countries. The shipping costs for some of these products often exceed the cost of the material. Some of these materials are frequently in short supply due to weather conditions or building trends, and most cost in excess of $12 per cubic yard F.O.B.

Because the plants produced by the nursery and greenhouse industries and utilized by landscape contractors and home gardeners are high-value crops, it is important that the organic amendments be of the highest quality possible. If the intent of composting is to manufacture compost for horticultural use, it is necessary to design, construct and manage composting facilities to insure quality. This means providing adequate space, time and technology to assure proper composting and storage—and to make each load of compost of the highest quality.

Marketing an odorous, improperly-composted product can result in complaints, total rejection and bad publicity. It only takes one bad experience by a well-respected grower, landscape contractor or popular home gardener to ruin the reputation of an otherwise good product. Bad news spreads like wildfire and composting facilities can ill afford to acquire a bad reputation.

Every facility should be over-designed to assure optimum composting conditions, and storage space should be sufficiently large to allow room for stockpiling compost during periods of slack sales. It is a well-recognized fact that sales are highly seasonal; therefore, adequate storage space and proper storage is

Uniform quality, minimal odor, steady consistency and availability will help to build markets for composts.

Francis R. Gouin
of utmost importance. The compost should either be stored under cover or outdoors in low windrows not to exceed 6 feet in height. The compost should never be allowed to go anaerobic during curing and storage (piles that are too high would require aeration). Experience has clearly demonstrated that many sludge-composting facilities are too small, which results in overloaded systems, improper storage and an end product that cannot be marketed.

To compensate for insufficient capacity, the ratio of sludge and/or soggy organic matter to bulking agent is increased, and fine-textured bulking agents are used in place of coarse-textured materials. This results in inadequate air flow through the bio-mass when air is either drawn or blown through the system. To hasten the composting process, some systems use continuous aeration and frequent stirring. The problems with these systems are excessive drying and rapid cooling of the bio-mass, resulting in a product that is not thoroughly composted.

To compensate for insufficient curing and storage space, compost is "PHD" (piled higher and deeper). Since composting continues during curing and storage, but at a reduced rate, the results from piling compost too deep are strong odors and sometimes the production of alcohol. Neither is acceptable and both contribute to a bad reputation for compost.

If a compost is going to be used to grow a variety of plants, it must be ready to use and its pH must be adjustable.

**ESTABLISHING STANDARDS**

It is impossible to establish uniform horticultural standards for all composted products, because composts are made from numerous raw materials and come from different sources. However, since compost is made from organic products and byproducts, e.g., discarded plants, plant parts, and animal and human wastes, it should be comparatively uniform, providing that additives such as metals and salts are within approved limits. The factors which influence the quality of compost most are: improper use of hydrated lime or alum, materials high in cellulose and low in lignins, improper composting and/or storage, and compost particle size. If the compost is going to be used to grow a wide variety of plants, it must be ready to use and its pH must be adjustable. The following is a sampling of specifications. These

---

**New From... ALL SEASONS RECYCLING**

**FEATURES:**
- Gooseneck or Straight hitch
- Low 38 1/2" loading height
- Bin Size optional
- # of bins optional
- Rust Resistant Finish
- Electric brakes
- 2-6000 lb. Axles
- Safety lights
- Rear Deck Step

**The ASR 25 Side Dump Recycler**

Designed for sensible curbside recycling and unloading. Rear dump models also available. Number of bins and loading capacities tailored to your specifications. Call, write, visit or FAX for more information:

**ALL SEASONS RECYCLING**
62 North Third St. P.O. Box 350
Stroudsburg, PA  18360
717-424-1818  FAX 717-424-6470
are based on composted sludge and wood chips.

Container Nurseries, Landscape Contractors and Greenhouses: These end users require a premium compost with minimal odor; pH between 6.0 and 7.0, particle sizes no greater than \(\frac{1}{2}\)" diameter and no liming materials. Because these users grow plants with different pH requirements, they must have the flexibility of raising or lowering the pH with limestone or sulfur as desired. Even the natural acidity in peat moss should be sufficient to lower the pH of recommended amounts of compost to a desired level, in a potting medium. The amount of compost used will vary with the quality and quantity of compost used and other amendments in the blend, and the crop to be grown. To insure accuracy, laboratory testing should not be conducted until approximately two to three weeks after blending. Preliminary media testing is highly recommended to avoid delays in potting.

The compost should have a moisture concentration less than 50%, blend easily and be free of hard chunks. When quality compost is blended 20% to 33% by volume in container media, it should be able to supply the nitrogen needs of plants for the first one to two weeks of growth. The compost should also provide all of the minor nutrient needs of the plants through the first growing season. Like good wines and cheeses, compost improves with age. Compost that has been aged for three to four months after the initial composting period has a higher concentration of nitrate nitrogen and a lower concentration of ammonium nitrogen, a ratio which is preferred by most plants. In most instances, this additional curing period can be provided by the user with some advance planning.

Home Gardeners: This group also requires a premium compost similar to that of nurseries, landscape contractors and greenhouses; however, many states require composted sewage sludges that are retailed to be limed to a pH near 7.0 and clearly labeled. In this

MAXIMIZING COMPOST QUALITY

IF YOU ask operators of a composting facility what their definition of quality is, they will probably say the compost has met the time/temperature requirements and it is brown," says Frank Gouin. "If you ask growers the same question, they will say quality means a material that has been properly composted and is ready to use. If facility operators are looking at a higher end use industry, then they need to go beyond the minimum requirements that a state may have for composts."

Gouin, a professor of horticulture at the University of Maryland who has been working with sludge composts for over 15 years, discusses the issue of compost standards in the accompanying article. Two issues related to quality that he feels facility operators must understand are producing a consistent product, and the serious nature of changing the consistency of a compost that already has a track record with end users.

1. Facility Startup and Market Development: For the first two to three months of a facility's operation, the compost is not consistent, says Gouin. After six months, it starts to become consistent. "The compost produced by a facility going through startup should never go to a high end market," he says. "It should go to other uses, such as land reclamation. Otherwise, you run the risk of giving a grower a bad batch of compost, which will give the material a bad reputation."

2. Changing Product Consistency: Do not make sudden changes in any part of the treatment plant or composting process and expect the end product to be the same, says Gouin. For example, switching from polymer to lime for dewatering will affect the end product to which users have become accustomed. He describes a situation where an in-vessel facility he was working with switched from using wood chips to sawdust. "I saw an immediate change at my end," says Gouin. "Everything was working well, and then my results changed. We traced it back and found that the facility had increased its use of sawdust and we ended up with a material that had a high C:N ratio, which leads to nitrogen starvation in the plants. Wood chips, on the other hand, are screened out, which results in a lower C:N ratio."

When growers use a compost made with wood chips, he recommends that they wait for two weeks to add fertilizer. But if the compost has a high sawdust content, then the growers should fertilize earlier because the plants will start to die if they don't have added nitrogen. If the growers aren't aware of the change, and they add nitrogen after two weeks, they will end up burning the plants with excess nitrogen, because by that point the C:N ratio will have reversed itself, and the nitrogen from the compost will be available. The net effect, says Gouin, is overfertilization.

—Nora Goldstein
The horticultural industries stand ready to utilize compost—but only if the quality is “up to snuff.”

instance, the lime should be added after composting and not before. This allows for two types of compost to be manufactured from the same facility. The compost should have minimal odor, particle sizes no larger than \( \frac{1}{2} \) inch diameter and should have a moisture concentration less than 40%, especially if it is going to be bagged. Alcohol has been known to accumulate in excessively wet bagged compost stored at the bottom of pallet stacks.

Field Grown Nursery Plants and Sod: A lower grade of compost can be used for these applications. In the harvesting of trees and shrubs, approximately 250 tons of topsoil are removed per acre with each crop. A lesser amount of topsoil is removed with each crop of sod. A lower grade of compost can be utilized because these crops are grown in more isolated areas, outdoors, and workers have limited contact with the compost. In addition, these crops are grown in soil, which has the ability to buffer variations commonly found in non-spec compost. Even compost that is not cured can be used for field-grown nursery plants and sod. However, because of the diversity of crops grown, the preferred compost should have a pH between 6.0 and 7.0 and the particles should be less than one-inch diameter. Although unscreened compost can be used for this purpose, it will compete with plant roots for soil nitrogen. To avoid any potential problem with contamination of ground water, compost levels should not exceed 50 dry tons per acre and soil testing is highly recommended.

Land Reclamation and Landfill Caps: Non-spec compost can generally be utilized for these applications. However, these are disposal outlets and not market outlets, and are generally one-time application uses and not repeat customers.

There is a market for quality compost, but few outlets for non-spec compost. Substituting non-spec compost for quality compost can only aggravate marketing problems by creating unwanted bad publicity from bad experiences. If composting of organic waste and sludge is going to have an environmental impact it must be done properly. Good composting can make a major contribution to recycling. The horticultural industries stand ready to utilize compost—but only if the quality is “up to snuff.”

Francis Gouin is a professor of horticulture at the University of Maryland.

REFERENCES


