

Does mouthwash affect worm burrows?



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Abstract

“Does mouthwash affect a worm's burrowing?” This question might be weird because we are using more mouthwash instead of water. We know that water makes a worm burrow but what about other liquids? We decided to use mouthwash and see if it affects the worms burrowing. After collecting the data, the earthworms burrow faster for the 50/50 water/mouthwash which makes it more significant. The 25/75 water/mouthwash wasn't as significant because the mouthwash wasn't something the worm was used to. The mouthwash has high chemical reactions which could hurt the worm if it was just 100% mouthwash. This research question shows if other liquids affect the burrowing of the worm. Our hypothesis was wrong right it did burrow faster in more water and it was more slow when more mouthwash was added. The worms are more used to water but when they have less water they can be a bit slow but the more water or liquid that's added to make the worm burrow faster and so that the worm is more active. Testing a worm is important because worms can detect more human diseases. The worms are soil engineers which means they loosen the soil and mix it up. As you can see from the results from the T-test the 50/50 water/mouthwash was more significant than the 25/75 water/mouthwash. The mouthwash slows down significantly because of the high chemicals.

Introduction

Our research question was “Does mouthwash affect a worm's burrow”? Well yes, If the earthworm is exposed to mouthwash then the earthworm's burrowing will slow down significantly because mouthwash has high chemicals. However, the way that us humans use this is mostly in the morning, but some at night. Mouthwash helps with killing bacteria, and it also helps strengthen your teeth. Mouthwash is also a source to help kill gum disease. This is

important to study because there are two main types of mouthrinse: cosmetic and therapeutic. Therapeutic mouthrinses are available both over-the-counter and by prescription, depending on the formulation. There are therapeutic mouthrinses that help reduce or control plaque, gingivitis, bad breath, and tooth decay.

Mouthwash was first created in the late 1879, the goal of mouthwash was to clean and sterilize surgical wounds. The formula for mouthwash is $C_{30}H_{52}O_3$ which we can see is mostly made out of hydrogen. The active ingredients in listerine are eucalyptol, menthol, methyl salicylate, and thymol. For our experiment we are not trying different liquids but yet instead we are putting different amounts of water. We can not put only mouthwash on the worm or it will die so we decided to water it down with different amounts of water.

The chemicals can affect humans by the chemicals going into our noses and to our lungs. That can affect our immune system and our health. We are studying worms instead of humans because worms provide models for tons of human diseases. They are similar because they have a vertical nerve cord. A vertical nerve cord is a major structure in the nervous system. The worm's vertical nerve cord can regenerate while the human's vertical nerve cord can't.

Mouthwash in some ways can get into the soil. This is possible because say a truck had an accident and it was filled with a bunch of mouthwash, then the scene of the accident would be filled with the smell and wetness of it. Another example is if someone is camping and they spill the mouthwash in the soil. We should care about our soil, and environment because this is what we intake or what our animals eat off of. Having a bad environment would cause the animals to have a bad life, and may cause health problems for us.

We think that worms will burrow faster with the water than the mouthwash. We think this is correct because mouthwash has certain chemicals to kill germs that could affect a worm.

Methods

Our earthworms project was to test if mouthwash affects the worm's burrowing time. We used earthworms, water, Listerine mouthwash, a worm, and a timer to collect all of our data. First we needed to make our solutions by combining water and mouthwash in a 50/50 ratio and in a 75/25 ratio. Then we needed to soak one paper towel with the mouthwash/water and let the worm soak in the paper for one minute. Then after that we had to put the worm in the soil for one minute to see if it burrowed. We had to do it with the paper soaked in 100 % water and both water and mouthwash ratios. Then we added the data to the Google Sheets, made a graph, and performed T-tests.

Results

The water had the longest burrowing time with an average of 151 seconds. The 50/50 water/mouthwash had the fastest burrowing time with an average of 74.7 seconds. The 25/75 water/mouthwash made the worm burrow slower with an average burrowing time of 96 seconds. The liquid they are used to is water and mouthwash is not something the worm is used to. So the 25/75 water/mouthwash shows that there was more mouthwash than water which made the worm go slower because they are not used to the mouthwash. The 50/50 water/mouthwash was significant compared to water with a p-value of 0.041. The 25/75 water/mouthwash was not significant compared to the water with a p-value of 0.11.

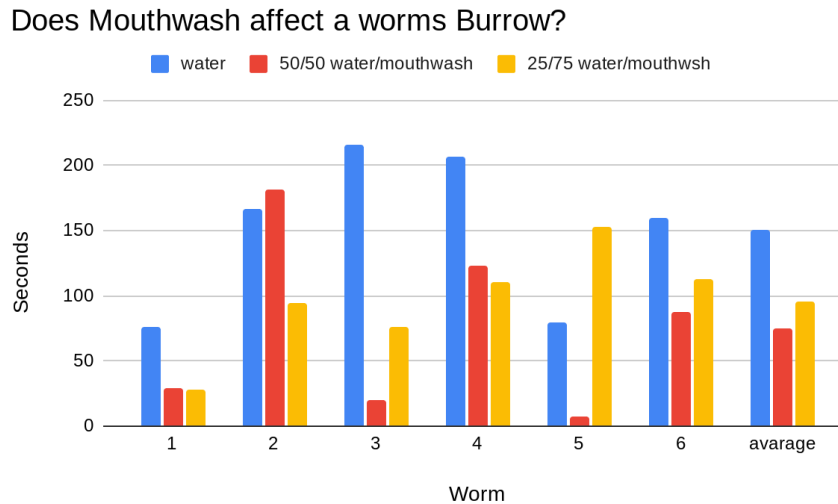
The independent variable is if the mouthwash affects the worm's burrow, the dependent variable is the amount of time for the worm to burrow and the controlled variable is the amount

of liquid, the time in the liquid, and the soil amount. We used the T-test to see if water or mouthwash would affect the worm.

Table 1: water/mouthwash data table

Worm	Water	50/50 Water/ Mouthwash	25/75 Water/ Mouthwash
1	76	29	28
2	167	181	95
3	216	20	76
4	207	123	111
5	80	7	153
6	160	88	113
Average	151	74.66666667	96
T-test		0.04120858102	0.1189649264

Figure 1: Does Mouthwash affect a Worm Burrow?



Conclusion

The 50/50 water/mouthwash was the most significant because it was under 0.05. In the data we found that worms burrow the fastest with 50% water and 50% mouthwash. We think this because they are not used to the different chemicals. The second fastest was the 25% water and the 75% mouthwash, this was because the worms could feel more of the burning sensation coming from the mouthwash causing the worms to burrow faster. Lastly, 100% water this was the longest round for the worms to burrow. This is because the worms are used to the pH level coming from the water. A big trend that was happening during this experiment was that the worms would burrow in each trial. Some of the worms would burrow in seconds, and others would take a couple of minutes.

Some of the limitations that we had was not knowing if we were picking the same worms, or different ones. Another limitation was some of the worms not burrowing in the time we had. The limitations were that worms wouldn't move and it would take longer for them to burrow. The overall picture of this experiment is that different worms may react differently, because all worms live a different life in the environment. This also clarifies that worms feel more comfortable with water and its PH level. Some future research that we would like to do is testing another substance than water. Something that may get the worms to like the mouthwash more.

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