MIDWEST BIO-SYSTEMS' NEWSLETTER
October 2004
Subject: Controlling the Composting Process

The Issue:

- Feedstocks can decompose in either an orderly or disorderly manner. A disorderly process may produce a compost product beneficial to the soil and plant. Such a result, however, is more by luck than design, and will not be repeated on a regular basis. Its success depends upon factors (e.g. weather) beyond the composter's control. Many problems can ensue when a "hope it all works out" approach is used.
- Compost marketers assure us that ***consistency*** and ***predictability*** of the finished product are essential to repeat sales and profitability.

The Consequences: If the composter does not control the process, many consequences can result. A few of these include:

- As materials are breaking down and tearing apart, hydrogen (the lightest element), rather than oxygen (the preferred element), can combine with other particles and produce phytotoxins, which inhibit plant growth.
- Temperatures may vary greatly. On one end of the spectrum, pathogens may not be destroyed and, on the other end, fires may result.
- If moisture levels are not controlled throughout the row, the environment for beneficial microbes is not maintained, so less desirable microbes proliferate in those areas (moisture levels were too high or too low).
- Inadequate mixing and blending limit the points of contact of the various feedstocks. The breakdown process involves the disintegration of complex polymers into simpler segments; the build-up process involves recombining those simple segments into altogether different chemical sequences of complex polymers, eventually forming humic molecules. Limited mixing/blending limits these biochemical transformations.
- Insufficient aeration throughout means the final compost product has a much lower ratio of aerobes to anaerobes than that of a high quality compost product (10:1 or higher).

Controlling the Process:

- Well managed windrow composting can condense to 8 weeks what would otherwise occur through natural processes over a 10 year period.
- The goal is humification, which produces the humic compounds humic acid, humin, and fulvic acid. The conversion of organic matter to humus is affected by moisture, temperature, pH, aeration, microbial activity, and soil fertility levels.
- ***Recipe*** formulation should bring an average of about 30:1 carbons to nitrogens among all feedstocks utilized. The structure of the beginning windrow should not be too dense and moisture levels should ideally be in the 40-50% range.
- ***Daily tests*** are integral to knowing what is occurring inside the windrow, thereby guiding the composter regarding turning and watering decisions. These tests include monitoring CO_2 levels, temperature, and moisture.
- ***Inoculation*** introduces proven beneficial microbes to accomplish specific purposes at the precise times indicated by daily test readings. Some microbes serve the decomposition (breakdown) phase, while others, introduced later, enhance humification during build-up. Use of the Aeromaster water aerator reduces the cost of inoculation by about 80%.
- ***Fabric covers*** help maintain desired moisture levels, whether the environment is dry or rainy.

Benefits of a Controlled Process:

- Use of these methods can help achieve the quality and consistency that compost buyers desire.
- Greater value to the soil and plant means increased profitability for the compost producer.
- Microbiological assays will indicate all desired parameters have been achieved.
- The amended soil will have improved physical, chemical, and biological profiles, fertility is increased.
- Healthier plants and better tasting foods will be the ultimate result.