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Ghana, Fall armyworm destruction
Ghana: Fighting Against Fall Armyworms

The fall armyworm has done substantial damage to farm crops and it is shown that “In excess of \$13 billion has been lost in Africa as a result of destruction caused by this lethal pest” (Esoko). More specifically, that same website says that Ghana has lost about 64 million dollars due to 20,000 acres of damage in 2018. This issue has caused an increase of poverty and starvation levels due to the loss of their primary crops. There are currently some things being done to fight against this issue, but there is definitely more that can help get rid of it sooner.

Ghana is a country in West Africa with an area of about 92,000 square feet. It has a population of around 29.6 million people and is on the coast of the Atlantic Ocean (World Bank). It borders three countries: Côte d’Ivoire, Burkina Faso, and Togo. It is mainly a hot country with an average high being 90 degrees fahrenheit and the low being 70. The amount of rainfall can be anywhere from about 33 to 87 inches on average (depending on the year). Ghana typically has a tropical climate because of its proximity to the equator (World Travel Guide) which makes it perfect for the growth of numerous types of crops. In fact, about 69 percent of Ghana is cultivated. Some of the major crops that Ghana produces is maize, cocoa beans, grains, and cassava.

The typical family in Ghana has about 4 members and the average household income is 5,070 GHS (876.77 dollars) per month. The population of Ghana is fairly split down the middle between living in a rural or urban area with 43.3 percent of people living in a rural community. People from this country tend to enjoy street food along with spicy foods from home. A popular meal tends to be in the form of a stew and includes ingredients such as maize and yams. Healthcare in Ghana is said to be one of the best healthcare systems in Africa and health insurance typically has very high coverage. However, the education system is not too great. According to unicef.org, many children who should be enrolled in school are not due to poverty, long distance, and/ or gender inequality. One big thing that makes Ghana particularly successful is their agricultural situation.

Cocoa is Ghana’s biggest cash crop and about 59% of Ghana’s workforce is involved with agriculture in one way or another. Because the majority of families work in the agricultural field, poverty spikes when something happens that affects the production of crops. Maize and grains are typically grown for the farmers' families in the form of subsistence farming. It is very common for a family to survive off of the foods that their family produces and/or raises. “Maize is an important food crop in Ghana, accounting for more than 50 percent of the country’s total cereal production” (Ghana Strategy Support Program).

Like I previously mentioned, poverty spikes when crop production drops and it is shown that starvation and hunger levels also rise when that happens. Over the past few years, many countries in Africa have been suffering with low crop levels due to the fall armyworm.

The fall armyworm consumes crops then turns itself into a moth. After that, the moths lay their eggs on plant leaves. About a week after they lay their eggs, the caterpillars will hatch and immediately start eating abundances of crops. They tend to eat staple food sources such as maize and grassy crops, along with cocoa. These armyworms are native to tropical climates in America and they were first spotted in an Eastern part of Ghana in 2016. Since then, it has spread across many African countries. "Fall armyworms destroyed 4,500 hectares of farmlands in Ghana last year" (Alliance for Science), that is the equivalent of about 11,120 acres. However, that website is referring to research gathered in 2017. Studies made in 2018 prove that the problem got worse between these two years and has resulted in the loss of over 20,000 acres of crops. That amount of farmland loss caused the country to lose a substantial amount of money that they typically would be making from exports.

This issue is important because getting rid of it could greatly impact the economy in a positive way. According to a study, having controlled ways to fight the fall armyworm in Ghana can lower the economic cost of crop losses by about 15 million dollars per year (Cabi.org). That is 15 million dollars that could be used to improve Ghana's education programs or help get people out of poverty. Based on numerous articles, it is obvious that this country does not have enough money to be letting this pest take away some of it. In order for things there to become reasonably stable again, researchers need to do something to kill off the fall armyworms.

There are a few things that are currently being done to fight against these armyworms. In 2017, the Ghana Agricultural Ministry requested 16 million cedis (4 million dollars) to help combat these pests. About half of the money has gone into the purchase of chemicals and the rest is supposed to be used on the education of these worms. The Ghana government has also made a taskforce to help watch for outbreaks. The taskforce includes members from the Veterinary Services and National Disaster Management Organization. It is supposed to inform farmers about the symptoms of armyworm attacks so they can report infestations to the correct authorities. Additionally, The Chemical Dealers Association is giving Ghana's government chemicals that supposedly have the capabilities to get rid of them. Ghana's minister for food and education is confident that the chemicals will get rid of the armyworms (Alliance for Science).

Research suggests that using chemicals to prevent the armyworms from consuming crops can be effective. Ghana is not a super rich country and this option is inexpensive compared to other solutions. It is also something that can happen right away because it is very time efficient. However, there are a few problems with using chemicals. Using too many of them can affect the environment in a bad way and can add things to the soil that negatively impacts the nutrients necessary for other plants to grow. Animals that are important to the food cycle could also ingest these chemicals and die which would set everything

off balance. And lastly, these chemicals could be harmful to humans in some way; people may start eating alternative crops to avoid the chance of health issues happening to them. A study was conducted to determine the health risks (in humans) of using chemicals to get rid of fall armyworms. The article displaying the results says, “In our analysis of pesticides in current use in Africa against the fall armyworm, we found that 13 pesticides were highly hazardous pesticides, 26 were high-risk pesticides requiring risk mitigation, and 17 were lower risk pesticides” (The Lancet Planetary Health).

Another option that may be useful to fight against this issue is to genetically modify the crops to be resistant to fall armyworms. “Mr Eric Amaning Okoree, Chief Executive Officer, National Biosafety Authority (NBA) says genetically modified (GM) crops have a high potential of controlling the fall armyworm” (Genetic Literacy Project). However, an issue with that is that Ghana does not have the technology that is needed to genetically engineer crops. It is also very expensive and not time friendly. Ghana is already losing large amounts of money due to this issue which means that the extra expenses needed to genetically modify crops may not be available. As for the time factor, other solutions may have already eliminated the armyworms by the time they’re finished changing the plants’ genetics. A benefit of doing this though is that the crops will be resistant to this type of pest for a long period of time, which may be useful if they can’t get rid of them in a long term format. Also, because the fall armyworm is a type of caterpillar, other caterpillars and worms may be unable to attack these farm crops too.

The last solution that research suggests is to introduce a predator in order to get rid of the armyworms. According to entomology.org, the Feed the Future Innovation Lab for Integrated Pest Management found two potential enemies which are parasitoid wasps in the genera *Telenomus* and *Trichogramma*. They are shown to get rid of up to 70 percent of the fall armyworm eggs. The only thing in the way of these wasps eliminating all of the armyworms is that they do not occur in big enough populations until later on in the season, which means the worms have already had enough time to eat a large portion of the crops. The next step for this solution is to find a way to breed them sooner, then let them loose in places where there’s an outbreak of these pests. A potential problem with this solution is that large populations of this wasp may do substantial damage to the food cycle and cause the ecosystem to collapse. So, scientists would need to keep track of how many wasps the environment can sustain while still being successful.

Loss of farm crops (such as maize and cocoa) due to fall armyworms has seriously affected the economy in Ghana. Many farmers lost their primary source of income and their primary food source. In order to help Ghana's economy improve, scientists need to find a solution to get rid of these pests. There are three main ways to get rid of them and they are as follows: genetically modifying farm crops to be resistant, coating the crops in a chemical, or introducing wasps that ingest armyworm eggs. If the government can manage to use one of those solutions to overcome the fall armyworms, the production of both maize and cocoa will increase. This will help many farmers and their families gain the money and the food that they need in order to be successful. Plus, the extra crops that these farmers produce could be either put right back into the community or exported to the United Kingdom, Belgium, and/ or the United States. Which, in turn, could help the global economy too.

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