

Information Sheet No. 5-1

Composting Science for Industry

Information Sheet No. 5-1
3rd Edn. January 2007

Inside This Sheet

- 1** Introduction to composting science
- Feedstocks processed in composting systems
- 2** Composting science for industry
- 3** Definitions
- Important references
- Acknowledgement

Introduction to composting science

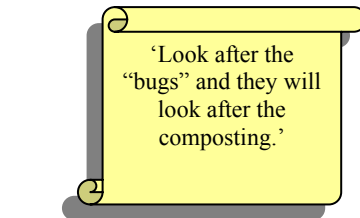
Aerobic composting is essentially a biological process governed by the activity of naturally occurring microorganisms (Figure 1).

Understanding the fundamentals of composting enables operators to manipulate the process to maximise the rate of decomposition of the organic material and meet other environmental or quality specifications.

The means to control composting conditions differ from site to site depending on the type of technology employed, the types of materials being processed, environmental considerations, the desired end-product and the preference and experience of the site operator.

Like all living things, including ourselves, the aerobic microorganisms responsible for composting need adequate living conditions to grow and multiply.

These conditions relate to the availability of:



- oxygen (air contains 21% oxygen);
- water;
- food – carbon, nitrogen and other nutrients; and
- suitable environmental conditions (including mainly warmth or heat.

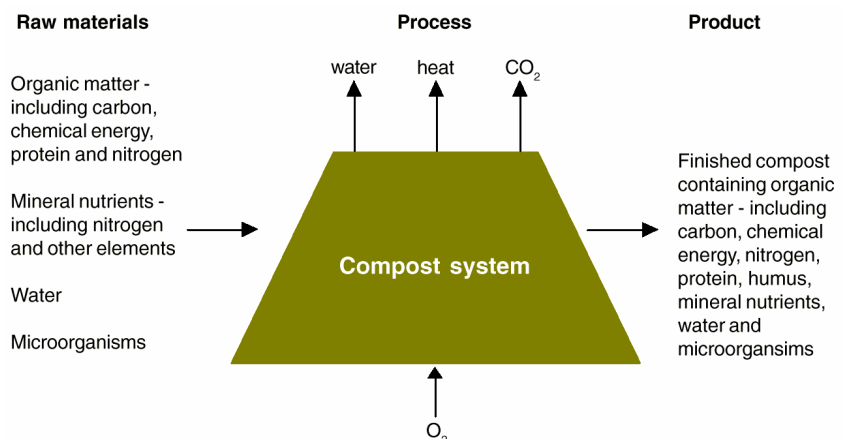
Heat is produced in composting as a by-product of microbial activity and is also important in eliminating *pathogens* and weeds.

Feedstocks processed in composting systems

A range of organic materials can be processed in composting systems.

Commercial composting operations use *source separated* organic materials as raw material, or *feedstock*.

Figure 1. Process diagram for composting systems. All composting processes are based on the same principles. O₂, oxygen; CO₂, carbon dioxide. Modified from Rynk *et al.*, (1992).



© Recycled Organics Unit 2002

ISBN 1-876850-13-2

The five major categories of compostable organic materials are shown in Table 1.

The financial viability of composting operations is closely related to the conversion of quality, source separated organics into quality composted products that meet market requirements.

A good understanding of the composting process is essential to produce high-value quality products.

Composting science for industry

The *Composting Science for Industry* series of information sheets provides

an excellent introduction to composting science.

Titles are shown below:

- Information Sheet No. 5-2. Composting Science for Industry: Composting systems.
- Information Sheet No. 5-3. Composting Science for Industry: Temperature.
- Information Sheet No. 5-4. Composting Science for Industry: Oxygen.
- Information Sheet No. 5-5. Composting Science for Industry: Water.
- Information Sheet No. 5-6. Composting Science for Industry: Porosity, structure, texture and particle size.
- Information Sheet No. 5-7. Composting Science for Industry: Carbon to nitrogen ratio (C:N) and other nutrients.
- Information Sheet No. 5-8. Composting Science for Industry: pH.
- Information Sheet No. 5-9. Composting Science for Industry: The compost recipe, processing time and curing.

Table 1. The five major categories of source separated compostable organics most commonly processed in composting operations (Recycled Organics Unit, 2002).

Compostable Organic Material Class	Material Description
Garden organics	Any garden derived organic (plant) materials generated by domestic, construction & demolition and commercial & industrial sources. Garden organics is defined by its component materials including: putrescible garden organics (grass clippings); non-woody garden organics; woody garden organics; trees and limbs, and stumps and rootballs.
Food organics	Food organics includes organics generated by any one of the following activities: the manufacturing, preparation or consumption of food (including beverages); the processing of meat, poultry or fish, and the manufacturing of edible grocery products. Such materials may be derived from domestic or commercial and industrial sources. The definition does not include grease trap waste.
Wood and timber	Any untreated, uncontaminated wood waste material produced by domestic, construction & demolition and commercial & industrial sources, including: off-cuts; crates; pallets and packaging; saw dust and timber shavings.
Agricultural organics (including forestry residuals)	Any residual organic materials produced as by-products of agricultural and forestry operations, including: weeds (woody and non-woody); animals (processing residuals, stock mortalities, pests), and crop residuals (woody and non-woody), and manures.
Biosolids	Organic solids or semi-solids produced by municipal sewage treatment processes. Solids become biosolids when they come out of an anaerobic digester or other treatment process and can be beneficially used. Until such solids are suitable for beneficial use they are defined as waste-water solids. The solids content in biosolids should be equal to or greater than 0.5% weight by volume (w/v). Biosolids are commonly co-composted with garden organics and/or residual wood and timber to produce a range of recycled organics products.

