



## INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE AND MANAGEMENT

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**Contributions to books**

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

**Journal and other articles**

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

**Conference papers**

- Chandel K.S. (2009): "Ethics in Commerce Education." Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2006): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Kelkar V. (2009): Towards a New Natural Gas Policy, Economic and Political Weekly, Viewed on February 17, 2011 <http://epw.in/epw/user/viewabstract.jsp>

**COMPOSTING: A TOOL TO SAVE EARTH AND GO GREEN****YOGESH MEHTA****ASSOCIATE PROFESSOR****VENKTESHWAR INSTITUTE OF TECHNOLOGY****INDORE****SRISHTI JOSHI****ASST. PROFESSOR****SAPIENT INSTITUTE OF MANAGEMENT STUDIES****INDORE****ASHWINI MEHTA****ASST. PROFESSOR****MATA GUJRI COLLEGE OF PROFESSIONAL STUDIES****INDORE****ABSTRACT**

Today, the major concerns for modern societies revolve around environmental issues like waste management, deforestation, land filling, land degradation, increased ecological risks in the form of growing atmospheric pollution, degraded soil health and the like. This in turn hampers agricultural productivity and it becomes difficult to feed the ever growing number of starved mouths. And the solution to most of the aforesaid issues can be found in an ancient process of decomposition of organic waste what we call composting. Composting happens to be an ancient technology performed at numerous scales from home to industries. As the capacities of landfills reach their thresholds and repel the organic wastes, composting has gained acceptance as an important method for treatment of organic waste. This paper is an attempt to reinforce the importance and need of composting and how it can be used as a tool to make this earth greener, cleaner and better for survival of all the living beings.

**KEYWORDS**

Green, Compost, Decomposition, Environment.

**INTRODUCTION**

Composting is nothing but an imitation of the nature's cycle of life. It is the process through which organic materials are decomposed and are recycled naturally into a rich soil known as compost. Every living thing can be decomposed to form compost. Basically, backyard composting is an acceleration of the same process that nature uses. By composting organic waste nutrients are returned to the soil in order to continue the cycle of life. The end product i.e. finished compost is a soil-like in appearance—dark brown, loose, partially decomposed, amorphous form of organic matter which is crumbly and smells like forest floor. Compost is rich in nutrients. Micro-organisms such as bacteria, fungi and algae feed on the organic waste material and reproduce. The colony of organisms produces heat, carbon dioxide and water. Once the waste has broken down, the organisms leave the heap which begins to cool down. Worms and insects feed on the woody material. Another vital ingredient is air which is essential for the survival of the micro-organisms and soil animals. Woody material in the heap allows air to pass through the heap although it slows the process of decay as some of the heat is lost. The green waste breaks down into compost which can be used again on the garden. Nonetheless; this dark brown soil has the potential to paint the earth green.

**TRACES OF COMPOSTING IN HISTORY**

The history is full of references of usage of composting as a tool to keep the environment clean.

1. The Ancient Greeks, Romans and the Tribe of Israel were all known to compost their organic waste mixed in with animal manure and street sweepings.
2. A retired Roman general, Marcus Porcius Cato, who lived from 234 BC to 149 BC, wrote a book titled "De Agri Cultura" (Concerning the Culture of the Fields) in which he described composting.
3. The Chinese are thought to be the first people to develop larger composting sites for use in farming. Compost made by humans is a more recent (but still very ancient) process.
4. Akkadians practiced composting in ancient Mesopotamia, a thousand years before Moses was born.
5. There are references to composting in the Talmud, in the Old Testament, in ancient Chinese writings and in the Bagavad Gita.

**CURRENT COMPOSTING TRENDS**

In a study of composting trends in the U.S., "Organic Materials Management Strategies" (U.S. EPA, 1998), 85% of the nation's municipal waste stream was identified as organic in nature (Sparks, 1998). This translates to approximately 177 million tons of organic waste per year, mostly as food scraps, yard trimmings and paper. It does not include organic wastes generated from agricultural and industrial sectors including food processing, paper production, biotechnology, forest products processing and livestock production. If all of these materials were composted, estimates of potential market demand for finished compost would greatly exceed the amount of compost produced from these sources. Depending on the type of waste and the method of composting, average national savings from composting municipal organic by-products over conventional landfill disposal range from \$9 to \$38/ton.

Composting of municipal solid waste is an emerging idea in India having great prospects as well as constraints. These developments can be observed from the waste management, agricultural and climate change scenario. The technology is simple and affordable, the product is beneficial for soil and significant saving of land (required for land-filling) is achieved. However, public-private partnership efforts are constrained due to quality requirements, marketing and pricing issues.

**COMPOST TO GO GREEN**

Greening happens to be the solution to most of the problems faced by modern societies. And one of the ways of going green is to compost the organic waste. Composting offers the twin benefit of providing rich nutrients for increased soil fertility leading to better productivity and at the same time reducing the area of landfills composing mainly of organic—solid wastes. This makes the earth greener and cleaner and directly serves as a solution to large scale deforestation, low agricultural productivity, environmental mis-balances, droughts etc. and also reduces the number of health problems owing to the filth produced in the dump-yards of these wastes.

Greening is the rejuvenation: the phenomenon of vitality and freshness being restored; "the annual rejuvenation of the landscape". It is the process of transforming artifacts such as a space, a lifestyle or a brand image into a more environmentally friendly version (i.e. 'greening your home' or 'greening your office'). The act of greening involves incorporating "green" products and processes into one's environment, such as the home, work place, and general lifestyle. These "green" qualities include

1. reduced toxicity
2. re-usability
3. energy efficiency
4. responsible packaging and labeling
5. recycled content
6. intelligent design
7. responsible manufacturing techniques
8. reduction of personal environmental hazards

All these qualities are that of compost. So we can say that composting is the easiest way of 'going green'. If you're ready to go green and in turn let that green debris go brown, you can do just that in building a compost bin. Compost is a great way to give back to the soil vital nutrients that will spur the growth of your plants and garden in a much better way than any fertilizers that will instead contain nasty chemicals. Having a compost bin in your backyard is easy to set up and just one more way you can help the environment. By adding the cardboard, coffee grounds, fireplace ashes, leaves, food wastes, and many more items you can then recycle and reuse it all at the same time!

The effort to go green is all the more fun when we get down and dirty with compost. Recycling paper and using other organic products around the home will save on purchasing other soils or plant foods but more importantly is an excellent way to earn that green thumb

## TYPES OF COMPOSTING

### BASED ON THE PREVAILING CONDITIONS

**Aerobic Composting:** Aerobic means in the presence of oxygen. Microorganisms for aerobic composting require oxygen more than 5 percent within the compost pile for decomposition of the organic waste. Aerobic decomposition is preferred in most backyard composting piles because it smells better and is more efficient. It generates heat up to 140°F or higher, which is enough to kill most plant pathogens and weed seed in the pile when properly managed.

**Anaerobic Composting:** Anaerobic means in the absence of oxygen. Anaerobic decomposition in backyard compost piles is generally undesirable due to objectionable odors that result. The most offensive gas resulting from the anaerobic process is hydrogen sulfide (rotten egg smell)

### BASED ON THE INGREDIENTS USED

**Backyard composting:** Compost formed out of fallen leaves or straw, grass clippings and food scraps.

**Worm composting (vermicomposting):** It is based on the use of worms to form a compost of high quality. The process does not require physical turning of the material. To maintain aerobic conditions and limit the temperature rise, the bed or pile of materials needs to be of limited size.

### WHY TO COMPOST?

The ability of composting to transform organic waste materials into an agricultural resource makes it an attractive proposition. It offers several benefits such as improved soil fertility and soil health thereby increased agricultural productivity, improved soil biodiversity, reduced ecological risks and a better environment. Thus, the reasons for composting are not difficult to comprehend. They can be summed up as under.

1. Yard and food waste comprise around 30% of the waste stream. Composting the kitchen and yard trimmings helps divert that waste from the landfill, waterways and water treatment facilities.
2. It can significantly reduce pest problems—and the use of pesticides.
3. It makes the soil healthy. Healthy plants from healthy soil look better, produce better and offer a much greater resistance to pests and diseases.
4. Adding organic materials to the soil improves its moisture retention capacity.
5. Adding decomposed organic material to the soil feeds beneficial organisms like earthworms and other insects that aid in turning the soil and adding to its fertility.
6. Compost makes sandy and clay soils fit for cultivation.
7. It provides a balanced, slow-release source of nutrients that helps the soil hold nutrients long enough for plants to use them.
8. Composting saves money—it avoids the cost of buying soil conditioners, bagged manure etc.
9. Feeding the plants well will indirectly improve the health of living beings dependent on them for food because plants grown in depleted soils have a reduced nutrient content.
10. Home composting is a valuable tool in educating children about nature and the cycle of life.

### BENEFITS OF COMPOSTING

Compost is an inexpensive alternative to chemical fertilizers, and it does not even harm the sensitive roots of the plants. Chemical fertilizers have damaging effects on plants. Chemical fertilizers also leave heavy metals like lead, arsenic and cadmium that can be harmful for us. They also kill the very microbes that make soil fertile, trapping us in the vicious circle of using chemical fertilizers over and over again.

Many chemical fertilizers are made from petroleum and other non-sustainable sources. The price of chemical fertilizers seems to get higher every year due to rising oil and shipping costs. On the other hand, compost doesn't use any oil and doesn't require much transportation. Using compost reduces our dependence on foreign oil and boosts soil health. And unlike some chemical fertilizers, compost actually helps decontaminate soil.

### ACCORDING TO EPA

*"The composting process has been shown to absorb odors and treat semi volatile and volatile organic compounds (VOCs), including heating fuels, polyaromatic hydrocarbons (PAHs), and explosives. It has also been shown to bind heavy metals and prevent them from migrating to water sources or being absorbed by plants. The compost process degrades and, in some cases, completely eliminates wood preservatives, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils."*

Many gardeners choose to compost their grass clippings, leaves, trimmings, and vegetable scraps. Here are some of **the reasons that make composting is popular:**

1. Cheaper than chemical fertilizer
2. Gradually releases nutrients
3. Reduces disposal fees
4. Diverts waste from the landfill
5. Less stressful on roots
6. Loosens soil
7. Allows roots to spread out widely, preventing erosion
8. Retains water like mulch
9. Accelerates nutrient cycling
10. Reduces oil dependence
11. Sustainable improvement to the soil
12. Reduced run-off and water pollution

13. Reduced irrigation bill

#### METHODS OF COMPOSTING

**Hot/fast composting:** Mix brown and green materials together and keep it damp and aerate the pile by turning or mixing once or twice a week. This method is the quickest method to finished compost and the best control of weed seeds and pathogens. It produces a more nutrient-rich pile than slow (cold) piles. But a lot of effort is required. It needs to be aerated often and works best with a larger amount of material.

**Slow/passive composting:** Layer the compost bin or pile with browns and kitchen scraps. Cover the kitchen scraps thoroughly with browns each time. Keep adding brown and green material. Water each batch of material put in so that the moisture is evenly distributed. When bin is filled, start a second bin. After approximately a year, the first bin or pile will have decomposed enough for use. It requires minimum management. But it takes a year or more and weed seeds or diseases are not destroyed.

**Dig-a-hole composting:** This method simply requires a trench or hole dug in the garden area filled with kitchen scraps and backfilled with soil. It requires no maintenance. But it composts only a small amount of material at a time.

**Tumbler:** this method is good for cold composting. This method needs to add materials (finely chopped) all at once. A small amount of soil is added into the bin to add microorganisms. It is turned every day. There are no odor problems and the compost has a tidy appearance. But it composts small amounts at a time.

**Grasscycling:** Leave the freshly mowed clippings on the ground, as it falls it will create a mulch to help with moisture retention. As the clippings begin to decompose, they will provide nutrients to the grass, reducing the amount of fertilizer needed for a healthy lawn. The method requires more frequent mowing, but the return is less time bagging and dumping the grass clippings.

**Mulching:** Compost can be created easily by using organic materials such as leaves, grass clippings, shredded bark, and even shredded newspaper as mulch. When laid on the surface of the ground the mulch will slowly breakdown and release some nutrients into the soil. This process takes a longer period of time, but moisture retention and lack of effort are its benefits.

**Burying:** Organic material can always be buried to form compost. Common methods are trenching, hole, and posthole. This method takes a longer period of time to breakdown, but it enriches the soil directly and gassing off into the atmosphere when the material is left on top of the soil does not lose nutrients.

**Bin or Pile:** This method is simple and effective. The key to this method is the size of the pile. A heap about 3x3x3 or one square yard is required. This gives a volume of material that creates the proper environment for maximum production in the pile. Assemble the pile using green and brown material. Layer the organics in 1" to 2" alternating layers adding water in between. After assembling, water well and cover the pile with a tarp, carpet, or an opaque plastic sheet. This will help hold heat and moisture. The center will reach temperatures of 120 to 160 degrees when the microorganisms are working. These temperatures do the 'cooking' to kill bacteria that are harmful and prevent the germination of seeds when the compost is used. Turn the pile weekly, until it has a dark rich look like chocolate cake.

Yet there are some things that should never be added to a compost pile and the initial starting of one should be done in a certain manner. As a composting guide to green living:

#### DON'T COMPOST!

1. Bread products: This includes cakes, pasta, and most baked goods as they call for unwanted pests.
2. Cooking oil: Smells like food to animal and insects and can also upset the compost's moisture balance.
3. Diseased plants: You don't want to transfer fungal or bacterial problems to whatever ends up growing in your finished compost.
4. Heavily coated or printed paper: including magazines, catalogs, printed cards, and most printed or metallic wrapping paper. Foils don't break down and leave a bunch of exotic printing chemicals in the compost.
5. Human or animal feces: it is too much of a health risk. Waste and bedding from non-carnivorous pets is fine.
6. Meat products: This includes bones, blood, fish, and animal fats. As they are another pest magnet.
7. Milk products: Refrain from composting milk, cheese, yogurt, and cream. While they'll certainly degrade, they are attractive to pests.
8. Rice: Cooked rice is unusually fertile breeding ground for the kinds of bacteria not desired in pile. Raw rice attracts varmints.
9. Stubborn garden plants: Dandelions, ivy, and kudzu are examples of plants or weeds which will probably regard the compost heap as a great place to grow, rather than decompose.
10. Used personal products: Tampons, diapers, and items soiled in human blood or fluids are a health risk.
11. Walnuts: These contain juglone, a natural aromatic compound toxic to some plants.
12. Aerosol cans: Sure, they're metal. But since spray cans also contain propellants and chemicals, most municipal systems treat them as hazardous material.
13. Brightly dyed paper: Strong paper dyes work just like that red sock in your white laundry.
14. Ceramics and pottery: This includes things such as coffee mugs.
15. Diapers: It is not commercially feasible to reclaim the paper and plastic in disposable diapers.
16. Hazardous waste: This includes household chemicals, motor oil, antifreeze, and other liquid coolants. Motor oil is recyclable, but it is usually handled separately from household items.
17. Household glass: Window panes, mirrors, light bulbs, and tableware are impractical to recycle. Bottles and jars are usually fine. Compact Fluorescent Lightbulbs (CFLs) are recyclable, but contain a small amount of mercury and shouldn't be treated as common household bulbs.
18. Juice boxes and other coated cardboard drink containers. Some manufacturers have begun producing recyclable containers. These will be specially marked. The rest are not suitable for reprocessing.
19. Medical waste: Syringes, tubing, scalpels, and other biohazards should be disposed as such.

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