Caribbean Agro-Economic Society

Farm & Business

The Journal of the Caribbean Agro-Economic Society

Vol. 10, No. 1, August 2018

ISSN 1019 – 035 X

ABSTRACTS

An Ex-Post Evaluation of the CARICOM-EU Banana Trade - Two Decades after WTO

Govind Seepersad[1], Omardath Maharaj[1], Ardon Iton[1], Dave Goorahoo[2] and Srinivasa Konduru[2]

[1] The University of the West Indies, St. Augustine;
[2] California State University, Fresno State

The WTO Agreement in 1995 was intended to offer improved access into more markets as well as give non-discriminatory treatment to members under the guise of "much needed" reform in agriculture. Many WTO members should have reduced the subsidies and trade barriers and there is the call for "More trade"; more traded goods and services and more trading countries. But at the same time, some developed countries have been exiting trade agreements as they have not seen the benefits to be derived; rather there has been an increased potential for friction. Banana, a major export from the Caribbean Region has been decimated after the agreement while other countries emerged as major exporters into the EU market. Food secure nations have emerged into food insecure nations. The regional market has experienced substantial changes. This study seeks to determine what changes have taken place and to advise whether countries should exit or place new emphasis on Banana. Several indicators were employed including the Export Share, Import Share, Intra-regional Trade Share, Complementarity Index, Trade Intensity Index and Revealed Comparative Advantage.

Keywords: *Banana, Complementarity Index, Trade Intensity Index, Revealed Comparative Advantage.*

An Illustrative Example of Seed-to-Supper Programs in Caribbean Areas

Marco Giliberti

Auburn University, Alabama, U.S.

Introduction: Malnutrition and lack of food in rural communities has proliferated in recent years as the result of increasing soil depletion, labor shortages, and economic changes. These changes have globally affected small farmers in impoverished rural areas. In some cases people buying vegetables often can grow them in their homes, however, they do not, due to lack of crop management.

Problem: For instance, dismantlement of family gardens to make space for cash crops has produced a progressive impoverishment of local food resources, and loss of precious local cultivars, in recent decades, loss of knowledge about local horticulture techniques and gardening skills. The objective of reaching food self-sufficiency has been considered a crucial objective to fight hunger and food insecurity of the rural communities that live in remote areas.

Purpose: The paper will a) illustrate the Seed-to-Supper initiative that have led to the establishing of local food gardens in the Caribbean and Central America rural areas, b) illustrate the Seed-to-Supper programs that address the root causes of hunger by teaching skills for self-sufficiency through agriculture education, and raises individual's self-reliance e.g. among young women living in rural areas.

Conclusion: Seed to Supper is a beginning gardening course that teach individuals a chance to grow their own food on a limited budget. The Seed-to-Supper program enable communities in remote rural provinces to counter the growing food dependency in a variety of contexts, which include Houses, schools, and maternity waiting houses.

***Keywords**: Food Security, Food Self-Sufficiency, Agricultural Education, Caribbean Areas*

An Ex-Post Evaluation of the CARICOM-EU Sugar Trade - Two Decades after WTO

Govind Seepersad[1], Ardon Iton[1], Omardath Maharaj[1], Dave Goorahoo[2] and Srinivasa Konduru[3]

[1]Department of Agricultural Economics and Extension, The University of the West Indies, St. Augustine; [2]Plant Science Department, California State University, Fresno State; [3]Department of Agricultural Business, California State University, Fresno State.

The WTO Agreement in 1995 was intended to expand world trade in agricultural commodities. The arrangement under the WTO offered free access into markets as well as non-discriminatory treatment to members. The agreement promised expanded opportunities for member economies. Sugar, a major export from the Caribbean Region has been impacted. In some countries, the industry has disappeared while in others local production is languishing. The regional market has experienced substantial changes. This study seeks to determine what changes have taken place and to advise whether countries should exit or place new emphasis on Sugar. Several indicators were employed including the Export Share, Import Share, Intra-regional Trade Share, Complementarity Index, Trade Intensity Index and Revealed Comparative Advantage.

***Keywords**: Sugar, Complementarity Index, Trade Intensity Index, Revealed Comparative Advantage.*

Impact of Climate Change on Food Security and the Role of Investment

J. Kalu Osiri[1], Uchechukwu Jarrett[1], Theo Udeigwe[2], Victor Oguledo[3] and Colin Ramsay[1]

[1]College of Business Administration, University of Nebraska-Lincoln, Lincoln, Nebraska, USA:
[2]Institute for the Advancement of Developing Economies, Washington, USA
[3]Department of Economics, Florida Agricultural and Mechanical University, Florida, USA

There is consensus in the scientific community that climate change is real; however, the debate pertaining to whether or not climate change will negatively impact food security lingers. On one hand, some have argued that potential effects of climate change on food production will be mitigated by farmers' adaptations or that global warming may even coincide with increases in agricultural productivity of certain regions. On the other hand, the World Bank Environment Department suggests that climate change will further reduce access to drinking water, negatively affect the health of poor people, and will pose a real threat to food security in developing countries. The same World Bank report, which reviewed the impacts of climate change and adaptations, noted that while climate change will subsequently affect agricultural productivity, adaptations by the agricultural sector and international policies are not keeping pace with climate change. Thus, the aim of our study is two-fold. First, we want to investigate the relationship between climate change and food security using empirical data from over 60 countries. Second, we want to understand how investment (domestic and foreign) and other institutional contexts influence the relationship between climate change and food security. We are interested in investment as a moderating or mediating factor because it signals the munificence of opportunities within the country receiving the investment. Increase in investments may exacerbate the effects of climate change, if it encourages fossil fuel consumption, but investment may reduce climate change, if it emphasizes innovation in clean energy technology.

Keywords: *Climate Change, Food Security, Investment*

Precision Agriculture Techniques for Crop Management in Trinidad and Tobago: Methodology & Preliminary Findings

Govind Seepersad[1], Shivani Seepersad[2], Terry Sampson[1] and Dave Goorahoo[3]

[1]Department of Agricultural Economics and Extension;
[2]Faculty of Engineering - Department of Geomatics Engineering and Land Management, The University of the West Indies, St. Augustine
[3]Plant Science Department, California State University- Fresno, California, US

Agriculture in Trinidad and Tobago has not advanced at the same rate at which new agricultural technology has been released. This has led to large-scale abandonment of crop lands as challenges posed by labor availability and their agronomic capability could not meet the technological demands for agricultural production, competitiveness and sustainability. There is an urgent need to develop technology-based agriculture models to meet the demands of a modern agricultural sector and to maintain its lead role in food production. This project looks at the development of advanced precision agriculture techniques for crop production, nutrient and water management. The project will utilize a combination of optimization principles (financial, yields, etc), agronomic data, advanced processing of remotely sensed images of agricultural fields and Geographic Information Systems (GIS) technology for the analysis and integration of the spatio-temporal farming data. A decision support system will be built upon the crop spatio-temporal intelligence for effective and efficient farm operations.

In the first phase of the project, the primary goal is to evaluate the effect of precision agriculture based irrigation and fertilizer technologies on (1) the growth, yield and quality of a corn crop, and (2) the soil nitrogen (N). In this presentation, we describe the replicated split plot Randomized Block Design (RBD) experimental design comprising of four irrigation (I) methods (Main factor) and three N fertilizer (F) rates (sub plot factor). This design will facilitate the assessment of the individual effects of irrigation (I) and N fertilization (F), as well as any I x F interaction effects, on the respective soil and plant parameters monitored through the project. The selection criteria for the Unmanned Aerial Vehicle (UAV) fitted with a Near Infra Red (NIR) Camera to collect multispectral data across the crop field are also discussed. By analyzing the "big data" comprising of the spectral reflectance values of the NIR, Red and Green bands, we will categorize problematic areas within the field. Based on this analysis, zones will be identified for irrigation and N management interventions.

Keywords: *Precision Agriculture, Unmanned Aerial Vehicle (UAV), Multispectral Imagery, Fertigation, Irrigation Efficiency, Nitrogen Use Efficiency, Water Use Efficiency, Big Data*

Monitoring Spatio-Temporal Changes in Soil Salinity for Validation of "CSUID-II" Hydro-Salinity Model for Optimizing Soil Leaching Fractions

Amninder Singh, Sharon E. Benes, Nigel Quinn, and Florence Cassel S.

Department of Plant Science, California State University, Fresno

Soil salinity is a major factor affecting irrigated agriculture in today's world, especially in arid/ semi-arid regions like the Western San Joaquin Valley of California. Soil salinity is a spatially and temporally dynamic property, and thus, mapping at field scale requires rapid and reliable means of taking geospatial measurements. EM-38 soil salinity surveys were conducted at the SJRIP (San Joaquin River Improvement Project) facility managed by Panoche Water District (Los Banos, California) where subsurface drainage water is re-used on forages such as 'Jose' tall wheatgrass (Thinopyrum ponticum var. 'Jose'and alfalfa (Medicago sativa) to reduce salt loading into the San Joaquin River. Surveys were conducted in two alfalfa and two tall wheatgrass fields to monitor soil salinity in response to the salinity (ECw) of applied drainage water. Soil samples taken to a depth of 120 cm (4 ft.) in 30 cm (1 ft.) increments for calibration of EM-38 data, were analyzed for pH, ECe, gravimetric water content and saturation percentage. The average ECe for spring and fall 2016 samples was 12.5 to 19.5 dS/m for tall wheatgrass fields and 9.2 to 14.4 dS/m for alfalfa fields. GIS maps were developed depicting the spatial variability of salts in the fields. Data will be used for the refinement and validation of a computer model (CSUID-II) developed as a decision support tool to optimize soil leaching fractions for irrigation water of varying salinity levels, with the overall goal of improving the sustainability of forage production using saline waters in the SJRIP.

Keywords: *Hydro-Salinity Model; Salinity; Alfalfa; EM-38, Electrical Conductivity.*

Digital Elevation Modeling of Agricultural Fields for Irrigation Management

Balaji Sethuramasamyraja and Huy Le

Department of Industrial Technology, Jordan College of Agricultural Sciences and Technology, California State University, Fresno.

The objective of this study is to develop a Digital Elevation Model (DEM) of the selected field and to infer effective water management and irrigation recommendations. Trimble WM Topo Base station was used in the study as the surveying equipment. It has a base station and rover which is a pole mounted Global Navigation Satellite System (GNSS) receiver. This system works on the principle of Real Time Kinematics (RTK). There are various data collection methods but the gator was used. The pole was mounted on the gator and using the handheld Nomad Computer the surveying was initialized with a customized setting of 10 feet to automatically map data points which are geo-referenced. At the end of the survey, final data files where extracted from the Nomad 900 series handheld computer in an USB stick /drive or can be ported by wireless via connected farm solution. The data files are then extracted in Farm works or Multiplane's software.

The software allows the user to run numerous analyses using the collected data file. The summary results of the analysis would include digital elevation model of the field, cut and fill contour models of the existing field as well as best fit models for rectifying levelling issues and recommending irrigation types and water management decisions. The types of conclusions that was reached for this project is that developing the DEM of farm land is possible, though the most difficult issue is having to create a data point every ten feet traversing the whole acre with the surveying equipment. The project concluded with having created data to be inputted into a database for future use to assist in levelling, and landscaping of the acre to more accurately reflect better irrigation management.

Keywords: DEM, Nomad, Geo-referenced, Data, Trimble.

Envisioning Food Security in 2030 Via New Technologies: The Case of the Caribbean

Mark D. Wenner

Country Economist, Inter-American Development

Food security will be a critical factor in avoiding human deprivation in 2030 in the Caribbean region. A rising world population will generate increased food demand by approximately 50 percent. At the same time, supply constraints are emerging that threaten to dampen productivity and increase real food prices. Climate change is likely to increase agricultural yield variability, while changing dietary preferences due to rising income will shift demand patterns for certain commodities that are particularly energy and water intensive. Rising food safety concerns creates the need for better grading, certification, and inspection services, all of which add to costs and increase the complexity of the supply chain. The Caribbean states with few exceptions are mostly net food importers and face a host of challenges to maintain or improve food security over the coming years. While only one Caribbean state is currently food insecure, climate change impacts, land use changes, stagnant growth, and high levels of debt, stand to increase vulnerability in the future for others. This article highlights how new transformative technologies will likely impact agriculture and argues the need for Caribbean states to adapt so as to improve food security in the next thirteen years. The technologies reviewed are (1) Information communication technology (ICT); (2) drones, robotics, and artificial intelligence; (3) three dimensional (3D) printing, (4) biotechnology, and (5) nanotechnology, and (6) synthetic biology.

Keywords: *Food Security, Caribbean Agriculture, Climate Smart Agriculture, Agricultural Innovation, Food Production, Technology, Risk Management*