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Panama: Emphasizing Higher Education in Agriculture

“Develop a passion for learning. If you do, you will never cease to grow.” When Anthony D’Angelo said this, he was describing his vision of getting all Americans to take their education seriously and moving on to higher education. In a way, the fact that we have the ability to think like this is unfair to some other countries. We are mainly concerned about getting good grades in high school and getting our college degree. When D’Angelo said this, he stated that while we are getting our degrees, we are not actually receiving an education, meaning basically that we will do whatever we need to do to scrape by, but not put forth all the effort we can. However, when we look at other countries, we should consider ourselves lucky that we even have these opportunities. Many countries today do not have much education past 8th grade.

One of these countries is Panama. A typical family in this country is extremely poor, making on average around \$1,717 per year, with only one or two acres to work. Corn and rice are the staple crops on their farms. Many vegetables are not able to grow in certain areas because of unfavorable conditions, but beans and bananas grow well and are also a major part of daily diet. The family normally consists of a mother, father, and two or three children. They are normally subsistence farmers without much education past a couple years. As of 2010, there are only 88 post-secondary education institutions in the entire country of Panama. Our state of California, which is around the same size as Panama, is home to 399 degree granting institutions.

37% of Panamanians are considered poor. A majority of them are subsistence farmers who have felt the negative impact of slash-and-burn agriculture. This practice started with the indigenous people in Panama and has been picked up by the poor farmers in the region. These farmers are forced to buy cheap, hilly land filled with forests. They cut down the forests on a portion of the land and burn it. They then use this land to grow the crops they will use to provide for themselves and for their families. However, after only a year or two, the soils will be completely deprived of all nutrients necessary to grow the crops. They are forced to move to a different area, also covered in forests, and repeat the process again in what seems to be a never ending cycle. Even with the new advancements in irrigation of the land, it is still extremely harmful. The land they have used could take ten or more years to regain these nutrients, by which time large corporations may have a chance to step in and take control of the area. This was a main reason for the formation of CREA.

CREA (Conservation through Research, Education, and Action) was founded in 2003 by Dr. Michael Roy, a conservation biologist currently living in New Zealand. His goal was to “promote common sense conservation that is good for the planet and good for human societies” (crea-panama.org). They are a non-profit organization whose purpose is to teach alternate methods of subsistence farming to the people of Panama. They educate the people by teaching them skills they will need for farming, and then they prepare them to be able to teach others these methods. This way, the good farming methods being taught by CREA will stick around and the old methods, such as slash-and-burn, will cease to exist, making the quality of the soil and the lives of the lower class of Panama better.

CREA runs a demonstration field station at the Cocobolo Nature Reserve in Panama where they work with both high school and undergraduate level Panamanian students to expose them to the major issues facing our environment and help them discover species of plants and animals unique to the nature reserve. They also teach students from Marvelwood College and Warren Wilson College in the United States,

where they take the required coursework before they get to the reserve to work with the people from CREA.

Cocobolo Nature Reserve is an area of over 1000 acres that was purchased by Michael Roy in 2005 to save it from cattle ranchers who wanted to cut down the forest on the land. It is located in central Panama in the 40 miles separating the Caribbean Sea from the Pacific Ocean. The reserve is an important part in the education of the nearby students, as well as being a vital area in conserving wildlife. On the reserve, CREA has set up a demonstration farm in order to teach the students alternate methods of farming. Since purchasing the reserve, CREA has been responsible for protecting much of the rainforest in the surrounding area. They now watch over 5000 or more acres in the Banyo Watershed.

Like CREA, the United States Peace Corps has also had a major educational impact on the agriculture in Panama. As in most cases, the goal of the Corps in Panama is to teach the citizens alternate farming practices to increase productivity in collaboration with the agricultural foundations already established in Panama. Volunteers in Bocas del Toro, Panama plan to use new teaching methods to train local farmers in cocoa farm management, while at the same time protecting the local ecosystem and biodiversity. From what they have seen in their work thus far, they seem to have motivated women and children to help with the work that for a long time has been the duties of the men. These duties fall mainly in the maintenance of the farm, including pruning, planting, grafting, and farm planning. Typically, the men in the area do all of the planning for the farm pre-harvest, and the children and women join in during and after the harvest. This real-life experience is helping spread agricultural education in Panama.

Colleges in the United States help increase education in Panama by providing U.S. students with study abroad programs. From December 26th, 2010 until January 9th, 2011, Iowa State University students visited Panama to study tropical agricultural production, international business, and trade in Panama. Daniel May, agriculture education teacher at Wayne Community High School, was one of the students on the trip. He said, "Everywhere we'd go in Panama, they knew of Iowa State and what they had done." While in Panama, Daniel met Jose Pacheco, who earned his master's degree at Iowa State University and is now in charge of MIDA. MIDA stands for Ministerio de Desarrollo Agropecuario, and it is the equivalent of the USDA (United States Department of Agriculture) in America. Currently, the main focus for MIDA is to aid subsistence farmers in the country by increasing livestock production. They study seed technology, which helps improve yields. They currently support over 5000 local farmers with seed that is supposed to help provide for their entire family. However, instead of planting the seed they receive and letting it produce, they often choose to eat the seed as soon as it falls into their hands. This stalls productivity in Panama and has ill effects on the lives of subsistence farmers by not letting the seed produce the nutrients they need. Obviously, these families are too hungry to even plant their crops. MIDA can teach them by giving them the food they need to not be hungry until harvest. Other projects going on at MIDA currently are improving goat milk production, growing citrus crops in a more fiscally responsible manner, and using artificial insemination to improve beef genetics.

One method of improving not only milk productivity, but also of beef in Panama is through the use of brachiaria grass. A major threat to the earth today is the release of carbon dioxide emissions into the atmosphere. The threat many people do not often hear or think about, however, is the nitrification of the soil. This takes place when farmers use nitrogen fertilizers and natural processes in the soil convert the nitrogen into nitrous oxide. Nitrous oxide is a greenhouse gas 300 times more powerful than carbon dioxide.

This is where the brachiaria grass comes into use. Brachiaria grass is a tropical, perennial plant that scientists claim can help in the prevention of climate change. As the tropical soils convert the nitrogen in the fertilizers into nitrous oxide, brachiaria can suppress the greenhouse gas from being admitted into the

soil. At the same time, the grass is extremely beneficial to cattle for both milk and beef. Scientists from CIAT (International Center of Tropical Agriculture) in Columbia preformed a study between 1990 and 2003 to discover how much the grass increases productivity in milk and beef. In fluid milk in that time span, they found that production increased from 26 metric tons to 9,891 metric tons. They found similar results in beef, as it increased in productivity from two metric tons to 657 metric tons. When put in terms of money, milk increased \$683 million in this time frame, and beef increased \$195 million.

Brachiaria grass has a 54% growth rate in Panama. Yet, despite its success growing in the country and all of the benefits it creates, Panama has the lowest adoption percentage in all of Latin America. CIAT scientist are trying to convince Panamanian farmers to begin using more of this grass, but many still will not switch over to it. Some of this is the fault of the grass's reputation in Brazil. They tried the grass on a certain area of land, but it failed. They were forced to move the cattle to a new area where the grass had not been planted. Scientists assure farmers that this is purely coincidence, and this grass can do a large part in fighting greenhouse gas emissions. The reason they can assure farmers of this is because they discovered brachialactone. Brachialactone is a chemical compound found in the roots of some plants. It is released into the soil and acts as a nitrification inhibitor. This, in turn, cuts down on greenhouse gas emissions. When scientists discovered brachialactone in brachiaria grass, it was enough to prove that it can have a significant part in reducing greenhouse gases and delaying climate change. The local farmers still seem to be more comfortable with traditional methods of farming and are not willing to change much of what they do. They need more proof that the grass helps them make a profit

To help people learn more about brachialactone, the CIAT is pushing to find the genes that are capable of producing brachialactone. These scientists are finding that the grass can continue to grow, even during drought or on acidic soils. It is also beneficial to the health of humans through the increased milk production in the cattle. The scientists at CIAT believe that if they can find what causes the reproduction of brachialactone, it can be used to create a new cornerstone in crop-livestock farming systems. Their goal is to figure out a way to make other crops, such as wheat or maize, be as productive as the grass. Currently, wheat and maize waste about 60% of the nitrogen that is put on them as fertilizer. This leaves much room for improvement, and productivity could increase dramatically with the addition of brachialactone. Farmers have tried using this grass to feed their livestock in Southeast Asia and Central America, and thousands of them, in just one or two years, have escaped from the poverty that plagued their families. If the trend continues and the people of Panama were educated on the use of brachialactone and brachiaria, it could have a major impact on the well-being of the Panamanians.

While in Panama, Daniel May also met farmers with the capability of teaching other farmers in the area. In one family, the man stayed on the farm at all times, while the woman went to work in Panama City. According to May, this was not your typical farm family in Panama, as they actually had a business plan on their farm. The family had come up with the idea to take a portion of their pasture and plant flowers and shrubs with a protein of around 15% to 20%. Every two months, he would prune the plants and supplement them to his livestock. Purchasing protein in his area is very expensive, if available at all. By growing the high protein plants himself, the farmer is allowed to increase the quality of his milk and beef without spending the extra money many of the other farmers have to spend.

With this farmer being the only farm in the area with high quality milk, another problem arose: he could not get the truck for high quality milk to come to his farm. Ray Dittmer, former president of Iowa's Warren County Farm Bureau, and his wife, Jan, went on a trip to Panama with Farm Bureau in the summer of 2011. They said that the biggest problem they saw in Panama was the extremely high price of gas. It is because of these high gas prices that this farmer, who has possibly one of the best ideas to improve the quality of life in the area, cannot get the monetary compensation his product is worthy of. All of the other farms in the area are producing grade C milk. The company will not drive the refrigerated grade A truck all the way out to this man's farm, just to pick up his product and nobody else's. As a

result, his grade A milk gets mixed in on the truck with the grade C milk, and because of this, all the work this man has done to produce a high quality product has been wasted. If more people in the area were educated on these kinds of proteins and trained to produce this higher quality milk, the better milk truck may begin coming to the area, and the farmers would have more income from what they produce.

Although it may seem that Panamanians don't get the agricultural education they need to thrive, there are many people that are here to help them. In the United States, we have groups like Peace Corps and schools like Iowa State who help others achieve their true potential. If we all can find a way to collaborate with the Panamanians to not just tell them how to do things, but to work together to meet the educational challenges, Panamanian agriculture education and production could improve dramatically. As Confucius once said, "Tell me and I will forget, show me and I might remember, involve me and I will understand."

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