

Colin Weaver, Student Participant
Boone High School
Boone, IA

Biofuels in the Central American Region

“There are people in the world so hungry, that God cannot appear to them except in the form of bread,” Mahatma Gandhi once said. For Central America, the literal translation of “bread” is “corn,” for that is the commodity closest in availability to the Central Americans, yet so short on supply. To Central American subsistence farmers, crop survival is a necessity. If the crops struggle to survive, then so do the families who rely upon them. In the year 2001, it did not rain through the months of June, July, and August. This extreme drought caused eighty percent of crops to fail in Guatemala and El Salvador, eighty-eight percent of crops to fail in Nicaragua, and complete crop failure in parts of central Honduras. Natural disasters have become a cycle in Central America. The soil can be parched of water completely from a drought that lasted the entire summer, and before long, it can get so much water that it is washed away in mudslides caused by devastating hurricanes. These hurricanes slammed into the Central American countries from June to November. Sometimes hurricanes can occur back to back, such as hurricanes Dean and Felix, both category five, which occurred within about twenty days of each other in August of 2007. Additionally, earthquakes are very common in Central America. Although minor earthquakes are the norm, on January 13, 2001 an earthquake with a magnitude greater than seven struck El Salvador. Earthquakes can sometimes cause tsunamis to pound the coasts. Although larger earthquakes generally are more likely to set off tsunamis, small earthquakes can also contribute to the formation of tsunamis. With this continuous cycle of natural disasters, it is almost impossible for the crops to last through the season in good condition. This is why research should be done to improve agronomic technologies and disease and drought resistance for the crops to survive these hard times and improve the overall yield.

Poverty is a huge crisis in Central America. At least seventy percent of Central Americans live below the poverty line. Most rural impoverished families are either subsistence farmers or serfs. These families usually consist of a mother, a father, and approximately five children. In most Central American households, grandparents, aunts, uncles and cousins will live with the family as well. These peasant and farmer families live tough lives. Food is usually scarce. The meals they do eat are extremely repetitious. Tortillas, usually made from corn, are eaten at every meal as well as rice and beans, generally black beans. Meat is rare, so it is saved for special occasions. Without meat, beans are relied upon as the main source of protein.

The Central American countries are extremely educationally weak. Although school is mandatory in most countries from the ages of six or seven through fourteen or fifteen, most children drop out early to help on the farm. Only the children of wealthy families can afford good education, such as private Catholic schooling.

Subsistence farms are typically extremely small. In Guatemala, the inequality in land distribution is the most important factor in the terrible poverty. Ninety percent of farms are too small to adequately feed the families, while only two percent of farms, owned by the extremely wealthy, use up sixty-five percent of Guatemala’s arable land. This unequal distribution of land is a long term effect of sixteenth and seventeenth century European exploration. When Spain took control of the Central American countries, the Spanish crown redistributed large amounts of land to the conquistadors. Spain only left small amounts of land, enough to subsist on, to the natives. Then, in the nineteenth century, land was taken from peasants to give land to large coffee plantation owners. Although reforms have been attempted to equal the distribution of land, attempts have ended with violence and civil wars.

The main crops grown in Central America are coffee, bananas, sugarcane, maize and beans. The maize and beans are grown for sustenance. Coffee, bananas and sugarcane are grown to sell for income. The land is generally farmed by hand using only simple tools.

Several barriers stand in the way of improving agricultural productivity and farm income. One major problem, as previously discussed, is the distribution of land. Farmers simply don't have enough land to grow what they need. Another barrier, in addition to unequal land distribution, is the lack of fertile land. Farmland is limited in Central America because of the small sizes of their countries. Thirdly, the lack of access to seed is a large problem. If farmers can't get enough seed to grow adequate food for nourishment, finding food for the rest of the season will be a struggle. In Nicaragua, lack of access to seed after droughts means that forty-six percent of farmers plant much less than usual, and fifteen percent of farmers are unable to plant at all. The largest barrier that stands in the way of improving agricultural productivity is the lack of money of subsistence farmers. Subsistence farmers do not have enough money to buy disease and drought resistant seed or farming tools and machinery. The average gross national income (GNI) of Central American countries in United States dollars averages to about \$1000 per person, per year. However, this average income accounts for the entire population. Most rural farmer families receive the equivalent of one U.S. dollar of goods or less per person per day. With only this tiny amount of money, it's surprising that rural families are even able to buy seed. Transgenic drought and disease resistant seed cost much more than regular seed. If farmers can't afford the transgenic seed, drought and disease will continue to be a problem.

Currently, not having drought and disease resistant seed plays a huge role in the inability for Central Americans to produce enough food and earn a sufficient income. As of December of 2001, 63,510 people were severely affected by droughts in Guatemala, 200,000 in El Salvador, 266,010 people in Honduras, and 470,000 in Nicaragua. Severely affected, in this case, refers to the number of people with seventy-five percent or more crops destroyed by droughts. Droughts haven't troubled farmers the last four years, but problems from the yearly droughts that occurred from 1998 to 2002 are still largely affecting subsistence farmers. Those five years without much rain, mixed with other natural disasters such as hurricanes, mudslides, and earthquakes caused a lot of crops to perish, which caused massive food shortages for which much has not yet been made up. Crop disease has also proved to be a large problem. Some common sugar cane diseases are *Xanthomonas vasculorum*, which is a bacterial gumming disease, *Xanthomonas albilineans*, which is a bacteria that causes leaf scalding, *Acidovorax avenae*, which is a bacterial red stripe disease, *Ceratocystis adiposa*, which is a fungus that causes black rot, *Peronosclerospora sacchari*, which is a fungal downy mildew disease, and sugarcane mosaic virus. Some common maize diseases are, *Enterobacter dissolvens*, which is a bacteria that causes stalk rot, *Bacillus subtilis*, which is a bacterial seeding blight disease, and *Aspergillus flavus*, which is an ear and kernel rot causing fungus. All of these common crop diseases could be eliminated if more research would be put into transgenic seeds. For these diseases to be eliminated, however, poor farmers would have to be able to buy this expensive seed.

Presently, the lack of sustainable agricultural methods for Central American farmers is not extremely severe. However, if more droughts should occur, poor farming families will be at a huge loss for food. Disease is a continuous factor of dying crops but not nearly as major as droughts. Transgenic seed needs to be available and reasonably priced for farmers to plant in case droughts hit the region again.

Research needs to be done not only in crop biology, but agronomy as well. The recent weather patterns have diminished the soil of key nutrients needed to grow produce. Hillsides comprise of over eighty-seven percent of the cultivated land in Honduras and forty percent in Nicaragua where ecological vulnerability to erosion, nutrient depletion, and other degrading processes are high. Recent hurricanes and mudslides have washed away large amounts of topsoil in some parts of Central America, leaving rough, rocky, un-arable soil. In addition it is estimated that population of these areas will double in thirty-five

years and that there are already sixty-three million hectares of degraded land in the region. Slowly, more and more land is becoming un-arable. Thus, there is an urgent need to stabilize the environment. Recently, fertilizers have been made more available to Central American farmers, which have helped increase key nutrients to the soil and help the maize yield very gradually change from a constant decrease to a slight increase. To better increase the arability of the land, farmers need agricultural education to learn procedures such as properly using various chemicals as well as techniques such as crop rotation. If the overall arability increases, the yield will increase as well.

Within the past forty years, the typical sugar cane yield in Central American countries has increased. Large sugarcane plantations have increased their income. This means for the farmers that are also employed on plantations, their income has increased as well.

Improving agronomic technologies and crop resistance would greatly help starving Central Americans maintain proper nourishment. Improving the soil to make it more arable and introducing transgenic seed into the Central American agricultural systems would greatly improve yield. This would result in much more food for subsistence farmers and a much higher income for peasants and plantation workers. Improving the soil would also help preserve the environment by replenishing the missing nutrients.

Biofuel production will most likely have positive effects on crop biology and agronomy research. Say, for example, sugarcane becomes a crop used in making a very widely used and cheap biofuel. The demand for this fuel will go up, so the demand for sugarcane will go up. Prices of sugarcane will dramatically increase, meaning sugarcane farmers will make a large profit. Additionally, if the farmers can increase their yield, they can make even more money. So with the large profit they have made, they can now afford to buy the transgenic seed, which will greatly increase the yield.

Biofuel production may, however, have negative effects on small subsistence farmers. Say that sugarcane becomes a widely used biomass. Most subsistence farmers do not grow sugarcane. They generally grow only food to eat, such as corn, rice, and beans. Most of the sugarcane is grown on large plantations. Most of these sugarcane, banana, coffee, and cocoa plantations are owned by wealthy and run by poor peasants. The land is already very unequally distributed and the governments in most of the small Central American countries are unstable. If the prices of sugarcane were to dramatically increase and the wealthy large landowners were to want more land, they would be able to bribe the government into giving out more land, which would require forcing subsistence farmers and peasants to give up their land. These wealthy overpowering landowners could prove to be bullies, going after as much money as they can get. In this sense biofuels would be a negative for the rural subsistence farmers.

If, on the other hand, corn becomes an important biomass, timing will be everything. It will either greatly help impoverished Central Americans to rise out of poverty, or send more Central Americans into poverty and starvation. If corn becomes an extremely popular biomass at a good time, such as in a year without droughts, hurricanes, mudslides, extreme outbreaks of crop diseases and during a time of slight surplus, it will be very helpful to impoverished Central Americans. All of the surplus can be sold for high prices, which will put extra money in the hands of the poor. They will be able to spend more on agricultural techniques and systems, such as transgenic seed and fertilizers to increase yield, which will again be sold for higher prices. This cycle will continue, hopefully helping many impoverished Central Americans be able to afford to always have something to eat, thus starting a cycle to end food insecurity. On the other hand, corn could become a popular biomass during a bad time, such as during a drought, when rural poor don't have enough to eat. If corn prices boom, it will be very difficult for the poor to be able to afford food at all. With corn being the main staple of a Central American's diet, this could be a horrible crisis of extreme food insecurity. It could be very helpful for

subsistence farmers that grow corn, but for the urban poor, corn as a popular biomass could have catastrophic effects.

Biofuels may end up having catastrophic short term effects, such as a large increase of malnourished as well as impoverished Central Americans. However, the long term effects will largely outweigh the short term effects. Over time, food insecurity will become less and less of a problem as farming techniques improve to maintain higher yields, which will provide more food. More food will provide more money for farmers. Biofuels, if produced wisely, may be our way of ending food insecurity in this world.

Assistance from corporations, national governments, and other organizations will be needed for biofuels to help rid the world of food insecurity. They will need to help by assisting those who will be in dire need of nourishment if food prices rise. Through monetary giving of the organizations, urban poor, who cannot grow their own crops, will be able to continue to eat.

The international community must work together to move towards the elimination of food insecurity. Poverty and malnourishment related to subsistence farming are profound problems in Central America, which will not progress simply through charity. National governments, organizations, and the entire international community together can resolve this. Through funding, the poor can be educated about the ways in which to increase the sustainability as well as arability of the land. Increasing the availability of technology to the impoverished farmers can also help to increase the sustainability.

While agricultural technology has advanced immensely during the last century, this technology is of little use to those who cannot afford it or to whom it is not made available. The production of biofuels may make this new technology available to subsistence farmers, who, before biofuels, were unable to get a hold of this technology.

“Society comprises two classes: those who have more food than appetite, and those who have more appetite than food,” Nicolas Chamfort once stated. If the class of society with more food than appetite will provide succor to those with more appetite than food, we can advance in elimination of food insecurity.

For Central America, the means can exist to resolve a modern day situation of the kind that Gandhi described. The keys to resolving this crises include increased economic commitment to providing seeds suitable to Central American needs, advances in agronomic research that offset the Central American difficulties, and assistance to Central America in planning for emergence of the biofuel market. The world as a whole can only stand to gain from Central American agricultural self-reliance, and the opportunity to achieve this is within our reach.

Bibliography

O’Kane, Trish. Guatemala: A Guide to the People, Politics and Culture. New York: Interlink Books, 1999.

Peede, Ian. Belize: A Guide to the People, Politics, and Culture. New York: Interlink Books, 1998.

Merrell, Floyd. The Mexicans. Boulder, Colorado: Westview Press, 2003.

World Food Programme. “WFP Seeks Long-Term Response to Central America Hunger.” 2001. World Food Programme. 12 Dec. 2001

<http://www.wfp.org/newsroom/in_depth/central_america14_12_01.asp?section=2&sub_section=2>

International Federation of Red Cross and Red Crescent Societies. “Central America: Hurricane Felix.” 2007. IFRC. 17 Sept. 2007 <<http://www.ifrc.org/docs/appeals/07/MDR4300201.pdf>>