Bioversity International

CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry

CacaoNet Global Network for Cacao Genetic Resources

Improved Planting Materials of good Quality, Yield and Diverse Flavours –

Tapping Cacao Diversity for Farmers, Manufacturers and Consumers

Photo: Phillips and Mata, CATIE

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Punta Cana, DR
Breakout Session 1 – Panel 5
Tuesday 24 May

What is needed?

- ✓ Farmers' access to good planting materials as part of a package of measures to increase productivity and improve overall economy of their farms.

How?

- ✓ Replace ageing trees with high-yielding and disease-resistant planting materials.
- ✓ Superior planting materials incorporating flavour traits to gain higher premiums.

Cocoa farmer in Côte d'Ivoire (D. Pokou,)

Global Cocoa Agenda provides a road-map

How can this be done?

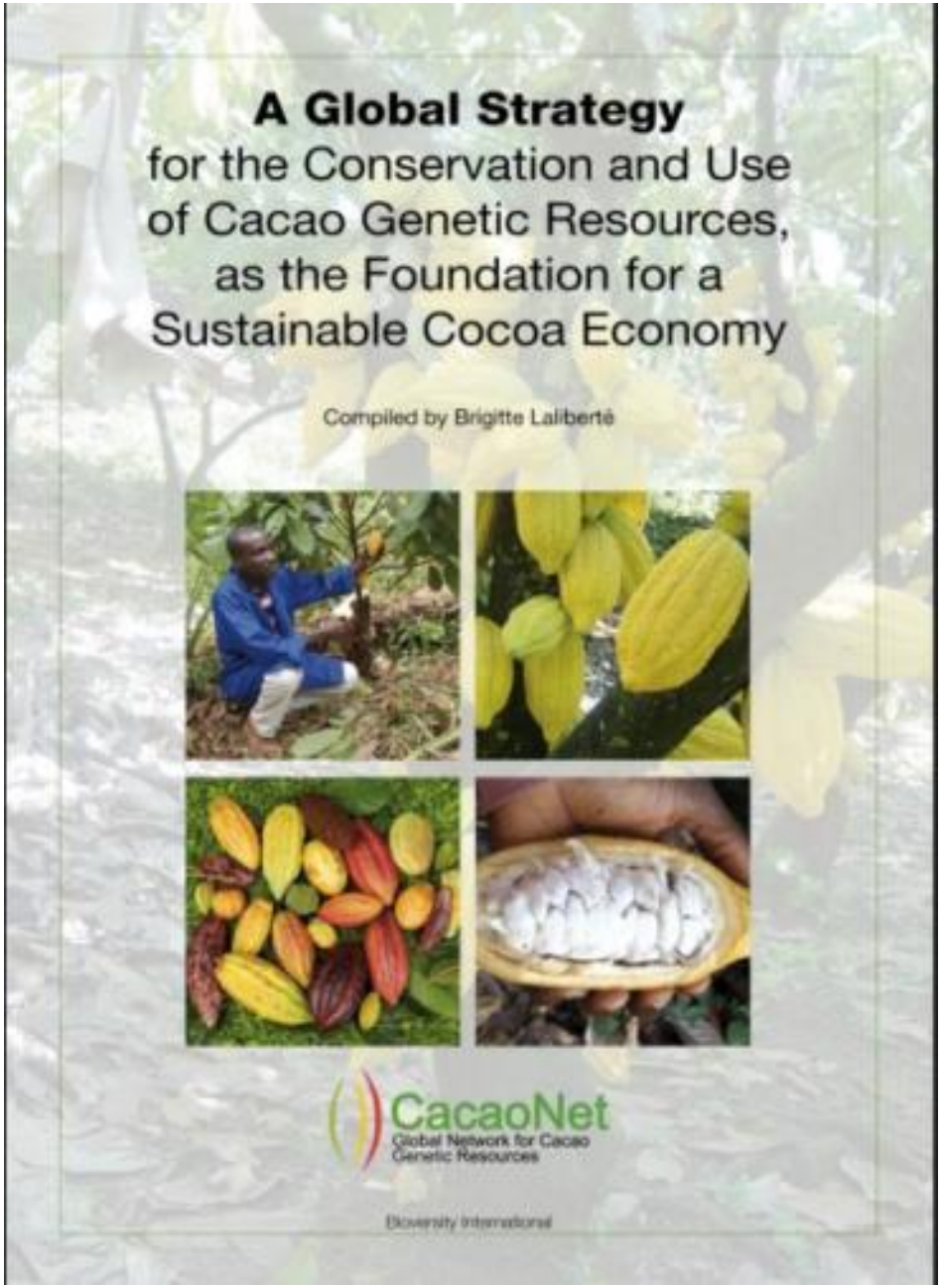
Finalised in October 2012

Result of a consultation process, drawing upon the global cocoa community's expertise in all aspects of **cacao genetic resources**

Over 75 individuals from 26 institutes contributed

Framework to secure funding for the most urgent needs to **ensure that cacao diversity provides direct benefits to the millions of small-scale farmers around the world.**

www.cacaonet.org



What traits are needed?

Early ripening pods

High quality

Small trees

Frosty pod resistant

High butter fat content

Resistant to VSD

Good flavours

Resistant to CSSV

Large beans

High yield

Resistant to pod borer

Uniform

Drought tolerant

Resistant to high temperature

Good pulp

Unique

Witche's Broom resistant

Breeding for Pest and Disease Resistance

Photo credit: Seed garden in Ghana – M. Gilmour

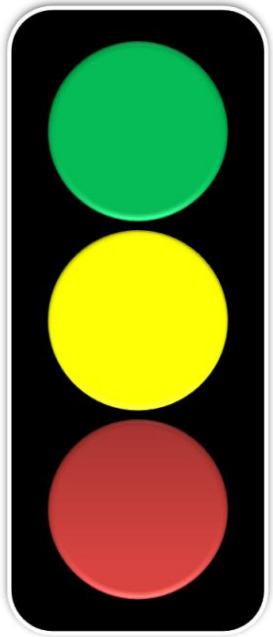
- ✓ Witches' broom disease (WBD) – Brazil and Trinidad
- ✓ Frosty pod rot or disease (FP) - CATIE
- ✓ Black pod (BP) – Trinidad and CATIE, French Guyana, Africa, Papua New Guinea and Trinidad
- ✓ Vascular-streak dieback (VSD) – Trinidad, Indonesia and Papua New Guinea.
- ✓ Cocoa Swollen Shoot Virus (CSSV) – Ghana, Cote D'Ivoire and CocoaAction
- ✓ Insects – Mirids and Cocoa pod borer (CPB)

NEED large genetic diversity in germplasm collections and farmers' fields.

Is it possible to have yield AND flavor?

- ✓ Further studies on evaluation of genebank accessions and wild cacao populations for flavour traits.
- ✓ A better understanding of best breeding approach to impact on capacity to select materials
- ✓ Possible to deliver agronomic traits (resistance to disease and productivity) AND preserve flavor.

Must be a criteria analysed and included at the beginning of breeding projects



One or more of the valued cacao flavours (cocoa, balanced bitterness/ astringency, fruit, floral, nut)

Problematic inferior flavour — dirty, badly out of balance, astringency—remove from breeding

Promoting Excellent Quality and Flavours

- ✓ Good trees (genetics)
- ✓ Well cared for and grown in suitable environment
- ✓ Pods correctly harvested
- ✓ Good practices to keep the trees healthy and free of pests and diseases
- ✓ Optimum fermentation and drying specific to the type of beans
- ✓ Know-how for processing cocoa beans and for chocolate making

All activities in cocoa production, management and processing ultimately affect flavour development and quality





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Diversity of flavours from 15 cacao origins

COCOA OF EXCELLENCE 2017
INTERNATIONAL COCOA AWARDS

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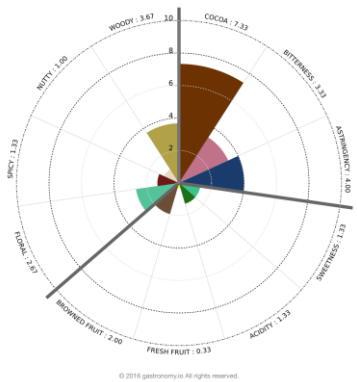

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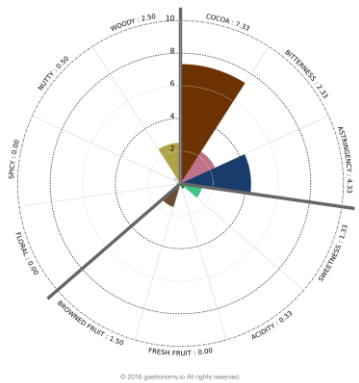

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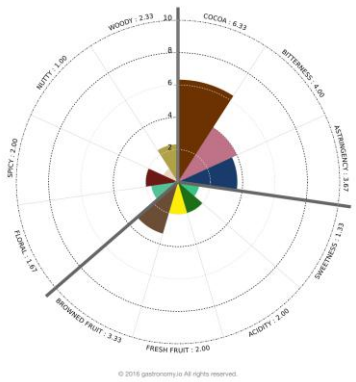

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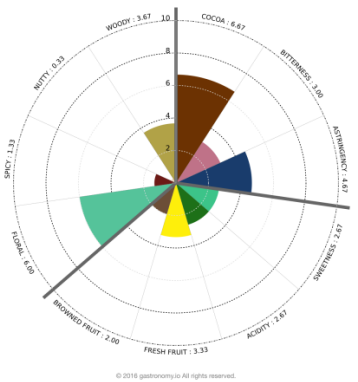

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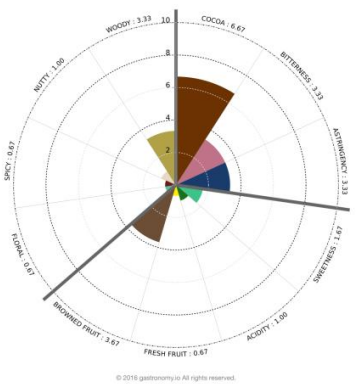

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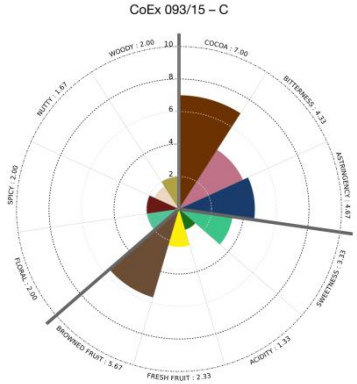

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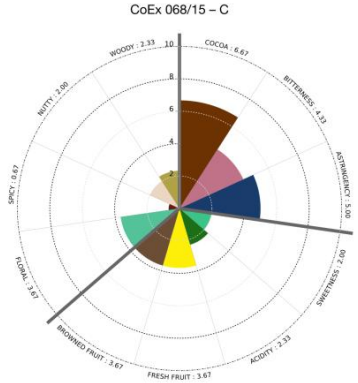

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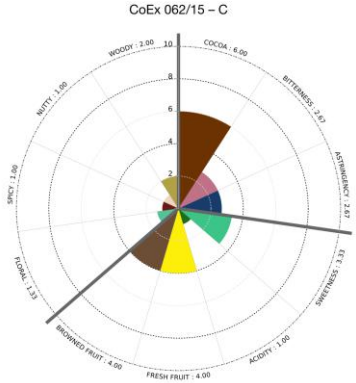

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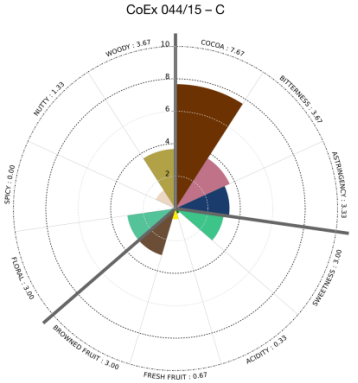

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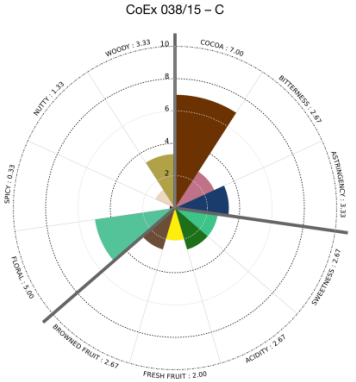

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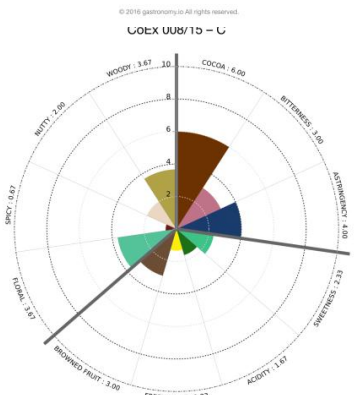

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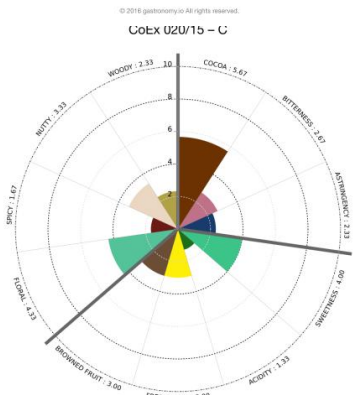

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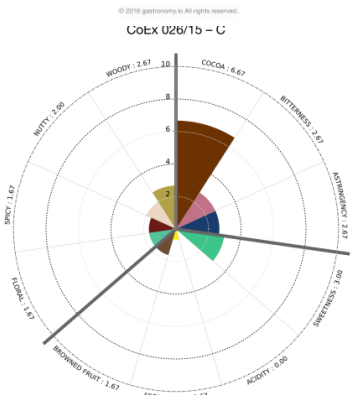

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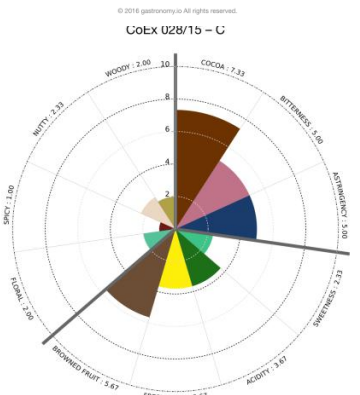

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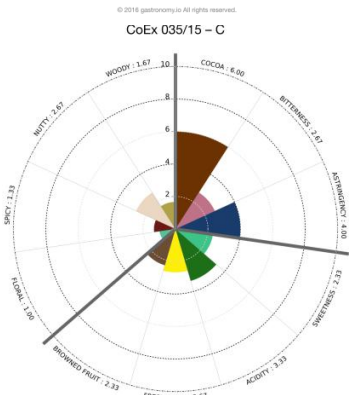
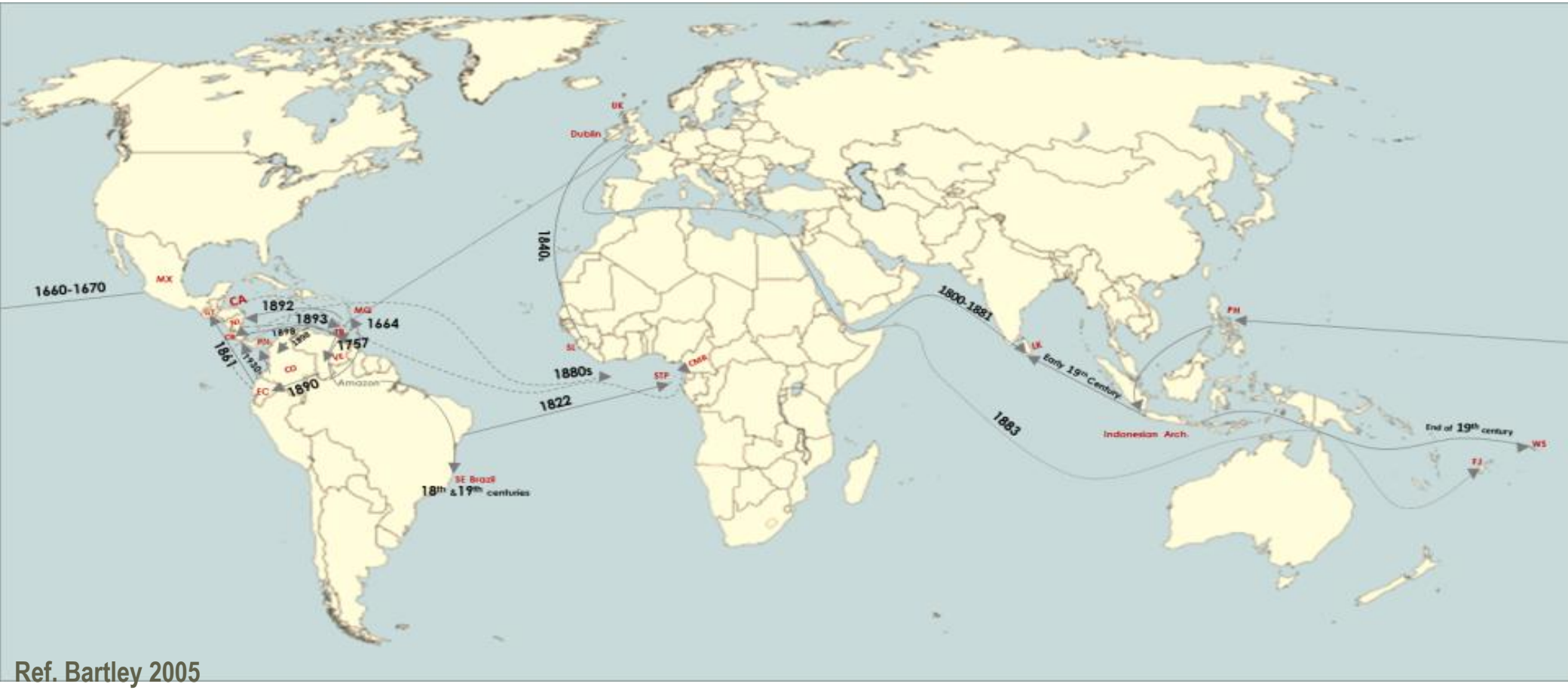


The Cocoa Route – how it moved around the world



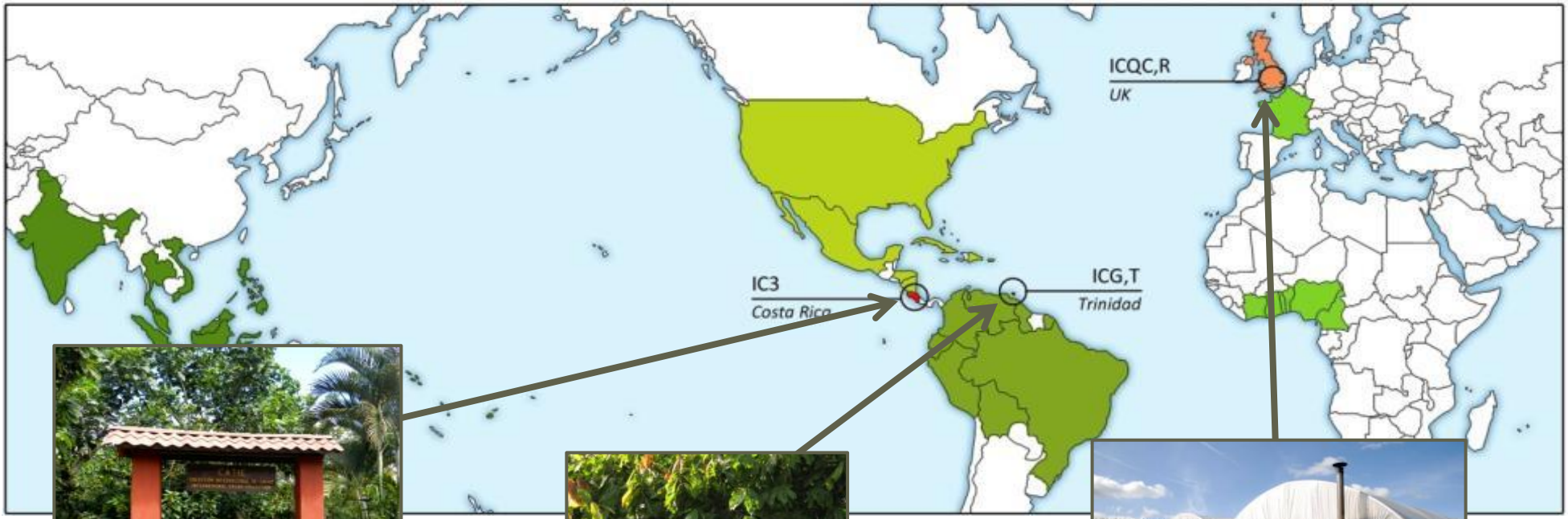
Ref. Bartley 2005

- 1660-1670 - Mexico to the Philippines
- 1664 - Amazon to Martinique
- Philippines to Indonesian Archipelago
- 1757 - Amazon to Trinidad
- Early 19th century - Indonesian Archipelago to Ceylon
- 18th &19th centuries - Amazon to Southeastern Brazil
- 1822 - Brazil to Principe
- 1840s - Dublin to Sierra Leone
- 1861 - Ecuador to Guatemala
- 1880-1881 - Trinidad (via England) to Sri Lanka
- 1883 - Trinidad (via England) to Fiji
- 1892-1893 - Trinidad to Nicaragua. Nicaragua to Trinidad.
- 1898 - Trinidad to Costa Rica and Colombia
- 1890 - Venezuela to Ecuador
- 1930s - Ecuador to Costa Rica and Panama
- 1880s - Trinidad, Venezuela and Ecuador to Sao Tome
- 1899 - Trinidad, Venezuela, Ecuador and Central America to Cameroon
- End of 19th century - Indonesian Archipelago to Samoa

How to increase the exchange of diversity?

- ✓ A range of cacao genetic diversity is maintained in national and international genebanks
- ✓ Access is restricted by the lack of clear institutional legal and policy frameworks for exchange of materials or pest and diseases affecting its safe movement.
- ✓ Issues of access and benefit-sharing, security of the material and ownership of collections are the subject of continuing debate.

How is it mainly exchanged?



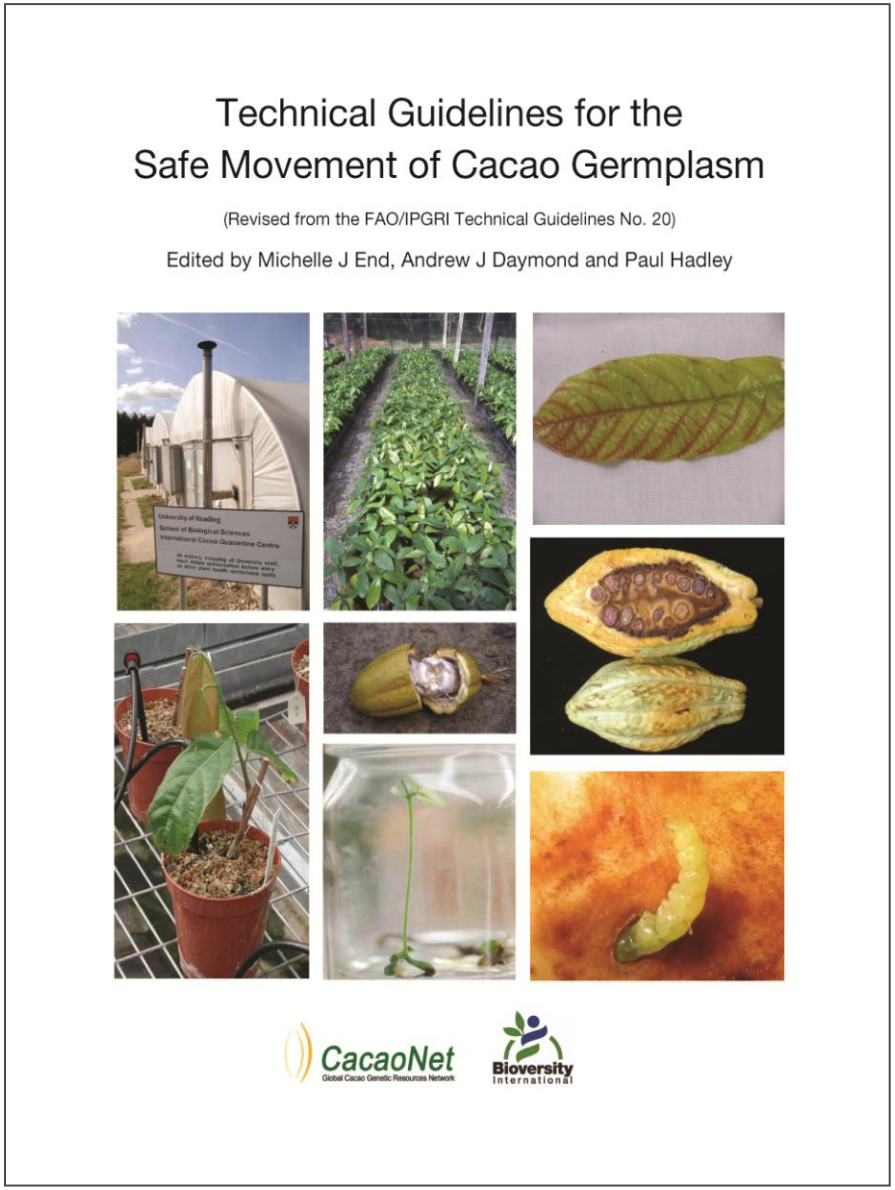
Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica

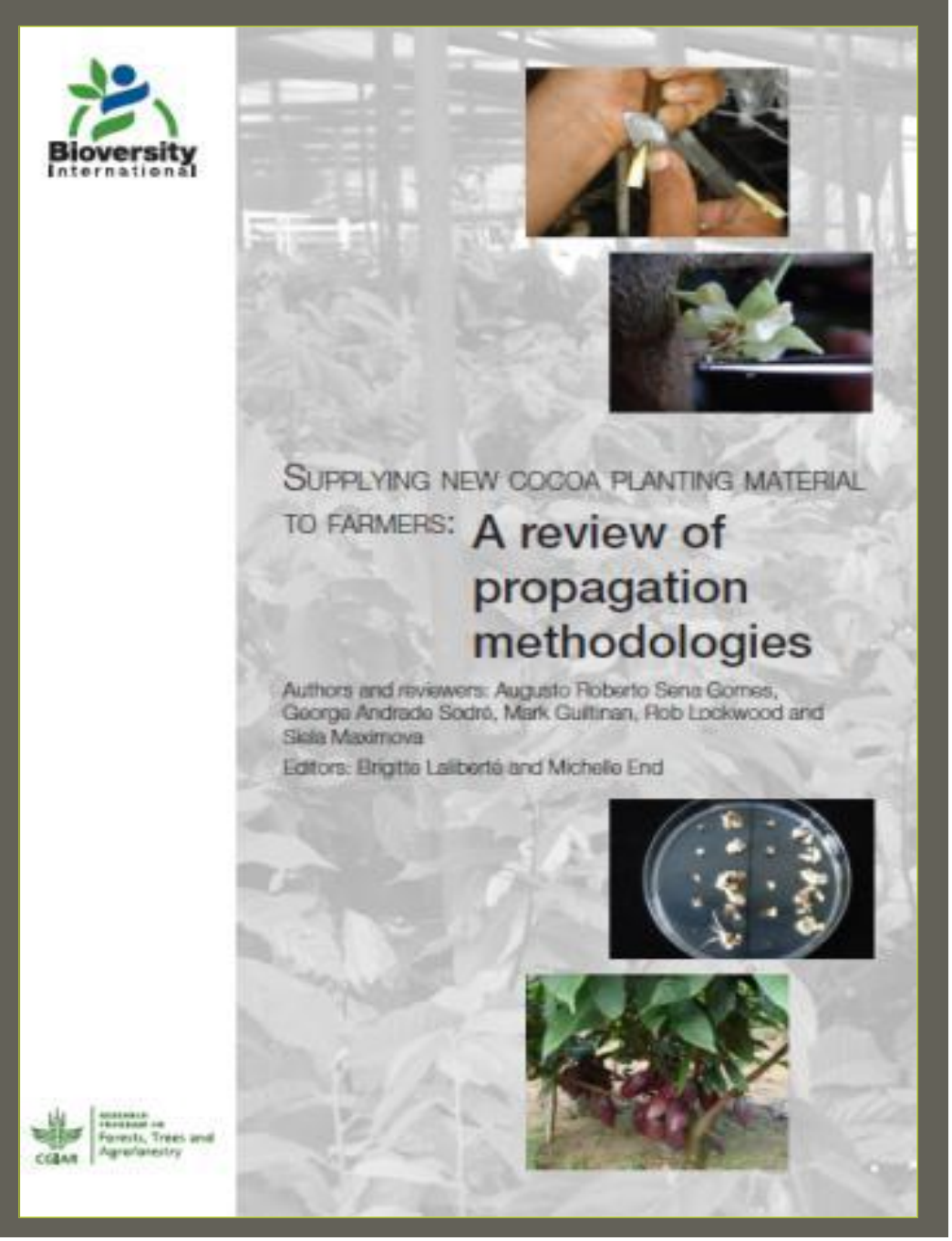
Cocoa Research Centre of the University of the West Indies (CRC/UWI), Trinidad and Tobago

International Cocoa Quarantine Centre (ICQC), Reading University, UK

How to avoid threats of pest and diseases to move from one region to another?

- ✓ Movement from one cacao-growing region to another brings risks
- ✓ FP within Central America and CPB in PNG - high levels of precautions needed
- ✓ At global level - through the International Cocoa Quarantine Centre at the University of Reading, UK (ICQCR)
- ✓ USDA/ARS Miami, facilities for regional transfers.
- ✓ 2014 CacaoNet updated Guidelines - last edition FAO 1999.
- ✓ Need rapid safe-movement – research





How to ensure the improved materials can reach farmers where they are quickly and in the right quantity?

Review in 2015:

- Chapter 1 General Introduction
- Chapter 2 Propagation by seeds
- Chapter 3 Conventional vegetative propagation
- Chapter 4 Tissue Culture
- Chapter 5 Crosscutting issues and conclusions

Download review at:

www.bioversityinternational.org

What factors should be considered?

- ✓ Production objective, scale and timeframe – new area, rehabilitation of low productivity?
- ✓ Farmers' demand and needs
- ✓ Farmer's ability to invest in new materials
- ✓ Resources and timeframe available
- ✓ Planting materials available and tested
- ✓ Technologies and facilities for propagation
- ✓ Labour, skill requirements and farmer training
- ✓ Technical issues and institutional support
- ✓ Financial considerations
- ✓ Phytosanitary considerations
- ✓ Considerations on estimating costs

No single solution can be recommended without evaluating these factors

Availability of appropriate source of proven materials is of overarching importance

Collaborative Framework for Cacao Evaluation - CFCE

- ✓ Each partner defines what they are interesting in getting out and willing to put in.
- ✓ Stimulate, facilitate and support on-going and future breeding efforts.

Goal - Optimizing use of cacao genetic diversity in development of improved, diverse and locally-adapted varieties through international collaboration, bringing together players in public and private sectors.

Outputs – focus on the following traits:

- ✓ Climate Change adaptation – drought (water stress) and temperature,
- ✓ BP (global), WBD and FP (Latin America), VSD and PB (Asia and Pacific), CSSV (Africa)
- ✓ Low uptake of cadmium

Collaborative Framework for Cacao Evaluation - CFCE

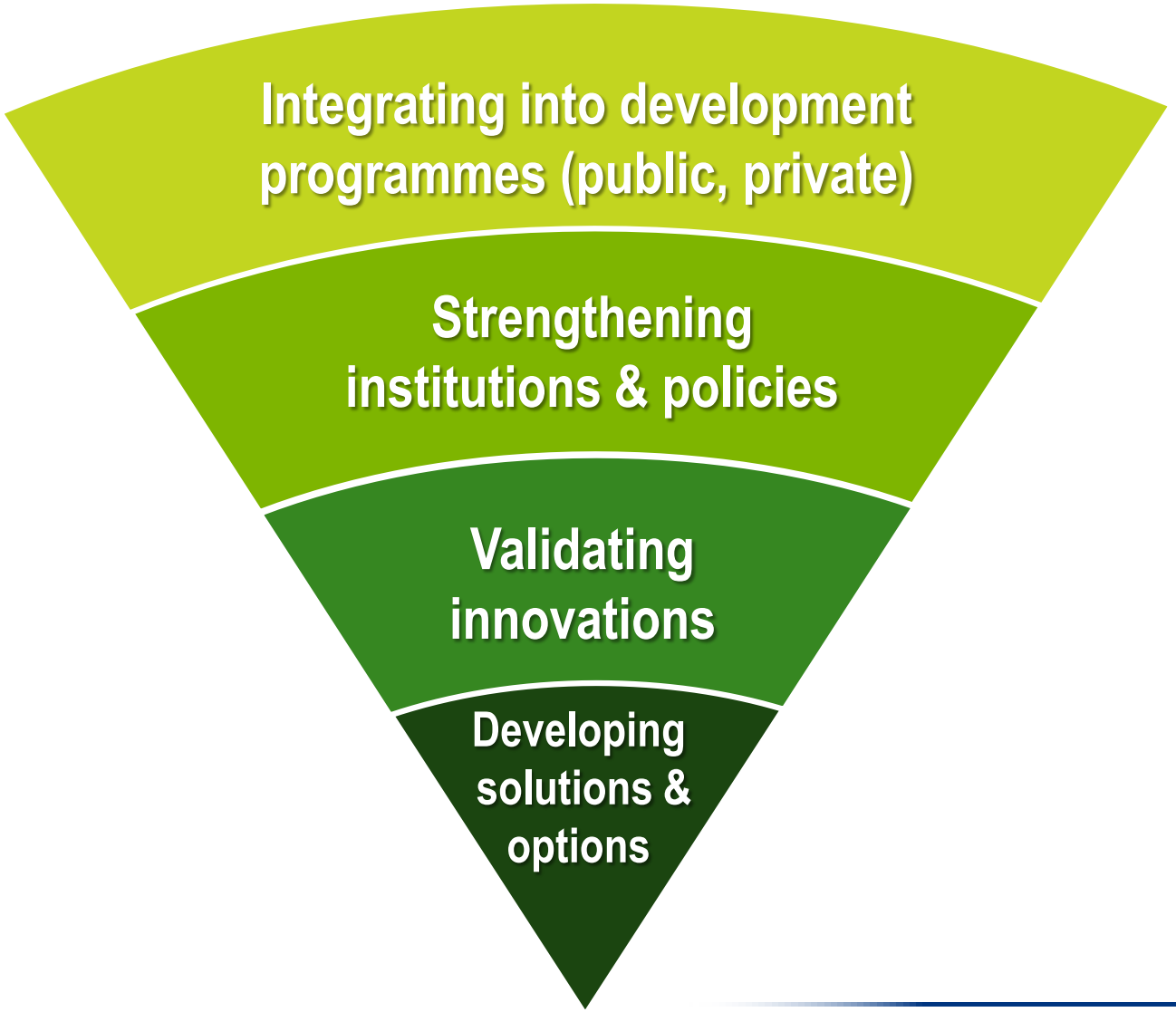
Cross-cutting components:

- ✓ Identification and screening of potentially resistant materials
- ✓ Agreed common tool, methods and standards
- ✓ International and regional safe-movement
- ✓ Policy and legal frameworks agreed for the sharing of specific materials
- ✓ Evaluation of promising germplasm in a range of environments
- ✓ Efficient Collaborative Framework

Builds on the experience of the CFC/ICCO/Bioversity programme from 1998-2010 (2 phases), what worked well and lessons learnt. It complements WCF, CocoaACtion, CIRCLE, PSP, CCAFS, and others initiatives.

Lead by CacaoNet (coordinated by Bioversity International)

Partnerships - Taking Research to Scale



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Opening the chocolate diversity box

Why cacao diversity matters for producers, manufacturers and consumers

www.bioversityinternational.org/cacao

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Opening the chocolate diversity box

Demand for cocoa-based products is increasing at an annual rate of 3%, mainly as a result of newly affluent consumers in emerging economies.

How can the 6 million smallholder producers who supply the cacao market keep up with consumer demand, and climate and pest-related pressures whilst ensuring that they make a profit? By using cacao varieties that offer improved genetic traits.

These provide tolerance to drought, resistance to pests and diseases, and are adapted to low-quality soils. But also a diversity of flavours that consumers are increasingly seeking. Sadly, these varieties and how they could contribute to sustainable production both now and in the future remain little researched.

This is where the **Collaborative Framework for Cacao Evaluation** comes in.

Photo credit: Chris Goldberg

Through scaling research partners, breeding networks, and suppliers of plants to farmers, the **Collaborative Framework for Cacao Evaluation** will

- Identify promising traits in existing collections of cacao
- Facilitate international access to and benefit sharing from cacao diversity

To develop cacao trees that are better adapted to overcome serious threats and achieve sustainable productivity, bigger harvests and decrease post-harvest and processing loss.

www.bioversityinternational.org/cacao

Muchas Gracias / Merci / Thank You

CacaoNet
Global Network for Cacao Genetic Resources

Cocoa farmer in Côte d'Ivoire (D. Pokou..)

Bioversity International is a member of the CGIAR Consortium.

CGIAR is a global research partnership for a food-secure future.

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