Beer's Effect on the Rate of Decomposition of Compost

Andrea Grover
Andy Washicheck
Chelsea Baus
Lindsey Sauerzopf

Abstract

The purpose of this research was to determine whether beer affected the decomposition process by making the material break down at a faster rate. We studied this situation not only to see and understand the process of decomposition and the benefits of composting, but to also see how beer affected the natural decomposition of leaves and yard waste, as well as to reduce the amount of leaves and waste products that find their way into Lake Wingra. We layered mulched leaves and grass clippings in five composting bins. We placed two temperature gauges in each bin; one on the bottom and one in the middle. We then dispersed beer in different quantities throughout four of the five bins. Following this, we turned the compost several times and while doing so downloaded our information from the temperature gauges.

Introduction

"Composting speeds the process by providing an ideal environment for bacteria and other decomposing microorganisms" (Backyard Conservation). According to *Composting as a Waste Management Technique*, composting "dates back to the history of early agriculture" (Cornell Composting). There are many different types of matter that combine to form compost. For example, vegetation, bacteria, worms, etc. all help form compost. The specific purpose of our composting experiment was to determine whether beer affected the decomposition process by making the material break down at a faster rate. We did this by putting different amounts of beer in each bin. We studied this situation not only to see and understand the process of decomposition and the benefits of composting, but to also see how beer affected the natural decomposition of leaves and yard waste, as well as, reduce the amount of leaves and waste products that find their way into Lake Wingra, or that would otherwise end up in surrounding landfills. We already knew that composting reduced yard waste in watersheds, but we wanted to "reduce, reuse, and recycle" waste by benefiting the environment in these ways (Cornell Composting). With our current knowledge, we understand that composting is an easy way to benefit the environment through recycling waste (food scraps, leaves, grass clippings, etc.). We can also use composting to our advantage by creating fertile soil for our use. We are now able to incorporate this knowledge into our own backyard.

Materials and Methods:

We used lake vegetation and mulched leaves for the basic composting material. We had three layers of each in every bin. We used 5-gallon buckets which we packed fully and firmly, by stomping on them to measure out the vegetation from the lake. To measure out the mulched leaves, we used 14-gallon plastic bins which were also packed fully and firmly by stomping on them.

The first layer in each composting bin consisted of three-14 gallon bins of mulched leaves. Next, we layered one-5 gallon bucket of lake vegetation on top of the mulched leaves in each bin and spread them out evenly across the bin. Our next layer in each of the bins consisted of two-14 gallon bins of mulched leaves, followed by one-5 gallon bucket of the lake vegetation (weeds, grass, leaves, etc), which we again, spread evenly over the mulched leaves across the bin. Our third and final layer for each composting bin consisted of one-14 gallon bin of mulched leaves. Again, we layered one-5 gallon bucket of lake greens on top of the mulched leaves and spread the greens evenly across the bin. After each layer of lake greens, we watered the compost pile until they were damp enough to have water drip out when the leaves were squeezed.

We also put temperature gauges in each of the composting bins. We compared the temperatures of the different bins to see which bin had the highest temperature the highest temperature would indicate the fastest decomposition rate. One temperature gauge was placed in the very bottom and in the center of each bin. Another temperature gauge was placed in the middle of the three layers of composting material and in the center of the composting bins themselves.

The last addition to our composting bins was Busch Light beer. We bought a half-barrel of the beer and measured it out so that bin one had no beer, bin two had 2 cans/24 oz (710ml), bin three had 20 cans/240oz (7,100ml), bin four had 40 cans/480oz (14,200ml), and bin five had 80 cans/960oz (28,400ml). When we added the beer to our composting bins, we poured it out of a pitcher that we previously measured to be 710ml and 7,100ml. When pouring the beer, we used a circular motion to distribute the beer evenly over the composting pile. We measured the initial depth of the composting bins by the handles on the front sides of the bins. The measurements were as follows: bin one 19 inches, bin two 18 inches, bin three 19 inches, bin four 19 inches, and bin five 22 inches. The average of the five bins was 35 inches in diameter.

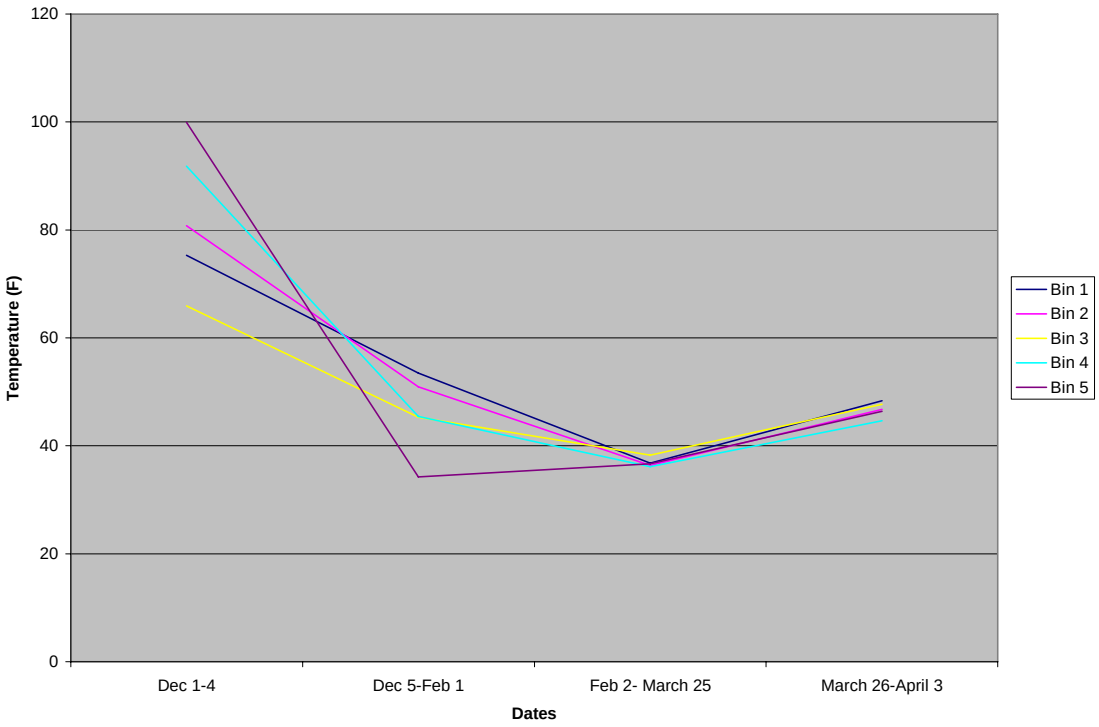
We were only able to turn the bins when the weather permitted. As this experiment was started in winter, we were only able to turn the bins when they weren't frozen solid. The bins were checked on 01-25-06 and were determined to be too frozen to turn. The bins were checked again on 02-01-06 and we were able to turn them and collect data (see Figure 1 below). When we did turn the bins, we un-strapped the bins and re-strapped them directly in front of the original spot of the five bins. We then used pitch forks to move the original pile into the new bins. We shoveled the compost that was on the top of the original pile, so that it was now on the bottom of the new pile.

Results:

Figure 1: Compost Data Collected Including Procedure of Set-up

Bin	Diameter	Amount Beer (12 oz cans)	Depth of Compost (Inches)				Maximum Temperature (F) for Bottom / Middle Gauges	
			11/30/05	01/25/06	02/01/06	04/03/06	02/01/06	04/03/06
1	36	0	19	17	18	13	76 / 77	52 / 54
2	33.5	2	18	17	17	10	84 / 91	50 / 55
3	37	20	19	14	15	15	78 / 92	52 / 54
4	32	40	19	15	17	12	80 / N/A	48 / 49
5	34	80	22	19	20	14	98 / 130	52 / 55

Figure 2: Temperature of Bins (F)



Temperatures in the bins were highest early in the experiment (at the end of November), and during the last week of our data collection (first week of April).

Bin #5, which had the most beer, initially recorded the highest temperature readings. Generally, the temperature readings for bins #4 and #5 recorded the lowest temperature readings up until the last week of data collected. The last week of data collection, the recorded temperature for bins #4 and #5 started to increase. In the middle of December and through February the temperature gauge for bins #1 and #2 (no beer, two cans respectively), were consistently the highest temperatures.

Discussion:

Our results support our hypothesis when outside temperatures are warmer and when the compost is more active. For example, when we initially built the bins the materials within the bins were not frozen, however, over the next three months outside temperatures caused the materials in the bins to freeze and seemed to stall any affects that the addition of beer may have had on composting. When outside temperatures rose, it allowed the composting materials to thaw and the initial temperatures within the bins to increase.

In relation to the Wingra Watershed Community, our results showed that the composting process can be improved throughout the community by using beer as a composting accelerator during the warmer and more active months. If more members of the community decide to use beer in composting, it can improve the efficiency of cleaning up yard waste. Composting with beer provides a more effective method of composting, and therefore, will decrease the amount of

lake weeds and yard waste which find their way into Lake Wingra. Over time this will result in a more resourceful and environmentally friendly community.

Our research indicates a more effective method for composting that all people could easily adapt into their regular composting methods. Future research could look into which ingredients in beer are responsible for the accelerated process. Further experimentation could include studying in depth reasons for the differences between composting in warmer versus colder temperatures.

Although there isn't research specifically done on beer effects on composting we can still compare our results to other composting experiments. In looking through a previous composting experiment we can conclude that it is beneficial to add materials such as food waste, beer, coffee, or feces in order to increase the composition rate.[1]

In conclusion, we determined that the composting process can be sped up with the addition of beer to mulched vegetation and lake weeds during the warmer months when the compost is more active.

References:

Backyard Conservation tip sheets. "Composting". April 1998

Cornell Composting. Composting as a Waste Management Technique: Composting in Schools. > January 2002. Accessed on February 20, 2006. <http://compost.css.cornell.edu/technique.html>.

Peerenboom, Julie, Megan R. Parish, and Christina Croak. "Effects of Goose Feces on Rate of Composting." Edgewood Blackboard. 30 Mar. 2006. Edgewood College. 10 Apr. 2006 <http://edgecms.edgewood.edu/courses/1/NATS-104-105-106-107-F5-2005-2006/groups/_728_1/_80462_1/science_draft__2.doc>.

[1]Peerenboom, Julie, Megan R. Parish, and Christina Croak. "Effects of Goose Feces on Rate of Composting." Edgewood Blackboard. 30 Mar. 2006. Edgewood College. 10 Apr. 2006 <http://edgecms.edgewood.edu/courses/1/NATS-104-105-106-107-F5-2005-2006/groups/_728_1/_80462_1/science_draft__2.doc>.