



Using Composts in Commercial Vegetable and Fruit Operations

Nancy Roe
Extension Horticulturist

The benefits of organic matter to soils and crops are well established. However, few commercial growers add organic matter

because of lack of availability and costs of handling. As the need to reduce the amount of wastes added to landfills increases, many municipalities and private companies are beginning to produce large amounts of compost from organic wastes from cities and farms. Availability of large amounts of locally made composts can enable even large growers to consider compost use as a part of their operations.

Compost Production

Compost is a partially stabilized product of microbial decomposition of organic materials. It can increase water and nutrient holding capacity of sandy soils; increase aeration and internal drainage of clay soils; add nutrients; increase populations of earthworms and soil microorgan-

Composts have the potential to improve your soil and increase crop yields while simultaneously recycling valuable organic materials which our society has been treating as wastes.

isms; and suppress some plant diseases.

Growers considering use of a particular compost should know something about its origin and production methods.

Feedstocks are the materials used to produce compost. A compost may be made of one

or several of the following feedstocks:

■ *Mixed municipal waste* (household garbage): If all recyclable materials are removed, this feed-

stock contains mainly paper, fabrics, and food wastes. If it is not sorted, materials such as batteries, household chemicals, and construction debris can add heavy metals or other undesirable components.



Compost may be turned with a front-end loader.

- **Biosolids** (sewage sludge): This is the semi-solid material that results from treatment in a municipal waste water treatment plant. It is usually a good source of nitrogen and phosphorus. Biosolids for composts should be low in heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc). Biosolids from residential communities generally do not contain high levels of heavy metals. In areas where industry is contributing to the liquid waste stream, the metals may be a problem if pollution control laws are not enforced. High salts may also be a problem in biosolids.
- **Yard trimmings** (grass clippings, leaves, and woody materials from tree and shrub pruning): These materials are usually free from contaminants, although plastic yard clean-up bags may sometimes be included. If construction debris is allowed, it should not include treated lumber and

non-organic materials such as shingles and nails.

- **Animal manures** (poultry, horse, dairy, or feedlot operations): Some may contain straw, hay, or woody materials as bedding. Poultry manures are usually highest in nitrogen and phosphorus. Salts can be a problem in some manures.
- **Food wastes** (from restaurants, institutions, or food processing plants): They may include all types of foods, as well as paper that has been used in food preparation or serving.

In Texas, the Texas Natural Resource Conservation Commission compost regulations classify four levels of compost facilities:

- "Exempt" facilities compost only yard trimmings, clean wood, vegetative material, paper, and manure.
- Facilities in the "Notification" tier may compost those materials plus meat, fish, dead animal carcasses, oils, greases or dairy materials.

- "Registration" is required if biosolids or sorted municipal waste are included.
- Facilities which compost mixed municipal waste must obtain a "Permit."

Composting Methods vary depending on factors like feedstock, amount of compost, facility size, time requirements, weather, equipment required, and economics.

- **Static piles:** Feedstocks are piled and allowed to set undisturbed until composted. This is the least expensive, but slowest method. Material on the outside of the pile may not be exposed to heat needed to kill weed seeds or disease organisms.
- **Aerated static piles:** Air is circulated through piles by a system of pipes and fans.
- **Turned windrows:** These may be turned by front-end loaders or compost turning machines. Frequency of turning varies according to the operation. Within limits, more frequent turning tends to speed up composting.
- **In-vessel system:** These use some kind of closed vessel which may revolve or contain an auger to turn the compost. Some of these are anaerobic (without air) systems.

These methods may be combined; for instance, material may be composted in a vessel system for a period of time and then turned out into static piles.



Delivery and application are often the most expensive aspects of using composts.

Compost Characteristics and Safety

Compost facility managers must be familiar with the characteristics of the feedstocks they use. These often vary with season or location of collection. For instance, yard trimmings may contain varying amounts of grass clippings or leaves compared to wood products. Municipal solid waste and yard trimmings usually have carbon:nitrogen ratios from 50 to 300. If these materials are not properly composted, they may cause “nitrogen rob,” resulting in nitrogen deficiency in the crop. While measurement of compost maturity is a controversial subject among scientists and compost producers, there are several points that growers should consider to assure compost maturity, safety, and effectiveness:

- Compost testing should be done by a reliable independent or university laboratory.
- Carbon:nitrogen ratio of finished compost should be 20-25.
- Seed germination in the composts should be tested through bioassays.
- Compost should be free of pathogens and weed seeds.
- The pH of composts is not usually a problem, but it should be between 5.0 and 8.0.
- For most horticultural uses, compost should have a salt content below 6 dS/m. This may be slightly higher if the

compost is to be used in an area with well-drained sands and high rainfall on crops that are not sensitive to salts.

- If the compost is from biosolids or MSW, the compost should be tested for heavy metal content, and should meet state standards for compost which can be applied to crop land.

Texas compost regulations do not limit use of composts from notification and exempt facilities, except by agronomic rates of nutrients applied. Composts from permitted and registered facilities must meet Grade 1 or Grade 2 standards in order to be used in agriculture. Grade 1 use is unlimited, but Grade 2 cannot be used around residences or child-care facilities.

Rates

One of the advantages of compost is that nutrients are released over a long period of time. However, this can also be a problem, because it is difficult to tell how much to use. Most composts contain less

than 1 percent each of nitrogen, phosphorus, and potassium. The best way to know how much to use is to test the compost on small plots with your crop, soil, and growing conditions.

Initial applications should depend on the compost and the soil type. In very sandy soils in tropical and sub-tropical climates, growers have used as much as 50 to 100 tons per acre. However, in loam or clay soils in more temperate areas with lower average rainfall, benefits may begin at rates as low as 5 tons/acre. In most cases, the first application can be 10 to 20 tons per acre.

Usually during the first growing season, the best plant growth and yields will come from compost combined with the recommended rates of fertilizer. In subsequent plantings, test soil annually and fertilize according to the recommendations. If rates of phosphorus or other nutrients do not become too high, you may continue to apply 5-10 tons of compost annually.



This side-discharge spreader can apply compost around fruit trees or on vegetable plots as a mulch.

Compost Handling

In some cases, the limiting factors for compost use may be the costs of transportation and application. However, compost application equipment is evolving rapidly. A semi-trailer with a moving floor and rear augers that can both deliver and spread compost has now been developed.

If you decide to buy spreading equipment, consider the types available. Most spreaders have some kind of moving floor, chains, or auger to move the material to the discharge area. Compost may be discharged from the side or back of the spreader. Consider the size and shape of the area and how you are going to use the compost before making a purchasing decision. For instance, if you want to use the compost as a mulch around trees, a side discharge model may place the compost where you need it. Used manure spreaders are often available, and some equipment companies are beginning to manufacture spreaders again.

Before purchasing equipment, test it with the compost you plan to use. Composts vary in bulk density and particle size. They may clog the machine or cause “bridging,” which stops



This type of semi-trailer can be used to deliver and apply composts.

the discharge process. Another consideration is the weight of the compost and the conditions of the soil on which you plan to spread compost. Be sure that the tractor or trucks that you plan to use can pull the weight of the full spreader.

In order to minimize transportation and application costs:

- Use composts that are produced close to your farm.
- Ask if the compost company has equipment to spread the compost.
- Lease equipment initially. This will give you a chance to test it with a particular compost under your conditions.

Composts differ in maturity, stability, composition, nutrient content, and carbon:nitrogen ratio. These factors, your soil characteristics, and crops to be grown, should be taken into consideration when deciding whether to use composts, which composts to use, and how to use them in your farm operation.

Investigate local sources of composts and evaluate them on a small area under your growing conditions before making commitments to receive large amounts.

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