

Alex Hoey
Upper Arlington High School
Columbus, OH
Kenya, Factor 6

Pest Control in Kenya

One concept that is on every animal's mind each day: food. For many people in the United States, food is easily attainable. All we have to do is go to the store and buy our breakfasts, lunches, and dinners as we please. Something that is rarely thought about is the farmer that grows the food, raises the livestock or, even more rare, the rural farmer that struggles with these tasks. This sparse American thought is the case for thousands of farmers in Africa, and in particular, the Eastern region. The average farmer in this region is faced with many factors that complicate their jobs, including climate change, pest infestation, and inadequate resources. Science in cooperation with agriculture is the step needed to lessen the gap between the average American going to the store to buy food and the poor farmer who grows the crops, say, in Kenya. In the words of Norman Borlaug, the 1970 Nobel Peace Prize winner, "I often ask the critics of modern agricultural technology: What would the world have been like without the technological advances that have occurred? For those who profess a concern for protecting the environment, consider the positive impact resulting from the application of science based technology."

Located in East Africa, between Somalia and Tanzania, is the country of Kenya. Kenya is 580,367 square kilometers with a population of 43 million people, and growing by 2.5% each year, according to the CIA World Factbook. Along the coast of the Indian Sea, the climate is tropical, while the interior is arid. The country's climate varies often, making drought and floods both major problems. Annually, the country gets 1,050 millimeters, or 41 inches, of rain ("KenyaClimate"). Jomo Kenyatta founded the country and led the people from 1963 until 1978, when he died. Daniel Toroitich arap Moi succeeded Kenyatta. Elections in 1992 and 1997 were full of violence and fraud, and Mwai Kibaki of the National Rainbow Coalition (NARC) took power next. "Government defectors joined with [Kenya African National Union] to form a new opposition coalition, the Orange Democratic Movement (ODM)..." (CIA World Factbook). Following charges of vote rigging on ODM candidate Odinga, Kibaki was reelected and Odinga "unleashed two months of violence in which as many as 1,000 people died" (CIA World Factbook). Kibaki is still the President of Kenya today. Of the country's land, 8.01% could be used for farming, though only 0.97% of land is home to permanent crops (CIA World Factbook). 75% of Kenya's population is working in the agricultural field, planting the main crops in the country: maize and sorghum. However, according to Culturegrams, other major crops include corn, wheat, sugarcane, and fruit. The other 25% of the people work in industry. The GDP is made up of 24% in agriculture, 15% in industry, and 61% in services. Combined, Kenya's total GDP is \$71.21 billion, 83rd in the world. In other words, while 75% of the population works in agriculture, only 24% of the GDP comes from agriculture. As a result, three quarters of the people share just one quarter of the country's income. It is no surprise then that 50% of Kenya's population is below the poverty line, even if they have a job.

99% of Kenya's people are African, and local tribes dominate the population. Major subpopulations include Kikuyu (22%), Luhya (14%) and Luo (13%). No matter what tribe, generally, most kids attend primary school, ages 6-13, which is free in Kenya. They then take the Kenya Certificate of Primary Education, or the KCPE, exam, to see which secondary school they will go to, which does cost money. Because it is expensive, many families sell personal items in order to pay for school. Secondary school lasts for 4 years, so commonly, girls and boys go to school for a total of 11 years, up to age 17. According to CIA World Factbook, the majority of families find the money to send their kids to school, because the literacy rate in the country is 87.4%. Only 22% of the people in Kenya live in urban areas and 78% live in rural areas, typically in the southern two-thirds of the country. However, each year, 4.2% of the population moves to urban areas of Kenya. In the rural places, families usually have an average of

4 children. The sons of the family are greatly valued, and many families keep conceiving until they have a boy. Rural families frequently live with multiple generations and extended families are extremely important. The highest status in society belongs to the elderly. Gender roles are specific; the men are the head of the house and the women take care of the home, the children, and the garden. Children are “often responsible for planting and harvesting crops, tending livestock, fetching water, and caring for younger siblings” (Culturegrams). The kids have to get water because most rural homes do not have modern appliances, which makes “cooking a time-consuming chore” for the women and the children (Culturegrams).

There are many problems in Kenya that are uncontrollable and natural, and many that are consequences of the people’s actions, just like any other country. Inevitable issues include soil erosion, drought, and flooding. Complications as a result of actions include water pollution, decrease in water quality, deforestation, poaching, cross breeding, pests, and a decrease in farm size. According to the CIA World Factbook, water pollution is becoming a big predicament because of urban and industrial wastes, and water quality is decreasing because of over usage of pesticide. Other dangerous obstacles are the limited access to health care and the inadequate medical supplies, even in government run hospitals. “Patients in hospitals must often provide their own medications and meals” (Culturegrams).

A major problem that is destroying the maize and sorghum in Kenya are the weeds and pests that infest crops, thus decreasing food security. “Stem borers, the parasitic Striga weed, and low soil fertility are the main constraints to grain production in Kenya and other parts of subSaharan Africa” (Quitkin, 242). Stem borers are “the larvae of several kinds of moths” that eat away at the plant they are growing in (“Stem Borers”). In maize crops, these bugs make the stem of the plant weak, making it bend or blow over onto the ground. Striga weeds attack the crop in a different way. The parasitic weed intertwines its roots with the roots of the plant, and takes all the mineral nutrients from the soil away from the cereal crop. Destruction due to Striga weeds is heightened by preexisting low soil fertility which is a big problem in the region of East Africa and, more specifically, the country of Kenya. When both Striga weeds and stem borers infest a farmers crops, they often lose all of their potential products. The parasites cause major damage especially to farmers that do not have a lot of money and resources to make them go away, as is the case for a poor rural family. This makes a farmer’s job of providing for his family extremely difficult.

Pesticides are used extensively to try to kill stem borers but are expensive, ineffective, and “potentially harmful to human health, soil... and biodiversity” (Quitkin, 242). Heavy pesticide usage results in a substantial amount of the unused pesticide running off into rivers, lakes, and other major water supply sources; thus decreasing water quality. “Tests on soil, water and plant samples...have shown high contamination with concentrations of [pesticide]...” (Kabukuru, 27). Not only is this harmful to humans, but other animals as well, especially birds of prey because they eat the weeds and bugs that are being sprayed with pesticides, resulting in pesticide in their bodies. “[Pesticides] caused the birds’ egg shells to be easily breakable, thus fewer young survived to hatch” (Campbell, Williamson, Heyden, 802). In addition, over time, parasitic bugs become used to pesticides, and are no longer affected by them. “[R]esistance to toxins often evolves in insects through the process of natural selection” (Campbell, Williamson, Heyden, 535). Because pesticides are not helping get rid of pests, crops are dying and causing major economic losses. “As a result, the food and livelihoods of millions of people in the region are constantly at risk” (Fischler, 1).

Traditional Kenyan agriculture policies call for heavy pesticide usage to rid pests, however a productive way to protect crops has been introduced as Push Pull Technology (PPT). This method involves intertwining crops that reject pests or weeds and surrounding the field with other plants that lure and trap them. “Stem borers are repelled or deterred away from the target food crop (push) while, at the same time, they are attracted to the trap crop (pull), leaving the food crop protected” (Fischler, 1). Crops planted to fulfill the job of ‘pulling’ include Napier grass (*Pennisetum purpureum*) and Sudan grass (*Sorghum*

vulgare). Molasses grass (*Melinis minutiflora*) repels or ‘pushes’ *Striga* weeds away. Napier grass is an extremely efficient plant to use because it attracts stem borers in great numbers. Not only do the pests stay away from the cereal crop, but the grass “can still be cut and fed to livestock” (“Stem Borers”). *Desmodium* can also be used to push *Striga* away by secreting a chemical that makes soil inhospitable to the weeds. This guarantees that the weed will not infest anything that is near the *desmodium* plant (Mediae Trust).

In a Summary of Household Characteristics of Farmers Assessed, taken by Intercooperation, the percent of crops that survived were given. 99.3% of maize, 59.0% of beans, 22.9% of Sorghum, and 13.9% of millet were preserved. In addition, according to Martin Fischler, 88% of villages mentioned high yield of cereals as a “positive effect of PPT.” This test “thus suggests ‘pushpull’ as ‘probably the single most effective and efficient low cost technology for removing major constraints faced by the majority of smallholder farmers in the region, resulting in an overall and significant improvement of their food security and livelihoods” (Fischler, 2). According to the Hungry Continent, not only does this technology reduce crop losses, but it also “increases animal forage and enhances soil quality and fertility” (Quitkin, 243). The system increases animal feed because of the fact that the Napier grass used to ‘pull’ can also be used for extra food that is totally safe to consume (“Stem Borers”). The other, ‘push’ plant is the one to thank for improving soil quality. *Desmodium* puts lost nitrogen back into the soil, which makes plants grow healthier. In addition, PPT can help improve water quality due to the fact that pesticides are no longer of use. This makes streams, rivers, and lakes safer for humans and other animals to drink from, therefore promoting biodiversity. In a study in Kenya and other parts of East Africa, again taken by Intercooperation, many people complained of spending money to put new plants in. In response to this, an adaptation has recently been made to the technology, according to Martin Fischler. An integration of edible beans has been introduced and is proving effective. This way, not only will the farmers get their cereal crop, but also beans will be protected from pests. This will increase farming productivity and therefore increase income for the farmers. According to Martin Fischler, most families use the extra money from the PPT system to pay for education for their children. In the absence of PPT, this is one of the biggest financial restraints for the typical rural Kenyan family.

One who is familiar with subject of pest control might ask why PPT is better than using genetically modified crops, or GMO’s. The technology behind GMO’s uses adjustments in genetics in crops to fight against parasitic weeds and bugs. While using these organisms create high yields, PPT is more efficient. Not only will crops be protected and able to thrive, but Africa can still trade and sell products to the European Union, who “[has] been largely hostile to them” (Wright). A member of the advocacy group, Friends of the Earth, Adrian Bebb, says, ““The public doesn’t want to eat genetically modified food”” (Wright).

A major problem with the technology is the lack of awareness. In fact, according to Martin Fischler and Intercooperation, 50% of the people in East Africa that did not use the PPT said their reason was due to “lack of enough or correct information.” It will be important for people to spread the word about this new agricultural technology. Since elders hold the highest respect in village society, it would be smart for them to be taught the information first. This way, the people in the area will listen to what they have to say and expand on their knowledge of farming. Next, the Kenya Ministry of Agriculture should be informed about the PPT system to help farmers all across the country. A big step will be involving the United Nations. Sharing this information with the organization will open up many possibilities with further steps in teaching farmers in the nation of Africa and all around the world. The plight of a rural Kenyan farmer facing a battle with the forces of nature to protect his harvest is certainly one that inspires great sympathy. Armed with education on push pull techniques, he is better prepared to diversify and protect his fields and provide for his family. Push Pull Technology will increase the food security of the rural farmer and of the region of East Africa.

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