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J2201

Project Title
What Different Types of Microplastic and Biodegradable Plastic Affect Plant Growth the Most?

Abstract

Objectives/Goals
To determine which types of microplastic (polypropylene granules, foam, and microplastic made from plastic bag) affects plant growth the most, and also to determine which type of biodegradable plastic (cornstarch, banana peel, algae and coconut) impacts the plant growth.

Methods/Materials
Three different types of experiments were conducted in which 148 plants were planted with different proportions of soil, microplastic and biodegradable plastic. I measured the plants' daily growth.
The first set of experiments consisted of growing pinto beans and making 5 groups of 10 plants in each. Each group was planted with a different proportion of soil mixed in with microplastic (polypropylene) or biodegradable plastic (cornstarch).
The second set consisted of growing microgreens: savory mix and making 5 groups of 10 plants in each. Each one was planted with 50% soil and 50% of either cornstarch biodegradable plastic, banana peel biodegradable plastic, algae biodegradable plastic, or coconut biodegradable plastic.
The third set of experiments consisted of growing microgreens: savory mix and making 4 groups of 12 plants in each. Each one was planted with a different proportion of soil mixed in with either polypropylene granules, microplastic made from plastic bag, or foam.

Results
In Experiment 1, in which I compared plants with different proportions of soil, microplastic and biodegradable plastic, the group that grew the less were the ones that contained 75% biodegradable plastic and 25% soil which grew 86% less than the ones with 100% soil.
In Experiment 2, in which I compared plants with soil and different types of biodegradable plastic, the group of plants that grew the least were the ones that had 50% coconut biodegradable plastic and 50% soil, which grew 37% less than the ones with 100% soil.
In Experiment 3, in which I compared plants with different proportions of soil and different types of microplastic, the group that grew the less were the ones that contained 75% microplastics from plastic bags and 25% soil.

Conclusions/Discussion
Plastic negatively affects plants, as can be seen by the low growth rate of the plants that contained micro plastic. Biodegradable plastic has been developing as a possible solution to reduce the plastic contamination. This can be seen with the corn starch and algae biodegradable plastic, which merely affected plant growth.

Summary Statement
Since plastic pollution is a severe problem in the world of today, I conducted experiments to determine which plastic impacts plant growth the least and to determine if biodegradable plastic is a good alternative.

Help Received
I did most of experimentation on my own. However, I got advice from Ignacio Vilchis (Ph.D.), Kathryn McCulloch (Ph.D), Leonard Vargas (Olivewood Gardens manager), and from Lourdes Nebel (garden architect).