CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
34351

Project Title
Airsoft and the Environment: What Happens to All the BBs?

Abstract

Objectives/Goals
The objective of this project was to determine if biodegradable airsoft BBs biodegrade and whether they biodegrade faster than non-biodegradable airsoft BBs. I also examined what environmental conditions affected the breakdown of the BBs.

Methods/Materials
I set up this experiment using a control group and 15 test trays with 3 different types of BBs (biodegradable, non-biodegradable, and plastic) and exposing them to 3 environmental variables (exposure to sunlight, exposure to soil, and exposure to soil and grass clippings). I tested them with 2 different tests I designed to replicate conditions that would either crush or abrade them at 90, 180, 365, and 545 days. For the crush test, I squeezed the BBs in a bench vice measuring the force applied to the vice handle with a fish scale until they cracked. For the abrasion test, I measured the diameter of the BBs using a micrometer before and after rubbing them 100 times between two bricks.

Results
The abrasion test results show that the biodegradable BBs with exposure to soil and to soil and grass clippings degraded dramatically after the 365-day test, shrinking by 5mm (83%) at the 545-day test. The non-biodegradable and plastic BBs showed very little change. The results also show that exposure to soil and grass increases the degradation. Two of the shade samples completely disintegrated at 545 days indicating that biodegradable BBs degrade more completely when exposed to biological activity. The biodegradable BBs required less force to crush than the other types of BBs throughout the experiment, never exceeding 10 lbs. of force. The non-biodegradable BBs showed what I believe was a seasonal variation possibly related to temperature or moisture content requiring over 20 lbs. of force when dry and dropping as low as 8 lbs. when cold and moist. The plastic BBs weakened over time, rapidly at first then more slowly over time, likely due to the plastic becoming more brittle.

Conclusions/Discussion
My results supported my hypothesis that biodegradable BBs will degrade faster than non-biodegradable BBs. Although it took much longer than I expected biodegradable BBs do eventually biodegrade with exposure to biological activity. My results also showed that non-biodegradable BBs do not biodegrade over the time span of my experiment and plastic BBs slowly weaken over time. My project shows the importance of using biodegradable BBs to reduce plastic in the environment.

Summary Statement
My project was designed to determine if biodegradable airsoft BBs biodegrade, whether they biodegrade faster than other types of BBs, and what environmental variables affect the breakdown.

Help Received
My mom helped me glue my information to my board and she answered questions when I was using the computer. My dad helped me learn how to make a table for my test data and how to make a graph on the computer. He also let me use his workshop and tools for my tests.