



## **International Forum**

*Unleashing Science, Technology and Innovation for Food and Nutrition Security  
With special focus on Africa, Caribbean and the Pacific*

### **Developing a road map**

15-17 October 2014

NH Rijnhotel Arnhem, The Netherlands

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### **Forum International**

*«Libérer la Science, la Technologie et l'innovation pour promouvoir la sécurité alimentaire et nutritionnelle*

*Avec, comme axe prioritaire, l'Afrique, Les Caraïbes et le Pacifique »*

### **Élaborer une feuille de route**

15-17 Octobre 2014

NH Rijnhotel Arnhem, The Netherlands

# Science and Innovation:

## Lessons in commercializing university research outputs



- the case of Anthurium, hotpepper and cocoa in the Caribbean.

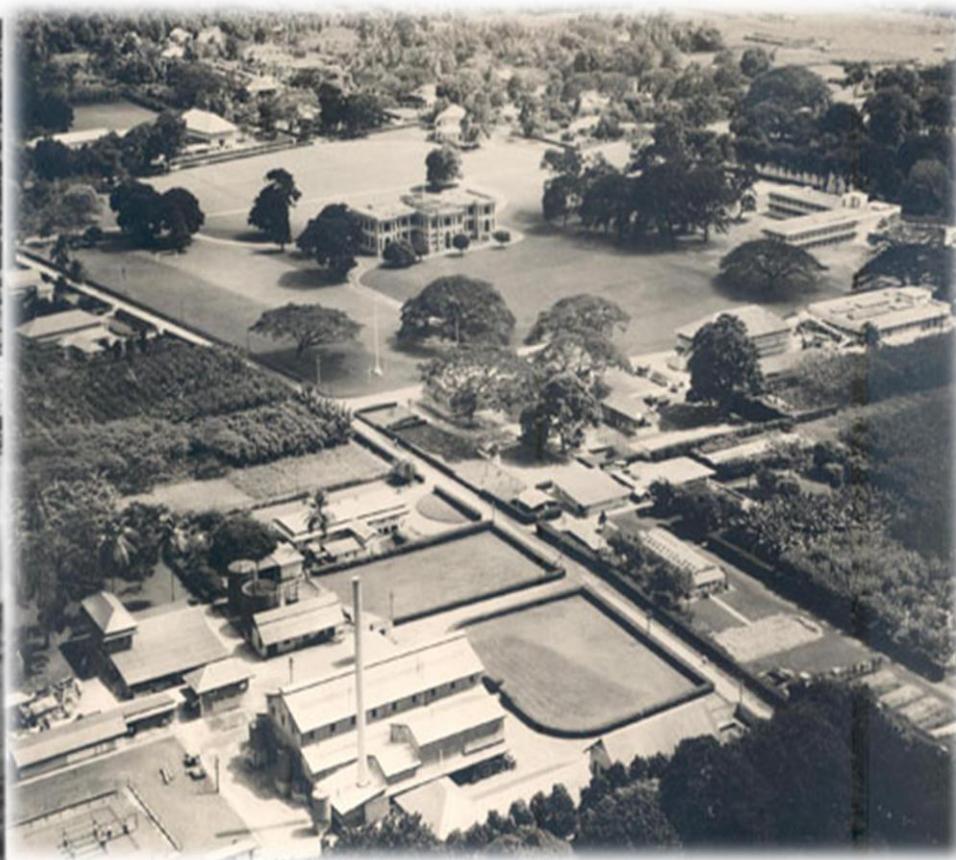


# The University of the West Indies was born (1962)

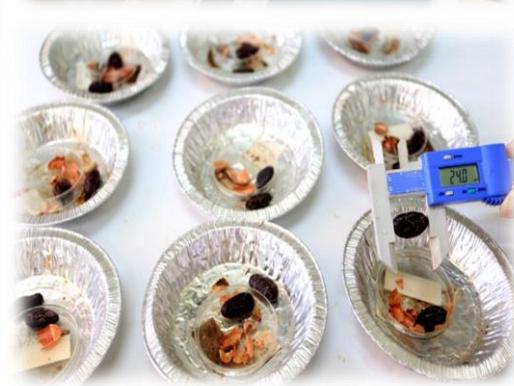


Standing on the shoulders of the 42 year legacy of the Imperial College of Tropical Agriculture

# The Imperial College of Tropical Agriculture - to support the research and training needs of the Commonwealth



# The Cocoa Research Centre is one of the remaining vestiges of the long legacy.



# Custodian of the International Cocoa Genebank



# The Caribbean

## Belize – archipelago of islands – Guyana, Suriname



Caribbean islands	Per capita land area		
	Arable, ha	% of critical	Agric., ha
Puerto Rico	0.009	13	0.078
US Virgin islands	0.038	54	0.094
Turks & Caicos	0.066	94	0.066
Cuba	0.329	470	0.651
Jamaica	0.069	99	0.206
Dominican Republic	0.138	197	0.464
Haiti	0.107	153	0.219
St. Kitts & Nevis	0.171	244	0.243
St. Lucia	0.028	40	0.139
St. Vincent/ Grenadines	0.062	89	0.142
Dominica	0.07	100	0.296
Grenada	0.011	16	0.131
Barbados	0.025	36	0.072
Trinidad & Tobago	0.058	83	0.102



Climate change predictions are not good.



# Caribbean

- Globalisation - Loss of jobs in the agricultural sector
- Poor **competitiveness**
  - Small farms - lack of economies of scale
  - High cost of land and labour
  - High disease pressure and high cost of control
- **Risk in Agriculture** - Natural disasters and adverse climate change predictions
- Food security concerns.

# Experiences and Lessons



# Breeding of dwarf, Cowpea severe mosaic virus and Cercospora resistant vegetable cowpea.

## Constraints:



Viney types that needed staking



Susceptible to  
*Cowpea severe mosaic virus*



Susceptible to  
Cercospora leaf spot

# Experiences

## Results (impressive)

1. Yield improved to 40,000 kg /ha
2. Resistant to CpSMV and CLS diseases.
3. Dwarf – no need of staking
4. Organoleptic & cooking quality good

## Adoption low:

1. High yield marketing problem
2. Market was local, in adequate absorptive capacity.
3. Seed system weak
4. Consumers preferred 1 m long vegetable cowpea.
5. Farmers' follow the market.



Photos - CIAT ©

# Lessons learnt

1. Approach should involve stakeholders – **Farmer centric**
2. Need to have a multidisciplinary approach – production technology development, seed production, extension.
3. Need to have marketing approaches (add value), identify export markets
4. Policy support

# Dysfunctional Innovation System

IMPORT

Private Sector

No linkage

RTO

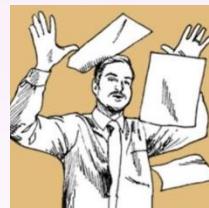
RTO

RTO



WTO

NARI



# MODIFIED DEVELOPMENTAL PARADIGM

Triple Helix

Comparative advantage

**Overcome Challenges - multidisciplinary**

Enabling policy environment for technology transfer

Climbing the value chain

Branding and niche marketing

Building a knowledge Industry

Business cluster development and value employment

**INNOVATION = Creativity implemented**

## 2. The Case of Anthurium



**Intensive prod  
systems**

**History of  
cultivation**

**Tropical  
adaptability**



**Good shelf-life -  
as long as 3 M**

**Indigenous  
genetic  
variability**

**High value -  
internet  
marketing  
Retail 6 US**

**Export market  
-2 billion  
- Close market**

# Experiences with Anthurium

Bacterial blight



Bacterial Leaf Spot

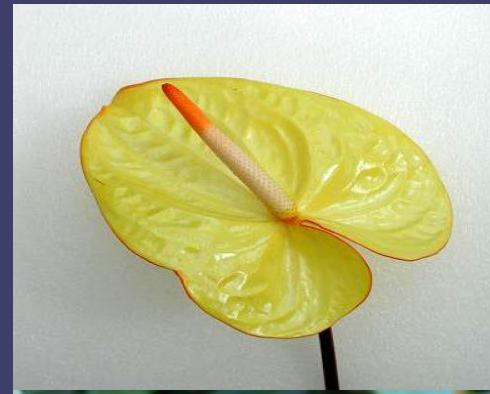


Nematodes

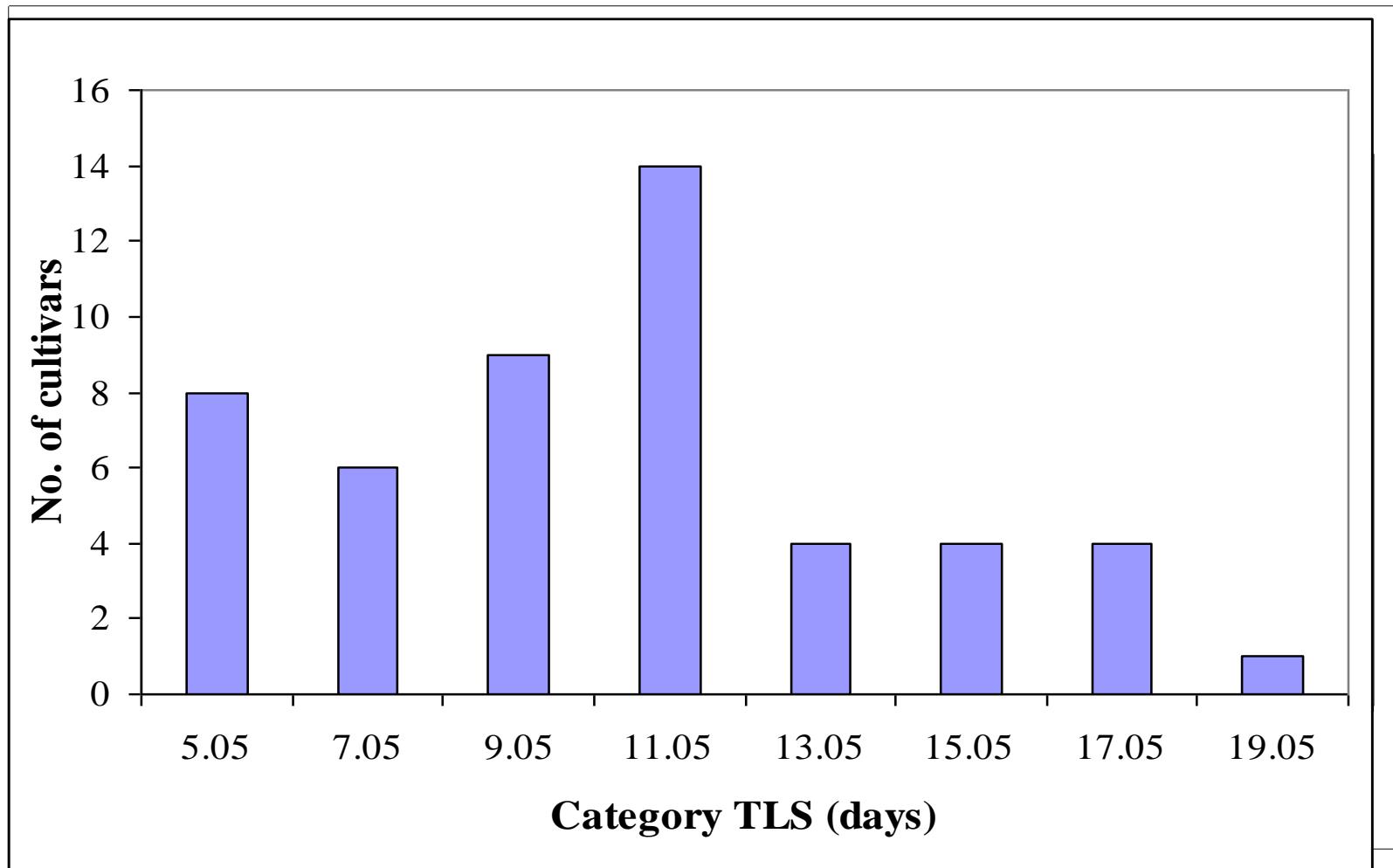


Variable vaselife

Lack of novel colours

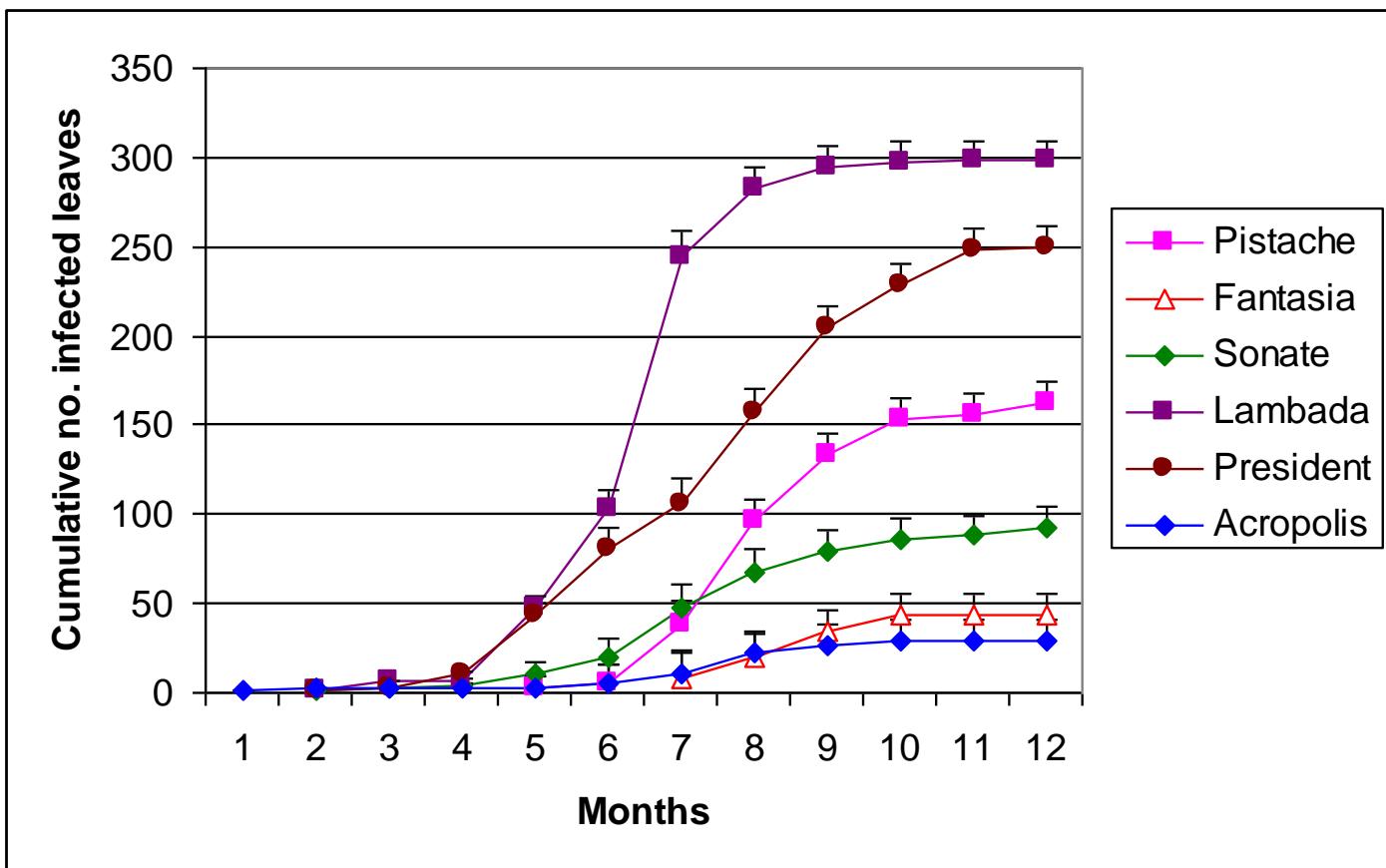


# Resistance to bacterial blight



Systemic

# Resistance to bacterial leaf spot



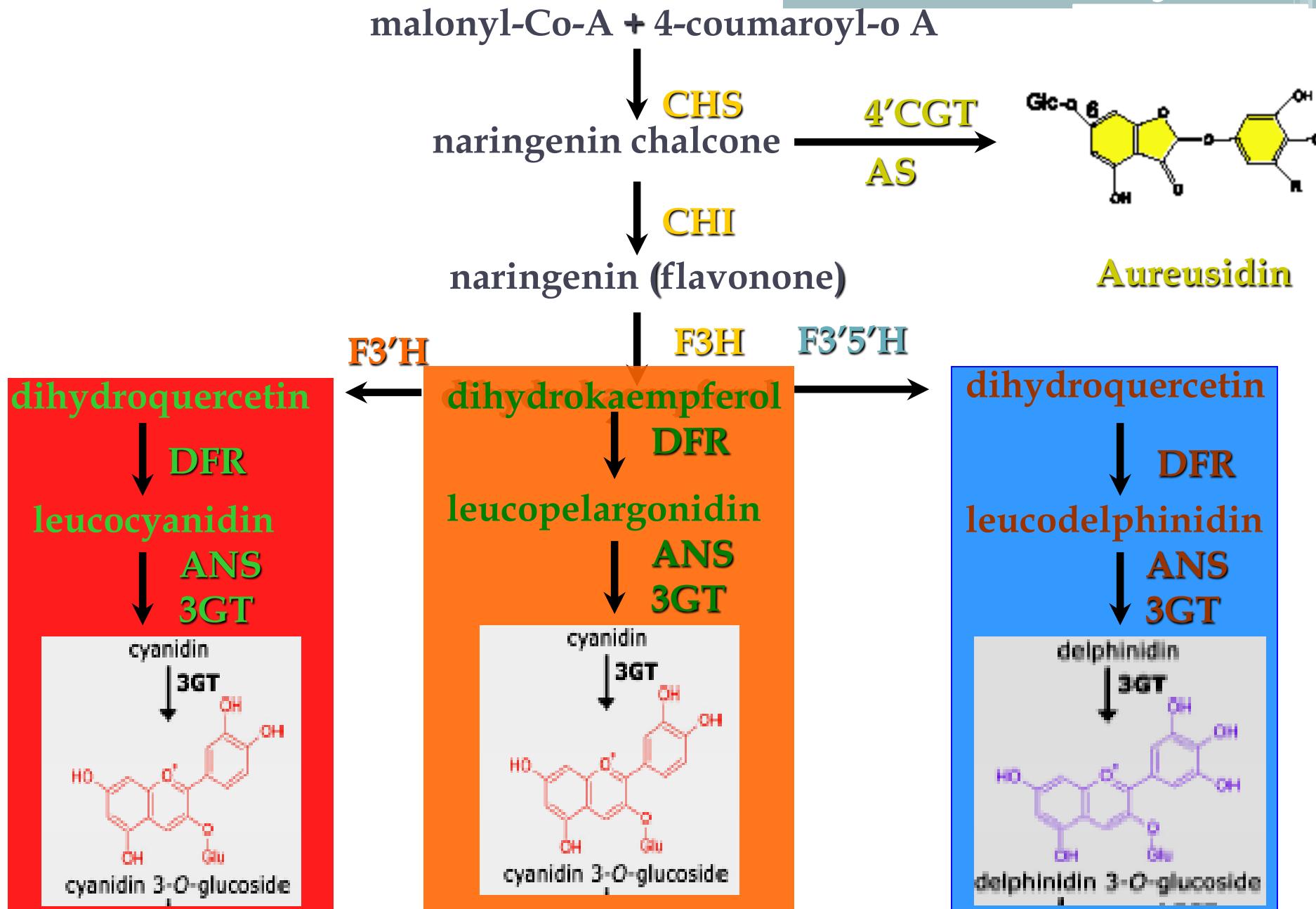
# New varieties of anthurium

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

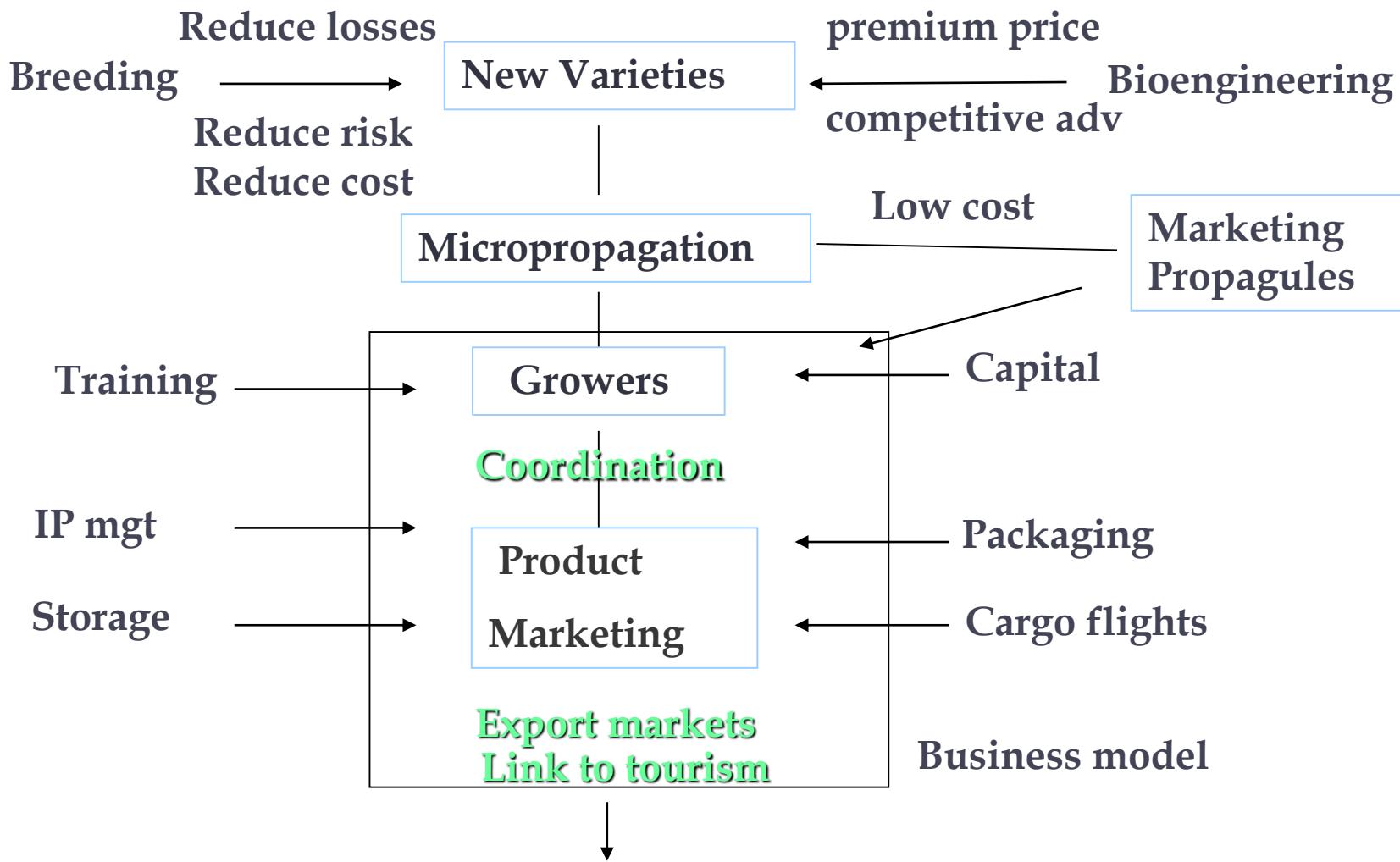
- high yield
- disease resistance
- quality



# Anthocyanin Biosynthetic Pathway



# An Industry Approach



# Innovation success score card

## 1. Comparative advantage

High value crop, intensive cropping systems allow high productivity per unit area

## 2. Overcome challenges

## 3. Stakeholder involved development

## 4. Opportunities for value addition

## 5. Opportunities for direct marketing

## 6. develop a knowledge industry

## 7. Potential for building clusters – multiplier effect in creating employment

# SIDS - Developmental imperatives

## Triple helix approach

- Stakeholder involved and private sector led
- Policy framework to support innovation, industry development

## Technology transfer

- Multi-disciplinary – production, value addition, market and business innovation
- Technology transfer facilities/ training
- Pilots

## Building a knowledge industry

# The Case of Cocoa



## Comparative Advantage

Oldest Cocoa  
Research Centre  
Largest Genebank

Oldest Cocoa  
breeding  
program

Exclusive Fine  
cocoa  
producer

Country of  
origin of  
Trinitario

Good Cocoa  
Soils  
35,000 t in  
40,000 ha

# Story of Riches to Rags

Cocoa was King

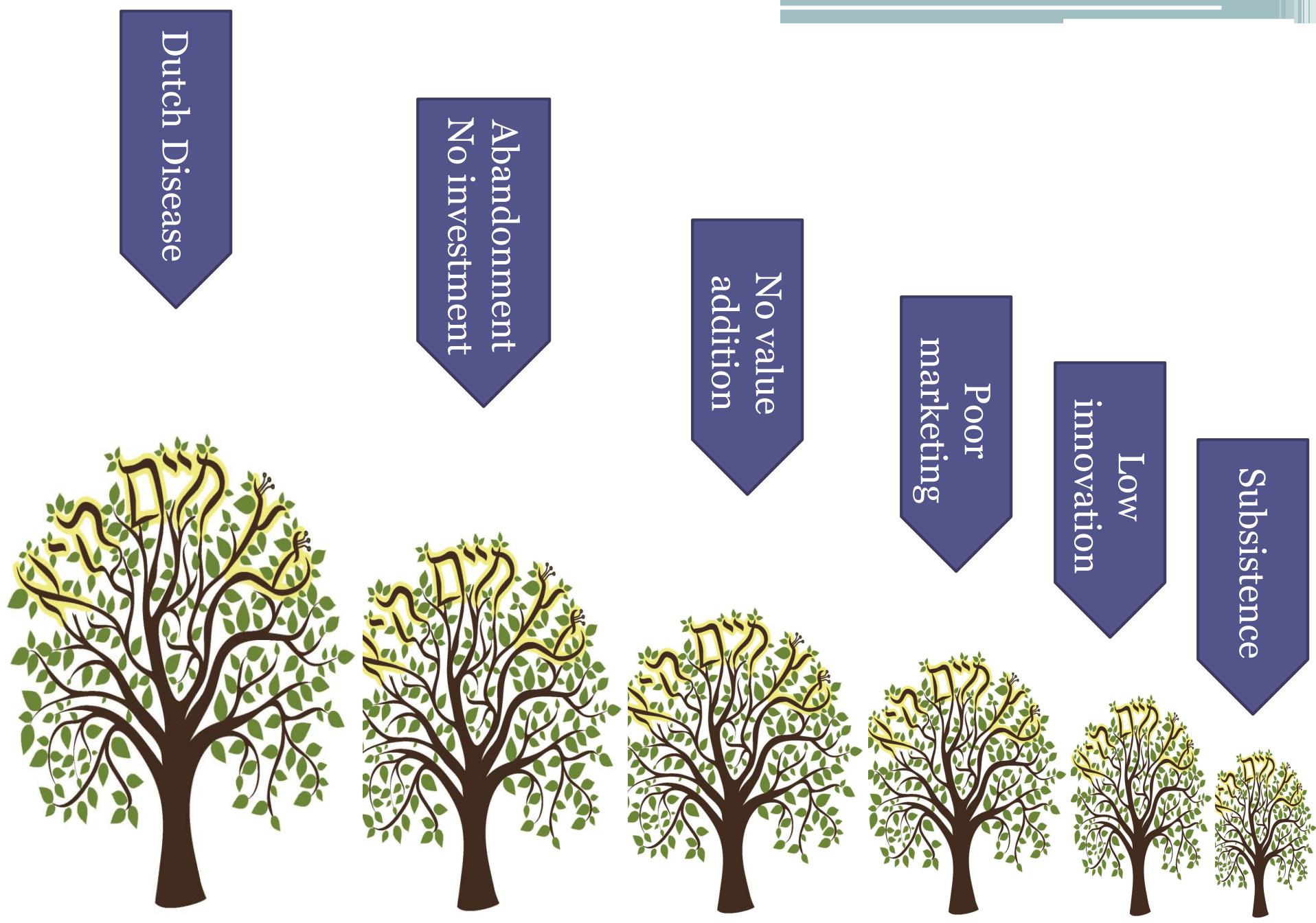
**1940**

Production 35,000 t  
Good productivity  
Land area: 40,000 ha  
New planting  
Commodity marketing  
CCIB

Industry in decline

**2013**

Production 700 t  
Poor productivity  $\frac{1}{4}$  t/ha  
Land area: 2800 ha  
Aging plantations  
Lack of investment  
Commodity marketing  
CCIB



# International perspectives

## 1. Demand will supersede supply

- a 20% deficit by 2020 – BRIC countries (Prices – buoyant)

## 3. Market structure changing

Consumer sophistication in metropolitan countries

- **Aware** of origin (sustainably sourced/ organic/ environmental sustainability)
- **Adventurous** consumer - innovative products, new flavours, terroirs recognised. nutraceuticals
- **Willing** to pay higher price for niche, gourmet products.
- **Responsive** to food safety concerns and quality

# UWI Innovations

## Supply end constraints

### 1. Low productivity

- genetics
- pollination syndrome
- disease and pest losses
- Agronomy: Agroforestry to orchard transition

### 2. Increase acreage

- Investor Confidence
- Land tenure issues
- Access roads
- Extension

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

# Innovations

## Demand end innovations

- 1. Direct marketing opportunities**
- 2. Value addition – intermediary or full**
- 3. Product differentiation**

Nutraceuticals , Pulp juices, Cocoa based cuisines, Cosmetics  
Novelty confectionary products

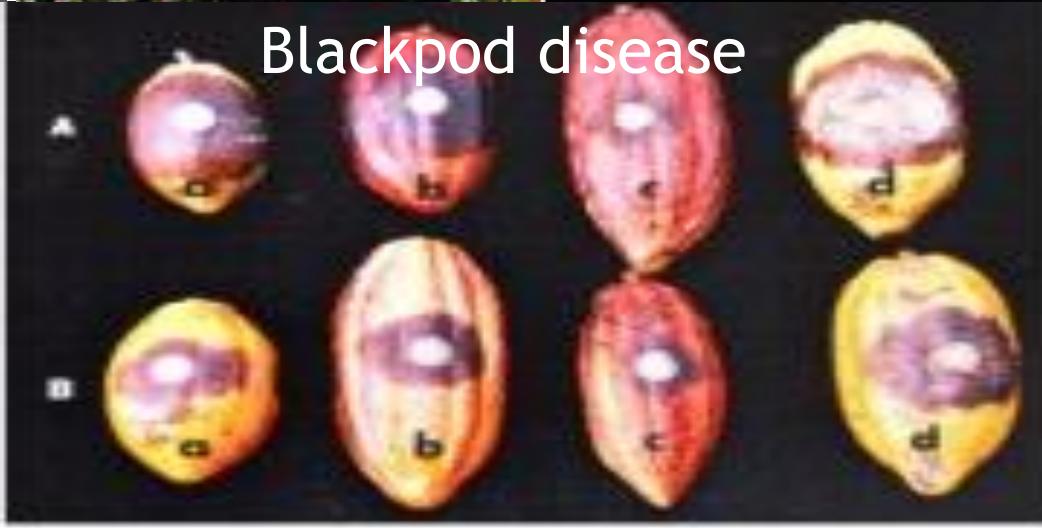
- 3. Branding**  
geographical indication, flavour signature profiles, certification marks, trade marks.
- 3. Attract international innovative cocoa industries into the cluster**

# Research:

## 1. Resistance breeding



Witches' broom



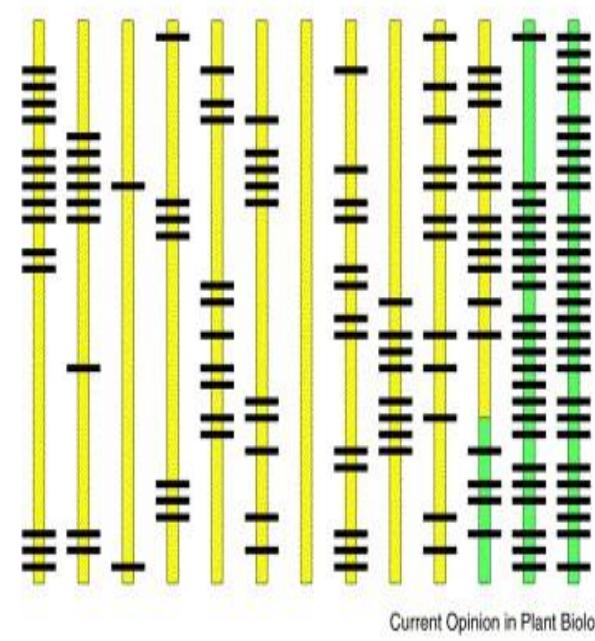
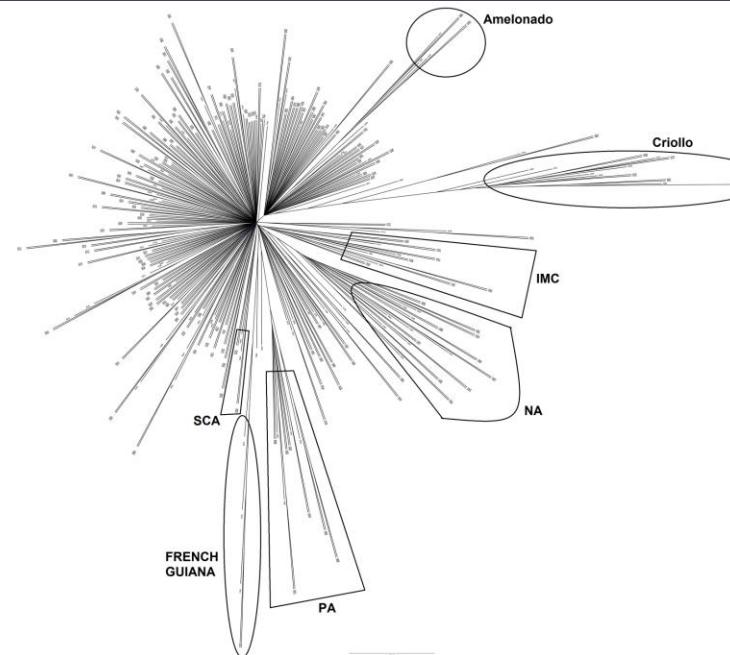
Blackpod disease

# Research: Resistance breeding

- 1. First Population Enhancement programme for disease resistance.**
- 2. Support international breeding**
- 3. Supports local breeding for resistance carried out by MFP.**



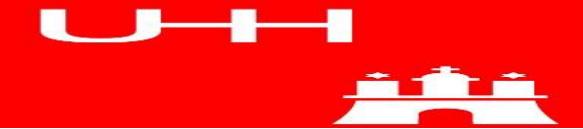
# Genomics tools assisted breeding



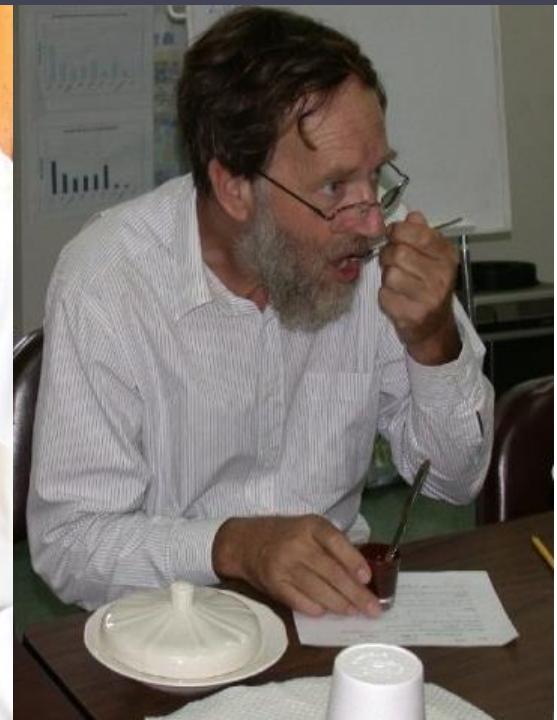
Current Opinion in Plant Biology



# Building an International Research Platform = CRC portal



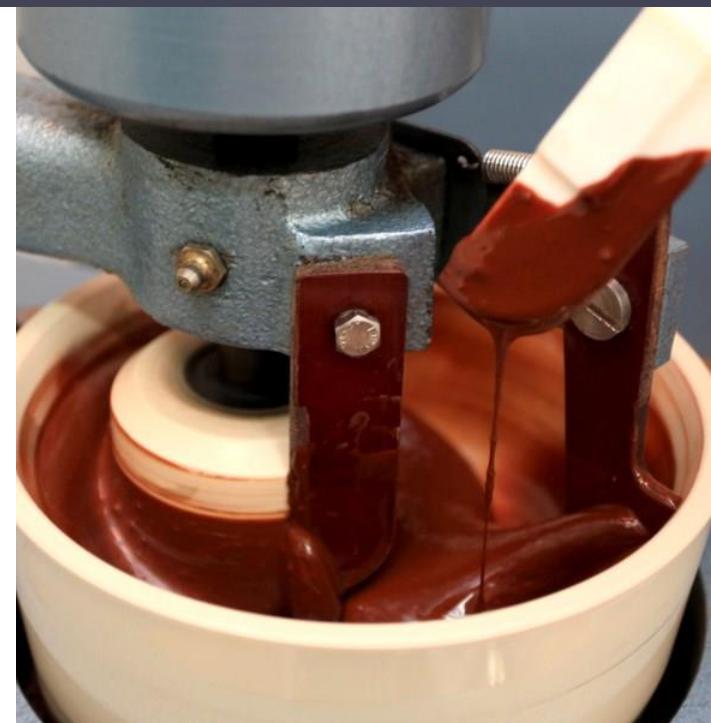
# Understanding fine flavour



# Geographical indications

1. Flavour is a function of variety, postharvest, environment.
2. Different flavours are affected differentially by these parameters
3. Optimisation & augmenting postharvest methodologies – sensory/ chemical profiling
4. Developing chemical and flavour signature profiles

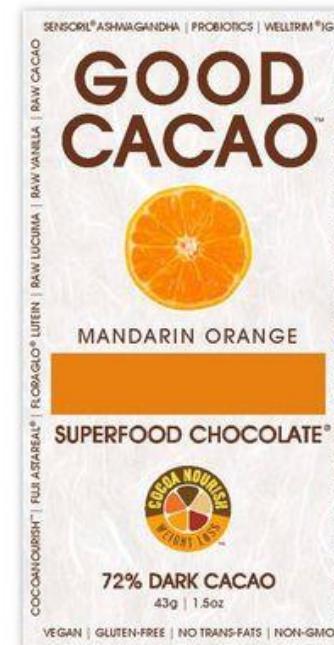
Pave the way for geographical indications



# Health Chocolates

1. Understanding the genotypic effects of differences in nutraceutical value
2. Understanding the effect of processing or nutraceutical value
3. Understanding the effect of manufacturing

(-) (-) epicatechin, PEA,



# Market innovations

## 1. Direct marketing opportunities

- Branding through geographical indications, quality management, traceability systems, certification.
- Linkages with high-end boutiques
- Farmers participate in final value of products

## 2. Opportunities for value addition

- Marketing coverage chocolate
- Marketing confectionaries, cosmetics, nutraceuticals beverages

## 3. Linkage with tourism industry

# International Fine Cocoa Innovation Centre

## What is it?

1. An integrated **pilot facility** that develops and showcases innovations along the **entire value chain**.
2. Uses the **triple helix** approach, involving the Private Sector, University and the Government.
3. Provides **apprenticeships/training** along the value chain
4. Provides technology **incubation**, business incubation
5. Provides quality management, certification, traceability and other technology **services**.



# International Fine Cocoa Innovation Centre

## Components?

### 1. The cocoa orchard

Orchard system, better genetics, pollination management.

### 2. Postharvest innovation facility

Innovations in postharvest, geographical indications, quality management.

### 3. Factory

Farmers produce couverture to export. Direct, niche, marketing

### 4. Incubator

Innovations in confectionary,, nutraceuticals. Business and technology incubation, Spin offs



# International Fine Cocoa Innovation Centre

## Components?

**5. Restaurant – Innovation in cuisine**

**6. Museum and visitor centre**

Public pride in the industry,  
showcase farm to fork model,  
improve investor confidence.

**7. Academic interface**

Provide training,  
apprenticeships, technology and  
business services



# Innovation centre will

## SUPPLY END

1. Increase **productivity** at least by 16 times.
2. Improve **investor confidence** through pilot experience, resulting in increased acreage
3. Greater **organisation** of farmers to improve scale of production.
4. **Policy support** with regard to land tenure, and access roads.
5. **Professional companies** will replace labour shortage.

## DEMAND END

1. **Predictable quality** through novel postharvest practices
2. **Quality management** and certification will allow niche direct marketing **improving price to farmer**.
3. **Couverture marketing** allows farmer to benefit from value addition.
4. Spin off companies begin to exploit **niche markets**.
5. Supportive companies grow around the sector to create a **business cluster**.

# Outcomes

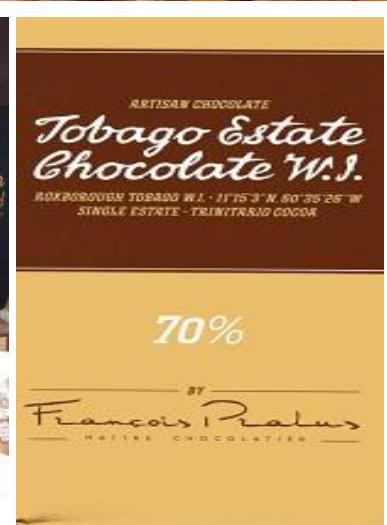
1. **Cocoa growing outfits become profitable** resulting in increased production.
2. **Proportion of value added products marketed increased.**
3. **Innovative chocolate companies** invest within the innovation hub.
4. **Emerging spin-offs and supportive industries** form a self sustaining business cluster providing valuable foreign exchange to country.
5. **Innovation Centre become a knowledge hub** to the world providing training, technology services worldwide.
6. **Stronger linkage between the Cocoa Sector** and the Tourism sector mutually benefiting both sectors.
7. **The centre becomes a model** for other industries in SIDS.

# SIDS - Developmental imperatives

1. Comparative advantage, linkage to economic development
2. **Triple helix approach**
3. Overcoming Challenges
4. **Branding and potential for niche marketing**
5. **Climbing up the value chain**
6. **Innovation obsessed industry – Creativity implemented**
7. **Technology transfer pilot**
  - Multi-disciplinary – production, value addition, market and business innovation
  - Apprenticeship programmes for stakeholders
  - Technology and business incubation
8. **Building a knowledge industry**
9. **Potential for building business clusters – multiplier effect in creating employment**



# Supporting value addition efforts



*Hot Cocoa Tea and Memories of Granny*

# Farmer Centric Innovation Model

EXPORT

Private Sector

Policy action



Policy action

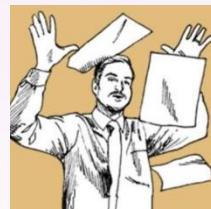
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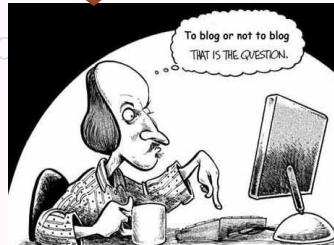
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Niche Market

Policy action

Farmers groups

Policy action



THANK  
YOU

