Safe Movement of Live Cocoa Plant Material around the Cocoa World

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ICCO CONSULTATIVE BOARD

23rd March 2015, Abidjan

Outline of Presentation

- Why move live cocoa plant material?
- Technical Guidelines on Safe Movement of Cocoa Germplasm
- What is Intermediate Cocoa Quarantine?
- Consequences of a Quarantine Failure
  - Economic
  - Legal: I-APSC
- CacaoNet: scientists working together for cocoa plant improvement
- Concluding remarks

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  - **Economic**
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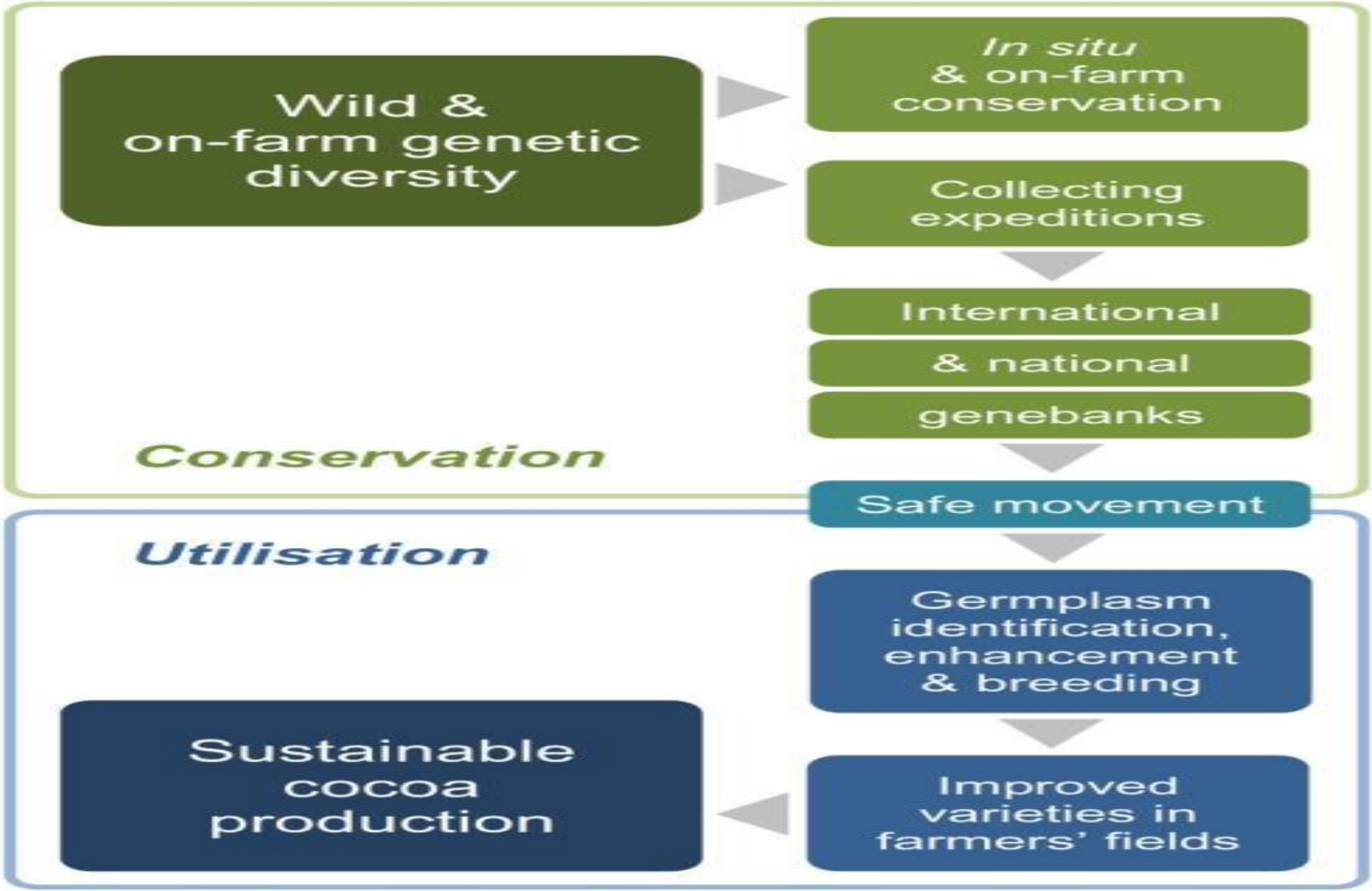
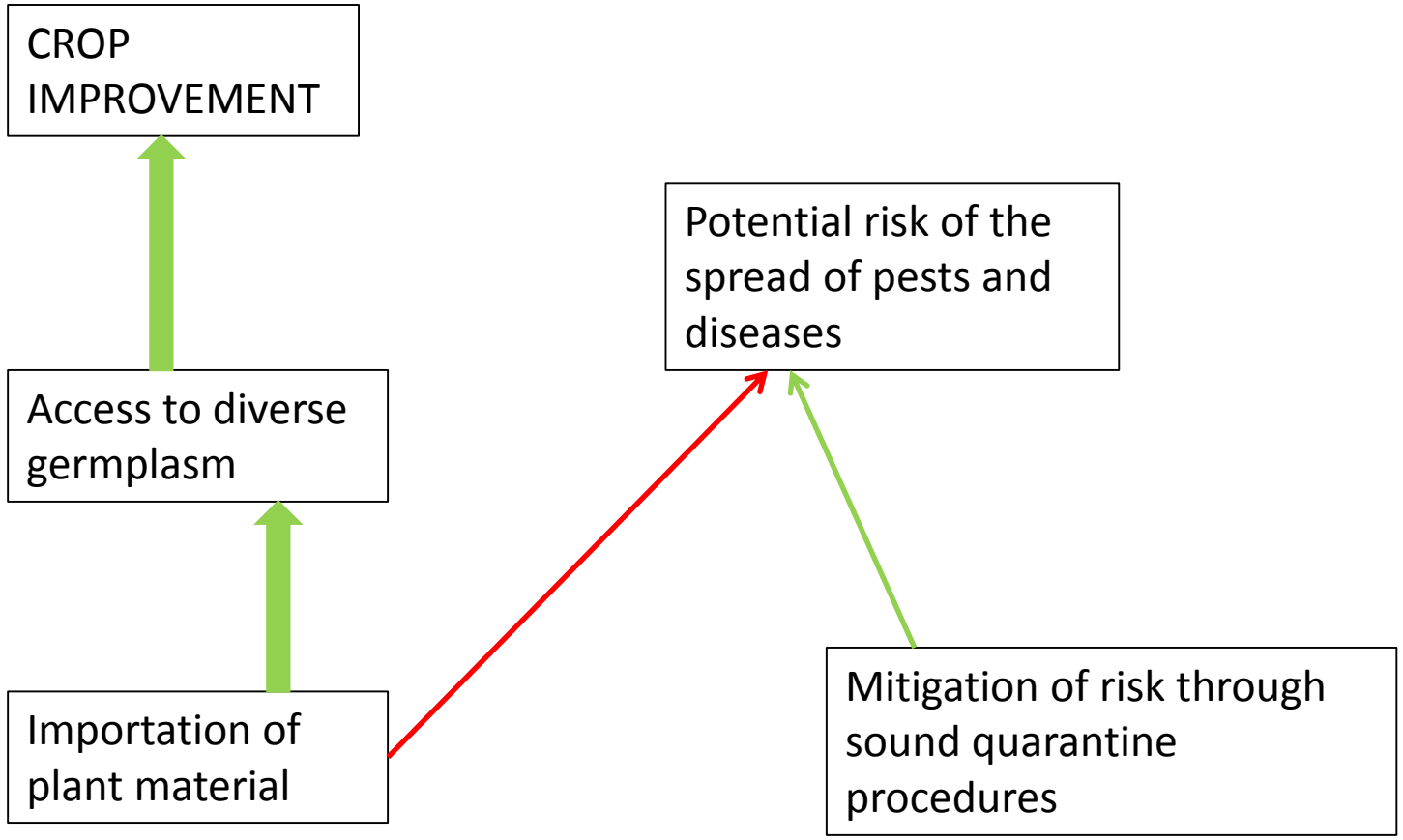
- **CacaoNet: scientists working together for cocoa plant improvement**
- **Concluding remarks**


Wild & on-farm genetic diversity
In situ & on-farm conservation
Collecting expeditions
International & national genebanks
Conservation
Safe movement
Utilisation
Germplasm identification, enhancement & breeding
Improved varieties in farmers' fields
Sustainable cocoa production

Background: The need for germplasm movement and associated risks



- Safe Movement Guidelines serve to highlight risks associated with particular pests and diseases and to provide advice on appropriate quarantine measures and precautions

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Technical Guidelines for the Safe Movement of Cacao Germplasm

Recent Revision of the Guidelines for the Safe Movement of Cocoa Germplasm

- Previous guidelines were published by FAO in 2000
- Revision conducted as part of the CacaoNet initiative - collaborative exercise involving number of experts on specific pest and diseases
- Revision includes helpful advice of risk reduction:
  - Description of a more extensive range of pests and diseases & their key features
  - Geographical spread of most significant cocoa pests and diseases
  - Up-to-date information on safe procedures to use when moving cocoa materials
  - Quarantine advice on moving germplasm from a region where a specific pest or disease may be present

Factors to consider in Assessing Risks

- **Pests and diseases prevalent within the area in which material is collected**
- **Biological characteristics of those pests and diseases present; e.g. the longevity/durability of fungal spores; (NB *Spores of Moniliophthora sp. – also called Frosty Pod Rot can survive for many months*)**
- **The form in which the plant material is transported – is it by budwood/graftwood, seed, somatic embryo; do not move whole pods or whole plants**

Extract of table from Safe Movement Guidelines+

Pest	**Geographical spread**	**Special precautions**
Cacao necrosis virus: genus Nepovirus	Ghana, Nigeria	Pod: Potential risk Seed: Low risk Budwood: High risk Quarantine advisable See: Section on Budwood SPECIAL RISK FACTOR: LATENT INFECTION UP TO TWO YEARS
Cacao swollen shoot virus: genus Badnavirus	Benin, Côte d'Ivoire, Ghana, Liberia, Nigeria, Sierra Leone, Togo Reports also in Sri Lanka	
Cacao yellow mosaic virus: genus tymovirus	Sierra Leone	
Witches' broom disease (*Moniliophthora perniciosa)*	Brazil (Bahia, Espirito Santo, Amazonian regions), Bolivia, Colombia, Ecuador, French Guiana, Grenada, Guyana, Panama, Peru, St. Lucia, St. Vincent, Surinam, Trinidad and Tobago, Venezuela	Whole pods: High risk, not recommended Seed: Moderate risk Budwood: Moderate risk

Management of Risk: general recommendations

- Whole pods or whole plants should not be moved
- Material should be derived from the safest source possible (e.g. an intermediate quarantine facility)
- When taking material from the field, care should be taken to examine the donor tree and those around it
- Budwood should be treated with an appropriate pesticide/fungicide mixture
- ALL region-to-region transfer of budwood should take place via an intermediate quarantine facility

Detailed description of pests and diseases Included in Guidelines

- **Virus diseases** (***Cacao necrosis virus, Cacao swollen shoot virus, Cacao yellow mosaic virus***)

- **Fungal diseases** (**Witches' broom disease, *Moniliophthora* pod rot, *Phytophthora* pod rot, Vascular streak die-back, *Verticillium* wilt, *Ceratocystis* wilt, *Rosellina* root rot**)

- **Insect pests** (**Cocoa pod borer, mirids/capsids, mosquito bug, other insect pests**)

- **Nematodes**

Safe Movement Guidelines contain detailed description of pests and diseases of cocoa

Each section contains details of:

- Causal agent of pest/disesae
- Symptoms
- Geographical distribution
- Alternative hosts (if applicable)
- Biology of pest/disease
- Quarantine measures
- References (for further reading)

Extract from Safe Movement of Cocoa Germplasm

9. Insect pests

9.1 Cocoa pod borer

Alias Awang and Kelvin Lamin
Malaysian Cocoa Board, Locked Bag 211, 88999 Kota Kinabalu, Sabah, Malaysia
Email: aliasawang@koko.gov.my

9.1.1 Causal agent

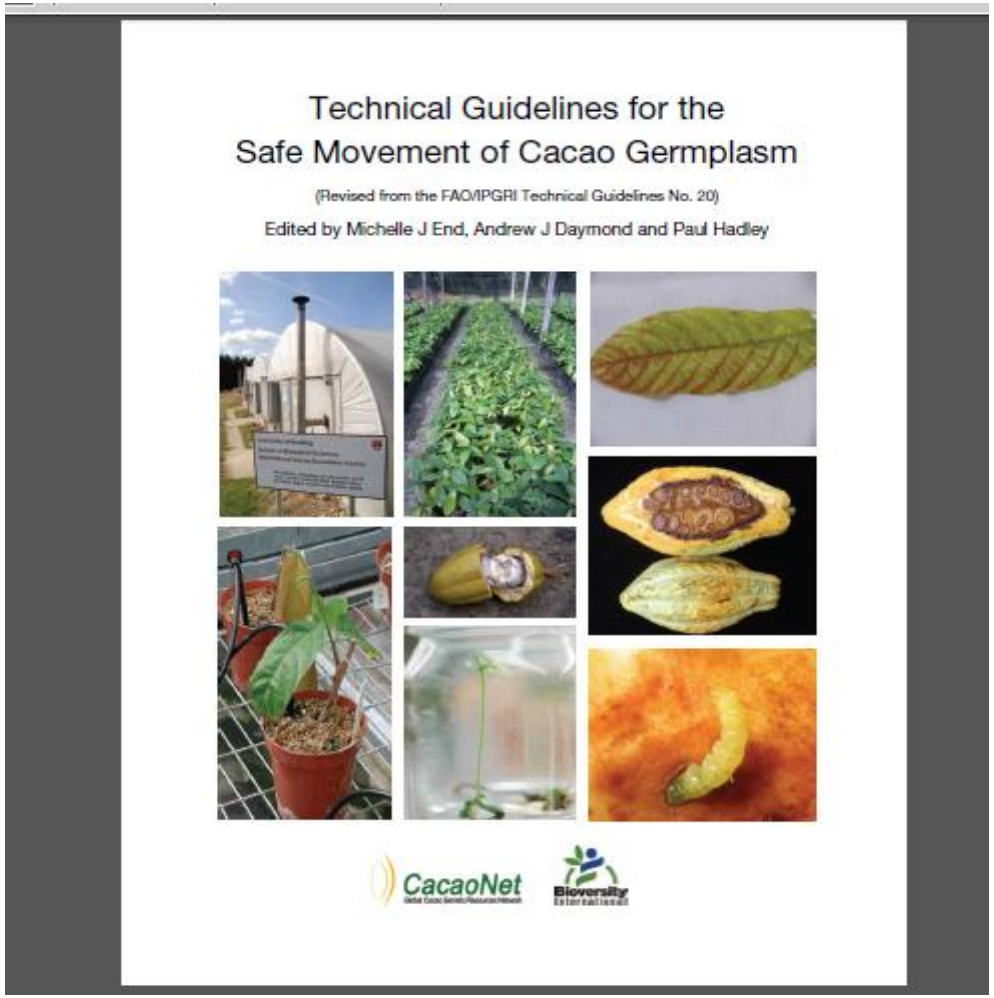
Conopomorpha cramerella (Snellen) (Lepidoptera: Gracillaridae).

9.1.2 Symptoms

Immature infested pods show pre-ripened yellow patches (Fig. 9.1.1). Larval entry holes on the pod surface are barely visible to the naked eye, but they can be detected by shaving the husk. Larvae leave characteristic 1-2 mm diameter exit holes in pod walls (Fig. 9.1.2). Beans from infested pods often clump together and are difficult, if not impossible, to extract (Fig. 9.1.3). Beans may begin to germinate within pods that are infested when nearly ripe (Azhar 1986).

Availability of Safe Movement Guidelines

- **Published on-line (www.cacaonet.org)**
- **Translated into FR and SP**
- **Will be updated often - as more information on particular pests and diseases becomes available**
- **Copies being sent to cocoa research institutions**
- **Can be also sent by post to CB particpants – need to specify language**
- **Email to request: tonylass@foxconsultancy.com**



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- **The International Cocoa Quarantine Centre (ICQC, R) at the University of Reading in the UK is the principal vehicle for international movement of cocoa germplasm**
- **Location in a temperate country reduces risk of pests and diseases entering the facility**
- **Procedures at ICQC, R include extensive virus indexing**
- **Is primary germplasm NOT result of breeding work**

International Cocoa Quarantine Centre, Reading, (ICQC,R)

University of Reading

- Started at University of Reading in 1987; recently relocated to new facility at University
- Over 200 accessions available on request; recipient to only pay cost of shipment
- Quarantine period is some two years
- Dispatched with a Standard Material Transfer Agreement (or SMTA) to record original origins
- High cost to heat in UK winters, now reduced by improved technology but -- pests do not thrive!!!!
- Regular checks by experienced cocoa plant pathologists, virologists, entomologists

International Cocoa Quarantine Centre, (or ICQC,R)

(Completed Nov. 2014 - capital cost provided by University of Reading)

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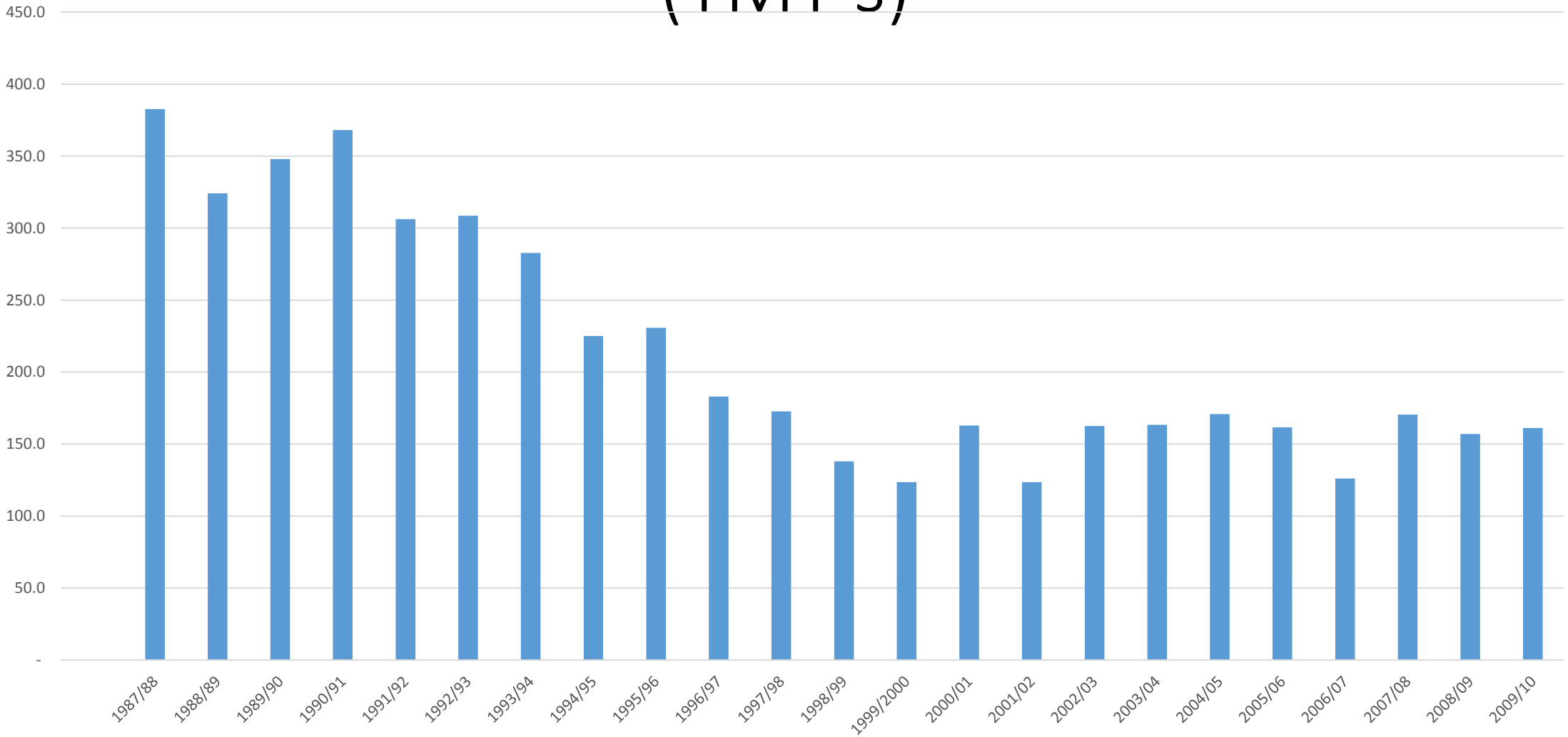
Brazilian Cocoa Production 1997/98 to 2009/10 (TMT's)



Guess at Possible Economic Loss to Brazil over 20 years due to Arrival of Witches' Broom in Bahia in May 1989

- 3 year production average for Brazil – 1987/88 to 1990/91 was some 355.7 TMT's
- 3 year production average for Brazil – 2006/07 to 2009/10 was some 153.7 TMT's
- Production difference over intervening 20 years is some 202,000 MT's/annum 4,040,000 MT's
- Assuming average market price of only USD 2000/MT, this might amount to a loss of revenue to Brazil of USD 8,080,000,000 over that 20 year timeframe

Consequences

- **Demonstrates grave economic consequences from move of Witches' Broom fungus to State of Bahia in 1989**
- **Similar consequences in Mexico (as % crop loss) for recent spread of *Moniliophthora***
- **Pathogen moved across Central America into Panama (1956), Costa Rica, Nicaragua, Honduras, Guatemala, Belize (2005), Mexico (2006), El Salvador (2010)**
- **Such spread of *Moniliophthora* may well be by non-deliberate human intervention as spores can survive on clothing, shoes and on the human body for long periods**
- ***Moniliophthora* may be even harder to control than Witches Broom Disase**

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International Legal Framework

- **Movement of cocoa plant material brings risks of movement of pests/diseases with material**
- **International legal framework is is not as strong as might be hoped**
- **From its creation in 1951, international standards are set by the International Plant Protection Convention (or IPPC) covering procedures**
- **These are implemented at a regional level, for example, by the International African Phytosanitary Council (IASPC) based in Yaounde**
- **Sadly such bodies are often short of resources and face many challenges**

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CacaoNet

- **The future of the world cocoa economy depends on the availability of a wide range of genetic diversity and its use to breed improved varieties.**

- **Decreasing cocoa genetic diversity now a serious problem due to:**
  - ***Destruction of the Amazonian rainforests***
  - ***Threats from natural disasters and extreme weather***
  - ***Loss of traditional varieties***

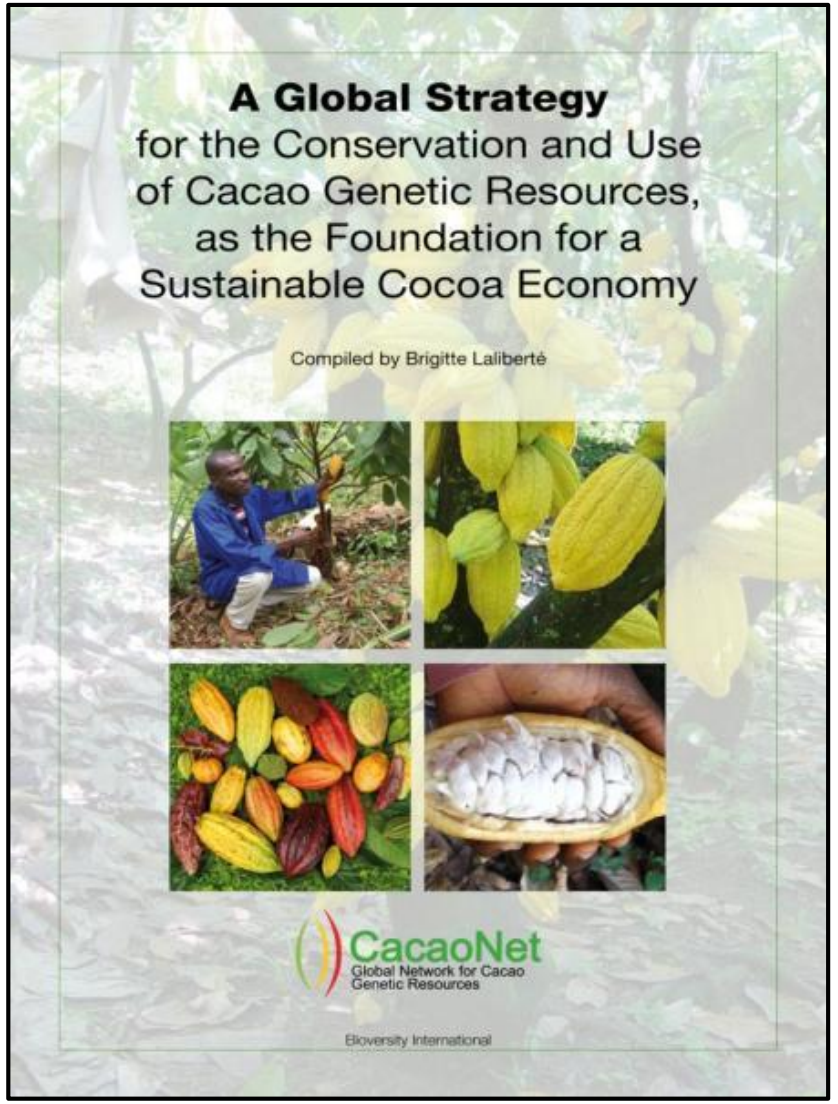
- **The loss of diversity increases the vulnerability of cocoa to sudden changes in climate and to new pests and diseases.**

  - **Most of the countries involved in cocoa improvement and production are highly dependent on genes and varieties from other countries and regions.**

  - **The efforts necessary to manage cocoa genetic resources effectively can therefore only be carried out through international collaboration.**

A Global Strategy

- **Developed by CacaoNet (Global Network for Cacao Genetic Resources)**
- **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)**
- **Provides a clear framework to secure funding for the most urgent needs to ensure that cacao diversity is conserved, used and provides direct benefits to the millions of small-scale cacao farmers around the world**



- **CacaoNet**

Global Strategy for the Conservation and Use of Cacao Genetic Resources

As the foundation for a sustainable cocoa economy

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Concluding remarks - 1

- **In order to minimise potential risks associated with the movement of cacao germplasm, it is vital that appropriate quarantine procedures are applied**
- **The Guidelines on Safe Movement of Cacao Germplasm serves as a reference point to guide researchers, breeders and curators when moving cacao material.**
- **As an on-line resource, the document can be frequently updated as new information on cacao pests and diseases and on quarantine measures become available**

Concluding Remarks - 2

- **PLEASE:**
  - **Always be aware of risk of movement of pests/diseases when moving cocoa material**
  - **Take especial care & precautions if in area where *Moniliophthora* is present**
  - **Request cocoa materials from the ICQC,R at Reading, UK**
  - **Request receipt of EN, FR or SP language version of 'Technical Guidelines for Safe Movement of Cacao Germplasm'**

Acknowledgements:

- Thanks are due to:
  - All the individuals and organisations who:
    - Worked on the CacaoNet Global Strategy
    - Contributed to the guidelines through the CacaoNet Safe Movement Working Group
  - The Editors of the Guidelines - Andrew Daymond, Michelle End & Paul Hadley
  - Brigitte Laliberte of BioVersity and Andrew Daymond of ICQC.R who allowed me to use their slides from elsewhere

Thank you for your kind attention

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