



Compost

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This Agricultural Note provides information on Compost and the industry.

Product

Compost is the result of the natural rotting process that occurs with all organic material. The increasing suburbanisation of Australia, and other countries, plus the expansion of the nursery industry has produced a huge demand for compost. Compost is a valuable source of organic matter for soils and contains nutrients that are slowly available for plant growth.

Composting reduces the amount of wastes going to landfill and recovers valuable organic matter for our soils. Governments and business have seen these opportunities, and a whole new industry has been born - commercial composting.

Commercial producers are simply speeding up the natural process of rotting. By creating the right environment, the rotting process of any organic material can, not only be accelerated, but also manipulated, to produce the desired results.

The development of new markets for compost is a strong focus of the industry at present. Like any new business, it is critical that marketing studies are completed well before any capital is spent on establishing a composting enterprise.

Physical requirements

The basic ingredients of making compost are quite simple: - a supply of organic materials, microorganisms, moisture and oxygen. The last three are universally available and practically free, however, watering costs must be considered in every climate. Compost is a net user of water. So this enterprise is feasible anywhere in Australia. Organic material can be sourced from anywhere - garden or green waste, or animal manure are the usual sources but you can compost kitchen waste, sawdust and even paper. Successful producers in Victoria are composting green wastes, grease trap sludges, food wastes, sawdust, manures and wool scour wastes.

There are strict regulations governing the siting and operations of composting enterprises. Contact EPA Victoria for assistance early in the planning phase of a facility.

Depending on your method of production, you may also need to add some other materials such as gypsum, lime, dolomite and even soil.

The other requirement is machinery. Depending on the scale of production and the types of waste accepted, composting requires the use of heavy machinery. As a minimum, commercial scale operations require the use of a front-end loader to load, unload and turn compost. Screening equipment for the end product is also typical for most operations.

Finally, you need microorganisms to do the composting. These occur naturally so all you need to do is provide the right environment to encourage the right types of microbes.

Production

As mentioned before, making compost is basically speeding up the natural processes of rotting of any organic material. If it is done properly, you can minimise the loss of nutrients into the air and so enhance your end product. Like every production process, the quality of your compost largely depends on the quality of the organic materials that you start with.

There are many aspects to quality compost such as its organic matter content, nutrient content, C/N ratio, salt content and suitability for use with particular plants. The Australian Standard for composts, soil conditioners and mulches (AS4454-1999) is the industry standard for determining compost quality.

The two most critical factors to consider when mixing organic materials are the C/N ratio and moisture content.

C/N ratio

The ideal C/N ratio is about 25-30:1 - that is, the composition of the raw material has about 25-30 times as much carbon as nitrogen. If there is too much carbon relative to nitrogen, composting is slowed down or even practically stopped completely. If there is too little carbon relative to nitrogen, there is a loss of the nitrogen (as ammonia gas) producing unpleasant odours and a loss of valuable nutrients.

Examples of C/N ratios of commonly used materials are: animal manure (5-12), weeds (20), leaves (60), lawn clippings (20), paper (170), straw (100), pine needles (70),

sawdust (450), and seaweed (25). Seaweed is interesting in that it can be used, so long as you wash off the surface salt before adding it to the compost heap.

If nitrogen levels need to be boosted, it is preferable to add other organic materials that are high in N (eg. manures, grass clippings), but inorganic fertilisers such as urea can also be used.

Moisture content

The next thing to consider is the moisture content. The optimum moisture content for composting is between 50 and 60% on a wet weight basis (ie. 50% = 50 g water in 50 g dry matter). Below 40%, the compost is too dry for the microorganisms to work at maximum efficiency. Above 60% there is a high risk of odours developing because of a lack of oxygen in the compost.

Temperature

Temperature also is important. The composting process naturally produces heat, which helps the microbial activity, but you don't want it to get too hot, otherwise these microbes slow down. When temperatures exceed 65° C the activity and diversity of microorganisms drops off markedly. The most rapid composting occurs between temperatures of 45 and 55° C. In colder areas, you may need to insulate the heaps in winter to retain the warmth. Heaps that are too small (eg. < 1 m³) will not heat up. Heaps that are too large become too hot and are at risk of catching fire. The optimum size of a heap depends on the materials being composted, space and equipment available (see below). The correct temperatures are also important in getting rid of the many pathogen, parasites and weed seeds that may be in the compost.

pH

Composting can occur at a broad range of pH. Adjustment may only be necessary if the starting materials are extremely acidic or alkaline, or if a certain pH range was required in the end product. Also, there is a greater risk of loss of nitrogen as ammonia causing odours when the pH exceeds 9.0.

Composting systems

The most common form of composting is the windrow system. Organic materials are placed in windrows of varying dimensions depending on the waste being composted, space available and equipment used. For manure based operations, the recommended size is around 1.5 m high and up to 2.5 m at the base. For green wastes, heaps can be as high as 2.5 m or more and 4-5 m at the base. The length of windrows only depends on space available, and can vary between 20 and 100 m. Windrows are turned by either front-end loader or specialised windrow turners. Turning is used to mix the compost, control temperatures and moisture and provide the aeration needed for composting. Capital outlays for windrow type systems are relatively small (unless a concrete pad is installed), but operating costs can be high because they are usually labour intensive.

Some types of wastes are more difficult to handle and must be composted with specialised aeration and leachate control equipment. These systems can be very expensive, and may not be an option outside urban areas.

Another simple and cheap option is the passively aerated windrow or pile system. In this system, pipes are laid on the ground and the heap is formed on top. The pipes extend outside the heap to provide adequate airflow to the compost. A layer of finished compost is placed over the pile to reduce the incidence of odours. This system does not require turning. This system has been used to compost manures, but careful preparation and monitoring is required to ensure success.

Marketing

Markets can vary from home gardeners, nursery suppliers, topsoil manufacturers, landscape suppliers, supermarkets, potting mix manufacturers, local government and commercial horticulture.

It is recommended that compost producers become certified to the Australian Standard for compost (AS4454-1999). Alternatively, compost producers may choose to get organic certification for their compost (eg. NASAA). Certification to one of these standards should give your product a marketing edge.

Most producers are small and sell through local markets and outlets. However, there are opportunities with larger organisations but they will want a consistent product, regularly supplied and professionally packaged.

Financial aspects

There are considerable capital outlays for urban based composting operations. However, on-farm based composting can be done relatively cheaply if the right equipment is available.

Organisations & contacts

Compost Victoria
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EcoRecycle Victoria
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Environment Protection Authority (EPA)
Branches statewide

IHD Knoxfield
Research & training programs in compost production and use
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References

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PO Box 1139

Collingwood Vic 3066
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