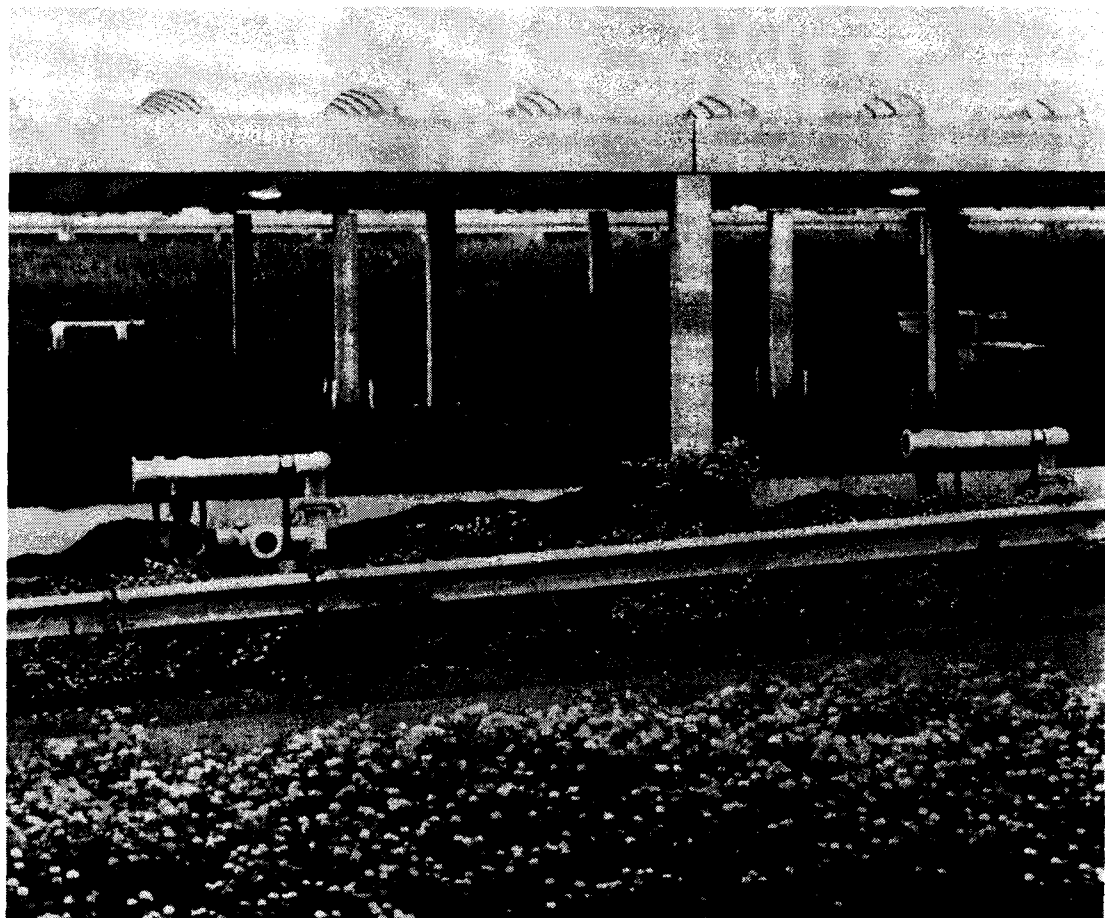


TAPPING THE POTENTIAL

EXPANDING COMPOST MARKETS

Experience shows there are strong markets for quality compost products. But consistency, reliability, and education are critical to success.

Ron Alexander



OVER THE past 10 years, composting sewage sludge has become tremendously popular. Its success laid the groundwork for production of municipal solid waste (MSW) compost, as well as compost from other organic materials. But making compost is only the first step. Ultimate success rests on our ability to utilize the products. Great progress has been made in developing markets for composts. Public acceptance is strong in many areas, and it's been proven that sewage sludge-based composts have

value, and should be considered a marketable commodity. Now, it is critical that composting programs strive for the same goal: To produce a high quality, consistent product which can be utilized in as many markets and geographical areas as possible.

PRODUCT QUALITY

Quality control and product consistency are at the heart of market development for composts. There is no long term market viability for a product that does not produce consistent results for its user. The smallest change in production procedures can affect

the quality of the compost product. Plant operators need to do what is necessary to become confident that the product is in a marketable condition. In this business, public opinion can make or break a program. Don't give anyone a chance to call the compost garbage.

From a marketer's perspective, there are four steps to producing a high quality, consistent product: 1) Prepare specifications; 2) Create production/storage procedures; 3) Consistently test; and 4) Build an educated, caring team.

Product specifications are important because the facility's staff not only needs to know what they are trying to produce, but also because customers will demand to know what they are buying. Table 1 lists the compost specifications used by our marketing firm. When creating a set of specifications, contact all appropriate state agencies to find out what they consider marketable compost. All states have their own set of regulations and specifications, which should be used as a guideline when preparing your own. Also try to meet the specifications of bordering states whenever possible. This leaves marketing options open.

Some of the major issues outlined in our company's 'specs' are related to concerns over public and environmental safety (e.g. heavy metal and pathogen limits). Other points relate more to agronomic/horticultural usage issues (e.g. pH range, screen size, C/N ratio), while some have more to do with product handling and image. Other issues listed in Table 1 are:

Odor: Almost all products have a recognizable smell, and properly produced compost is no exception. If compost has a putrid or sulfurous odor, however, a red flag should go up. These odors could be a result of improper composting or poor storage conditions.

Screening: Screen size depends on the type

of compost being screened and the targeted markets. For instance, golf courses regularly top dress large turf areas with various types of products to improve growth. If there are a large number of golf courses in your geographical area, you may decide to purchase a 1/4 inch screen to accommodate that market with a fine grade of compost. In general, we have found that most sewage sludge based composts are marketable when screened through a 3/8 inch screen (or equivalent), while MSW composts need to be screened through a 1/4 inch screen.

Curing: Proper curing (stabilization) is essential to the production of a high quality product. The curing period should not be less than 30 days with forced aeration or constant turning, nor less than 60 to 90 days in static piles. When curing unscreened compost in static piles, pile height should not exceed 10 feet. Screened compost piles should be no higher than 6 feet.

Phytotoxicity/Plant Growth: During composting and curing, situations may arise which reduce compost quality. For example, a build up of phytotoxic chemicals may occur which could be toxic to germinating seeds, or stunt the growth of established plants.

A product that achieves PFRP (process to further reduce pathogens) or meets state heavy metal requirements is not necessarily a high quality compost. In addition, avoid marketing compost which is 'borderline' when compared to your product specifications. It should be recycled as bulking agent or sold as off-spec compost.

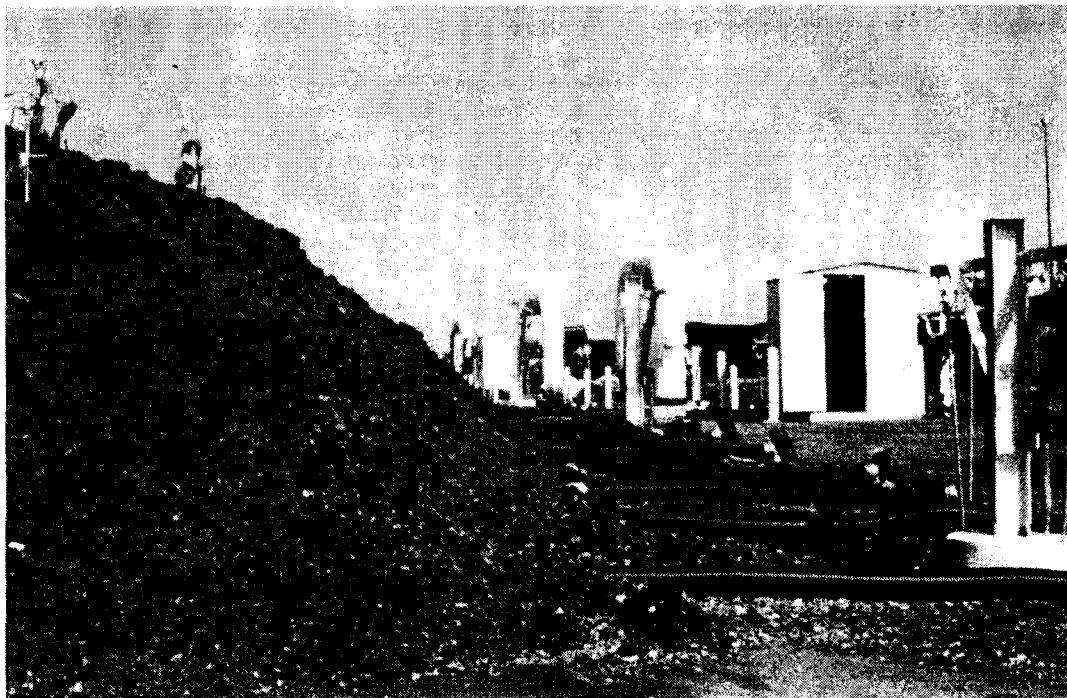
Proper storage of compost is often overlooked by facility designers and operators. Storage areas should have an all weather surface, proper drainage, be free of trash and debris, and be adequately sized.

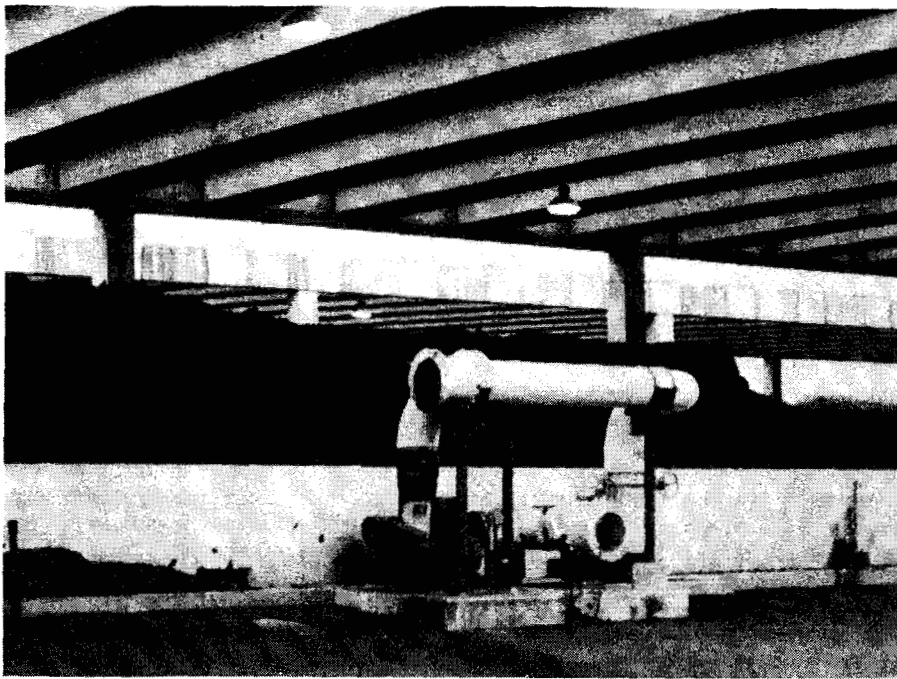
In some plants, it is common to see a pool of brown water laying between two piles of 'once' perfectly good compost. The product



Proper curing is essential to the production of a high quality compost.

Continuous recording of temperature data helps to ensure compost meets pathogen destruction requirements and remains an "on-spec" material.





Curing shed with forced aeration. A minimum of 30 days is recommended for curing when aeration is used.

soaks up the water like a sponge and becomes odorous and difficult to handle. If it gets too wet, anaerobic conditions could occur. At other plants, the pads are so small that compost is piled 20 to 25 feet high, which can result in spontaneous combustion. A rule of thumb is that the storage area should be large enough to accommodate at least 25 percent of the plant's yearly production capacity plus a large supply of bulking agent. If the site doesn't have adequate storage capacity, consider obtaining a secured storage area off site for finished compost.

HOUSEKEEPING TIPS

Good data collection, regular testing, and employee training and education will all help to produce a good quality compost. Data collection procedures should be designed with representatives from appropriate state agencies. We are familiar with a sludge composting facility that had over 35,000 cubic yards of sludge compost ready to be marketed. A representative from the state came by and asked to review temperature data to ensure that the compost met the requirements for pathogen destruction. While reviewing the data, he saw that no records were collected over the weekends — even though proper temperatures were achieved Monday through Friday. The absence of proof during the weekends meant the facility had to find a home for 35,000 cubic yards of off-spec compost.

It is important to test the finished product as often as financially possible. Monitor both chemical characteristics (e.g. heavy metal content, pH) as well as physical properties (e.g. bulk density, water holding capacity). Phytotoxic conditions to seeds and plants also have become important to monitor on an ongoing basis (and especially just prior to actual distribution to avoid plant kills). The ability to record test data on a computerized spreadsheet can facilitate reporting require-

ments and provide a basis for comparing information collected over a long period of time. This can indicate subtle changes in compost quality/properties (e.g. increase or decrease of cadmium).

Finally, one of the most important and least recognized elements in the production of a consistently high quality product is the work force. Employees should recognize the role they play in the composting operation. Show them why short cuts can't be taken and what the product can do when produced correctly. (Giving them product to try at home may be one of the easiest ways of accomplishing this). Regardless of how it is done, be certain employees understand that they have a great influence on the quality of the finished product.

COCOMPOSTING OPTION

The two most popular bulking agents used in the production of sewage sludge compost are wood chips and sawdust. A third option is municipal solid waste (MSW), which could be mixed or source separated, e.g. only food

Table 1. Sewage Sludge Compost Specifications

- 1) Meets federal and state heavy metal limits
- 2) Meets federal and state pathogen content limits
- 3) Moisture content between 35% and 50%
- 4) Organic matter content of 50% or more
- 5) pH of between 6 and 8
- 6) Carbon/nitrogen ratio must not exceed 30:1
- 7) Weight of 1000 lbs./cubic yard, or less
- 8) Adequate curing (from between 30 and 90 days, depending on methodology)
- 9) Free of objectionable odors
- 10) Free of objectionable foreign matter
- 11) Not phytotoxic to seed and promotes positive plant growth
- 12) Screen through 1/4 to 3/8 inch screen*
- 13) Enhances soil fertility

**Unless sawdust (or other material smaller than 3/8") is used as the bulking agent.*

Table 2. Chemical and Physical Characteristics Comparison

| | Municipal Solid Waste Compost | Sewage Sludge Compost |
|--|-------------------------------|------------------------|
| pH | 6.5 - 7.5 | 6.2 - 6.9 |
| Bulk Density | 25 lbs/ft ³ | 37 lbs/ft ³ |
| Organic Matter | 50% (minimum) | 69% (average) |
| Water Holding Capacity (dry wt. basis) | 100% (minimum) | 50% (average) |
| Moisture | 35 - 45% | 35 - 55% |
| Particle Size | Less than 1/4" | Less than 3/8" |
| Total Nitrogen | 1.4 % | 2.5% |
| Phosphorous (P ₂ O ₅) | 1.56% | 1.5% |
| Potassium (K ₂ O) | .3 % | .3% |

*MSW Source: Delaware Solid Waste Authority, New Castle, DE
Sewage Sludge Source: Philadelphia Water Dept., Phila., PA
Information collected from technical and promotional data.*

wastes, leaves, paper, etc. While there are many similarities between composts made with or without MSW, there also are striking differences that will influence production procedures and marketing efforts.

When using MSW as a bulking agent, it may be beneficial to lengthen both the composting and curing processes. The various types of organic wastes break down at different rates (e.g. food wastes vs. paper) making overkill in these processes a prudent practice.

We have found that no screen or separating unit will remove all of the inorganics in the MSW. It is common to see small pieces of plastic throughout the compost pile (which reminds customers from whence this material came). In addition, the variation in particle size, shape and bulk density of the MSW makes it more difficult to produce a uniform product. And visual uniformity is very important to customers.

To minimize this potential problem, some speed and production output (quantity) will have to be sacrificed. A finer screen size (1/4") will produce a uniform product which contains a minimal amount of inert material.

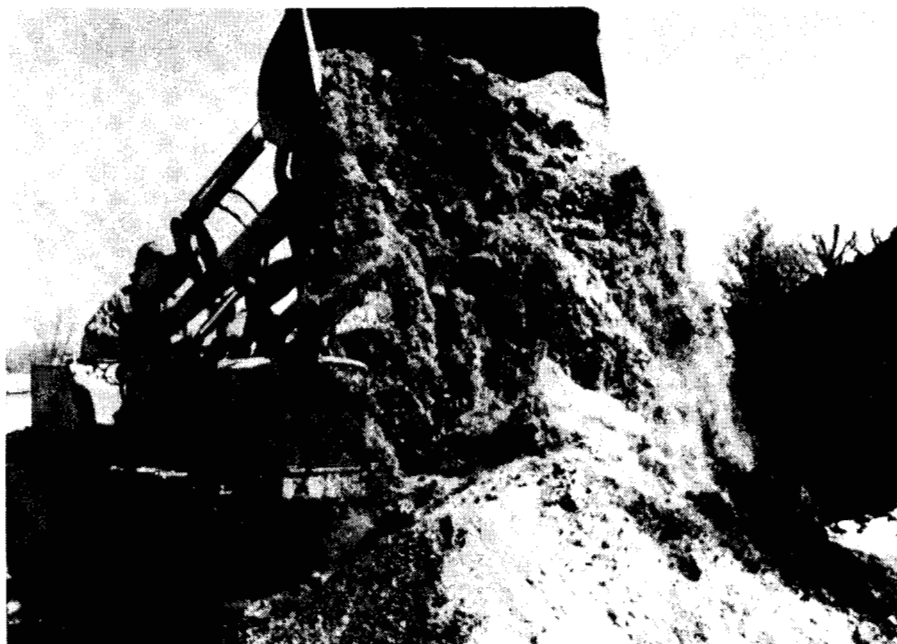
The two greatest differences between MSW and sewage sludge composts are bulk density and water holding capacity (Table 2). Sewage sludge compost has a greater bulk density than MSW compost. A rule of thumb is that two cubic yards of sewage sludge compost weigh approximately one ton, whereas there are three cubic yards of MSW compost per ton. MSW compost, due to its paper content, has a greater water holding capacity than sludge compost. It will generally hold 100 percent of its dry weight in water, while sewage sludge compost will only hold 50 percent of its dry weight.

MARKET DEVELOPMENT

Marketable compost falls into two basic categories: 1) General distribution compost that can be used by all market groups; and 2) Limited distribution compost that only can be utilized by certain markets. Usually, heavy metal levels determine whether a product is considered general or limited distribution, however many states now require that sewage sludge compost contain 10 percent lime, by weight, to be considered for general distribution.

'On-spec' product is compost that meets state specifications for product usage and resale. Both general and limited distribution compost can be on-spec in the state's eyes. 'Off-spec' compost can only be marketed for specific uses (as determined by each state), or cannot be marketed at all. Have potential outlets available to dispose of off-spec compost quickly, thus avoiding storage related problems. Sites where off-spec compost is used may require special permitting.

Market development should be underway in the early phases of a composting project. The task is somewhat more difficult and time consuming if no other sewage sludge based composts have ever been marketed in the geographical area. Another decision in-



Finished compost is mixed with sand and topsoil for use on athletic fields.

volves whether the marketing program should be administered inhouse or contracted out to a private firm. Companies, which market composts from a number of different facilities incur all of the sales related costs and pay an agreed upon price per ton for the compost. Working under long term contracts creates a long term stream of revenue.

Over the years, we have found four basic objections to using sewage sludge based composts — odor, fear of pathogens, fear of

Table 3. Soil Modification with Composted Municipal Waste

| <i>Chemical and Physical Parameters</i> | <i>Field Soil (loamy sand)</i> | <i>Field Soil and Sewage Sludge Compost* (1:1 V/V)</i> | <i>Field Soil and MSW Compost** (1:1 V/V)</i> |
|---|--------------------------------|--|---|
| Organic Matter (%) | 1.5 | 9.3 | 5.3 |
| Estimated N Release (lbs/A) | 71 | 140 | 140 |
| Phosphorus (PPM) | 106 | 156 | 135 |
| Potassium (PPM) | 101 | 357 | 270 |
| Magnesium (PPM) | 111 | 200 | 156 |
| Calcium (PPM) | 560 | 2770 | 630 |
| pH | 6.6 | 7.3 | 7.1 |
| Cation Exchange Capacity (MEQ/100G) | 4.2 | 16.4 | 5.1 |
| % Base Saturation Potassium | 6.1 | 5.6 | 13.5 |
| % Base Saturation Magnesium | 21.8 | 10.1 | 25.3 |
| % Base Saturation Calcium | 66.1 | 84.3 | 61.3 |
| Sulfur (PPM) | 11.0 | 486 | 500 |
| Zinc (PPM) | 4.2 | 136 | 61 |
| Manganese (PPM) | 16 | 99 | 49 |
| Iron (PPM) | 51 | 820 | 302 |
| Copper (PPM) | 0.9 | 11.9 | 9.9 |
| Boron (PPM) | 0.3 | 0.3 | 2.5 |
| Bulk Density G/CM ³ | 1.41 | 1.14 | 0.84 |
| % Moisture at Field Capacity | 17.7 | 28.9 | 33.4 |
| Water Percolation Inches/Hr | 2.5 | 10.0 | 3.75 |

*Woodchips as bulking agent, screened at 3/8"

**Screened at 1/4"

Source: A&L Agr. Labs, Inc. via W.H. Mitchell, PhD.

heavy metals and a negative attitude toward the product's composition (human manure/trash). Working closely with potential end users, educating them about the product's benefits and how it should be used, will help to overcome these concerns. It is useful to be affiliated with a technical expert, e.g. someone from a local university, who can help to provide information and data on compost use.

MARKETS AND END USES

Land Reclamation: Sites such as landfills and abandoned mines can be excellent disposal options for large quantities of compost. These end users will not pay much for product acquisition, which makes this an ideal outlet for off-spec product. Since these sites are out of the public eye, there will not be as much concern about the texture or product odor; instead, a product is needed that will just help grow grass. MSW compost is ideal for these sites because of its high water holding capacity.

Mixers/Resellers: Companies which have built markets around selling bulk products or producing bulk and bagged mixes can be an excellent market for compost products. These individuals can consume large quantities on an ongoing basis. If they are simply reselling your product (unmixed) on a smaller scale, then they will only purchase top quality compost. To them, physical characteristics are just as important as chemical make up. Companies using the compost as a component in bulk mixes, or to upgrade poor topsoil, place less importance on physical appearance. They are utilizing the material for its innate qualities. Limed and unlimed sewage sludge compost, as well as MSW compost, are ideal for blending into mixes.

Public Agencies: Local, state and federal agencies have the potential to utilize large quantities of compost. But because they are scrutinized and funded by the general public, only top quality product should be utilized on their projects (the exception being land reclamation sites and possibly large highway projects). To initiate the usage of compost on a highway project, start by getting it approved by the department of transportation. The product must be tested and meet their specifications. The use of sewage sludge and MSW composts on turf and wildflower establishment projects is highly likely, especially if demonstration plots are first established for the appropriate individuals to monitor. The lack of proper maintenance on

these sites will highlight the composts water holding capacity and nutrient content.

Both schools and parks also can utilize large amounts of compost on a regular basis for such purposes as landscaping and to construct and maintain athletic fields. Limed and unlimed sewage sludge compost, which is finely screened, is being used for this application.

Growers: Greenhouse and nursery (container) growers have specific uses for composts. The products distributed to them must be of the highest quality and almost always unlimed. The high value of their crops makes this market very cautious and slow to change. To improve the consistency of compost earmarked for growers, cure in smaller piles and for a longer period of time to allow the compost to further stabilize and soluble salts to leach out.

Field growers and sod producers could utilize large volumes of compost and be another avenue for the disposal of off-spec compost. Neither of these end users typically use soil amendments because of their cost, even though they would be beneficial. Limed and unlimed sewage sludge compost, as well as MSW compost, can be utilized by these individuals.

Landscapers/Turf: Both landscape and general contractors have proven to be excellent outlets for all types of on-spec compost. Their uses range from soil incorporation to the production of outdoor growing mixes. These markets will consistently purchase large quantities of compost due to the product's versatility, however both are affected by economic cycles in the construction and housing industry.

Huge quantities of compost are being utilized by landscapers and golf courses for the maintenance, renovation and establishment of turf. These projects have become the largest end use for sewage sludge based composts and will probably remain so. All types of compost can be utilized in turf establishment and maintenance projects. R.A.

age. (Regardless of what market group uses the product, it is very important to obtain customers who are well known in their segment of the industry. This strategy adds credibility and makes product sales in that segment easier.)

The greater the quantity of product produced, the more time and money must be allocated to an educational program. A smaller compost facility, one producing 1,000 to 5,000 cubic yards, may only need to create a program which addresses local landscape professionals and homeowners. A larger facility, on the other hand, one producing 30,000 to 50,000 cubic yards, will need to create a program that addresses homeowners, landscape professionals within 50 miles of the plant, agricultural extension agents, landscape architects, etc. The program could include product giveaways, plant tours, advertisements, and informational mailings and slide presentations.

As was mentioned earlier, having a quality, consistent product is an absolute necessity. It may be necessary to prove that the product's quality is comparable, if not superior, to the competition, which includes other sewage sludge based composts as well as more common products such as topsoil and peat humus. The product's image must be built around its quality. That includes working with customers when problems occur — and tracking the problem back through the production process and rectifying it.

As in any business, it also is important to have an adequate and reliable supply of product whenever customers demand it. This is even more critical (and difficult) when demand is seasonal — as it is for compost. Design a system that tracks the utilization schedule of the major markets (who buys what, when), since it can influence the facility's production schedule. Customers must feel that they can depend on you at all times.

RELATED ISSUES

The accompanying sidebar reviews markets and end uses for composts. Some other factors to keep in mind when establishing a marketing program are:

Limed Vs. Unlimed: We have found that, if possible, it is best to avoid using lime stabilized or lime dewatered sludge. Compost produced from these materials will have a higher pH and cannot be utilized in as many applications as unlimed compost. Both agricultural lime and hydrated lime are sometimes used. Hydrated lime is more concentrated, more soluble and faster reacting, but has less of a residual effect than agricultural lime. For these reasons, hydrated lime is often used at compost facilities in odor control situations. In states where only limed compost can be sold to homeowners, lime easily can be added after composting has been completed.

MSW Vs. Sludge Compost: Table 3 shows the impact on the soil (physical and chemical parameters) as a result of using a sludge based versus a MSW based compost. The end use often defines which type of compost

to use. For example, someone wanting compost to top dress a turf area would surely choose 1/4 inch screened sewage sludge compost over MSW compost (cost considerations notwithstanding) because sewage sludge compost is more uniform. Individuals interested in incorporating the compost into poor soils, however, may prefer using MSW compost. Any inert material in the MSW compost (e.g. small pieces of plastic) would not be noticeable once incorporated and the MSW compost will improve the water holding capacity of the soil to a greater degree.

Mixes and Bags: Producing various mixes containing your compost could help the facility better service established markets such as golf courses and growers. And bagging the compost could more effectively service smaller 'green industry' professionals and homeowners.

This diversified product line will be of great benefit to some facilities, especially where large volumes of product must be distributed. For others, however, it will only increase the inventory that has to be moved. In addition, increasing the product line increases the risk of quality control problems.

Market Range: It is a given that most of the compost will be sold within a 50 mile radius of the plant. Problems may occur, however, if the 50 mile zone overlaps into neighboring states. In these situations, it is helpful to get the product approved in as many neighboring states as possible. It could be your saving grace in times of an emergency.

Trucking/Product Delivery: Proficiency in delivering product can have great influence on the success of the marketing program. The goal is to get product into the customers' hands when they need it. When looking for truckers, find ones that are dependable rather than just inexpensive. Truckers experienced in delivering compost can also assist in quality control. After a short period of time, they will know how the product should look and smell, and how much it should weigh. It is also essential to establish a process to monitor who the compost is being delivered to and where. A 'bills of lading' system can be initiated to satisfy all agency related regulations.

Weigh Scale: A scale at the facility expedites product shipments and improves inventory control. It also eliminates the need for a trucker to commute to an off site weigh scale, saving them time and money, and thus reducing your rate. An on site weigh scale also decreases the potential of trucking fines (overloading) and makes it easier to monitor product weight.

Pricing: The quality, end use, and availability of similar products affect the pricing scheme and perceived market value, as do the cost of products such as peat moss, topsoil and mulch. Factors that can increase a product's value are consistent high quality, positive market image, availability, convenient pick up and delivery, fair pricing and a knowledgeable sales staff. Regardless of price, document all established sales pro-



grams, purchasing and payment policies and establish a standard price list.

MARKET OUTLOOK

The future of composting looks positive and strong, both in areas where it has yet to gain a foothold and where compost markets are maturing and expanding steadily as more product becomes available. Difficulties could be encountered, however, where markets for compost are currently established and additional large volumes of product are then made available so quickly that the current market cannot absorb them. These glut conditions (at least for the short term) could disrupt the established market.

To minimize exposure to this type of situation, try to determine how much compost the market can absorb, see if any existing or future events will adversely affect the market, and research proposed legislation (e.g. landfill bans that could divert organic material to composting facilities). Obviously, certain circumstances can occur to alleviate a glut, e.g. legislation making it mandatory for municipalities producing compost to utilize it on public works projects. There also is a need for continued research to develop new products and uses for compost and other organic wastes.

The future success of the composting industry hinges, in large part, on our ability to market, or dispose of, the product we produce. It also is important to remember that the income produced from the sale of compost products is used to defer certain production and marketing costs. This revenue can in no way cover all the costs associated with its manufacture and distribution. Composting has simply become a safer, more publicly accepted and, in some cases, more economical method to manage certain types of municipal wastes. ■

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To improve compost used in growing mixes, cure in smaller piles and for a longer period to further stabilization and allow leaching of soluble salts.