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### **Zimbabwe: A Look Into Large-Scale Biofarming**

Take a moment to think of the continent of Africa. Beautiful rivers flow between monstrous mountains and wondrous rainforests. Birds of many colors fly overhead, and snakes and other creatures slither across the clean ground underfoot. Now forget about all of these extraordinary sights. Picture emaciated human civilizations, barely surviving. Picture having to drink from pollution and bacteria laden waterways. Many places in Africa are suffering. They are suffering due to a multitude of things. Diseases ravage the country, malnutrition is far too prevalent, and water pollution is nearly constant. However, these can be changed. This essay will take a look into the uses, effects, and purposes of biopesticides.

Zimbabwe is a presidential republic with a capital city of Harare. It's past president was Robert Mugabe, who was usurped from his position of leadership. It's current leader is Emmerson Mnangagwa (Though it is not relevant to this paper to understand the current president, it is important to understand the change of power, as well as the governmental instability that plagues the nation). Its main sources of jobs stem from mining and agriculture. It is landlocked, sitting nearly centered in the continent of Africa. Approximately 42.5% of the country's land is used for agricultural purposes. The total population is estimated at 13,805,084 people (CIA's *The World Factbook*). The Republic of Zimbabwe currently recognizes 16 official languages, with the three widespread languages being English, as well as the native languages of Ndebele and Shona.

In the country, the men work while the women are tasked with caring for their children. In *Countries and their Cultures*, it is stated that "The average household is 4.76 persons." The families form tight knit circles, indicating a loving and happy environment (Mashaire). The people that live there seem to be peaceful and calm, and are typically subsistence farmers of the corn, wheat, and barley variety. Though some of the people in the country are compacted into cities, such as the nation's capital, many live on the outskirts of civilization. It is a developing nation. Therefore, technology is minimal when compared to today's leading civilizations, such as America, Canada, Japan, and England. Even though it is developing, it is still capable of utilizing electricity, cellular networks, and power plants.

Though the country sounds peaceful and plain, it is not without its share of problems. The culture is male-dominated. It is such an extreme patriarchal country that women and children are literally the property of the man of the house (*Countries and their Cultures*). Drinking water and sanitation are major problems to anyone that does not live in one of Zimbabwe's larger cities. The unemployment rate is above 80% with some studies projecting it as high as 95%. A whopping 32.7% of rural citizens live with unimproved

water sources, and 69.2% of that same rural population live with unimproved sanitation access (data gathered from CIA's *The World Factbook*). Crops are very hard to grow as the desert terrain is barren of water and minerals that would be beneficial to plants. It is truly a harsh life.

Many natives to Zimbabwe leave their homes in search of better living conditions elsewhere in Africa. The Southern African Migration Project conducted a series of interviews on Zimbabwean refugees in order to better understand why they were choosing to leave their home country. Interviewee Number 34 stated, "The situation in Zimbabwe is very bad -- there are no jobs, no food." Another refugee agreed, claiming, "There was a shortage of maize (corn) meal, sugar, and there was no rain." (Interviewee Number 29) If a major reason for these people to leave their lives and homes is due to lack of necessary resources such as water and food, it would stand to reason that an effort to improve both water and food sources should be made (Lefko- Everett 270-271).

The water sources in Zimbabwe are dicey at best. It is landlocked, as previously mentioned, which means that all water comes from lakes, rivers, and a type of well known as a borehole. A borehole is created when a drill is driven into the ground, and moved deeper and deeper into the earth until water is struck. The water in these wells is stagnant, and when these wells are opened, they are used by many rural citizens. This water is often unsafe to drink, and allows disease and illness to spread throughout the country. This water like most rivers and lakes, is polluted by the heavy use of pesticides on crops. Food sources are low, because the extreme pesticides most farmers are forced to use are not only dangerous to pets, but to their crops as well. The use of these pesticides is a well-meaning act of farmers, and in their jobs to keep Zimbabwe's food sources safe, this practice is actually destroying both their water and food stores.

The main crop of Zimbabwe is maize. This crop's main pest is the Stalk-Borer, which burrows into the stalk of the plant and breeds. This effectively kills the plant. The impact of pesticides is widespread throughout the country. If farmers are not able to supply food, people all over Zimbabwe go hungry. If farmers pollute the water sources, all Zimbabweans stand the risk of becoming ill from using the contaminated water. However, there is a key solution that can put an end to this violent, self-destructive force. The solution is called biopesticides, an ingenious creation of modern biologists and scientists. This utilization of technology is much more efficient and applicable than others. Don't forget the borehole, a use of technology that ended up damaging more than benefiting. Biopesticides are much more appropriate, because they cause no major damage to the climate, flora, or fauna of the population (other than reducing or repelling certain types of pests). Essentially, biopesticides are biological tools that are poisonous, repellant toward, or interrupt the mating cycle of invasive bugs, yet are perfectly safe to humans and plants alike (*What are Biopesticides?*). The major pests of Zimbabwe include the Armoured Cricket and Fall Armyworm. However Stalk-Borers, a mothlike specimen, have historically been responsible for catastrophic damage to maize crops, one of Zimbabwe's main staple foods.

Unfortunately, no known biopesticides are capable of killing off or affecting the Stalk-Borers of Southern Africa. Yet, research is a highly viable option. Stalk-Borers need to be studied, and tested in order to find

a biological substance that is capable of inhibiting the insect. The substance doesn't even need to kill the bug. It could be something as simple as masking their mating pheromones, drastically lowering the chance of larvae being created. This would give maize crops in future years a much better chance of surviving the attack of invasive species.

After research is conducted and a suitable biopesticide is discovered, the next course of action would be creating a product that is affordable, able to be mass produced, and capable of being delivered to farmers in Zimbabwe that need it. There are multiple types of biopesticides that may fit all of these criteria. Fungi have the capacity to live among many species of plants, while having no negative affect toward them. On top of that, fungi typically employ defense mechanisms that make them poisonous toward many types of insects. Another possibility for farmers to use in the line of biopesticides is introducing foreign bacteria both to the soil and the crops. In order for this bacteria to work, it would have to do one of a number of things. It would have to either mask the scent of maize, essentially making the crop unappealing to Stalk-Borers; be deadly to the insects if the bacteria were to come into contact with them; or disrupt mating sequence of the bugs. The final biopesticide is likely the cheapest one: natural resources. This type of biopesticide is not a living thing, but a common chemical or item that is inherently dangerous to invasive species, yet is not able to harm maize or humans. Any one of these classes of biopesticides has the capability to increase production of staple crops, as well as causing no damage to water or food sources.

However, there are a few issues that must be taken into consideration. First and foremost is the fact that there is currently no known pesticide that is especially effective toward Stalk-Borers. This leads farmers to overuse conventional pesticides, even further damaging crops and waterways. Since there is not yet a chemical or substance that is capable of protecting crops from Stalk-Borers, finding a biopesticide will likely prove to be a difficult task. But with advances in modern farming, there should be no doubt that a discovery can be found. Another issue is bringing the biopesticide itself to the farmers of Zimbabwe. Luckily, biopesticides are natural, and will hopefully be able to be created in Zimbabwe itself, which has the added benefit of providing jobs to the horribly unemployed people of the country. Another major problem is the possibility of the farmers not using the newly developed biopesticide, simply due to a lack of education about the new farming technique, as well as not enough understanding about the harmful effects that conventional pesticides have on the environment and humans alike. To remedy this, teaching farmers is a natural solution. To teach them would allow the people to see just how important it is that biopesticides are implemented, as well as making them aware of their direct influence on their ecosystem.

It is highly recommended that a plan be implemented to research both the anatomy and biology of Stalk-Borers, as well as to develop a deeper understanding of the uses of biopesticides. Educating the citizens of Zimbabwe would most definitely prove to be a deeply effective tool. Both the government, as well as the people of Zimbabwe, could have a major hand in working toward a solution. The republic could create incentive to push scientists to focus more on Stalk-Borers. They could offer rewards or funding for those that are willing to research the insect. Scientists could then enlist multitudes of citizens to procure and isolate the bug. In return, the people would be rewarded with resources or assets. Doing so would also benefit the republic-- by putting them in a good light in the eyes of the people, as well as moving closer to

bigger crop yields.

There are multiple companies and groups taking strides to enlist biopesticides in African farming. However, I would argue that there are not nearly enough to take on an instrumental and tremendous process such as this. One such group, *ICGEB* (International Centre for Genetic Engineering and Biotechnology), has its eyes set on researching plants, bacteria, and humans across the globe, as well as implementing many unique ways to better human life. Their goal is to “significantly improve quality of life” (ICGEB).

Zimbabwe is in dire need of changes both sanitation wise as well as agriculturally. The proposal of utilizing biopesticides improves the net crop harvest and the water purity. It also has the added benefit of creating jobs for citizens that urgently need them. The research that would be conducted will have the benefit of aiding in the control of future pest infestations. I truly believe that researching the Stalk-Borer in the effort of producing an effective biopesticide to control the insect is a righteous decision, one that will benefit not only the people of Zimbabwe, but people globally. I urge that this idea is reviewed and adopted as soon as possible, because people are suffering. They might be in trouble halfway across the world, but the suffering of one is the suffering of all. To be able to help people rewards one with an amazing feeling.

I ask that when this paper is read, the reader takes a moment to understand what the purpose of this essay is. It is not for a grade, or because I’m required to write it. It is not for the scholarship, or because it looks good to colleges. I am doing it because I care for everyone on the planet, and it is clear that the lives of people in Zimbabwe can and should be drastically improved. The purpose of this essay is to draw attention to people in need, as well as propose an idea as a way to relieve the suffering of the people in need. The suffering of one man should and must be felt by all. No being should be alone in their struggle, and it is our duty to make sure that nobody has to go at it alone. “Our prime purpose in life is to help others. And if you can’t help them, at least don’t hurt them” (Dalai Lama). Thank you for taking the time to read this paper.

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