Will a lower C:N ratio produce higher quality compost and in a quicker fashion?

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Introduction

- In the United States alone, roughly 120-160 billion pounds of food is wasted yearly. (Gunders, Dana et al)
- This project aims to investigate the best composting technique, elaborating on the procedures and conclusions from pre-existing literature.

Hypothesis and Background

A higher C:N ratio should be more effective as it is more acidic and will increase the rate of decomposition (Chang and Hsu).

The addition of more nitrogen substrates allows for the flourishing growth of microorganisms which are known to accelerate the process of decomposition.

Materials

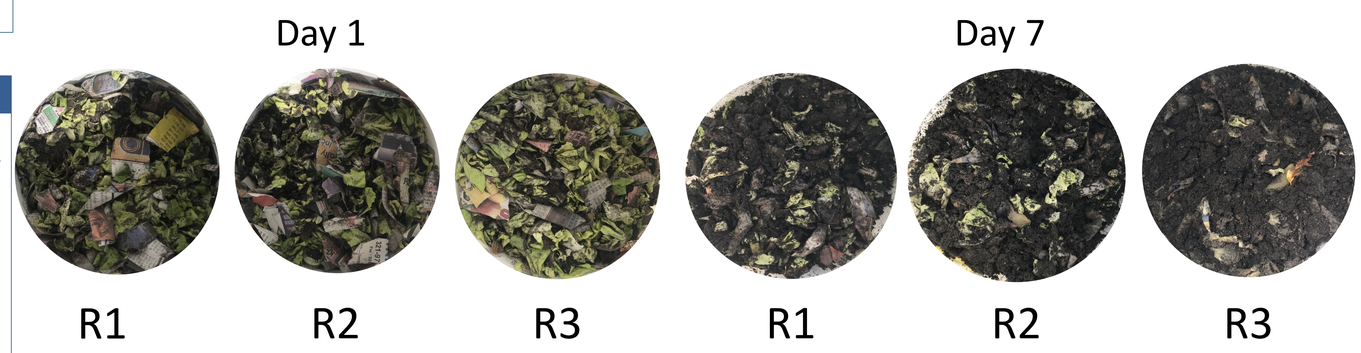
- 3 five-gallon food durable buckets
  - (this size should maintain 2-3 lbs of weekly waste)
- Weighing scale
- Thermometer
- pH strips
- Bulking agents (newspaper 100:1)
- Food waste (butter-head lettuce 12:1)
- Deionized water
- Gloves
- 3 Trays
- Power drill

Take Away Message

30: 1 Ratio provided had the most acidic and high temperatures during the daily checks, insinuating fast decomposition.

Methods

1. In order to prepare the buckets, holes will be made on the lower sides of each bucket to promote aeration and allow for drainage.
2. The collected compost material will be shredded (to maximize the reaction rate through surface area) and will be added to the buckets. The produce material, bulking material, and 8 pounds of soil should be alternated while creating their respective C:N ratios (26 cups total).
   1. Bucket 1 – 20:1 (1 cup paper: 12 cups lettuce)
   2. Bucket 2 – 25:1 (1 cup paper: 6 cups lettuce)
   3. Bucket 3 - 30:1 (1 cup paper: 4 cups of lettuce)
3. Each bin will be weighed at the beginning and end of the week period. Additionally, temperatures and pH will be checked daily.
   1. pH will be conducted by taking a tablespoon of soil and mixing it with 3 tablespoons of D.I water. The litmus pH paper will then be dipped in the solution for 30 seconds and left to change color.
   2. Place the lids on top to regulate temperature within the buckets
4. Each bucket will be turned daily for 30 seconds each to aerate and homogenize the mixture.
5. Daily observations will be made, specifically towards the color, texture, and odor which are indicators of poor and fair compost health.
6. 1 cup of water will be applied every 2 days



Daily Temperature (°C)							
Ratio 1	24.5	27.7	27.8	24.6	18.2	16.7	21.3
Ratio 2	24.9	26.5	27.8	24.4	19.7	17.2	21.8
Ratio 3	28.2	28.2	29.8	24.6	20.8	17.6	22.1

Daily pH							
Ratio 1	6	6	7	7	7	8	9
Ratio 2	6	6	6	7	7	8	8
Ratio 3	6	5	6	6	7	7	8

Calculating the C:N ratio

1. Add all the carbon units
2. Add all the nitrogen units
3. Divide the total of carbon by the total nitrogen

Ex. If there are two units of coffee grounds (which have a ratio of 20:1) and one unit of leaves (60:1), it would produce an overall C:N ratio of 33:1.

(20:1 + 20:1 + 60:1)/3
= (100:1)/ 3
= 33:1

Conclusion and Future Directions

- From the temperature and pH results, there is a direct correlation between C:N ratios to those two variables
- Too short of an observation time, future modifications include:
  - Changing compost materials
  - Prolonging compost duration
  - Quality checks
- Obstacles faced
  - Sporadic weather

Ratio Type	Initial Weight (lbs)	Final Weight (lbs)
Ratio 1	11.4	11.2
Ratio 2	11.4	11.2
Ratio 3	11.4	11.1

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