

Biodegradable Bags

Name

Target Range School

8th Grade

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Question

Which biodegradable plastic bag breaks down the fastest compared to a traditional plastic bag?

Background Knowledge

I chose this topic because I wanted to compare biodegradable bags to a traditional plastic bag, to see if there's a difference over a short amount of time. I wanted to see if any of the brands were actually better than the others or than a typical plastic bag.

Research

Are biodegradable plastic bags really a solution to plastic pollution? This paper will include research to try and determine which biodegradable bag breaks down best. In order to research bags, it is necessary to know about the plastic waste in the environment, the most popular bag companies, the differences between biodegradable and non-biodegradable plastic, and finally how biodegradable the bags really are.

To begin with, it is important to know about different types of plastic waste in the environment, specifically plastic bags. The *UN Environment Programme* website says, "Between the 1970s-90s, plastic waste generation has more than tripled" (*UN Environment Programme, 2022*). Microplastics and other plastics in landfills can take up to 1,000 years to decompose, staying around for way too long and hurting animals and the environment. There definitely has to be a solution to this plastic problem, specifically focusing on plastic bags. "Annually, approximately 500 billion plastic bags are used worldwide" (*Plastic Oceans International, 2018*).

So, the most popular style of plastic bag is the T-shirt bag, and many companies use them. The website *Good Start Packaging* says that the brand Biobag is the most commonly used biodegradable bag, and "...they are made of a plant based bioplastic" (*Anon, Good Start Packaging, n.d.*). This is why biodegradable bags should decompose more easily than traditional plastic bags and be better for the environment. So, if biodegradable bags are well used, how much of a difference can they make?

There are some key differences between biodegradable and non-biodegradable plastics. The average non-compostable plastic bag is made of polyethylene, usually the high-density kind, also known as HDPE. HDPE materials are light but sturdy, so they're very popular with companies. The website *Geeks for Geeks* says, "Non-biodegradable products... damage our environment when they exist for a long time without decomposing" (Jain, 2024). On the other hand, compostable bags are made of natural, less-processed materials that are able to break down naturally. The same website says, "The entire

procedure... is natural. Therefore, there are very few... environmental problems associated with biodegradable garbage” (Jain, 2024). This is why biodegradable bags are thought to be the better choice for the environment.

So, how well do the bags actually work? The people at *PBS NewsHour* ran an experiment comparing bag types. They found that some ‘biodegradable’ bags didn’t break down even after 3 years underwater. The bag that broke down the fastest was the compostable option. *PBS*’ website says, “Even if these bags take less time to break down than traditional plastic bags, as litter they would still have time to become potentially deadly food for ocean animals” (Stein, 2019). This means not only do the bags need to break down, they need to break down quickly.

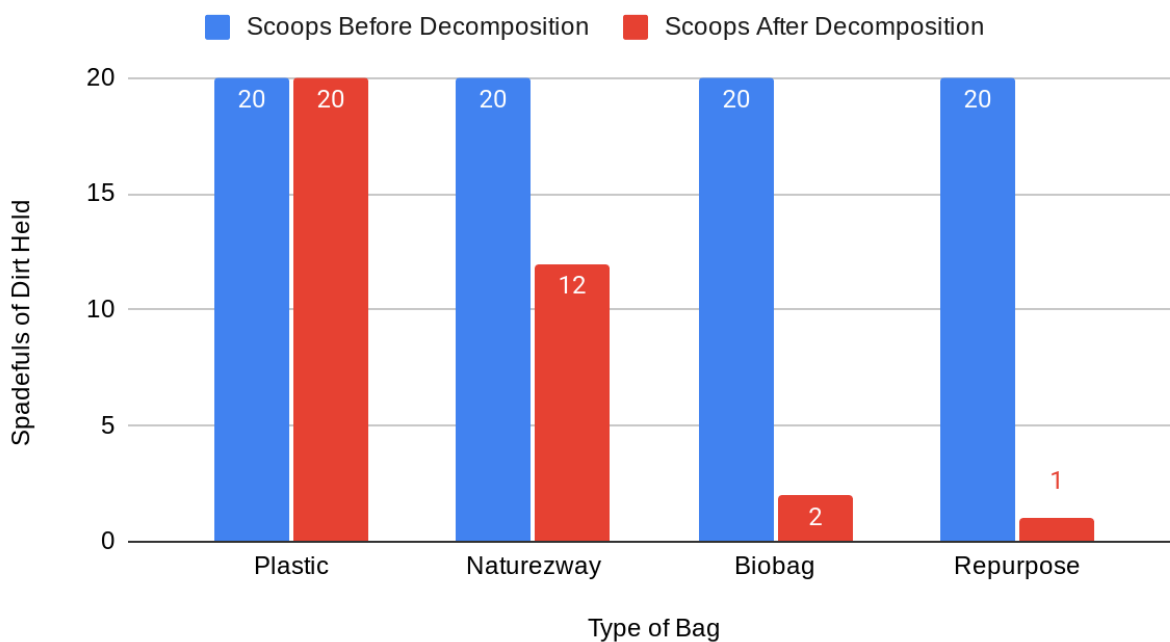
In conclusion, some biodegradable bags might be better than others for the environment. Understanding all types of plastic waste, popular bag companies, differences between biodegradable and non-biodegradable, and how compostable the bags really are will help solve the problems with plastics that do not decompose quickly enough.

Hypothesis

I think that the brand Biobag will break down the fastest because it is the most popular and made of 100% compostable materials.

Data

How Many Scoops Can a Bag Hold



Data Analysis

This graph is showing the number of spade-fuls of dirt that the different types of bags could hold, before and after decomposition. I used the same spade and the same dirt each time, and held the bags with one hand. If a bag ripped or broke after a number of scoops, that’s the number I counted. If a bag held twenty scoops, I stopped counting, so it’s possible some bags eventually held more than others. There was

a significant difference on all bags after the experiment except for the plastic one, which showed hardly any change. Naturezway showed the second least, and then Biobag, with Repurpose doing the best. Repurpose couldn't even hold one spadeful after decomposing, which is an ideal result.

Conclusion

In conclusion, my hypothesis was incorrect. My hypothesis was that the brand Biobag would break down the fastest because it is the most popular and made of 100% compostable materials. This was incorrect because the brand Repurpose had better results and held even less dirt after the experiment, even though it was close.

I conducted my experiment by getting three types of biodegradable bags and one plastic bag, and putting them on my feet and scuffing them around a yard to wear them out. I then buried the bags in their own pots, and watered them with the same amount of water daily for a little more than 2 weeks. When I took them out, I tested how many scoops of dirt the bags could hold after decomposing, and also recorded the overall effects that were shown on the bags.

Some things that may have affected my experiment's results are that I became sick at the deadline, so the experiment did run longer than 2 weeks. Also, the pots were watered at different times each day and I missed a few days. If I could go back and do this experiment again, I would only run for a specific amount of time and water at the same time every day.

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