THE UNIVERSITY OF THE WEST INDIES
MONA CAMPUS, JAMAICA, WEST INDIES

CLIMATE CHANGE TECHNOLOGY BRIEF

CATERPILLAR TUNNELS – ADAPTATION IN AGRICULTURAL SECTOR

TECHNICAL DESCRIPTION

Caterpillar tunnels are miniature protective structures that produce a greenhouse-like effect to facilitate crop production. The technology can be cost-effective, and can vary on the user's needs, size and shape. Typically, tunnel farming uses plastics sheets as a roof covering, reinforced with steel-type bars to form hoops. These tunnel-like structures are placed over the crops to entrap carbon dioxide thereby enhancing photosynthetic activity and thus increasing crop productivity. The idea behind tunnel farming is to shield crops from the harsh elements of the external environment such as extreme heat, ultraviolet radiation and rain exposure.

CLIMATE RATIONALE OF THE TECHNOLOGY

The agricultural sector could be severely impacted by sea level rise and resultant salt water intrusion into coastal agricultural settlements which exist in both Trinidad and Tobago. Extreme weather events and resultant flooding of farm lands is particularly important as many of these lands are located in low lying areas that have historically been impacted by flooding. It is expected that there will be an increase in these occurrences for many agricultural communities. These effects will create a reduction in the capacity of farm lands in the future and the output of food will be decreased. Trinidad and Tobago also currently have a high food import bill. The availability of food for import could decrease in the future and the cost of imported food could increase making adaptation and resilience building for local agriculture a top priority for the future. Climate impact models project a decrease in rainfall which means less water available for irrigation purposes, and therefore water conservation would be necessary both for the agricultural sector as well as water resources management. Solar powered systems will also add a mitigation component by reduction in emissions from power generation.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The intention is to develop a pilot/demonstration project involving an initial target of 50 small-scale farmers selected from vulnerable rural areas to illustrate viability and affordability within a five year timeframe.

The following actions have been identified to this end:

1. Implement appropriate fiscal incentives, including in appropriate arrangements with insurance companies and commercial banks to:
    i. Provide preferential interest rates on loans and repayment terms, to finance caterpillar tunnels,
    ii. Provide preferential insurance premiums for investments;
2. Increased capacity of extension services to educate farmers on the benefits of caterpillar tunnels, including on maintenance of systems;
3. Provide market conditions to facilitate greater penetration of relevant equipment

EXPECTED IMPACTS OF THE TECHNOLOGY

The technology presents many co-benefits that can build resiliency in the agriculture sector as it addresses major barriers associated with chronic water shortages, low yield per acre and low value crop production.

Caterpillar tunnels can contribute to climate adaptation and build local adaptive capacity in a number of ways:

- The tunnel/house can protect crops from climate change effects such as heavy rain, temperature extremes, and reduce likelihoods of pest as opposed to crops cultivated in an open field.
- The tunnel structure helps efficient use of scarce resources such as water, fertilizers, pesticides, and labour while providing thermal cooling for crops.
- Caterpillar technology can be synergised with drip/pressurized irrigation structure for efficient use of water during times of drought or dry periods.
- The tunnel technology also provides prolonged production periods and allows farmer to grow and harvest crops on a continuous basis, which increase crop productivity and income generation.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

The National Climate Change Policy (NCCP) has among its objectives, the integration of adaptation into national development as well as enhanced agricultural production and food security in light of identified climate vulnerabilities. The Vulnerability Capacity Assessment (VCA) identifies the climate risks in the agricultural sector as well as actions to address the risks.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

The national development plan to 2030 points to modernization of agriculture as a crucial factor for the economy's international competitiveness. The technology is also supported by policies aimed at water conservation and management such as the Integrated Water Resources Management Strategy.

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

The cost for establishing 50 demonstration systems is USD 400,000.00.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

National Climate Change Policy:

https://www.preventionweb.net/files/60670_trinidadandtobagoclimatechangepolic.pdf

Carbon Reduction Strategy:

https://www.planning.gov.tt/sites/default/files/CRS%20_Strategy_Final.pdf

Nationally Determined Contribution:

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Trinidad%20and%20Tobago%20First/Trinidad%20and%20Tobago%20Final%20INDC.pdf

Nationally Determined Contribution Implementation Plan:

https://transparency-partnership.net/system/files/document/200114_GPD_Trinidad_and_Tobago_RZ.pdf

Vulnerability and Capacity Assessment Report:

https://www.planning.gov.tt/content/vulnerability-and-capacity-assessment-report-trinidad-and-tobago-jan-2019#:~:text=As%20the%20basis%20for%20the,Agriculture%20and%20food%20security

Technology Needs Assessment: https://tech-action.unepdtu.org/tna-database/?fwp_tna_database_type=tna_report&fwp_tna_reports_region=trinidadandtobago