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The Reliance on Maize in Ghana

A mile down the road from the food stand, a nine-year-old boy named Richard Turkson stands in line for his bread. As the son of Ghana's Ambassador to Canada, he has money for ten loaves, but when he reaches the front of the line he only receives two. During the early 1980s in Ghana, Richard Turkson, his friends, and his country suffered from the famine. The death toll in October 1984, estimated to be 200,000 deaths in Eastern Africa alone in regards to the famine (Dougherty). He says, "my family were fortunate enough to get left-over food from my mother's job at the hotel; however, my friends only ate two pieces of bread each day." This is clear evidence to how famines, pest infestations, and drought problems need to be cared for immediately. As Rachel Naomi Remen, Clinical Professor of Family and Community Medicine at the UCSF School of Medicine, once said, "Helping, fixing and serving represent three different ways of seeing life. When you help, you see life as weak. When you fix, you see life as broken. When you serve, you see life as a whole. Fixing and helping may be the work of the ego, and service the work of the soul." As I listen to Richard Turkson tell me about the challenges he faced as a child growing up in Ghana, I feel compelled to help protect their lives from starvation and guard their security as a whole. As I strive to help them, a part of my soul smiles as I see families thrive. My soul is determined to rectify this pest infestation problem in Ghana by searching for potential solutions.

In modern day, there are serious problems in Ghana as the government faces challenges in the ability to feed its population. The growth in agriculture is critical to meet the goals of reducing hunger, poverty, and ensuring food security. By eliminating the major constraints to productivity, such as pests, weeds and infertile soils, agricultural growth can be achieved. Complete elimination of these problems has not yet been achieved and remains a major cause of extreme hunger, malnutrition and poverty (ICIPE). It is imperative to start taking action before this problem causes more issues.

Maize was introduced into Africa in the 1500s and has since become one of Africa's dominant food crops. In Ghana and many other regions, it is consumed as a vegetable although it is a grain crop. The grains are "rich in dietary fibers, vitamins A, C and E, carbohydrates, and essential minerals, and contains 9% protein" (IITA). In addition, the calories contained in this crop are a good source of energy. Many Ghanaian farmers rely on maize for livestock feed and as a raw material for industrial products. Of an estimated 5 million small scale farming households in Ghana, more than 1 million (20%) gain a main income from the production of maize (Maize: IITA). This crop is Ghana's number one staple crop, but unfortunately it is being severely attacked by stem borers, and the Striga "witch weed." Without this staple food crop in Ghana, there will be many citizens facing an uncertain future.

For instance, a Ghanaian farming family grows maize as their staple food crop. The family relies on this crop as a valuable part of their diet, a main source of their income, and animal fodder. The crop shows signs of distress forcing the realization that their maize crop is slowly dying, and their survival is in grave jeopardy. It is determined that stem borers and Striga are attacking their maize crop, the farmer then potentially falls into the category of being impoverished. Especially with Ghanaian farming families, they belong to a large family. Mr. Richard Turkson discussed how "family in Ghana, goes beyond spouse and children. There are parents, siblings, uncles, cousins, aunts, grand-parents and great grand-relations." The importance in ensuring food security is vital for this family, so they can survive on a daily basis.

In addition to these problems, another constraint leading to hunger in Ghana is the concern of storing the maize post harvest. Paul W. Armah, an agriculture economics professor, and Felix Asante, Research Fellow at ISSER, University of Ghana suggest that "Ghana is about 99% self-sufficient in domestic maize

production and therefore, inadequate storage may be considered as the major cause of maize price variability in Ghana"(ITTA). With the post harvest storage and pest infestations problems throughout sub-Saharan Africa, there have been different ideas to help this scenario; however, no one has taken real action to solve this serious problem.

With the combination of the Striga weed and stem borers attacking the maize crop, it could potentially wipe out an entire yield; leading to negative outcomes such as poverty, hunger, and an economic crisis in Ghana. Maize is Ghana's number one staple crop followed by rice, and the domestic demand for both is growing. "Between 2010 and 2015, maize demand is projected to grow at a compound annual growth of 2.6 percent. However, Ghana has experienced average shortfalls in domestic maize supplies of 12 percent" (ITTA).

Striga is a parasitic plant that attaches itself to the host crop roots, and steals essential nutrients that the maize is trying to get from the soil. The IITA (International Institute of Tropical Agriculture) estimates that "approximately 100 million sub-Saharan African farmers could lose up to $1.2 billion" from the effects of the Striga." In addition, Stem borers are a serious problem when trying to protect the maize. Stem borers are the larvae of several kinds of moths. Stem borer moths mate and deposit their eggs in groups of 30-100 on the inner sheath of the plant near the funnel (REAP). The larvae feed on the funnel and then tunnel into the young plant. As the larvae bore into the stem, they weaken the plant, leaving it highly susceptible to being blown over. "Losses caused by stem borers can reach as high as 80% in some areas and an average of about 15-40% in others, and the losses attributed to Striga range between 30 and 100%" (ICIPE). In addition, trends in data have shown that these pests are multiplying quickly and the effects are worsening. It is imperative to keep these pests away from this crop.

To take action regarding this problem in Ghana, an easy and affordable agricultural practice is ideal. The agriculture practice that will likely be most beneficial to this country is the push-pull system. Dr. Zeyaur Khan, a Principal Scientist and Leader of the Grass Ecosystems Program at the International Centre of Insect Physiology and Ecology (ICIPE) founded the push-pull practice. The push–pull technology is a strategy for controlling agricultural pests by using repellent "push" plants and trap "pull" plants (NSJ).The technology is appropriate and economical to the resource-poor smallholder farmers in the region as it is based on locally available plants, not expensive external inputs, and fits well with traditional intercropping systems in Africa. "To date it has been adopted by over 35,000 smallholder farmers in East Africa where maize yields have increased from about 1 t/ha to 3.5 t/ha, achieved with minimal inputs" (ICIPE). This system is likely to encounter little resistance to adoption by a society that values traditional processes and plants. Its affordability should also help to make it appealing to the maize farmers of Ghana.

The push-pull system will consist of a push crop, a pull crop, and the main crop. The pull crops importance in this system is to attract the stem borer pest. Napier grass is an effective pull crop for controlling stem borers. When Napier grass is planted around maize fields, the stem borers are attracted to the grass and the damage to the crop is minimized. The Napier does not waste the arable farmland as it can still be cut and fed to livestock. This helps to diversify the farmer's yield and generate more income from the livestock. In addition, this pull crop could be of vital importance to the farmer's family. Because Napier is a great animal fodder for cows, a family can raise their own herd of cows to produce more milk for their family. This could then lead to selling the cow for more income, and even being able to send children to school.

The push crops importance in this system is to repel the Striga weed. The push crop Desmodium, a fodder legume, is intercropped with the maize crop. The Desmodium covers the surface of the ground between the maize rows, and expels a natural chemical in the ground that inhibits Striga growth. This effectively prevents it from growing close enough to the maize to tap into its vulnerable root system.

Therefore, leading Striga to not grow anywhere near Desmodium. Desmodium is the best push crop for this system because it also puts nitrogen back into the soil through nitrogen fixation. In addition, like the pull crop, it can be sold to other people for animal fodder too. With this agricultural practice, it reduces all the constraints of pests, weeds and degraded soils.

When practicing the Push- Pull system, it is important to follow specific measurements when preparing your field of push and pull crops. Developed by the founders of this practice, ICIPE has created measurements for each field. A push pull plot can be as large as 21m x 21m (about 69ft x 69ft), and as small as 10m x 10m (33ft x 33ft). This can be of great convenience to a small-scale farmer because the plots are flexible to the amount of space provided by the farmer.

Agriculture is the backbone of the Ghanaian economy. It plays an important role in the socioeconomic development of Ghana as it contributes to ensuring food security, provides raw materials for local industries, and provides employment and incomes for most of the population, thereby contributing to economic development and poverty reduction. In addition, "it is the number one crop in terms of area planted and accounts for 50-60% of total cereal production" (ITTA). By implementing the push-pull system it will likely reach my millennium development goals of providing food security, children's health, and economic development by 2015.

With the culture in Ghana being very traditional, it is likely favorable that they would prefer a more traditional resolution to this pest infestation to the maize crop. When speaking with Richard Turkson he described to me the importance of seeking respect first in the villages with the chief. In order to communicate a resolution to this problem, it is imperative to talk with the chief of the village first. In addition, when speaking I will hear either English, or Pidgin English. The Pidgin English language is a mix of American English, and their native twang. With the push-pull system it is a traditional way of farming that the villages would feel comfortable adopting. The reason to why Ghanaian farmers aren't using this push-pull system to protect their maize today is explained by their education levels and cultural resistance to change. For example, in modern day Ghana, only 47% of females attend primary schooling (Otto). Especially with Ghana's traditional culture, the people are hesitant towards change. That is why seeking respect in their village's chief is essential when teaching new ideas.

Although there are many different ways in resolving this pest infestation in Ghana, the push-pull agriculture practice is the most traditional option. For example, with the technology we have today there is a method of genetically modifying the crop so it repels all pests. In addition, there is the option of spraying pesticides on the crop to reduce the amount of pests. Although these could be options for this problem in Ghana, the side effects are unknown, and the natives could not trust these technology oriented methods. If these technology based options were to be used as the resolution, there could a potential health risk from the unknown side effects, which could lead to yet another problem. Like Richard Turkson said, "the natives use traditional farming practices."

Using the Push-Pull practice it eliminates the need to genetically modify food, and the use of pesticides. In addition, it provides more income to the farmer by providing the ability to harvest the Napier grass and the Desmodium legume. This simple resolution could potentially resolve many of the problems that have lead to hunger in Ghana. In regards to the climate change impacts in Ghana "resulting in severe droughts in the dry season, severe floods, high temperatures, [and the] influx of pest and diseases taking away human life and property," there is a need for a resolution in order to resolve looming issues for the future (ICIPE). The push-pull system will likely eliminate many of the major problems leading to hunger, and will eliminate future issues concerning climate change.

As Richard Turkson stands in line for his bread in modern day Ghana, there is still a chance that he would only receive those two loaves of bread. The people in Ghana still struggle with memories from the early

1980s famine, and in modern day I believe the push-pull system will likely eliminate all fears leading to hunger. As I have searched for potential solutions to fix this issue, I have further understood my position in writing this paper. At first the writing was the work of the ego, but the service in writing this paper has been a work of my soul. I find it very important that we help these people in Ghana before this pest infestation causes more issues. The implementation of the push-pull system will insure food security for this country. In addition, with agriculture being the backbone to the Ghanaian economy it is imperative to protect their staple food crop maize. This traditional agriculture practice provides food security that will be brought to Richard Turkson, his friends, and his country.

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