Designing A Compost System Using Styrofoam

Group 7

By: Ayesha Zahid - zahid24a@uregina.ca
Aimen Ejaz - ejaz202a@uregina.ca
Anukaranjit Bharthi - bharthia@uregina.ca
Tinsae Alemu- alemu20t@uregina.ca
Supervisor : Kelvin Tsun Wai Ng, PhD, PEng

Objective

The objective of this project is to design a small-scale indoor composting system using Styrofoam containers to reuse and reduce the amount of Styrofoam in the waste stream. A 15-week experiment is conducted where five versions of Styrofoam containers designed for composting are compared to a regular compost bin.

Methodology

Note: To ensure safety of all group members, all safety precautions were taken.

Equipment and Material:

- Vegetable and fruit waste
- Knife, Ruler, 5 Plastic Cups, Food Processor, Weighing Balance, Large Container, Styrofoam Container, Composting bin
- pH paper and pH meter
- Thermometer
- CO2 Meter
- Soil, Dry Leaves

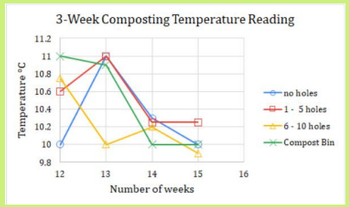
General Procedure:

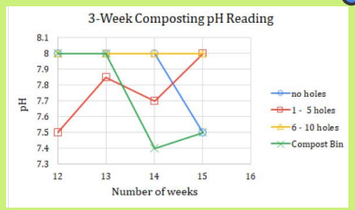
The compost mixture is composed of soil, chopped vegetable and fruit waste pieces and dry leaves. The operating parameters are temperature, moisture content, pH, oxygen content, CO_2 content, and weight change. These will be tested once a week. The duration of this experiment is 15 weeks, where the first 12 weeks is performed with the same number of holes (8 holes) for each Styrofoam container and the last 3 weeks are performed with with various number of holes as follows:

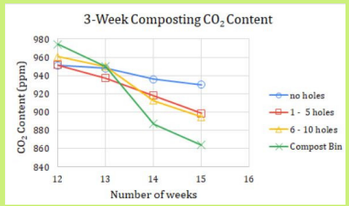
- Trial 1 - no holes
- Trial 2 - 8 holes
- Trial 3 - 4 holes
- Trial 4 - 5 holes
- Trial 5 - 10 holes

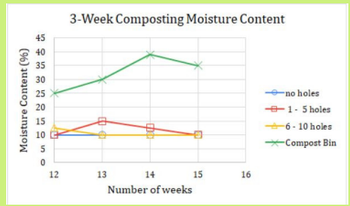
As the design component of this experiment is the number of holes, altering this component will change the oxygen being supplied to each container. Using the data received from this additional 3-week composting, (if) any significant difference found is further analyzed.

Results









According to the results obtained in the additional 3-week composting period, Styrofoam containers are comparatively doing better than the compost bin since the temperature, pH, moisture content, and carbon dioxide content parameters have stabilized, which indicates that the compost is nearly finished. This can be observed in the trends shown in the graphs above where compost bin shows a greater variance in each parameter compared to the Styrofoam containers with different number of holes.

Conclusions

- When analyzing the results, no solid conclusion is formed after the 12-week experiment as it is uncertain which method is more efficient
- After the additional 3-week period, Styrofoam has shown to be more efficient than the compost bin in terms of composting
- Styrofoam containers can be used to compost at home and reduce the amount of Styrofoam entering the waste stream and, thus, reduce the amount of methane produced
- Styrofoam is a better alternative for composting than metal composting bins.

Recommendations

- Performing this experiment in summer might produce better results as higher surrounding temperature will increase the composting rate
- Starting with different number of holes to see significant differences