

## **Ability of Microbes and How to Utilise Them**

### 1. Motivation behind Research Paper

Recently, we often think about environmental problems. I decided to study these problems. What is a good environment? According to NACS-J, many people imagine a green forest. I want to compare this to a polluted environment. What is a polluted environment? For example, muddy rivers and abandoned pet bottles. These types of places exist on earth. People clean these places with machines, but this way has a risk of destroying the environment. I want to select the way that hardly destroys it. I focused on the decomposition of microorganism's abilities because I think it can be cleaned without harming them. This essay is about microorganism's abilities and research results.

### 2. Introduction

The data collected for this study will include online sources and experiments. I will introduce bioremediation. Bioremediation is technology that uses microorganisms and plants to clean the environment. In the 1970s, this was first used for decomposition of petroleum in the USA. Also according to environmental technology commentary, bioremediation has two types. First, people provide water and nutrition to microorganisms that were originally there to promote decomposition of contaminants. This way is called biostimulation. Second, it is to introduce new microorganisms there. This is called bio-augmentation. Bioremediation needs more

time to clean than other ways. However, it doesn't need more energy. According to "Cleaning the Environment with Microorganisms-What is Bioremediation?" It is studied hard by many people, but it isn't known around the world. Why?

The reasons are to need more time, low profile, and it is difficult to clean high concentration pollution. Therefore, I want to solve the problem of low profile so I make terrariums. It can feel close to microorganisms to people. In addition, I want to do experiments that will defile terrariums, clean by microorganisms.

### 3. Results and Analysis

I used soils, plants and stones from school for terrariums and I got rain water to put in it.



Those are pictures of its collected place and completed terrariums.

I have put it in my classroom so my classmates can see it and learn about microorganism's ability. However, the experiment was a failure because I did it in summer. Plants wither and rain water evaporates because of the heat. I could not confirm the microorganism's ability because of that, but I could find out another experiment. I did it. First, I got rain water and tap water. Second, starch was put in both. Third, iodine solution was put in both and left for a few days. After that, tap water's colour changed to purple blue, but there are microorganisms in rainwater so

it didn't change the colour. In short, microorganisms have the ability to break things down. However, I didn't know that microorganisms can disassemble plastic by this experiment. Then, I learned about biodegradable plastics. It is a plastic that can be broken down into water and carbon dioxide by microorganisms. According to the NTT Technology Journal, biodegradable plastics degrade faster than existing plastics. Otherwise it can reduce the use of fossil resources and carbon dioxide emissions but there are demerits. The biggest problem is the cost issue. The reason for this is that it takes a lot of time and effort to make biodegradable plastics. But with improved technology, costs could also be reduced. In doing so, it may be used around the world. However, I see one problem. I believe that the use of biodegradable plastics will lead to a decline in environmental awareness. To avoid this, people need to develop a better understanding of the environment.

#### 4. Conclusion and Future Problems

In conclusion, microorganism's ability is one way that can solve the environment problem. However, this has some disadvantages. It needs more time than other ways, but it can break the environment less than others. There is environmental restoration technology. This is called bioremediation. That started in America in the 1970s. That can be used at low cost under mild conditions, but it is low profile. So I do that to let everyone know that I make terrariums. And I know biodegradable plastics. This can be broken down into water and carbon dioxide by microorganisms and this can take less time. However, it is not yet used around the world. Why is that? Cost is the biggest reason, but this problem will be solved with the improvement of technology.

Conversely, there is a possibility that environmental awareness will decline. To prevent this from happening we need to learn more about the environment.

## 5. Reflection

I came to think that studying is very important from the research. At first, I came up with using microorganism's ability for clean the environment because of what I had studied in my biology class. Also, when I missed my experiment, I didn't give up studying. So, I could learn about biological plastics. I came to think that studying is essential in our life. From now on, I would like to study everyday, seeing everything as something that will be useful someday.

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