

Biomagnification Activity

Introduction

Many chemicals produced by industries end up in the environment through dumping or runoff. These chemicals may be persistent and accumulate in the fatty tissue of organisms. Unable to be excreted, the chemicals move up the food chain, increasing in concentration at higher trophic levels. This is known as biomagnification. Examples of chemicals that bioaccumulate include mercury and DDT.

Aim

To model how contaminants can accumulate in higher-order organisms within a food chain or web

Materials

- Large “mixing” cup (environment)
- 10 × red M&Ms (producers with DDT)
- 20 × non-red M&Ms (normal producers)
- 9 × small cups (minnows)
- 3 × medium cups (sunfish)
- 1 × large cup (osprey)

Method

1. Place all 30 M&Ms in the “mixing” cup to represent all the producers within a particular population
2. Record the amount of contaminant per producer (i.e. 10 contaminants per 30 producers = 0.33)
3. Mix the M&Ms before randomly removing three and placing them in a small cup (eaten by minnow)
4. Repeat step 3 for the remaining small cups and record the amount of contaminant per minnow
5. Empty the contents of two small cups into a medium cup (represents sunfish eating minnows)
6. Repeat step 5 for the remaining small cups and record the amount of contaminant per sunfish
7. Empty two medium cups into the large cup (osprey eating sunfish) and record contaminant level
8. Repeat the experiment multiple times (or collate class data) and determine the average amounts

Results

Type of Organism	Amount of contaminant per organism					
	Group 1	Group 2	Group 3	Group 4	Group 5	Average
Producer						
Minnow						
Sunfish						
Osprey						

Discussion

1. Describe the trend seen and provide a scientific explanation for why it has occurred

2. Suggest whether the precision should be represented by standard deviation or standard error

3. Use the following information to construct a food web of the ecosystem these organisms inhabit:

- Algae undergo photosynthesis
- Minnows eat zooplankton, algae and insects
- Sunfish eat minnows and insects
- Insects eat zooplankton and algae
- Zooplankton eat algae
- Bass eat sunfish and minnows
- Osprey eat bass
- Turtles eat minnows and sunfish