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Honduras

Biofuels Annual

2010

Approved By:
Robert Hoff, Agricultural Counselor
Prepared By:
Ana Gómez, Agricultural Specialist

Report Highlights:
Honduras is the only Central America country that has a law and a regulation for both biofuel and ethanol production. The law provides exemptions from customs tariffs, income tax, and other related taxes for 12 years. The regulation provides a mechanism to define the mix of biofuel with diesel, and of ethanol with gasoline. Honduras' increase in the production of African palm oil provides opportunities for biofuel development. The production of African palm oil has become more efficient leading to increased output and more land planted to African palm trees. Honduras has ten African palm oil extracting plants, five of which with capacity to produce biofuel. Additionally, new initiatives have been established such as the production biofuel from tilapia by-products and Jatropha, the production of biogas sold for carbon credits, and the production of biomass to burn for electricity. Honduras has a Center for Scientific Support for the Production of Renewable Energy at Pan American Agricultural School – Zamorano, one of the region's premier agricultural schools.

Post:
Tegucigalpa

Executive Summary:

Honduras' growing demand for fuel provides an excellent opportunity to develop biofuels. Honduras is currently highly dependent on imported oil and gas for meeting a significant proportion of its energy needs. In 2007, imports of diesel were 4.9 million barrels, and in 2008, 5.8 million. This amount accounts for 27 percent of the 21.3 million barrels of fuel imported in 2008. The import value was US$440 million in 2007 and US$629 million in 2008. The import value increased 43 percent from 2007 to 2008. Data for 2009 are not yet available.

To meet fuel demands, increase employment and incomes in rural areas, reduce carbon dioxide (CO2) emissions and foreign exchange, Honduras is developing biofuels. The country provides excellent conditions for African palm oil production, and in the last nine years such production has increased by 42 percent. In 2005, the Honduran Ministry of Agriculture and Livestock (SAG) identified an additional 200,000 hectares (ha.) of land suitable for potential expansion of African palm. In 2009, African palm oil production reached 330,000 metric tons of oil and land given to the cultivation of African palm accounted for 125,000 ha.

Honduras has ten African palm oil extracting plants. Five of those plants have the equipment and appropriate facilities to produce biofuel. The five plants together have the capacity to produce 66,100 gallons of biofuel per day. During previous years, they produced biofuel mostly for their own consumption.

However, the plants are currently not producing biofuel. This is due to the higher cost to produce biofuel compared to the cost of fossil fuel. Fossil fuel is subsidized by the Government of Honduras (GOH), which has an effect on its real price. As the GOH removes some of its fuel subsidies, consumer prices will rise. Subsequently, the incentive to use and produce biofuel will increase. In addition, the cost of biofuel production in Honduras is affected by a higher international price obtained with the sale of African palm oil.

Honduras has various innovative biofuel projects being currently developed in Honduras. One relates to biofuel obtained from the processing of tilapia, and the others involve using by-products of African palm oil for the production of biogas and biomass for electricity generation as a substitute for fossil fuels.

Policy and Programs:

The GOH's legal framework is well suited for the development of biofuels. Honduras is the only Central American country that has approved a law and a regulation that treats biofuel and ethanol production equally. The law provides exemptions from customs tariffs, income tax, and other related taxes for 12 years. These incentives are available for businesses using at least 51

percent of the feedstock of Honduran origin.

The GOH created "The Law for the Production and Consumption of Biofuels" in November 2007. Three GOH Ministries worked on the design and implementation of policies for the production of biofuels and their promotion in the market. The participating Ministries are: the Ministry of Industry and Trade (SIC), the Ministry of Agriculture and Livestock (SAG), and the Ministry of Natural Resources (SERNA).

SIC oversees the promotion, commercialization, distribution, and storage of biofuel. To accomplish these tasks, SIC created the Technical Unit of Biofuel (UTB). The UTB is made up of representatives from SAG, SERNA and the Honduran Council of Private Enterprise (COHEP). SAG applies the law to promote research and the production of sustainable feedstock for the generation of biofuel. Programs are implemented through incentives, promotions, and credits. As an example, SAG has purchased improved African palm seeds from the Malaysian government.

The Biofuels Law provides a legal basis for assigning funds to promote production and provide incentives for the transformation of feedstock into biofuel. These funds can be used for the purchase of equipment, materials, and services used for the planting, design, installation, construction, and operation of projects.

The regulation provides a mechanism to define the mix of biofuel with diesel, and of ethanol with gasoline. The mechanism is based on a supply and demand analysis. Producers of sugarcane and African palm, and the processors of ethanol and biofuel will provide their production capacity to the UTB for a six-month period. Based on the supply and demand of biofuel and ethanol, the UTB will set the mix at two, three or five percent. The main obstacle for the industry is deciding what is more profitable: to sell the oil for food and other types of processing, or to make biofuel.

The GOH believes that biofuel will bring an increase in employment and incomes in the rural areas. For example, it is calculated that one hectare of African palm can produce 1,000 gallons of African palm oil. Each hectare can create 1.5 direct jobs and 2 indirect jobs. If 1,000 hectares are planted and two percent biofuel is added to diesel, 1,500 direct jobs and 2,000 indirect jobs could be created.

One GOH initiative to develop the African palm sector was a loan that SAG requested in 2007 to the Central American Bank of Economic Integration (CABEI) for US$7 million. During the first stage of the loan, 700,000 Malaysian palm seeds were imported from Malaysia and were planted on 4,238 ha. The second stage of the loan will import 600,000 seeds of high quality genetic material to cover 3,500 ha. The GOH is also providing loans to the African palm producers through the National Bank for Agricultural Development (BANADESA) at lower interest rates and long grace periods.

To support biofuel development, the Pan American Agriculture School - Zamorano has a "Center for Scientific Support for the Production of Renewable Energy." In addition, SAG will sign an agreement for technical assistance and research on biofuels with the Northern Regional Center of the University of Honduras (CURLA).

The private sector, non-governmental organizations (NGOs), and international organizations have developed innovative programs for making biofuel from African palm, Jatropha curcas and higuerillo (Ricinus communis). Additionally, new initiatives in the production of biofuels have been established such as the production of biofuel from tilapia by-products, the production of biogas sold for carbon credits, and the production of biomass to burn for electricity.

The programs that have supported biofuels follow:

- The German Development Service (DED) conducted a six-month experiment with biofuel in 2007. The experiment featured six public transportation buses powered by biofuel made from African palm. Through partnerships between investors and producers, DED plans to transform bus motors so they can use Jatropha biofuel. The cost to transform a 35 passenger bus is between US$1,500 to $2,500.

- The Colombian government donated a biofuel plant to SAG in 2009. SAG committed to an agreement to have the African palm producers association manage the plant. The plant has a 24 hours production capacity of 20,000 liters. The plant is still not working due that is more expensive to produce biofuel than oil.

- Technoserve - a U.S. PVO has selected the "Green Drop" project to increase its coverage and strengthen biofuel production. The "Green Drop" project is carried out by the Honduran PVO Foundation for the Agribusiness Rural Development (FUNDER). Technoserve will provide this assistance with USDA funds from 2009-2011. The project is divided in two stages. The first one is to establish Jatropha's plantation; and the second stage is the production of biofuel from Jatropha.

The first stage implements a Jatropha diversification program. This program helps individual producers to set up farms that combine Jatropha with short cycle production crops. Technoserve has established eight model farms to study Jatropha plant yields and the variables that determine these yields. By 2010, Technoserve will have established 539 ha of Jatropha under this system. Technoserve will also develop and distribute a Jatropha production manual adapted to Honduran conditions.

The second stage is to provide business counseling to the Yoro Biofuel' (BYSA), which is a small enterprise. BYSA has 350 small producers as business partners. Technoserve is providing its entrepreneurial expertise to improve the management of BYSA in the production of biofuel, its by-products and the elaboration of BYSA's business plan. Currently, the biofuel processing plant utilizes used oil as feedstock to produce biofuel. The biofuel is sold in the city of Yoro for trucks, buses and agricultural machinery. Technoserve's plans are to use Jatropha oil as feedstock for biofuel.

The "Green Drop" project was created initially by the Social Trade Organization (STRO) and HIVOS from Holland with FUNDER. They, together with Technoserve, continue providing support to FUNDER in the implementation of this project. In previous years, the project also received assistance from the European Union, DOEN Foundation, FACT (Holland), Dajolka (Denmark) and AGERATEC (Sweden).

- The Honduran Foundation of Agricultural Research (FHIA) is also providing support to the "Green Drop" project in the research component of the project. They are providing technical assistance to small producers in the selection of growing areas and growing techniques among others topics.

- The Pan American School of Agriculture - Zamorano has a Center for Scientific Support for the Production of Renewable Energy. Since 2007, Zamorano has been conducting research trials on Jatropha. Currently, Zamorano has a five-year project (2009-2013) funded by the Syngenta Foundation for Sustainable Agriculture. Zamorano describes their project with Jathropa as follows:" Jatropha will be planted in 8 ha. and a Germplasm Bank will be created at Zamorano. The Germplasm Bank will help to facilitate selection and research.

Zamorano will convert Jatropha seeds to biofuel in its pilot biofuel plant. Research will take place on oil extraction and biofuel production, quality and storage stability of Jatropha-based biofuel. Zamorano will create a regional Central American network for Jatropha research activities." Zamorano will hold an International Conference on the Production and Development of Biofuels from August 23-25, 2010.

- In 2008, the farm AGROIPSA started to plant 1,000 ha. of Jatropha. It is the largest commercial plantation in Central America. The seed is harvested, processed and exported to the U.S., Europe and South America. Oil will be obtained later this year (2010) from 400 ha. The biofuel will be sold locally to generate electricity and to a public transportation company. In 2011, they plan to produce 2 million liters of biofuel. Further information can be found at: www.agroipsa.hn.

- The Dinant Corporation is applying its African palm/biofuel technology to the Jatropha plant. This venture is being developed with assistance from the Netherlands Development Organization (SNV) and the Honduran Enterprise Counsel of Sustainable Development (CEHDES). Dinant will start planting 80 ha. later this year (2010) of Jatropha to process it in its plant and obtain biofuel of Jatropha.

Bioethanol and Biodiesel:

Ethanol Production

Currently there is no commercial ethanol production in Honduras. The Honduran Sugar Producers Association (APAH) advocated for the design and approval of the Biofuels Law. APAH saw this law as key for investment in ethanol production. Through their investment plans, APAH has planned a feasibility study of the infrastructure and funding requirements to build an ethanol processing plant. The cost of an annex distillery with a daily capacity of 300-400,000 liters would be about US$ 50 million if the plant were installed in an existing sugar mill. If a new sugar mill with an ethanol processing plant were built, the cost would be about US$170 million. The sugar mills are waiting for an improvement in the global financial crisis, as well as biodiesel prices.

The sugar mills produce the energy they use during the harvest months through the use of bagasse (the biomass remaining after sugarcane stalks are crushed to extract their juice). The mills can generate 128 Mw-h, with a potential of 344 Mw-h of electricity. They also sell electricity to the GOH's electric company ENEE. Due to the high price of oil, mills are using coal during the non-harvest season of May-November. The coal is imported from Colombia.

Ethanol Consumption

Currently there is no commercial ethanol consumption in Honduras.

Trade

Under the Central American-Dominican Republic Free Trade Agreement (CAFTA-DR) with the United States, there are opportunities for ethanol production. The participating countries have duty-free access to export to the United States the ethanol produced from regional feedstock. CAFTA-DR quotas are equal to seven percent of U.S. ethanol consumption. If consumption increases in the United States, the quota can also increase.

Biofuel Production

Honduras provides favorable geographic and climatic conditions for the production of biofuel. The African palm plant is the primary source of biofuel in Honduras. In its 2006 "Register of Characterization and Geo-Referencing of the Members the African Palm Agri-Food Chain," the Ministry of Agriculture and Livestock (SAG) observed that African palm production can expand to an additional 200,000 ha. In 2010, there are 130,000 ha. under cultivation.

a) Biofuel from African Palm

African palm production in Honduras began commercially in 1971. As part of the agrarian reform, producers organized into agro-industrial enterprises. One of their objectives was to expand the production of African palm in the regions of Cortés, Atlántida, Yoro and Colón, all on the north Atlantic coast. In 2006, the GOH implemented an investment plan for African palm which established the Register of Characterization and Geo-Referencing. This Register included the elaboration of the location of the African palm sector. It has an interactive database that links together socioeconomic factors, production, and the location of the plants (extracting, fractioning, and refining).

The national average yield of African palm fruit was 15.5 MT/ha/year in 2007. In 2009, the fruit yield increased to 16.5 MT/ha/year. The increase is due to technical assistance and training, improved genetic material, and better management of the plantations by the producers. The yield is affected by the diversity of micro-climates, soil types, genetic varieties of the African palms, pests, irrigation and the availability of credit to buy fertilizer. Yield in the processing stage is affected by the quality of fruit. Fruit which is harvested green will likely be damaged during transportation. Additionally, the state of the plant and the equipment influences the yield.

Another factor in African palm management is that the average age of the plantations is about 14 years meaning that significant replanting is needed. This will provide employment which the GOH is highly interested in increasing. Immigration of young people from the African palm areas is decreasing. This is due to the support given to small producers to become entrepreneurs, which allows them to hire more members of their families.

Since 2000, demand for African palm oil has been growing. Over a nine-year period, production increased by 136 percent to 330,000 MT and planted area increased by 101 percent to 125,000 ha. in 2009. Of the 380,000 MT of African palm oil produced in 2008, 85 percent was used to produce oil and 15 percent was used for biofuel production. Of the 250,000 MT of palm oil exported the same year, 60-70 percent was exported to Mexico and 20-30 percent was exported to El Salvador. Data for 2009 are not yet available.

There are ten palm oil extraction plants that are owned by four export companies. The five plants listed below have the equipment to produce biofuel. During previous years, they produced biofuel mostly for their own consumption for their company's vehicles, machinery and irrigation pumps. However, the plants are not currently producing biofuel. This is due to the higher cost to produce biofuel compared to the cost of fossil fuel. Fossil fuel is subsidized by the GOH, which has an effect on its real price. In addition, the cost of biofuel production in Honduras is affected by a higher international price obtained for the sale of African palm oil. The chart below shows the installed capacity of these plants. The plants could produce biofuel at 10 percent of their processing capacity.

	Oil Extraction Plants	**Installed capacity to produce biofuel (Gallons/per day)**
1	Dinant	36,000
2	Jaremar	25,000
3	Salama	2,800
4	Hondupalma	1,500
5	Coapalma	800
	T O T A L	66,100

Source: PRONAGRO, Ministry of Agriculture and Livestock

Dinant Corporation is one of the leaders in African palm oil production. The corporation manages 16,000 ha. of land. Fifty percent of its oil production is exported. Dinant uses the remaining oil to produce processed oil products.

In 2006, the Dinant Corporation began operation of a biofuel processing plant. It used biofuels (B100) to fuel its distribution trucks and six public transportation buses in Tegucigalpa. The only modification it made to its vehicles was to change the filters. The processing plant can be enlarged for a capacity of 36,000 gallons of biofuel (B100) per day, enough to run a fleet of diesel trucks, tractors, equipment for irrigation, other vehicles, retro-excavators, and a bulldozer. In August 2008, the price of fossil fuel decreased, which was not profitable to continue producing biofuel.

b) Biofuel from Jatropha Curcas

The land and climate in Honduras are highly suitable for the growth and production of Jatropha

curcas. This tree-like plant grows in marginal soils and has limited requirement for water. The plant bears fruit twice a year for 25 productive years, but needs extensive labor. During the first year, the plant may provide 10 percent of its potential oil yield and the percentage continues to increase until it is mature. At maturity (4-5 years), Jatropha can provide 1,500 – 2,000 liters of oil per hectare. Since Jatropha grows on poor quality soils, it does not compete with land for food production. In addition, the quality of the biofuel from Jatropha is comparable with corn or soybean oil. Its quality is better because it does not require further refining, which results in less processing.

The programs that support Jathropa's biofuels technology development and commercialization of production in Honduras were listed in the Policy and Programs section above mentioned.

Investment is needed for the producers to grow Jatropha. Honduras has the know-how, but, producers need financing to manage a plantation and earn a living during the three years it takes the plants to reach maturity.

c) Biofuel from Fish Processing

Aquafinca Saint Peter Fisheries is the largest tilapia farm in Honduras, producing 32,850 MT of fresh fish every year. In 2006, Aquafinca opened a biofuel plant which uses tilapia waste. The fish remnants (guts, heads, skins, and internal organs) are rendered into oil which is processed into biofuel as a fuel stock. Approximately 40 percent of these fish remnants (48,000 pounds per day) are used to produce biofuel every day. In 2009, Aquafinca produced 1.0 million liters of biofuel and used it to run the company's vehicles. This biofuel replaced about 60,000 gallons per month of fossil fuel. Aquafinca was awarded the Latin American Award of the Environment in 2006. In 2010, Aquafinca received the U.S. Ambassador in Honduras's Renewable Energy Award. Further information can be found at:
http://aquaticbiofuel.files.wordpress.com/2009/08/fishwaste-biodiesel.pdf

Biofuel Consumption

Currently, there is no commercial biofuel consumption in Honduras. The one tilapia by-product processing plant mentioned above utilizes the biofuel for its own consumption. The biofuel powers generators, irrigation equipment and company vehicles.

Stocks

Currently there are no commercial stocks of biofuels in Honduras.

Biomass for Heat and Power:

The biogas and biomass programs and projects currently carried on are the following:

- EECOPALSA, a private Honduran company, uses the liquid waste from its African palm oil extracting plant (PALCASA) to produce energy. The liquid waste obtained from washing down the oil extraction equipment is stored in a covered lagoon where it decomposes and creates biogas. The composition of biogas is 65 percent methane and 30 percent carbon dioxide (CO2). The biogas is captured and burned to create 1.266 kilowats per hour (Kw/h) of electricity in the first project. The second project burns 950 Kw/h. The biogas saves 27,000 MT of carbon emissions annually, and through its registration with the Clean Development Mechanism of the United Nations (UN) Framework Convention on Climate Change (UNFCCC), EECOPALSA sells carbon offset credits to Switzerland and Belgium.

EECOPLASA is the first African palm biogas project in the world certified for carbon credits with a category of Gold Standard. Further information can be found at: http://www.onecarbon.com/ and http://cdm.unfccc.int/UserManagement/

EECOPLASA has also developed the technology of boiling the solid waste (biomass) of the African palm to produce electricity. Three MT of African palm fruit produce one MT of biomass. Approximately 3.5 MT of biomass can produce 3.5 mega watts of electricity per hour. The biomass creates 3,400 Kw/h of electricity.

- Grupo Jaremar, an industrial and commercial cluster in Honduras operates a biogas plant generating electricity from the capture of methane released in the production of African palm oil. The biogas is captured and burned to create 848 Kw/h of electricity. The electricity produced offsets the equivalent of 500,000 gallons of oil annually and more than 30,000 MT of carbon dioxide. The company also runs a biomass plant that creates 1,600 Kw/h of electricity. This saves an additional 15,000 metric tons of carbon dioxide emissions. Grupo Jaremar also works with the Kyoto Protocol and UNFCCC's Clean Development Mechanism.

Notes on Statistical Data:

Conventional & Advanced Bioethanol (million liters)						
CY	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Production	N/A	N/A	N/A	N/A	N/A	N/A
Imports	N/A	N/A	N/A	N/A	N/A	N/A
Exports	N/A	N/A	N/A	N/A	N/A	N/A
Consumption	N/A	N/A	N/A	N/A	N/A	N/A
Ending Stocks	N/A	N/A	N/A	N/A	N/A	N/A
Production Capacity (Conventional Fuel)						
No. of Biorefineries	N/A	N/A	N/A	N/A	N/A	N/A
Capacity	N/A	N/A	N/A	N/A	N/A	N/A
Production Capacity (Advanced Fuel)						
No. of Biorefineries	N/A	N/A	N/A	N/A	N/A	N/A
Capacity	N/A	N/A	N/A	N/A	N/A	N/A
Co-product Production (1,000 MT)						
Product Y	N/A	N/A	N/A	N/A	N/A	N/A

Product Z	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock Use (1,000 MT)						
Feedstock A	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock B	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock C	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock D	N/A	N/A	N/A	N/A	N/A	N/A

Conventional & Advanced Biodiesel (million liters)						
CY	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Production	0.9	1.0	1.1	1.0	1.0	1.1
Imports	N/A	N/A	N/A	N/A	N/A	N/A
Exports	N/A	N/A	N/A	N/A	N/A	N/A
Consumption	0.8	0.9	0.9	0.7	0.9	0.10
Ending Stocks	0.09	0.09	0.18	0.36	0.14	0.09
Production Capacity (Conventional Fuel)						
No. of Biorefineries	N/A	N/A	N/A	N/A	N/A	N/A
Capacity	N/A	N/A	N/A	N/A	N/A	N/A
Production Capacity (Advanced Fuel)						
No. of Biorefineries	N/A	N/A	N/A	N/A	N/A	N/A
Capacity	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock Use (1,000 MT)						
Tilapia remnants	5.4	6.2	6.5	6.2	6.2	6.5
Feedstock B						
Feedstock C						
Feedstock D						

Source: Aquafinca

Biogas (KW/hour)						
CY	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Landfill	N/A	N/A	N/A	N/A	N/A	N/A
Sewage Sludge	N/A	N/A	N/A	N/A	N/A	N/A
Field Crops/Manure	1,266	1,266	2,114	2,114	3,064	3,064
Total	1,266	1,266	2,114	2,114	3,064	3,064

Biomass (KW/hour)						
CY	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Landfill	N/A	N/A	N/A	N/A	N/A	N/A
Sewage Sludge	N/A	N/A	N/A	N/A	N/A	N/A
Field Crops/Manure	N/A	N/A	1,600	5,000	5,000	5,000
Total	N/A	N/A	1,600	5,000	5,000	5,000

Source: EECOPALSA and JAREMAR