Building a climate resilient agriculture sector

Training young scientists in modelling and data management

The University of the West Indies Mona (Departments of Physics and Life Sciences) in collaboration with the Department of Life Sciences, UWI St. Augustine hosted a two-week crop modelling workshop, “Training Modules in Crop Simulation Modeling, Climate Change and Livestock Impact Assessment,” from July 16-27, 2018. The training was delivered by leading regional and international experts in the areas of agriculture, crop modelling, climate variability and climate change.

During week one, participants were introduced to climate and modelling basics in preparation for the advanced DSSAT module which was delivered in week 2. The training was intended to build the capacity of key public and private sector stakeholders within the agriculture sector, nationally and regionally, to conduct crop simulation modelling using the FAO AquaCrop Model and the DSSAT Model. In addition to being trained in the use of these models, the course sought to enhance understanding of climate change basics and how climate variability
and change is impacting agriculture. It was intended to provide a basic introduction to crop modelling, and its application to Caribbean Crops.

The workshop targeted agronomists, extension officers, farmers, researchers (including graduate students), Agro-meteorologists, representatives from Universities and the Ministries of Agriculture and Fisheries. Seventeen persons attended in week 1 and 26 persons in week 2. A pre and post Knowledge, Attitude and Practice Survey was conducted and it showed that there was considerable knowledge uptake and that the training was generally well-received.

The workshop served to highlight the need for greater focus, and resources to be put towards advancing and strengthening crop modelling efforts in the region. Recommendations in this regard were for:

▪ Development of a crop modelling consortium/group to spur developments locally and in the region
▪ Development of a regional crop modelling agenda
▪ Development and implementation of research projects geared at filling critical data gaps,
▪ Furthering capacity building and increasing knowledge sharing.

The project equipped CARDI Scientists who participated in the training sessions with appropriate computers to support the crop modelling activities. The lap tops were outfitted with the relevant programmes that enabled the scientists to store, collate and process crop data in the DSATT Crop Modelling Programme.

Expanding seed production

Agriculture is a climate sensitive sector and small-scale farmers in particular are at the frontlines of climate change impacts. Thanks to the IDB-executed Pilot Program for Climate Resilience (PPCR) funded by the Climate Investment Fund (CIF) and the EU-funded Agriculture Policy Programme (APP), the Jamaica’s agriculture sector is becoming more climate resilient.

CARDI and the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) have signed a Memorandum of Understanding to expand and refurbish the seed storage facility at Bodles Agricultural Research Station, St Catherine. The re-designed 1000 -sq. ft (92.9 -sq metre) facility was
completed in March 2019 and houses micro-propagation, growth chambers for vegetative seed (tissue culture plantlets), improved and expanded shelf space for storing true seed and a cold room. A seed batch dryer will soon be added, further enhancing the integrity and viability of the seeds produced at the facility.

At Bodles, both true and vegetative climate resilient seeds for Jamaica and CARICOM Member States will be stored.

The expanded facility is now positioned to assist countries impacted by disasters to quickly restart their agricultural production by multiplying seeds of key staples. Seed multiplication will be accelerated prior to the start of the hurricane season.

CARDI will hand over the facility to MICAF in October 2019.

Planning for drought

A drought tolerant split plot (irrigated versus non-irrigated) experiment was established at the CARDI Demonstration and Training Centre on the Mona Campus. Both the irrigated and non-irrigated sections, contained four randomized complete blocks; each containing four randomized treatments (sweet potato accession Clarendon, Ganja, Uplifta, Yellow Belly). Each treatment was 3ft x 15ft (1m x 5m) and contained 30 plants each.

Data will be collected over a 5-month period and will constitute 5 cycles. From each treatment four random plants (sample) will be harvested; a total 256 crop samples per cycle. Data will be collected on the following:

▪ Canopy cover
▪ Total weight of the vines and tubers
▪ Fresh weight of the vines
▪ Dry weight of the vines
▪ Total number of roots
▪ Length of the roots
▪ Fresh weight of the roots
▪ Dry weight of the roots

Upon analysis, the data sets, will be introduced into the AquaCrop...
and DSATT Programmes to demonstrate how crop modelling (crop models) can be used as an economic and effective means of quantifying climate impacts. The study will also look at methods of improving field management practices, including but not limited to fertilizer treatments, irrigation, pest and disease management.

**Focusing on nursery expansion to meet coconut seedling demand**

CARDI in collaboration with the Coconut Industry Board (CIB) has undertaken several initiatives to increase the availability of quality coconut seednuts and seedlings to farmers in Jamaica, under the EU/ACP Coconut Industry Development for the Caribbean project.

Research has confirmed that placing coconut seednuts under shade while providing adequate moisture will result in higher rates of germination and better development of seedlings. To this end, a 5,000 -sq ft (464.5 -sq metre) nursery was established at the Knockalva Polytechnic College in Hanover, using the Maypan hybrid seednuts. The seednuts were obtained from the CIB-operated seed garden at Barton Isles.

To protect the seednuts, a perimeter fencing was erected and a drainage system constructed. A sprinkler system was also installed to ensure seednuts and seedlings have adequate moisture.

In addition to providing farmers with quality seedlings, the nursery will be used by the college to provide practical training to students on nursery establishment and management. The training will be facilitated by CARDI and CIB.

Within the nursery an experiment was set up to determine the effects of seednut orientation (horizontal, positioned at a 45° angle and upright) and quality, on germination percentages and seedling quality. A total of 3,315 seednuts were sown on 18 seedbeds.
Across in Portland an irrigation system was installed at the CIB Spring Garden nursery. On 25 April CARDI handed over the irrigation system which was installed by the National Irrigation Commission (NIC). The system will facilitate expansion of the nursery area.

**Promoting the use of compost to enhance an integrated production system**

One of the main activities at the CARDI Sam Motta Demonstration and Training Centre (SMDTC), is that of crop/ livestock integration. Crop/ livestock integration is a form of mixed farming that utilizes livestock and cash crops in ways that can complement each other through time and space. Forages are planted and fed to the animals (goats and sheep), manure is harvested and composted, the compost is added to the soil (as an ameliorant to help rehabilitate the mined-out bauxite soils) during the production of crops and forages (feed for the animals).

Composting is a major component of this production system, and at the SMDTC stock / pile composting and vermicomposting are practised. Stock and pile composting is made up of layers of manure, crop residues, “left over forages” and grass bedding. The breaking down of the pile is dependent on micro-organisms and air. Microorganisms such as bacteria, fungi, and actinomycetes account for most of the decomposition that takes place in a compost pile. They are considered chemical decomposers, because they change the chemistry of organic wastes. Many microorganisms, including aerobic bacteria, need oxygen in order to produce energy, grow quickly, and consume more materials.

The vermicompost is produced by using California Red Worms (*Eisenia fetida*) to break-down, goat and sheep manure. The manure is placed in 2-feet deep concrete bins and worms are added. The entire process takes six weeks to convert to compost, as compared to the stock and pile technique which takes up to five months depending on the type of crop and forage residues used.
During the months of June through August, the DTC experienced dry conditions, therefore the bins had to be kept adequately moist through watering. A total of 9,900 kg of vermicompost was harvested from 10 bins of goat and sheep manure, over nine cycles. The vermicompost is reused on station and samples given to stakeholders.

**CARDI participates in Denbigh 2019**

The 67th Annual Denbigh Agricultural and Industrial Show was held from 4 to 6 August 2019 at the Denbigh showgrounds in May Pen, Clarendon, Jamaica under the recurring theme, “Grow what we eat.. eat what we grow.” This year, the organisers also chose to highlight the subtheme of -“Aligning Farming Decisions with Climatic Conditions.”

The booth hosted by the CARDI Jamaica featured various aspects of the unit’s work programme. In focus were the achievements of the first phase of the EU/ACP Coconut Development in the Caribbean project and a preview of the activities under the upcoming second phase. CARDI Jamaica also highlighted the on-going work under the IDB/ CIF-funded, Pilot Programme for Climate Resilience (PPCR).

In addition, CARDI participated in a Seed Fair executed by the Rural Agricultural Development Authority (RADA) under the CTA-funded project, “Accelerating the Uptake of Climate-Smart Agriculture in Jamaica.” The seed fair was supported by a cross section of stakeholders (academia, extension service, researchers, seed suppliers and farmers) in the seed industry. The objective was to galvanize the stakeholders towards building a Climate-Smart Seed Industry, and sensitize the wider public to the importance of the use of quality seed as the foundation of a robust, resilient crop production system. CARDI showcased varieties of hot pepper, corn, red bean and black bean seeds that are produced by the Belize and Antigua & Barbuda Country Units and distributed by the Institute’s commercial subsidiary, Caribbean Agricultural Commercial Services Hub (CACSH).
The annual show scheduled within the season of the country’s Independence celebrations receives a wide cross section of patrons (local, regional and international). Recent estimate indicates that the show attracts over 80,000 patrons annually.

Among the visitors to the booth were strategic partners, farmers, students, input suppliers, tourists etc. Visitors invariably expressed favourable comments with respect to the relevance and informative value of the work displayed.
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