



Climate Smart Agriculture in the Eastern Caribbean States

***The Path to Sustainability and Stability
of Growth in a Changing Climate***

Belle Vue Farmers' Cooperative, St. Lucia



Contributions to Climate Smart Agriculture



Improved soil fertility and water use efficiency, together with the use of varieties more resilient to the local climate are resulting in farming systems better adapted to the changing climate. Capacity development of the Cooperative's members is providing a sustainable foundation for continuous improvement.



A combination of diversification and climate smart practices such as mulching and water harvesting, has resulted in greater yields and stability of production for several crops, increasing locally grown produce and enhancing farmer's incomes.



Use of renewable energy (solar, biogas), increasing soil organic matter, tree planting, and a decrease in agrochemical use contribute to a reduction in greenhouse gas emissions from the Cooperative's members and operations.

Climate change signals:



Increased climate variability



Changes in precipitation patterns



Increase in frequency and/or intensity of floods



Increase in frequency and/or intensity of droughts

Climate smart practices and technologies:



Water management



Soil Management



Diversification



Introduction of more climate resilient varieties



Alternative farming methods



Renewable energy



Capacity development

Challenges posed by climate change

The Belle Vue Farmers' Cooperative, currently located at Myers Bridge in Soufriere, St. Lucia, originally started in 1984 at Belle Vue Choiseul with twelve small farmers. Prior to the formation of the Cooperative, the area's farming activities were uncoordinated and disorganized, with each individual traveling to the main market in Castries. Extension services were very poor, inputs difficult to obtain, there was a significant amount of food loss on farm and farmer's incomes were low. Today, the Cooperative has grown to three hundred farmers (30% women) from all around the island. The operations generate over two million EC dollars of business a year, and employs 25 full time of staff. Produce is bought from farmers on a weekly basis, ensuring timely payment, and the Cooperative has an open market day where the general public comes in to buy fresh goods.



Climate change is proving to be a challenge for the Cooperative's members. For the past five years, farmers have suffered heavy losses on their main cash crop, tomatoes, due to unusually heavy rains as well as dry times with water scarcity which affected the traditional growing season for the commodity. Excessive rainfall had become more unpredictable and extreme event more intense, evidenced by Hurricane Tomas in 2010, and the Christmas Eve Trough of 2015 which was called a Freak Storm. The heavy rainfall over very short periods of time did direct damage to crops. This impact was compounded with extended drought periods and longer "dry season" conditions which affected not just traditionally dry areas but even those accustomed to regular rainfall. These drought conditions were observed over 2010 – 2015. Further, tomato production has also been reduced by the yellow curly leaf virus, which is transmitted by the white fly vector, that flourishes under the warmer conditions that St. Lucia is experiencing more frequently.

As a result, some farmers have stopped cultivating due to substantial losses. In addition, St. Lucia has had to import tomatoes for hotels and supermarkets, yet the high cost of fertilizer and challenging climate conditions have made it almost impossible to compete with imports, not only for tomatoes but also for bell peppers.

Water pump powered by solar panels at Belle Vue Cooperative's office and nursery.

The solution

A combination of technologies and practices were used to combat the more unpredictable conditions and resulting impacts caused by climate change. These included:



Adopting drip irrigation: An increasing number of farmers are purchasing drip lines and water tanks. Where previously none of the member farmers from the dry belt (Southern Saint Lucia) used drip irrigation, currently some 20% of member farmers now do. The irrigation units, together with water storage and other good agricultural practices have regularized access to water, improved efficiency in water use, has allowed them to produce target commodities like tomato year-round as opposed to the limited traditional growing period of a few months.



Water harvesting and storage: A water tank to collect water from the roof of Belle Vue Farmers' Cooperative was installed. The Cooperative has also started a programme for making water tanks available to members and so far a number of them have installed tanks on their own fields to provide a more stable water supply.



Mulching: Increased awareness of the benefits of mulching, such as improving water use efficiency, improved soil moisture retention and the promotion of earthworms and nutrients in decomposition has led the Cooperative to discontinue the sale of weed killers at its input shop. To help farmers adapt, a small machine unit with weed cutters for rental was established. The Cooperative accompanies this with capacity development activities on how to make compost and use the clipping as mulch. Composting and organic pest control have also been introduced at here secondary schools in region. Capacity building efforts have resulted in farmers becoming more knowledgeable about the danger of agrochemicals for their health and the environment.



Introduction of more climate resilient varieties: The introduction of more heat and pests (especially white flies) tolerant varieties **of tomato** (heat master, rodeo, TX 62, improved Cariabe), has provided more resilient varieties. Similar work for heat and pest tolerance was also done for watermelon. The Cooperative is now testing a number of shorter cycle sweet potato varieties. This is important for reducing exposure to risk of weather variations by having a shorting grow-harvest period, as well as improving earnings by being able to have more harvests per year. Together with improved irrigation and use of greenhouses/protected agriculture, the Cooperative can now produce sweet potato year-round.



Protected Agriculture: The Cooperative purchased a greenhouse that has enabled it to provide over fifty percent of the colored peppers consumed by households and hotels, most of the production is being pushed by organic nutrients.



Biodigester and solar power: Belle Vue has also worked to make its own operations more climate smart by installing a bio digester (on demonstration plot) and a solar electricity system. The biodigester was installed to help in the control of waste run-off from pig pens, produce liquid and solid fertilizer inputs and generate methane gas for preparing animal feed and household use. The solar electricity system is used to pump water from a rainwater collection tank to the seedling nurseries at the Cooperative's office. Altogether the solar electricity system and rainwater collection saves about EC\$ 130 in bills per month.



Diversified production and food processing: The cooperative has been working with farmers to provide other on-farm income options. Production of other commodities such as watermelon, herbs, cocoa and fruit trees is promoted through a field school. The Cooperative is also holding a joint field school with a local hotel to produce mushrooms as a high value and low impact commodity that will be sold directly to hotel chefs. A similar initiative with cocoa is also being pursued. Value added activities, such as the production of smoothies by the Cooperative's youth arm, are also being promoted as an alternative form of incomes.



Good Agricultural Practice Demonstration Plots: are used to test new tomato and watermelon varieties and identify those more resilient under local conditions, pilot drip irrigation and water tanks, as well as evaluate the performance of a biodigester. The plot is managed with input from senior extension officers and technicians from the Ministry of Agriculture and is used to train both members and non-members of the Cooperative.



Field schools and training: are implemented to build members' capacity in composting, alternative pest control, use of local materials, and the adoption of more climate smart practices is provided to farmers. Youth in particular are targeted for capacity development initiatives.

Implementing these actions costs approximately EC\$ 92,000 (USD34,000) over November 2014 – December 2015, with approximately 40% being used to install the solar electricity and establishing demonstration and validation plots, and the rest on the water tanks.



Seedlings being watered the nursery.

Results and contributions to the 3 pillars of climate smart agriculture

- Training on and use of natural mulching has improved soil cover thus reducing soil and moisture loss. It has added nutrients and beneficial bacteria to the soil which reduces erosion and increases soil quality. Ten farmers, including women and youth are demonstrating the benefits of promoting better soil management practices on their farms.
- Better soil and better water conservation has been achieved through using drip lines (anecdotal reports of users based on typical water usage and bill payments) and composting improved the health of the soils (anecdotal reports on soil texture, presence of earthworms and micro-fauna and crop growth response). The use of compost of raw manure has also helped to maintain the area's water quality by reducing run-off of waste (anecdotal reports).
- Cost saving and additional income for farmers has been achieved through different practices, such as using mulch instead of purchasing herbicides, using renewable energy and increasing quality and yields of tomatoes and other crops. Farmers report using less chemical fertilizers as a result of composting and organic mulching (e.g. most members are down to 3 bags of fertilizer from 5 bags per quarter). Direct market connections with hotels and value added activities are also helping to increase incomes. The Cooperative itself saves water and money by using its solar water pump; the Cooperative saves approximately EC\$130 per month in costs for seedling production and running the office.
- Increased productivity has resulted from these efforts. In 2015, the Cooperative was able to consistently produce watermelon, tomatoes and bell peppers throughout the year – which had never been done. The country experienced its first glut of locally-produced watermelon and for the first time in many years and the Cooperative was able to buy and sell tomatoes throughout the year, increasing quality and volume on the local market.
- Locally sourced vegetables such as tomatoes and watermelons are now available year-round through Belle Vue's efforts, thus contributing to healthy local diets. Purchasing a greenhouse with a deposit and monthly payment has enabled the Cooperative to provide over 50% of the colored bell peppers consumed by households and hotels in 2015. Most of the production was done organically.



Compost bin at Belle Vue Organic Farm (La Fargue)



Establishing biodigester using water tanks at the demonstration plot.



Farmer setting up rainwater harvesting system to store water on farm.



Use of inorganic mulch under greenhouses.

- The introduction of improved varieties and diversification of crops has helped to stabilize and even increase production and incomes. Evidence of this is in the increasing volume of seedlings of these new varieties being produced and sold through the Cooperative. As many as 10,000 seedlings are now being ordered/requested by single members.
- The use of the combination of the climate-smart practices described above has resulted in farmers buying less chemicals and fertilizers, and this lower demand led to a decrease in the volume of these agro-chemicals being demanded by members and so bought for sale by the Cooperative.
- The Cocoa Field School (involving 20 farmers) and Mushroom Field School (involving 20 farmers) are creating new business opportunities for entrepreneurs - especially, for youth and women. For example, the initiative is training youth to provide mushroom spawns to mushroom farmers within the Cooperative and women farmers are being trained to manage the production system which is less strenuous than traditional crops.
- Mitigation from the reduced use of agrochemicals, the employment of solar energy and biogas and the planting of trees. At present most of the Cooperative's members have reported a significant reduction in the use of agro-chemicals as well as applications with high toxicity.

Lessons Learned

The efforts described here demonstrate the value of building strategic alliances with national, regional and international organizations and businesses such as the UNDP, GEF, GIZ, and local hotels and restaurants. These alliances have helped in mobilizing resources, building technical capacity and improving access to information and knowledge on climate smart agriculture. In addition, the success in demonstrating benefits in cost savings, risk reduction and improved income of the composting, mulching and drip irrigation initiatives have convinced members and partner farmers to be willing to adjust practices and explore new production methods.

Involving youth and women farmers in climate adaptation efforts is crucial to changing the farming culture and helping new farmers to get it right early so that they are not discouraged. The need for simple investment on farms is critical; many farms lacked basic infrastructure (greenhouse/protected structure, irrigation system, storage shed). Prior to this work, most farms lacked the basic knowledge on good agricultural practices to improve water use and better care for soils. This resulted in high financial costs for obtaining sufficient water.

Farmers are now receiving training and support to help them identify, adapt and finance equipment to enhance the resilience of their farms with items such as water tanks,

drip lines and weed cutters, water harvesting and storage. Adaptation to the changing climate is an ongoing process that requires additional skills for success. An example of this is the need to improve record keeping, and the cooperative is building partnerships with other organizations to address this with information and communication technology. ■



Belle Vue initiated a pilot action to supply community schools with fresh fruit in 2014/2015 to promote health and consumption of local foods.

For more information: Mr. Raphael Felix, General Manager, bellevuecoop@gmail.com

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