



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

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<b>Project Title</b> <b>Investigating the Ingestion of Synthetic Polymers by Mealworms vs. Superworms</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Approximately 50% of the plastic we use goes to waste after one use. The average American throws away 185 pounds of plastic each year. The solution: mealworms! The purpose of this project was to compare mealworms and superworms for their ability to consume plastic products. I tested styrofoam, high density polyethylene, polyester, and nylon to see whether beetle larvae are able to ingest these synthetic polymers. Would the worms be able to consume plastics other than styrofoam? Some research stated mealworms are more efficient than superworms at consuming styrofoam, so this project will also investigate whether mealworms and superworms differ significantly in their consumption of plastics.</p> <p><b>Methods/Materials</b> I obtained 1,000 superworms and 1,000 mealworms. I set up ten plastic test boxes with 200 mealworms or superworms in each, along with one of the synthetic polymers or the control. I tested the amount of material consumed by the worms from two blocks of styrofoam, twenty pieces of high density polyethylene, two pieces of polyester, two pieces of nylon, a carrot and lettuce (the control). I monitored these boxes for five weeks, and weighed the test material every third day, using a scale with 0.001 gram accuracy.</p> <p><b>Results</b> I tested 2,000 worms and evaluated over 100 data points. During the course of the experiment, the mealworms ingested 0.111g of styrofoam, and the superworms ingested 4.037g of styrofoam, more than 36 times the amount consumed by the mealworms. The mealworms also ingested 0.045g of high density polyethylene, and the superworms consumed 0.02 grams. The mealworms ingested of nylon, only 0.016 grams, while the superworms consumed 0.079g of nylon. The mealworms consumed none of the polyester, but the superworms ingested 0.041 grams of polyester.</p> <p><b>Conclusions/Discussion</b> My results revealed that neither the mealworms nor the superworms ingested significant amounts of synthetic polymers except for styrofoam. Contrary to my hypothesis, the superworms consumed significantly more styrofoam than the mealworms. Superworms also consumed small amounts of nylon and polyester, and surprisingly, both worms consumed small amounts of high density polyethylene. My project suggests superworms, and to some extent mealworms, in a landfill setting might be an effective resource for eliminating styrofoam, although neither worm would make a significant reduction to other disposed plastics.</p>	
<b>Summary Statement</b> I tested the mealworms and superworms in their ability to consume plastics, after the experiment I found that the styrofoam was consumed the most.	
<b>Help Received</b> None. I designed, built, and performed the experiments myself.	