

Mason Kollwitz
New Auburn High School
New Auburn, WI
Brazil, Factor 1: Plant Science

Brazil: Mending Brazil's Future through Agriculture's Plant Science

Brazil is my country of focus because of my personal interest in plant science and because of the potential that plant science has within Brazil. I have had an interest in plant science since I was very young. My vision to improve agriculture reaches beyond my local community with hopes to make differences within our state, country and throughout the world. I hold a great deal of respect for Norman Borlaug. With my hopes to change the world I have chosen Brazil and its potential for plant science. Hope builds on potential and makes answers become reality. In order to focus on a solution to world hunger I believe it is important to examine all countries to identify strengths and weaknesses in each. Doing this will provide a way to network together and find solutions. Each country can be lifted up by another country's strengths.

A Brazilian family usually consists of four people, two adults and two children. With four people living in one home that means that they need 8000 calories or more a day. Brazilians have just as diverse of a diet as American's do. Their challenge is affording it, which could be a problem seeing that 21 percent of the entire Brazilian population is below the poverty line (CIA). With 21 percent of the 208 million people that live in Brazil, below the poverty line, that's approximately 44,000,000 people who will have a challenging time getting the appropriate amount of nutritious food. They need to have nutritious food that provides all their essential nutrients without having to spend all of their money doing so. A plant that can be grown anywhere in Brazil, while providing adequate nutrients, and feeding people at a reasonable price will not appear naturally but it can happen with plant science.

Rajiv Shah, a veteran of the Gates health program, stated "We always came back to agriculture. We saw it was a big problem, it was getting worse, and the global effort was getting less. That looked like a crisis to us. And we saw that agriculture is tremendously important for reducing poverty." (Kilman, Thurow 2010) Even though we may be able to give people more money for food that does not mean that there will be any improvements in the poverty level. Agriculture is the basis of almost everything. Everyone needs to eat and without being able to eat properly, for low cost, then poverty will still be on the rise.

The average diet of the Brazilian people is very similar to that of the average American's diet being extremely diverse and largely depending on social status/income level. If you were to sit down at a dinner table with a Brazilian farm family you would find yourself eating such foods as beef, mutton; indigenous meats such as alligator or frog; unique fruits such as guava, mango, papaya, and passion fruit; nuts such as Brazil nuts, cashews, peanuts; vegetables including avocado, green peppers, okra, onions, and squash; and beverages such as cow's milk and coffee (Adopt Nutrition).

A Brazilians life includes education. In terms of literacy, ninety-two percent of the population are literate. This is a positive element for those people living in Brazil. This country would benefit from education accented on plant science. Why? They are in good position to serve as an outreach to other countries. We need to view Brazil as a country of strength where they can serve as an outreach to weakened countries.

In terms of Brazil's healthcare system, they serve their people well. All publicly financed health services and most common medications are universally accessible and free of charge at the point of service for all citizens — even for the 26% of the population enrolled in private health plans (Macinko, Harris 2015).

One of Brazil's top industries is agriculture ranking in at number three with 5.9 percent of the GDP (gross domestic product) but even more importantly it employs 15.7 percent of Brazil's population (CIA). With the minimum wage in Brazil being \$1.98 (USD) per hour they don't have any other option than to just pay for food (Mejeur 2009). With the main focus of one's money being food you would expect the food to be nutritious but sometimes that isn't the case. As of 2009, Brazil had 2.2 percent of their children under the age of 5 years old being underweight (CIA). This indicates that they need to improve the quality of the food they are eating so that they can get an adequate amount of nutrients.

Brazil has different organizations working toward bettering their country by helping people climb out of poverty and eliminating child malnutrition. An organization that has had a large impact on the country of Brazil is their National Council for Food and Nutrition Security also known as CONSEA. During an 8 year period (2003-2011) CONSEA, with the help of other programs, were able to raise enough money to help 20 million people out of poverty and help reduce child malnutrition by 61 percent (Frayssinet 2011). With all of that hard work there are still people who are not being fed and there are still people who are unable to bring home enough food to feed their family.

Another organization that is working hard in Brazil in the field of plant science and food security is Embrapa. Embrapa was founded on April 26th, 1973. Embrapa is monitored by and partnered with the Brazilian Ministry of Agriculture, Livestock, and Food Supply. Embrapa is in the process of creating a model of agriculture that is specific to Brazil so that their products make a difference in their home country. Embrapa is currently incorporating lands previously known as cerrado lands or "closed lands" into their research. The cerrado lands were once plains that no one could effectively farm and now, thanks to Embrapa and other organizations, the former cerrado lands now account for 50 percent of Brazil's grain production. (Embrapa)

With such a severe problem in Brazil we need to think about solutions that we can draw from plant science. As an agriscience student and FFA member, I have carried out plant science research projects. This prompts me to turn to plant science for solutions to Brazil's food challenges. To conduct research or to genetically engineer crops in Brazil the project must first be approved by a government association called CTNBio. With every laboratory having to go through a five step approval process to conduct research on GMOs (genetically engineered organism) it could be hindering Brazil's true production potential (LOC 2015). Currently, there are only 35 genetically engineered crops able to be grown in Brazil. Many serving as the main agricultural commodities including beans, corn, and soy. Soy is the most cultivated crop in Brazil and also the most cultivated GMO crop (LOC 2015).

Brazil's careful monitoring of plant science discoveries safeguards its country. However, plant science research will continue to offer solutions. Until 2005, controversy was surrounding the whole realm of plant science in Brazil so that in many parts of Brazil GMOs were not even allowed to be planted or researched. A law passed by Congress in 2005 put an end to controversy by passing a law that put in place a set of rules governing biotechnology (LOC 2015). Brazil's new set of laws made it possible so that the government association called CTNBio is solely responsible for all of the regulation of biotechnology in Brazil (LOC 2015). This is a lot of responsibility to be given to one organization being held accountable for all of the GMOs in a single country.

Two thirds of farms in Brazil are smaller than 100 hectares (one hectare is 2.47 acres) but it is very hard to have an average farm size in Brazil due to its size and diversity. In the southern part of Brazil the average farm size is 92 hectares (227 acres), in the central part of Brazil is 897 hectares (2216 acres) almost 10 times the size of southern farms (Cesar 2005).

Brazil's biggest barrier for improving agricultural productivity is the limitation of education for the farmers within the country. Many of Brazil's farmers only have six years or less of formal

education. Another barrier to the Brazilian people is the lack of government funding to rural commercial activities. According to an article titled *Brazil*, written by Paulo Cesar de Faccio Carvalho, it states, Government finances only 16% of rural commercial activities. Consequently, 34% of farmers believe that the major limitation to their activity is credit. Only 0.3% believe that technology is a primary limiting factor. This probably reflects the average low level of education. For example, in the most intensive ruminant sector, the dairy cattle sector, only 5% of farmers own milking machines and 5.9% use artificial insemination. Of these farmers, 0.2% percent believe that extension is the major limitation even if only 34% of them received some type of agricultural assistance at least once a year, but 71% intend to increase it. Less than 1% of Brazilian farmers carry out any kind of natural resource protection, despite the great increase in soil conservation by direct drilling, mainly concentrated in Southern Brazil in recent years. (Cesar 2005)

Most of the country's cultivated crops are also some of the only genetically modified crops that are allowed to be grown. Brazil's most prominent genetically engineered crops are beans, cotton, corn, and soy which also happen to be the crops that they consume and export the most.

When I was carrying out my research related to Brazil my attention was drawn to their environmental conditions.

Deforestation in Amazon Basin destroys the habitat and endangers a multitude of plant and animal species indigenous to the area; there is a lucrative illegal wildlife trade; air and water pollution in Rio de Janeiro, Sao Paulo, and several other large cities; land degradation and water pollution caused by improper mining activities; wetland degradation; severe oil spills. (CIA)

With such severe problems within the environment, having crops that can withstand the various different kinds of environmental factors is crucial to agricultural productivity levels of success. There is room for improvement within the country of Brazil as related to the environment. This country's leaders need to work together in order that there is a balance between mining activities and care for natural resources.

As we look for solutions to seeking balance for Brazil and their environment, we need to examine the role of both men and women in this country. Women are usually employed in the lower-paid positions, such as teaching and nursing (Brazil.org). However, in relation to decision-making, I noted that "In 2007, women were 36.1% of all legislators, senior officials, and managers (Catalyst 2012).

My personal suggestions for making improvements within Brazil are varied. I believe it will be important to widen the guidelines of research in plant science. Through plant science many different goals can be attained. In terms of environmental concerns, it will be critical for Brazil to reduce pollution levels and give attention to air and water quality. Blending plant science, with focus on utilizing plant species to act as natural protectors for the environment, can serve as one of several needed solutions. Doing this would allow Brazil to help its own country and eventually help others. Brazil needs to recognize its country's strengths and how it can serve as an outreach to help other countries. If Brazil was able to feed its own population, due to increased production of adequate nutritious foods, they could then sell their remaining nutrient-rich food products on the world market. If so, then not only would Brazil, but other countries, would be able to strengthen their fight against world hunger. Experts from outside the borders of Brazil can offer expertise in the significance of the role of plant science.

Within the pages of the book titled, *Enough*, (Thurow & Kilman 2009), I discovered the words of President Barack Obama. He stated:

To the people of poor nations, we pledge to work alongside you to make your farms flourish and let clean waters flow, to nourish starved bodies and feed hungry minds. And to those nations like ours that enjoy relative plenty, we say we can no longer afford indifference to the suffering outside our borders, nor can we consume the world's resources without regard to effect. (p.259)

Rural farms and urban families can team together to learn. To learn of the importance of plant sciences, educating themselves on the benefits and possible downfalls of different aspects of agricultural practices/methods. To learn about how everyone can make a difference no matter how large or small, through agriculture. Rural farmers can learn how to have their land be used as a testing site for new agricultural products helping the advancement of plant science. Urban families can learn about plant science and help advocate for the importance of agriculture on a local level. Location, along with social status, should not be seen as a disadvantage with plant science because each and every person can make a difference.

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