COCOA RESEARCH CENTRE
THE UNIVERSITY OF THE WEST INDIES

Use of Plant Variety Protection to add value in Trinidad and Tobago

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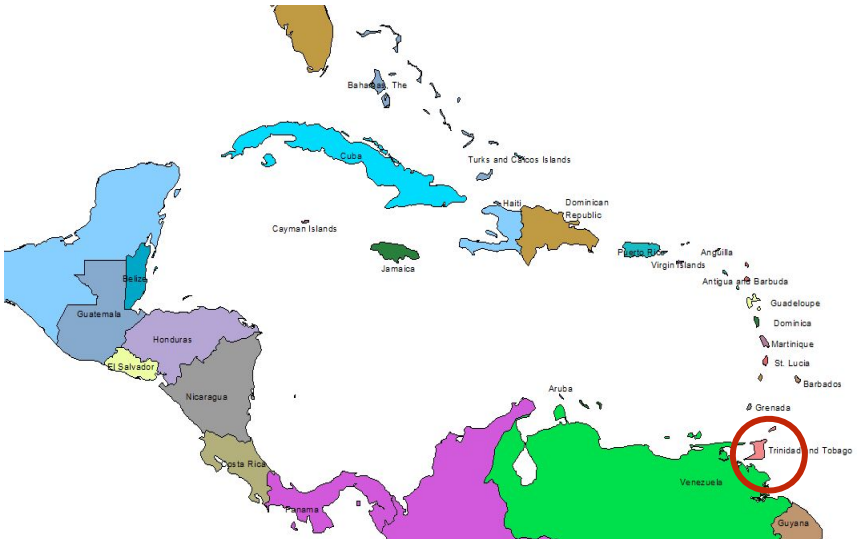
The Caribbean

Belize – archipelago of islands – Guyana, Suriname

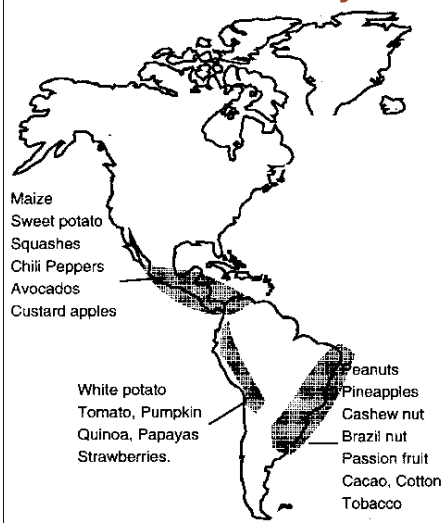


Caribbean - Challenges

- 92% of the population live in Small Island States
- Small and declining per capita arable land area
- Poor competitiveness
  - Small farms - lack of economies of scale
  - High cost of land and labour
  - High disease pressure (tropics)
- **Unadapted varieties**
  = mainly uncharacterised landraces
  = or poorly adapted imported material
- Food security concern

On the other hand the Caribbean region is rich in genetic diversity – forms a bridge between the meso-American and South American centres of diversity

Maize	Cocoa
Quinoa	Tobacco
Potato	Cotton
Sweet potato	Vanilla
Cassava	
Beans	Brazilnut
Tomato	Peanuts
Pumpkin	Cashew
Squashes	
Peppers	Anthurium
	Heliconias
Papaya	Bromeliads
Pineapple	Orchids
Passion	
Custard apple	
Avocado	



Important genebanks in the Americas

International genebanks

CIMMYT	- Mexico
CIAT	- Colombia
CIP	- Peru
ICGT	- Trinidad and Tobago
CATIE	- Costa Rica

National genebanks

USDA-GRIN – USA

SIDS - Developmental imperatives

1. **Prioritize -Comparative advantage, linkage to economic development**
2. **Overcoming Challenges –Convert genetic resources into knowledge products– Breeding (IP)**
4. **Branding and niche marketing (IP)**
5. **Climbing up the value chain (IP)**
6. **Innovation obsessed knowledge industry (IP)**
   - Multi-disciplinary – production, value addition, market and business innovation
   - Technology transfer facilities
   - Pilots to inspire private sector – investor confidence
7. **Triple helix approach**
   - Stakeholder involved and private sector led
   - Policy framework to support innovation, industry development
8. **Build a business clusters around the sector – multiplier effect (IP)**

Trinidad and Tobago

Building an innovative cocoa industry using the genetic resources

Story of two countries

Witches' broom disease

Suriname - 1895

Trinidad - 1928

Expeditions into Amazonia in search of resistance

In situ genetic resources

- Imperial College of Tropical Agriculture – research into resistance in 1930
- F.J. Pound went on expeditions into Peru and Ecuador in the1930s
- Selected ICS varieties 1-100

Late F.J. Pound

The late Dr. F. J. Pound.

Breeding programme started in the 1940's in the Department of Agriculture

W.E. Freeman

Continued over 60 years in the public sector (Ministry of Agriculture) that has led to four generations of varieties

TSH varieties

- Combine resistance to Witches broom with good yields.
- **Saved the Brazilian cocoa industry when it was hit by the** same disease in the early 1990s'

UWI Innovations- Cocoa Research Centre

Supply end constraints

1. **Improving productivity**
   - genetics – heterosis plus self-compatibility
   - molecular markers – hasten breeding
   - simultaneous flowering & pollination hives
   - disease and pest losses reduction
   - Agronomy: Agroforestry to orchard transition

2. **Increase acreage**
   - Investor Confidence – pilots/ business models
   - Land tenure issues/ Access roads
   - Credit

3. **Organize farmer groups** to capitalize on scale

Innovations

Demand end innovations

1. **Direct marketing** opportunities (Small holder innovations)
2. **Value addition** – intermediary or full
3. **Product differentiation**

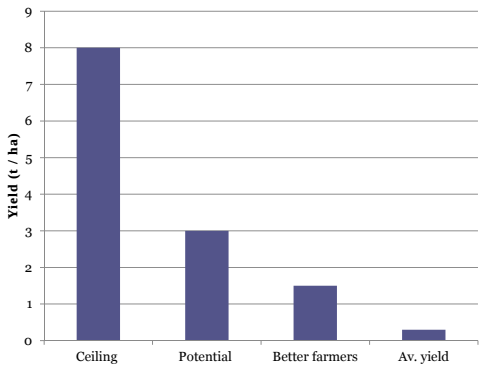
   Nutraceuticals , Pulp juices, Cocoa based beverages/ cuisines, Cosmetics

   Novelty confectionary products
3. **Branding**

   geographical indication, flavour signature profiles, certification marks, trade marks.
3. **Attract international** innovative cocoa industries into the cluster

Yield improvement

1. Improving productivity



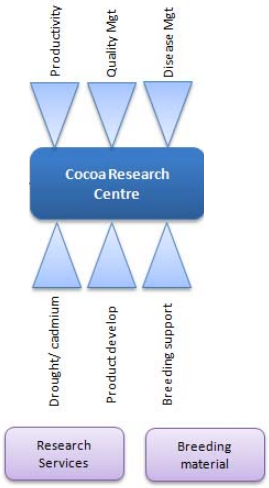
Ceiling — Molecular (32x) Breeding, Orchard Pollination

Potential yield

Actual yield

Yield gap 12 x

RESEARCH



Innovation centre

Inspire, showcase innovations, provide training and develop investor confidence to support the private sector growth and prosperity

Triple helix model

Galvanize the University research capacity and engage the public and private sector towards jointly building a model that can drive development.

Energising the value chain

Building a value chain model that inspires stakeholders to act in unison as a business cluster ensuring all links of the value chain are profitable.

International Fine Cocoa Innovation Centre (EU/ACP)

Innovations and technology toolkits

Converting Science into innovations (EU/ACP)

1. **Model Cocoa Orchard to showcase innovations (Lindt and Sprungli)**
   - Improving the **genetic architecture** of the orchard PVP and deployment of varieties
   - **Orchard designs** to suit different stakeholder needs
   - Innovations in **tree architectural** management,
   - **Soil and fertility management toolkit** – IP
   - **Pollinator hives** innovations - IP
   - Innovations in **disease management - IP**
   - **Climate smart cocoa** management toolkit - IP
   - **Cadmium mitigation** toolkit -IP
   - **Small scale mechanisation** of production -IP
   - Farmer clusters and **Geographical indications toolkit**

Innovations and technology toolkits

2. **Processing Innovation Centre - Innovations in postharvest processing to create novel products**

   - Process optimisation and **monitoring toolkit**
   - **Optimising fermentation of genetic groups** to elicit flavour potential
   - Modifying fermentation using **microflora starter kits**
   - Other modification to modify product
   - Small scale fermentation and **microfermentation systems**

Innovations and technology toolkits

3 a Geographical indications based branding toolkit

Building the layers to create a flexible branding system

- History, storylines, social sustainability
- Environmental sustainability
- Genetic layer – DNA fingerprinting toolkit
- Flavour map – sensory toolkit
- Processing management innovations
- Flavour sensory profiling – **quality certification**
- Traceability – **NIRS based traceability**

b. Varietal branding toolkit– developing genetic group specific fermentation and drying systems to elicit flavour potentials.

c. Estate origin branding

Innovations in value addition

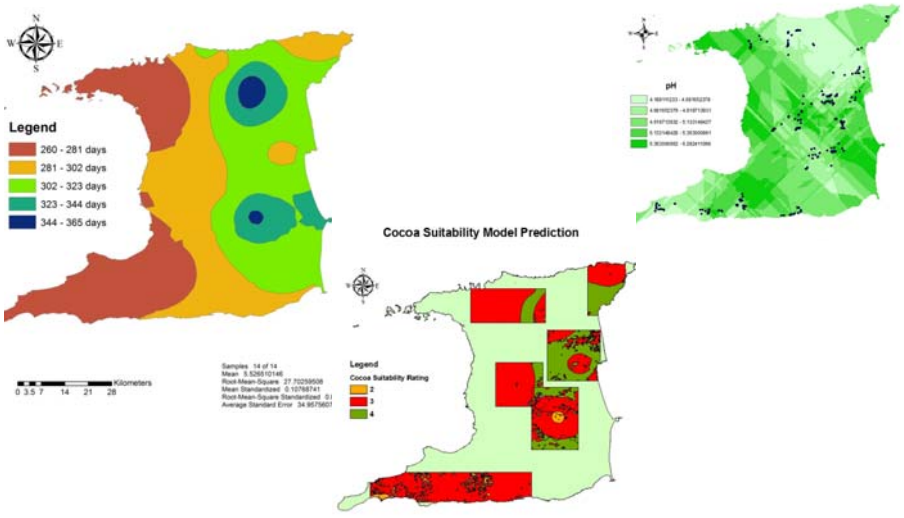
4. **Flexible manufacturing facility**
   - Modify product through changing the roasting, conching, particle size manipulation methodologies or equipment.

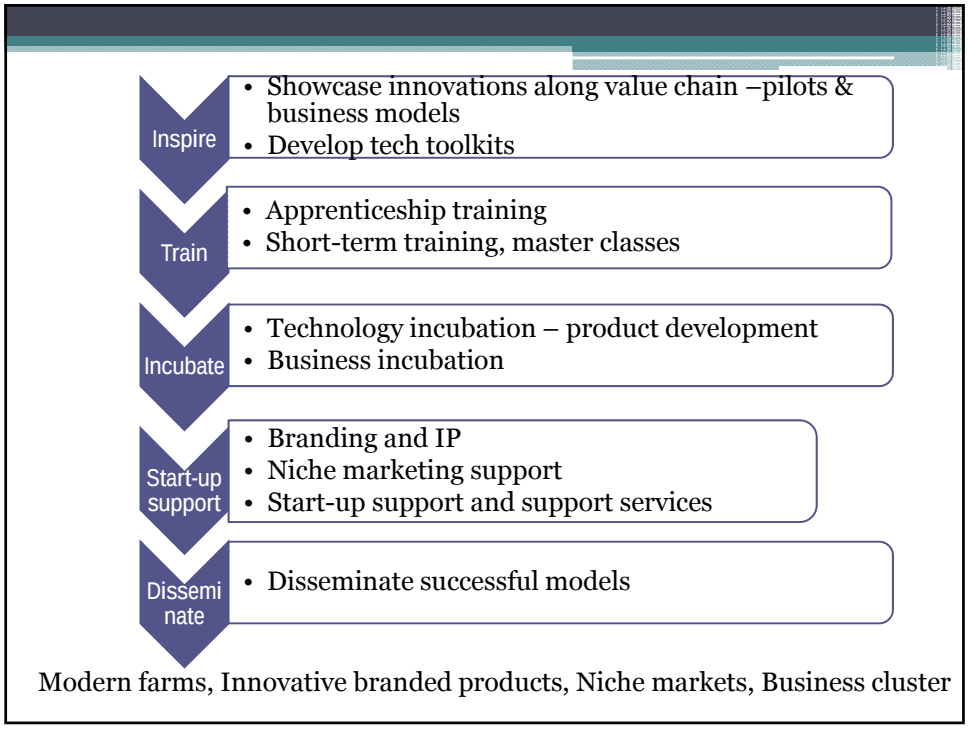
5. **Novel product development** technologies
   - Nutraceuticals and health products
   - Beverages, Pulp based products
   - Chocolate and bonbons
   - Cuisine innovations

7. Incubators and start-up support

8. Innovations in **marketing and developing new markets**.

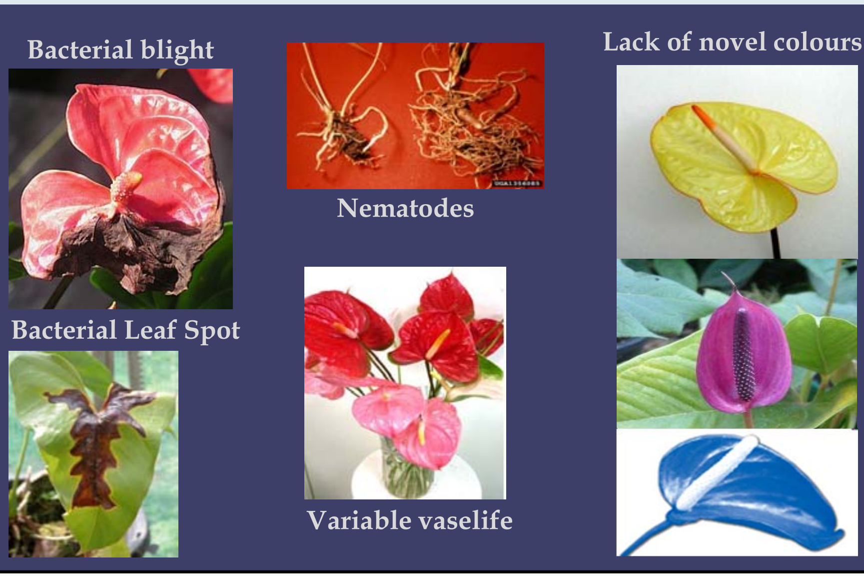
Building and information system to support development



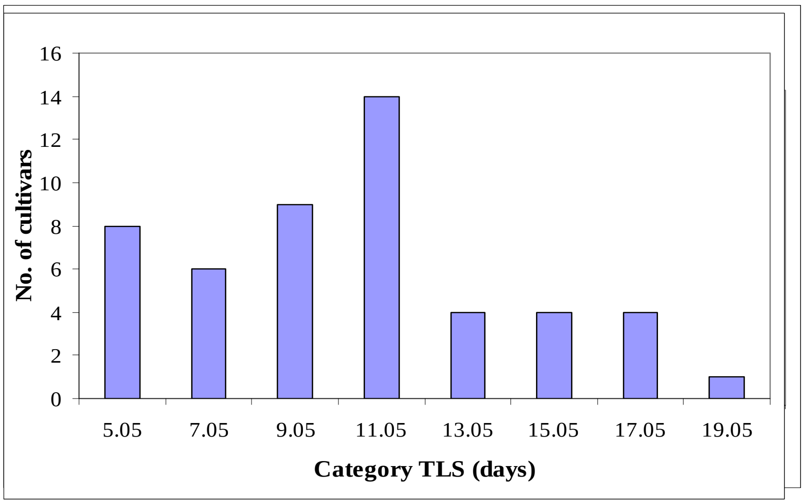


The Case of Anthurium

Experiences with Anthurium

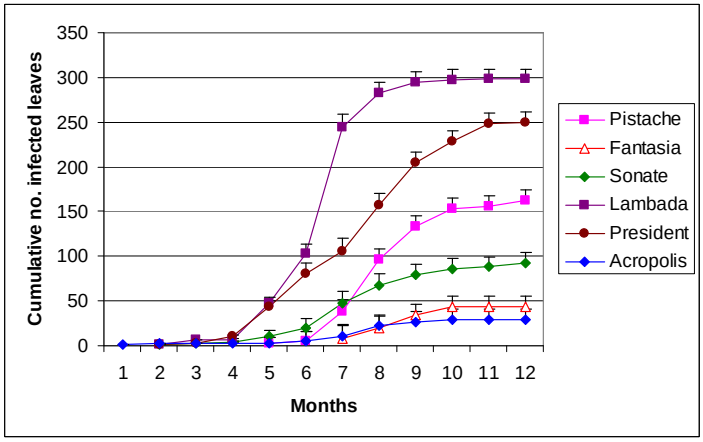


Resistance to bacterial blight



Foliar
Systemic

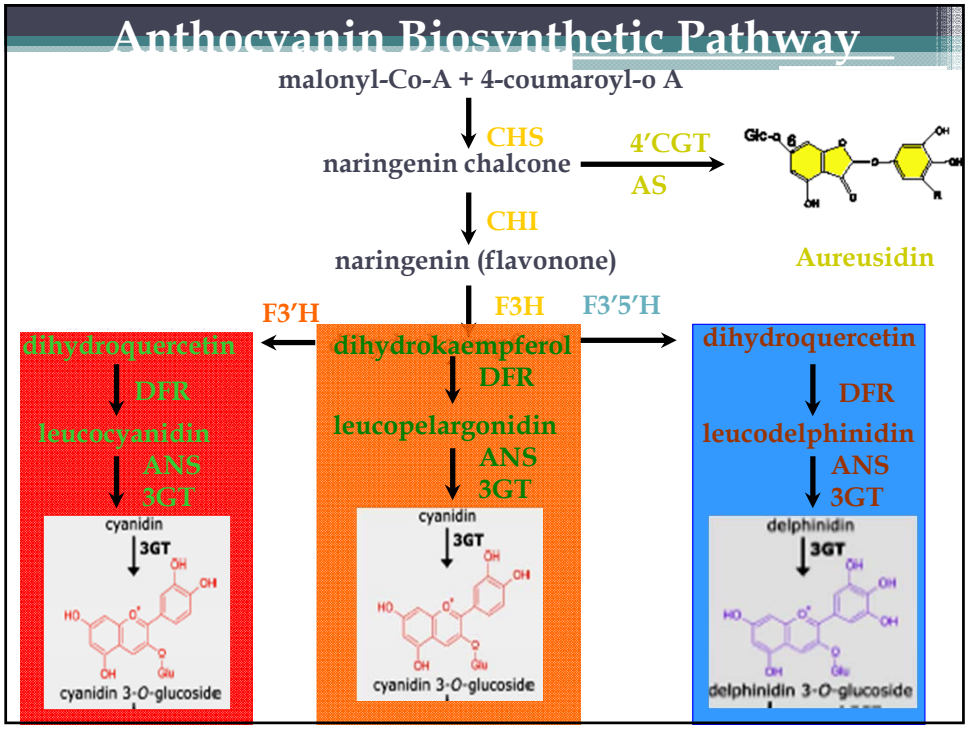
Resistance to bacterial leaf spot



New varieties of anthurium

Kairi Blooms Ltd / UWI Participatory breeding resulted in new varieties that combine

- high yield
- disease resistance
- quality



SIDS - Developmental imperatives

1. **Comparative advantage, linkage to economic development**
2. **Triple helix approach**
   - Stakeholder involved and private sector led
   - Policy framework to support innovation, industry development
3. **Overcoming Challenges**
4. **Branding and potential for niche marketing**
5. **Climbing up the value chain**
6. **Innovation obsessed industry – Creativity implemented**
   - Multi-disciplinary – production, value addition, market and business innovation
   - Technology transfer facilities
   - Pilots
7. **Building a knowledge industry**
8. **Potential for building business clusters – multiplier effect in creating employment**


THANK
YOU