CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35522

Project Title

Photodegradation vs. HDPE #2 Plastic Bags Pollution in Water, Soil and Its Effect on Plant's Growth

Abstract

Objectives/Goals

Photo-degraded plastic bags are a major problem when it comes to recycling. My main objective is trying to improve the photo-degradation of HDPE #2 plastic bags. I also wanted to learn what type of toxins can be released from these bags in water, soil and how could this affect plants growth. I think that the photo-degradation process of High Density Polyethylene plastic bags will reduce the effect of possible toxins remaining in the residues.

Methods/Materials

Soil pollution: Set pots with soil and have some samples with plastic residues to track plant growth for at least 6 weeks and the release of toxins.

Water pollution: Set samples of plastic bags and photo-degraded residues in water to observe any change regarding its properties and the possible release of toxins.

Materials: Soil, Beans, HDPE #2 Plastic bags and Photo-degraded residues, Tap water. Soil and Water test kits for Chromium.

Results

Plants growth wasn#t affected at all in this test. All the plant samples grew bean vines. Soil samples tested no trace of Chromium and photo-degraded plastic bags were not visible in any of the pots used for this procedure. Water samples showed no results of Chromium but plastic pieces were fragile and turned into little pieces. Photo-degraded plastic in water was impossible to retrieve and if they were drained the pieces weren#t visible anymore.

Conclusions/Discussion

Photo-degraded HDPE #2 plastic bags didn#t release any Chromium in water and/or soil. These experiments have proved that in a period of five months HDPE #2 can be degraded. Photo-degradation of HDPE #2 plastic eliminates its mechanical properties: strength, flexibility. The tiny residues of plastic can endanger the life of microorganisms. Water degradation can be performed but photo-degradation shows to be faster and more effective.

Summary Statement

Testing photo-degraded HDPE #2 plastic bag residues for water and soil pollution and the possible release of toxins.

Help Received

Field Research: Dr Roberto Ma. Gregorius-Canisius College, Vince Calder Ph. D., Lydia Zipp, Dr Christopher S. Brazel-University of Alabama, Julie Meloro-EPA

Preliminary