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# Caribbean Agro-Economic Society

**In association with ALACEA; the University of the West Indies, St Augustine; CARDI and the Ministry of Agriculture and Fisheries, Belize**

# *Programme and Abstracts*

**27th West Indies Agricultural Economics Conference/8th Meeting of Asociacion de Latino America y del Caribe de Economistas Agricolas (ALACEA)**

***"Improving Marketing and Sustaining Natural Resource Systems in Latin America and the Caribbean"***

**23rd-27th July, 2007.**

**Belize City, Belize**

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# *Opening Ceremony*

## *Monday 23rd July, 2007*

Chairman - ***Roberto Harrison***
General Manager, BELTRAIDE
and Member, Local Organizing Committee

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| 9:00 am - 9:10 am | Welcome Remarks - ***Mrs Sandra Hall***, Chief Executive Officer, Ministry of Agriculture and Fisheries, Belize |
| 9:10 am – 9:20 am | Remarks - ***Dr Wendel Parham***, President CAES |
| 9:20 am - 9:30 am | Remarks - ***Dr Carlisle Pemberton***, President, ALACEA and Vice President, CAES |
| 9: 30 am – 9:50 am | Feature Address - *Right* ***Honourable Said Musa***, Prime Minister and Minister of Finance, National Development and the Public Service, Belize |
| 9:50 am – 10:00 am | Vote of Thanks - ***Mr Eugene Waight***, Chief Agricultural Officer and Chairman of Local Organizing Committee, Belize |

# CONFERENCE PROGRAMME

## *Sunday July 22*

Arrival of Participants

6:00 pm – 8:00 pm Registration

## *Monday July 23*

8:00 am – 9:00 am Registration (continues throughout the day)

9:00 am – 10:00 am ***Opening Ceremony***

***10:00 am - 10:30 am*** ***Break***

10:30 am – 11:30 am ***Lewis/Beckford Memorial Lecture***
***Presenter: Prof Ralph Christy***

***Moderator:*** ***Carlton Davis***

***11:30 pm – 1:00 pm*** ***Lunch***

## *Session A: Marketing and Trade Issues*

***Moderator:*** ***Edric Harry***

1:00 pm – 1:30 pm **The Continuing Saga of the EU Banana Debate: An Analysis of Possible Refinements to the 2006 EU Banana Trade Regime**. E. A. Evans, T. H. Spreen, S. Nalampang and D. N. Corrie-Kordas. University of Florida



**Presentation 33: Status of Aquaculture Development in Belize – 2006.** By G. Myvett and R. Quintana. Ministry of Agriculture and Fisheries, Belize

Aquaculture in Belize has been expanding in volume and value more rapidly than capture fishery production, terrestrial livestock production and other agro-production activities. The industry is primarily based on the production of the Pacific White Shrimp (*Litopenaeus vannamei*). During the past three years, the sector has diversified into the farming of other aquaculture species, namely the Tilapia (*Oreochromis niloticus*) and the Cobia (*Trachynotus carolinus*). During the period of 1995 to 2004, the industry has shown 160% annual increase in the production volume. The export production and revenues have increased from 1.2 million pounds valued at Bz$10.4 million respectively in 1995 to 16.86 million pounds and Bz$84.28 million respectively in 2004. In 2006, there was a decline in the volume and value of aquaculture export commodities. This was mainly as a result of the closure of at least three shrimp farms and the continued decline in global shrimp prices.

FISHING. At last, strengthen to Bocas del Polochic Association and you entrance in the second level organization called Fisheries Caribbean Network for to influence in the fishermen with a methodology named fishermen to fisherman is other target.

**Presentation 32: Harvesting bevaviour in the Pelagic Fisheries of the Southern Caribbean: Implications for Governance.** By S. Hutchinson. The University of the West Indies, St Augustine

Similar to many regions in the world, fisheries in the Caribbean are largely considered to be overcapitalized and therefore overexploited. Financial and human resource restrictions over time have resulted in a disconnect between actual fishing behavior in terms of landings and effort, and the fisheries policies that are already in place, and those that are proposed. This paper examined the historical catch and effort in key ocean and coastal pelagic fisheries in the Southern Caribbean region, which contribute significantly to the region's fisheries sector. It also appraised changes in trade for these key pelagic species in the Caribbean, as well as emerging policies on the use of these fisheries, and the potential for sustainability. Global, regional and local governance structures were also evaluated to determine the sources of potential short run and long run conflict, and provide recommendations for solutions to existing or potential problems.



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| 1:30 pm – 2:00 pm | **Can One Size Fit All? An Analysis of CARICOM Agricultural Development Policy Formulation** R. M Gordon. CARICOM |
| 2:00 pm – 2:30 pm | **Market Integration and Efficiency in the Presence of Cross-Border Trade Restrictions: Evidence from Selected Maize Markets in Southern Africa.** E. Mutambatsere and R. D. Christy. Cornell University |
| ***2:30 pm - 3:00 pm*** | ***Break*** |
| ***Moderator:*** | ***Sharon Hutchinson*** |
| 3:00 pm – 3:30 pm | **Changing Agri-food Markets in the Caribbean: A Preliminary Investigation**. A. Iton. CARDI, Trinidad and Tobago |
| 3:30 pm – 4:00 pm | **The Effect of CAFTA on Ethanol Production and Trade.** P. Gregorowicz and C. Ligeon. Auburn University. |
| ***4:00 pm – 6:00 pm*** | ***Special Session: Development Forum (Poster Presentation, Panel Discussion)*** |
| ***Moderator:*** | ***Carlisle Pemberton*** |
| ***6:00 pm*** | ***Hotel Reception*** |

## *Tuesday July 24*

## *Session B: Agribusiness*

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| ***Moderator:*** | ***Edward Evans*** |
| 9:00 am - 9:30 am | **Selecting a Model for R & D Impact Analysis: the CARDI Dominica Portfolio.** M. Wilson. CARDI, Trinidad and Tobago |
| 9:30 am - 10:00 am | **Towards Starting a Sustainable Medicinal Plant Industry in Trinidad and Tobago.** N. Badrie and Y. Baksh-Comeau. The University of the West Indies, St. Augustine |
| 10:00 am - 10:30 am | **Vertically Integrated Pig Industry Cluster Improves Productivity.** K. Amiel. Pig Industry, Development Committee and Caribbean Agribusiness Association (Jamaica) |
| ***10:30 am - 11:00*** | ***Break*** |
| ***Moderator:*** | ***Hesdie Grauwde*** |
| 11:00 am -11:30 am | **Comparing the Growth of Agriculture and Agribusiness – Mapping the Real Contribution of Agriculture to the Economy**. H. Patterson Andrews and C. Pemberton. The University of the West Indies, St Augustine |



**Presentation 31 Sustainability of Mayan-Q`eqchi` Fisheries in Refugio de Vida Silvestre Bocas del Polochic –RVSBP-, Protected Area, Izabal Lake, El Estor, Guatemala. The Conflict toward the Sustainability with Aquaculture y Fisheries Management.** By H. Hidalgo. Defensores de la Naturaleza, Guatemala

Historically the importance of fisheries activities in Guatemalan Caribbean is sub estimated give a short account the system conformed by Izabal Lake-Rio Dulce work like nursery area for different commercial species in specialty for Honduras Gulf and Bahía de Amatique. Forty years ago the presence of jacks, drums, sharks, shrimps, blue crab and others species was bigger in the Lake. If the fisheries activities in the Guatemalan Caribbean was omit, in the Izabal Lake this happen with to much intensity. This lake has 680 fishermen register an estimation over 300 don't register. All them fishing without license extended by The National Unit for the Fisheries and Aquaculture -UNIPESCA- . Add to this, techniques no sustainability that began your use four years ago, like the trawling fisheries (haladores) that impacted in terms of ecology, to reduce the catch for Mayan artesian and living fishermen. The conflict developed between Bocas del Polochic fisheries association and Haladores de El Estor Committee provoked look different activities for obtain the fisheries sustainability in the Lake, important for get nutritious security over one thousand families. Some of this activities are the evaluation for the establishing a system the fish production in cage (Tilapias, native species); with the target for to reduce the fisheries effort to cause by the trawling fisheries. Also the building of artificial reef, function like fisheries aggregated device system –FADS- and anti-trawling device is other action to take with the objective of increases the aggregation of native species and to reduce the impact of bigger net fish. Developed this, implicated challenge like, take risky actions against we by the trawling employees, whom historically don't had been fisheries, and whom has been incorporated to fisheries activity by economic bonus. The salary is over 300% the normal. Like part of this process, actuality we are developed a conduct responsibility code using the Maya-Q`eqchie cosmovisión; we believe that this code is more easy for respect that occidental laws, also a model of environment education to bring the fishermen reflection, a popular version of fishing rules with pictures easy to understand and a fish catalogue of commercial species. With the market, we consider that for obtain the fisheries sustainability is necessary balance the force between offer and demand, This is equal to work with middleman to local level for to reduce the illegal commercialization in close season and to avoid the catch under minimal size of gonadal maduration. IF DON`T BUY, WHOM

**Presentation 30: Exploring the Opportunities for Exporting Yellowfin Tuna (*Thunnus albacares*): The Case of Dominica.** By B. Theophille, CARDI, Trinidad and Tobago; S. Hutchinson, The University of the West Indies, St Augustine; and A. Iton, CARDI, Trinidad and Tobago

In the last decade, there have been significant changes in the economic prospects of persons in Dominica, especially in response to changes in the trade access for key agricultural commodities. This study examined opportunities for exporting Yellowfin tuna (*Thunnus albacares*) in Dominica, within the context of Caribbean fisheries systems, and the market for high-valued agricultural products. The fisheries sector is identified as an under-exploited resource in Dominica, having significant capacity for foreign exchange earnings, evidenced by an increasing trend towards harvesting yellowfin tuna, and attractive prices on both domestic and international markets. The study assessed the historical and current trade in Yellowfin tuna, the marketing requirements of current importers of the product. It also reviewed the availability of new markets, and key market trends in the trade of high-valued seafood commodities. Finally, this study reviewed Dominica's ability to meet existing and proposed marketing and trade requirements, as well as the institutional and other factors that are in place, and those needed to provide continued support to increasing trade of this commodity.



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| 11:30 am - 12:00 noon | **An Assessment of Emerging Agribusiness Opportunities in the Fresh Agricultural Produce Market of Selected CARICOM Countries.** A. Iton, CARDI, Trinidad and Tobago; G. Seepersad, The University of the West Indies, St Augustine; and C. Johnson, CARDI, Trinidad and Tobago |
| ***12:00 pm - 1:30 pm*** | ***Lunch*** |

## *Session C: Sustainable Development*

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| ***Moderator:*** | ***Curtis Jolly*** |
| 1:30 pm - 2:00 pm | **Multimedia Mapping and GIS Integration for Sustainable Resource Management**. E. Joseph. Grand Valley State University |
| 2:00 pm - 2:30 pm | **An Evolving Model of Outreach and Land Management Training for Limited Resources, Minority Landowners.** R. Fraser, C. Christian; Alabama A&M University; J. Hamilton Wayne, Community College, North Carolina; and J. Schelhas, Tuskegee University |
| ***2:30 pm - 3:00 pm*** | ***Break*** |
| ***Moderator:*** | ***Curtis Jolly*** |
| 3:00 pm - 3:30 pm | **Sustainable Forest Management and the Valuation of Ecosystem Services.** E. Kebede and M. Ngandu. Tuskegee University |

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| 3:30 pm – 4:00 pm | **Integrating Limited Resource Agricultural Production within the formal service sector in The Bahamas.** M. N. Alvarez, A. Cleare, IICA, Bahamas; I. G. Stubbs, Bahamas Agricultural Producers Association; A. Dorsette, Bahamas Agricultural Industrial Corporation |
| 7:00 pm – 9:00 pm | ***Cocktails and Cultural Show Sponsored by The Ministry of Agriculture, Belize*** |

## *Wednesday July 25*

## *Session D: Food Safety*

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| ***Moderator:*** | ***Neela Badrie*** |
| 8:30 am – 9:00 am | **Antibacterial Efficacy of *Eryngium foetidum* (Culantro) against Select Food-borne Pathogens.** S. Homer, G. S. H. Baccus-Taylor and J. O. Akingbala. The University of the West Indies, St. Augustine |
| 9:00 am – 9:30 am | **Food Safety Issues between the U.S., Latin American and Caribbean Countries.** C. Jolly and E. Namugabo. Auburn University. |
| 9:30 am – 10:00 am | **Health and Economic Impact of Mycotoxins in Latin America and the Caribbean.** P. Jolly, University of Alabama and C. Jolly. Auburn University |
| ***10:00 am -10:30 am*** | ***Break*** |



**Presentation 29: The CSME and the Common Fisheries Policy for CARICOM States**. By M. O. Haughton. Caribbean Regional Fisheries Mechanism

The Revised Treaty of Chaguaramas came to life with the formal launching of the CARICOM Single Market in 2006. The Treaty is a framework agreement which lays down principles and rules for the operation of the CARICOM Single Market and Economy (CSME). Its aim is to create an enlarged internal market without barriers where the free movement of goods, labour, capital and services, and freedom of establishment will be ensured. The CSME also requires the development of a number of common institutions and policies. This paper examines the provisions of the Treaty relating to the use and management of coastal and marine resources and discusses the development of a common fisheries policy and regime to give effect to the rights and obligation arising from the Revised Treaty

**Presentation 28: Shrimp Bycatch in Trinidad and Tobago: What is it really worth?** By S. Hutchinson, R. Singh, G. Seepersad, The University of the West Indies, St Augustine; and S. Soomail, The Ministry of Agriculture, Land and Marine Resources, Trinidad and Tobago

Globally, there is a concerted effort to reduce bycatch, especially in the harvest of shrimp, which is seen as the fishery which uses the least selective gear, trawling. Bycatch is known to include not just unwanted species of fish and other seafood, but also juveniles of many species of commercial importance. This study reviewed the importance of shrimp byactch in Trinidad and Tobago, using two key fishing communities: Orange Valley and Otaheite, as case studies. Surveys were done of fishers to determine the type and volume of shrimp and bycatch landed, and their vessel and trip characteristics. Surveys were also done of households to determine their involvement in the fisheries sector of the local communities, directly or indirectly, their consumption patterns of shrimp and bycatch, both in and outside of the home, and their views of the linkages between the harvest of shrimp and bycatch, and the livelihoods of community members. The information provided by households and fishers was used to estimate the production value of bycatch in these two communities. This information has implication for proposals to reduce the incidence of bycatch, and also proposals to alter access to traditional fishing grounds, which may reduce all seafood harvest.



## *Session E: Belize /Special CCCCC Session*

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| ***Moderator:*** | ***Eugene Waight*** |
| 10:30 am - 10:50 am | **Challenges and Opportunities for Forest Management in Belize**. N. Novelo. Forestry Department, Belize |
| 10:50 am - 11:10 am | **Sustainable Tourism in Belize**. A. Mahler. Belize Tourism Board |
| 11:10 am - 11:30 am | **Environmental Management using the Environmental Impact Assessment Procedures** M. Alegria. Department of Environment, Belize. |
| 11:30 am - 11:50 am | **Policies for Sustainable Fisheries Development in Belize.** Fisheries Department, Belize. |
| ***11:50 am - 12:30 pm*** | ***Discussion*** |
| ***12:30 pm - 1:30 pm*** | ***Lunch*** |
| ***Moderator:*** | ***Kenneth Leslie*** |
| 1:30 pm - 2:00 pm | **Climate Change – Evidence for its Existence in the Caribbean and its Possible Effects on Agriculture**. C. A Pemberton. The University of the West Indies, St Augustine |
| 2:00 pm - 2:30 pm | **Potential Impacts of Climate Change on Agriculture in Belize**. R. Frutos. Department of Meteorology, Belize |
| 2:30 pm - 3:00 pm | **Climate Change and Food Security in the Caribbean**. Caribbean Community Climate Change Center |

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| ***3:00 pm - 3:30 pm*** | ***Break*** |
| ***Moderator:*** | ***Phillip Tate*** |
| 3:30 pm - 3:50 pm | **Strategies for Sustaining Agriculture Production in Belize**. J. Castellanos. Ministry of Agriculture and Fisheries, Belize |
| 3:50 pm - 4:10 pm | **Agriculture in the CSME**. R. Reid. Ministry of Foreign Affairs and Foreign Trade, Belize |
| 4:10 pm - 4:30 pm | **Agriculture and Rural Development.** M. Avila. Belize Rural Development Project |
| ***4:30 pm - 4:50 pm*** | ***Discussion*** |
| ***4:50 pm – 6:15 pm*** | ***CAES/ALACEA General Meeting*** |
| ***7:00 pm – 9:00 pm*** | ***CAES Banquet*** |

## *Thursday July 26*

***Field Trips***

## *Friday July 27*

### *Session F: Caribbean Regional Fisheries Mechanism Session*

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| ***Moderator:*** | ***Hugh Saul*** |
| 9:00 am - 9:30 am | **Shrimp By catch in Trinidad and Tobago: What is it really worth?** S. Hutchinson, R. Singh, G. Seepersad. The University of the West Indies, and S. Soomai, Ministry of Agriculture, Land and Marine Resources, Trinidad and Tobago |



**Presentation 24: Climate Change and Food Security in the Caribbean**. Caribbean Community Climate Change Center

**Presentation 25: Strategies for Sustaining Agriculture Production in Belize**. J. Castellanos. Ministry of Agriculture and Fisheries, Belize

**Presentation 26: Agriculture in the CSME**. R. Reid. Ministry of Foreign Affairs and Foreign Trade, Belize.

**Presentation 27: Agriculture and Rural Development.** M. Avila. Belize Rural Development Project

## *BELIZE/CCCCC Special Session*

**Presentation 18: Challenges and Opportunities for Forest Management in Belize**. N. Novelo. Forestry Department, Belize

**Presentation 19: Sustainable Tourism in Belize**. A. Mahler. Belize Tourism Board

**Presentation 20: Environmental Management using the Environmental Impact Assessment Procedures**. M. Alegria. Department of Environment, Belize

**Presentation 21: Policies for Sustainable Fisheries Development in Belize.** Fisheries Department, Belize.

**Presentation 22: Climate Change – Evidence for its Existence in the Caribbean and its Possible Effects on Agriculture.** By C. A. Pemberton.
The University of the West Indies, Augustine

The concerns about climate change are escalating as populations throughout the world are becoming convinced that temperatures are increasing and that rainfall patterns are changing. The situation is true for the Caribbean. However the evidence for climate change in the Caribbean has been scanty. This paper will examine this evidence, focusing particularly on temperature rise. The impacts of climate change on agriculture will also be examined.

**Presentation 23: Potential Impacts of Climate Change on Agriculture in Belize**. R. Frutos. Department of Meteorology, Belize



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| 9:30 am - 10:00 am | **The CSME and the Common Fisheries Policy for CARICOM States.** M. Haughton. Caribbean Regional Fisheries Mechanism, Belize |
| 10:00 am -10:30 am | **Exploring the Opportunities for Exporting Yellowfin Tuna (Thunnus albacares): The Case of Dominica.** B. Theophille, A. Iton, CARDI, Trinidad and Tobago; and S. Hutchinson, The University of the West Indies, St Augustine |
| 10:30 am - 11:00 am | **Sustainability of Mayan-Q`eqchi` Fisheries in Refugio de Vida Silvestre Bocas del Polochic – RVSBP-, Protected Area, Izabal Lake, El Estor, Guatemala. The Conflict toward the Sustainability with Aquaculture and Fisheries Management.** H. Hidalgo. Defensores de la Naturaleza, Guatemala |
| 11:00 am – 11:30 am | **Harvesting Behaviour in the Pelagic Fisheries of the Southern Caribbean: Implications for Governance.** S. Hutchinson. The University of the West Indies, St Augustine |
| 11:30 am - 12:00 noon | **Status of Aquaculture Development in Belize – 2006**. G. Myvett and R. Quintana. Ministry of Agriculture and Fisheries, Belize |
| ***12:00 pm - 1:00 pm*** | ***Closing Ceremony and Cocktails*** |

## *Closing Ceremony and Cocktails*

## *Friday 27th July, 2007*

Chairman - ***Mr Roberto Harrison***
General Manager, BELTRAIDE
and Member, Local Organizing Committee

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| 12:00 pm -12:10 pm | - | Remarks - ***Dr Wendel Parham***, President, CAES |
| 12:10 pm– 12:20 pm | - | Remarks - ***Dr Carlisle Pemberton***, President ALACEA and Vice President, CAES |
| 12:20 pm -12:35 pm | - | Closing Remarks - ***Mrs Sandra Hall***, Chief Executive Officer, Ministry of Agriculture and Fisheries |
| 12:35 pm - 12:45 pm | - | Vote of Thanks - ***Mr Eugene Waight***, Chief Agricultural Officer and Chairman of Local Organizing Committee |

## *Cocktails*



**Presentation 17: Health and economic impact of mycotoxins in Latin America and the Caribbean.** By P. E. Jolly, University of Alabama and C. E. Jolly. Auburn University

Mycotoxins are naturally occurring toxicants that cause major problems to food safety worldwide. They are produced by certain fungi and pose serious health problems to man and animals when contaminated foods are ingested. In acute mycotoxicosis severe symptoms of illness such as acute liver damage, jaundice, vomiting, high fever and hemorrhage can appear very quickly after consumption of contaminated foods and can result in death. Chronic dietary intake of mycotoxins in humans and animals has been related to cancer, growth retardation, micronutrient deficiency and impairment of the immune system. According to the FAO, 25 % of the world's food crop is contaminated with mycotoxins. While many countries in Europe and North America enforce regulations that control the levels of mycotoxins in foods, efforts to educate the public on the dangers of mycotoxins and to reduce the levels of aflatoxin contamination in foods in Latin American and Caribbean (LAC) countries have been rather weak. A number of crops (maize, wheat, coffee, soybeans, barley, sunflower, groundnuts, tree nuts, cocoa, root tubers and dairy products) that are produced and consumed in LAC countries are highly susceptible to fungal contamination and mycotoxin production. Mycotoxins are not only health hazards but cause serious economic and financial losses to domestic food producers and exporters. In this paper, we review the economic and health threats of mycotoxin contamination of foods in LAC countries and examine the measures adopted by governments and institutions in these countries to reduce the health and financial burdens of mycotoxin contamination in foods.

**Presentation 16: Food Safety Issues between the U.S., Latin American and Caribbean countries.** By C. M. Jolly and E. Namugabo. Auburn University

Latin America and the Caribbean constitute the largest trading area for U.S. exports. The Latin American area is also the fastest growing U.S. regional trading partner. Between 1992 and 2003, total U.S. merchandise trade (exports and imports) with Latin America grew by 154 % compared to 88% for Asia, 89% for the European Union, 78 % for Africa, and 102 % for the world. Food trade is gaining importance in international and regional trade. One of the largest importers of food in the global market is the United States. In 1999, the U.S. exported $69.85 billion (12.6 % of world export market share) and imported $62.4 billion (10.6% of world market import share). A large portion of the food from the United States comes from Latin American and Caribbean countries, particularly Mexico. However, as trade between the regions increase the non-trade barriers in the form of product detentions also increase. These countries have been forced to meet stringent standards imposed by U.S. importers and the U.S. government, as consumers become vigilant about food safety issues. In this paper, we examine the rates of U.S. food trade detentions from Latin America and the Caribbean. We analyze the trends and the various reasons given for detentions. We note that the number of detentions of agricultural exports from Latin America and the Caribbean surpasses that of all other regions of the world, and the number of detentions increases with the volume and value of trade. The reasons given for the detentions vary by country and products and have changed over time. Before the attacks on the World Trade Center, the most common reasons for detention of products were infestation by microorganisms, filth, and labeling. After the attack on the World Trade Center the most common reasons are pesticide contamination, labeling, and poisons. The measures required to satisfy U.S. standards place a serious financial and economic burden on exporters from Latin American and Caribbean countries.



# Abstracts

**Presentation 1: The Continuing Saga of the EU Banana Debate: An Analysis of Possible Refinements to the 2006 EU Banana Trade Regime.** By E. A. Evans, T. H. Spreen, S. Nalampang and D. N. Corrie-Kordas. University of Florida

In April 2001, an agreement was reached between the main rivaling parties (the United States, Ecuador, and the European Union) on how to resolve the longstanding dispute over EU rules for banana imports. Among other things, the agreement provided for a transition to a tariff-only import system that would become fully operational by January 1, 2006. Details of the new regime were released on November 29, 2005, following earlier versions that were deemed unsatisfactory from an MFN (most favored nation) perspective. Specifically, the new regime would replace the quota for MFN banana imports with a tariff of 176 EUR (US $234) per metric ton (MT) and preferential duty-free access of up to 775,000 MT for imports from ACP (Africa, Caribbean, and Pacific) countries. ACP countries' out-of-quota exports to the EU would be subject to the same MFN tariff. EBA (Everything-But-Arms) countries would be allowed unlimited duty free access to the EU market. The proposal was touted as bringing the EU rules for banana imports in line with the WTO rulings.

However, recently at the urging of Ecuador, the world's largest banana producer, the WTO has authorized an investigation into the EU's current banana import regime, re-opening the 10-year old dispute. The gist of the dispute is that the new import regime does not offer fair market access to MFN countries. Rather, it has taken away market shares from the MFN countries. The feeling is that the current tariff is too high and should be lowered to EUR 75 (US $100), which was the in-quota tariff faced by the MFN countries before the current regime was implemented, and that the zero-duty quota for ACP countries should be eliminated. ACP countries, for their part, as well as interests within the EU are vehemently opposed to any such proposal.

With the use of a spatial equilibrium model depicting the world market for bananas, we investigate the consequences of possible changes to the current regime as a result of this new development. Specifically, the scenarios being considered are the impact of a 10% or 20% reduction of the current tariff with the ACP quota remaining in place and the impact of reducing the tariff to EUR 75 per metric ton for MFN countries with unlimited duty-free access for ACP exports. Additionally, the ACP countries efforts to request an enhanced Third Party status in the WTO Panel, if granted, will be highlighted within the framework of an on-going attempt by the ACP Group to secure a mutually accept-



**Presentation 15: Antibacterial Efficacy of *Eryngium foetidum* (Culantro) against Select Food-borne Pathogens.** By S. Homer, G. S. H. Baccus-Taylor and J. O. Akingbala. The University of the West Indies, St Augustine

There is a growing trend of consumer preference for the use of natural food preservatives either to prevent the growth of foodborne pathogens, or to delay the onset of food spoilage. In this study, an in-vitro screening method was used to determine the antibacterial efficacy of a 10% w/v suspension of the natural leaves of the herb culantro (*Eryngium foetidum*), against *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis* and *Salmonella typhimurium*. The apparent sensitivity of the gram-positive bacteria and resistance of the gram-negative bacteria were distinct. Significant antibacterial activity was evident against *S. aureus* and *B. subtilis*, but no apparent antibacterial activity against *E. coli* and *S. typhimurium*. There was approximately 100% kill for both *S. aureus* and *B. subtilis*.

The results obtained from this investigation suggest that culantro leaves can be potentially used as a natural additive in the preservation of food, by extending the safety and the shelf life of food products.

**Presentation 14: Integrating Limited Resource Agricultural Production Within the Formal Service Sector in The Bahamas.** By M. N. Alvarez, A. Cleare, IICA Bahamas; I. G. Stubbs, Bahamas Agricultural Producers Association; and A. Dorsette, Bahamas Agricultural Industrial Corporation

The tourism and financial sectors generated 90% of the Bahamian gross domestic product (GDP) of $5.9 Billion. The agriculture sector contributes only 3% of GDP. To feed the 5 million annual visitors to the Bahamas, food imports have reached $500 million. The reported tourism dollar leakage is more than 85%. Government policies are in place, in the form of tourism anchor projects, to help generate employment and catalyze employment and greater participation of local entrepreneurs in the tourism sector. However, there are major challenges to overcome in order to optimally capitalize on this opportunity. Some of the challenges include adoption of improved technologies, strengthen and consolidate producer groups, need for improved infrastructure, better marketing and improved linkage between producers and buyers. By strengthening the production clusters, through training and enhancing capacity for competitiveness, producers will penetrate new market opportunities and strengthen the linkage between agribusiness and tourism. This paper reviews the opportunities that exist for the development and implementation of techniques to penetrate the formal service sector by the informal entrepreneurs.



able solution to the banana debate–a solution that is negotiated and not merely imposed by the WTO decision making process.

**Presentation 2: Can One Size Fit All? An Analysis of CARICOM Agricultural Development Policy Formulation.** By R. M. Gordon. CARICOM

The importance of the agricultural sector in the CARICOM countries preceded the integration process. Since the establishment of sugar, coffee, banana and rice plantations during the colonial era considerable resources have been invested to increase agricultural output in the region.

Beginning in the mid 1970s some regional programmes focused on agricultural development were the ‘Regional Food Plan’, ‘Regional Food and Nutrition Strategy’, ‘Regional Transformation Programme for Agriculture’ and more recently the ‘Jagdeo Initiative’. Details differ in each, but an underlying common philosophy is that agricultural development within CARICOM members can be fostered through common regional policy prescriptions. Many argue that this ‘one size fits all’ philosophy has left expectations for growth in the agricultural sector unfulfilled.

Agricultural growth is a precursor to economic growth. Some issues deemed critical to increased agricultural output and productivity growth are knowledge and research, the availability of non-farm inputs and governmental policies that influence producer incentives.

We conclude that foremost among the policy areas that must be differentiated is the macroeconomic environment encompassing policy parameters such as foreign exchange rates, interest rates, wage rates, land rental rates and rural-urban terms of trade. Exports require a policy mix separate to that for the domestic food supply. The framework for research and related support must integrally involve the agro entrepreneur in all key phases: focus, design and funding. This too must separately address the needs of exporters and domestic food suppliers. Agricultural health and food safety is the one policy area amenable to a common approach across the countries.

**Presentation 3:** M**arket Integration and Efficiency in the Presence of Cross-Border Trade Restrictions: Evidence from Selected Maize Markets in Southern Africa.** By E. Mutambatsere and R. D. Christy. Cornell University

This paper investigates pair wise spatial integration and efficiency for four maize markets in southern Africa: Blantyre in Malawi, Maputo and Mocuba in Mozambique, and Gauteng in South Africa. The goal is to evaluate the extent to which cross border trade restrictions on maize trade affect market integration and efficiency, vis-à-vis related costs of transfer. We also attempt to establish the most dominant form of efficiency barrier in those markets. The analysis employs primarily non-parametric assessments, supported by the Barrett-Li extended parity bounds model (Barrett and Li 2002), analyzed using monthly wholesale and retail data on prices, trade flow data, and estimated transfer costs for the period 1996 to 2004.

Results reveal significant frequency of market integration between markets in close proximity, regardless of country location, indicating tradability of commodities and contestability of markets across borders. For those markets, however, efficiency appears weak, as trade often fails to exhaust arbitrage profits. We observe inefficiency driven by insufficient arbitrage at least 60% of the time. Occasionally, trade is observed in the presence of negative returns, though at a lower frequency of about 10%. Markets not linked through trade tend to have a higher frequency of efficiency (up to 52%), so that the lack of trade often is justified by the lack of positive arbitrage returns. In those cases, market segmentation appears driven more by restrictive transport costs than cross-border trade barriers.

Our results suggest that the dominant forms of inefficiency in the southern African maize markets considered in this study are (1) insufficient arbitrage resulting from supply side constraints and other non-cost barriers to trade, and (2) restrictive transport costs. Border administered tariffs and other forms of taxes on imports seem to account for a relatively low proportion of transfer costs, and generally reduce arbitrage returns marginally.



**Presentation 13: Sustainable Forest Management and the Valuation of Ecosystem Services.** By E. Kebede and M. Ngandu. Tuskegee University

Forest ecosystem services are derived from specific functions of forests in the production and consumption of goods and services in order to increase economic welfare. Forest resources are used for timber production and non-timber activities. Both uses generate benefits to private forest landowners, and simultaneously, losses or economic costs to society. Such costs can be in terms of contaminated water in aquifer recharge areas because of increased sedimentation, increased soil erosion, and biodiversity losses, as well as increased vulnerability to floods, all arising from deforestation. The Caribbean countries, as a group, have forest cover of about 53847 $km^2$ with different types of forest of which only 15% are protected. Martinique has the highest protection, 70%, Gaudeloupe 36%, and Montserrat 23%. These forests belong to two major ecological zones, lowland (very moist, moist long dry season, and sub-dry) and premontane (moist and dry). These forests are diverse and need different protection approaches for sustainable forest management. Losses of forest ecosystem services are not assigned market and non-market valuation. Therefore, they are underestimated, or are unaccounted for. Full accounting and valuation of Nature's services rendered by forest ecosystem is a bridge to long-term sustainability. Management policies, including incentives for forest conservation and restoration, such as payment for ecosystem services schemes and identification and removal of disincentives which hinder the attainment of sustainability are equally important. Empirical literature shows that stakeholders' and government participation leads to successful forest conservation and restoration. This paper defines the concept of ecosystem services and develops a conceptual framework in an ecological-economic behavioral context in order to achieve long-term sustainable forest management.

**Presentation 12: An Evolving Model of Outreach and Land Management Training for Limited Resources, Minority Landowners.** By R. Fraser and C. Christian, Alabama A&M University; J. Hamilton, Wayne Community College, North Carolina; and J. Schelhas, Tuskegee University

In 2004, Alabama A&M's Center for Forestry and Ecology received funding from the US Forest Service to develop focused land management training workshops for traditionally underserved minority landowners in 13 southeastern states. The ultimate objective of these workshops is to assist underserved landowners maintain their forestland and sustain natural resources by developing a model for applied forest management training. Training sessions include drawing upon pre-existing information about specific landowner needs in targeted areas to increase the use of information on forest ownership and management by minority landowners. Thus far, 12 workshops have been completed in Alabama, Georgia, Tennessee, North Carolina, South Carolina and Mississippi. These workshops included property tours and formal presentations and interaction with resource personnel on a number of topics/issues facing these landowners. Topics included: heir property/estate management, meat-goat production on marginal forest lands, forest and timberlands management, recreational pond production, and silvopasture. The involvement of youth, elders, congregations and local service providers have all enhanced and deepened the learning experiences for over 300 landowners and members of their communities. Most of the attendees had no prior engagement with the local land management agencies - Forestry Commissions, NRCS, FSA, and Extension Services – who were involved in most aspects of the workshops. Lesson learned and suggestions for improving outreach efforts will be presented.



**Presentation 4: Changing Agri-food Markets in the Caribbean: A Preliminary Investigation.** By A. Iton. CARDI, Trinidad and Tobago

The food-retailing sector in the Caribbean is undergoing tremendous change, almost unnoticed by policy makers and development agencies. Supermarkets are gaining market share possibly at the expense of the traditional outlets utilized by small farmers. The organizational and institutional changes offer both opportunities and challenges for our small farmers. By far small farmers contribute the largest share of agricultural production in the Caribbean Region. Ensuring them access to supermarket procurement systems is necessary if they are to continue making their contribution to our economies. This paper attempts to identify some of the opportunities and challenges that might confront small farmers during this period of tremendous change.

**Presentation 5: The Effect of CAFTA on Ethanol Production and Trade.**
By P. Gregorowicz and C. Ligeon. Auburn University

With an increasing trend and fluctuating oil prices, fuel ethanol consumption in the US has grown significantly. Most of the ethanol used in the US is manufactured from corn and is produced domestically. Over the last couple of years, the US has been importing ethanol from countries in South and Central America and the Caribbean that are using sugar cane to produce ethanol. One reason why import of ethanol has played a minor role in the US market is a tariff placed on imported ethanol by the US government.
Under Caribbean Basin Initiative (CBI), ethanol that is produced in the CBI and CAFTA countries can be imported duty free into the US. Therefore, several countries have set up dehydration plants in the CBI and CAFTA countries to convert hydrous ethanol (“wet ethanol”) from Brazil and Europe into dehydrated ethanol, which is then exported duty-free to the US. This study examines the effects that CAFTA might have on the ethanol production and economies of the CAFTA and CBI countries.

**Presentation 6: Selecting a model for R & D impact analysis: the CARDI Dominica portfolio.** By M. Wilson. CARDI, Trinidad and Tobago

Previous reviews on CARDI's achievements reveal an intriguing list of technology generating activities from the mid-1970s. The reports present a diverse range of thematic and commodity based technology products and services across all CARDI member countries. It has been the mandate of the institute that the consequence of these research efforts would be the manifest transfer and adoption of the technologies so generated and having been adopted that it would contribute to the maximisation of agri-food producer incomes and their overall welfare. It has been a challenge to evaluate the linkage between these two factors and the stakeholders of the agri-food sector have become increasingly demanding for unequivocal indicators that could justify the quantum of overall resource investment in this area. Within the above context, preliminary enquiries (including literature reviews and institutional searches) reveal several methodologies that might be utilised (singularly or in combination) in this type of analysis. In this regard, an appropriate model is selected, tested through application to a selected CARDI member country and the findings presented prior to a wider application of the model.



**Presentation 11: Multimedia Mapping and GIS Integration for Sustainable Resource Management.** By E. Joseph. Grand Valley State University

Rapid development of Information Technology has opened up new opportunities for improving extension services. Information Technology however, has changed not only organizational structures within extension, but also the way agricultural information is organized and used for modifying development decisions. All over the world Geographic Information Systems (GIS) and Global Positioning Systems (GPS) technology is being utilized to assess environmental and land use changes, and as a tool for monitoring agricultural production. This paper introduces multimedia mapping as a sustainable management practice for acquiring, updating, and disseminating agricultural information. Multimedia mapping combines GIS and GPS technology with digital imagery to produce thematic maps.

**Presentation 7: Towards Starting a Sustainable Medicinal Plant Industry in Trinidad and Tobago.** By N. Badrie and Y. Baksh-Comeau. The University of the West Indies, St. Augustine

A vast number of 'over the counter' drugs produced by pharmaceutical companies are derived from medicinal plants. In the Caribbean, there is the tradition of making 'bush (herb) teas', which are valued for their culinary and medicinal properties. The Chemistry/ Food and Drugs Division, Ministry of Health, Trinidad and Tobago monitors and regulates the sale, manufacture, importation, storage and disposal of drugs (pharmaceuticals) and herbal products. Starting a sustainable medicinal plant industry in Trinidad and Tobago could foster the much required agricultural diversification and socio-economic development. It could also encourage entrepreneurship, develop new skills and new technology and foster product innovation. This paper will give the status of agriculture in Trinidad and Tobago and some global and traditional uses of medicinal plants. It attempts to identify some of the major challenges towards starting a sustainable medicinal plant industry. Socio-economic issues (such as labour shortage, competing land usage, legislation, good agricultural and manufacturing practices, registration of products and intellectual property rights), as well as, technical issues, relating to the correct identification of medicinal plants, selection and breeding of suitable medicinal plants, scientific testing to establish biological activity will be addressed.



**Presentation 10: An Assessment of Emerging Agribusiness Opportunities in the Fresh Agricultural Produce Market of Selected CARICOM Countries.** By A. Iton. CARDI, Trinidad and Tobago; G. Seepersad, The University of the West Indies, St Augustine; and C. Johnson, CARDI, Trinidad and Tobago

Pre-packed and Fresh-cut convenience vegetables for both retail and food service applications have been increasingly appearing in the global marketplace within recent years and this trend is predicted to increase substantially. Many leading fresh-cut processors have also included the development of **fresh-cut** vegetable products as part of their long-term business plans. However, processors of fresh-cut products are expected to face numerous challenges which would require a new and higher level of technical and operational sophistication.

The Region has been witnessing a growth in the convenience foods segment in various CARICOM countries, though at varying rates. The change in consumption patterns to more convenience foods has been primarily driven by the supermarket and fast foods sector in some countries. Further, a large share of this market is being occupied by imported tropical vegetables.

This study seeks to identify some of the more important attributes driving consumer demand for convenience foods (Pre-packed Vegetables) in the Region. In so doing, it is hoped that viable opportunities and features would be identified for small farmers in the Caribbean to insure their continued contribution and participation in the development of the economies.

## Presentation 8 : Vertically Integrated Pig Industry Cluster Improves Productivity.

By K. Amiel. Pig Industry Development committee and Agribusiness Association (Jamaica)

Pork is amongst the most consumed meats in the Hospitality Industry in North America, Europe and Asia. Most visitors to the Caribbean emanate from these countries. In providing food for the tourist industry it is therefore imperative that pork products be made available. Dishes, such as those based on 'Jamaican Jerk' recipes, were in high demand but were mainly dependent on imported port k satisfy the need.

Plans were put in place to develop the pork industry so as to substitute for imports of pork from Canada and to grow the fresh pork and pork processing convenience food business simultaneously in the Jamaican population to enhance food self sufficiency and create a viable base for gainful agricultural activity.

Suitable land was identified. Finances were sourced from an IDB/MIF project and local commercial banks. A joint venture concept was agreed with Canadian counterparts to supply the necessary genetic stock and technical expertise to run the project. Bids were placed for state of the art physical facilities for an Artificial Insemination (AI) boar station, a gestation and farrowing barn and a holding and grow out building to keep pregnant gilts and sows and to rear replacement animals for the project and for sale to the public.

Training was initiated for AI officers and for farmers with the capacity to do their own inseminations. Agreements were reached with strategically located Agricultural Colleges to run a Certificate course in Swine Reproduction. Simultaneously the Jamaica Pig Farmers Association (JPFA) was financed to help build a viable permanent farmer base.

The distribution of improved breeding stock and the widening use of AI produced faster growing, bigger pigs with better livability and conversion weights. A feed for pig programme, involving the projects pork processing plant and the feed mill, allowed pigs to achieve their genetic potential for growth. While grading at the processing plant provided financial incentives for better quality carcasses.

The public was exposed to more consistent, high quality differentiated products that made pork, 'the other white meat' a viable substitute for chicken and fish in the Jamaican diet. At the same time, the Pork Association of the Caribbean (PAC) having been created, arrangements were in progress to extend these activities throughout the Caribbean Single Market (CSM) area.



## Presentation 9: Comparing the Growth of Agriculture and Agribusiness-Mapping the Real Contribution of Agriculture to the Economy.

By H. Patterson Andrews and C. Pemberton. The University of the West Indies, St Augustine

There has increasing concern about the declining contribution of agriculture to the economy of Trinidad and Tobago and this has led to the belief that agriculture should not be given prominence in overall economic development policies. What this paper attempts to do is to map the true contribution of agriculture to the economy not only in terms of primary output (agriculture) but also in terms food and fiber – agribusiness. The analysis shows that while agriculture's contribution to the economy did fall from 6.7% in 1966 to 0.62% in 2006 the contribution of agribusiness fell from 10.94% to 4.81%, thus showing that agribusiness was still making a significant contribution to the economy.

The paper also analyses recent trends in the value of the output of agriculture and agribusiness as well as the contribution of primary agriculture to agribusiness.