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european cocoa association

CAOBISCO
Chocolate, Biscuits & Confectionery of Europe



ECA/CAOBISCO/FCC Joint Research Fund Overview of research projects

A sustainable cocoa supply chain calls for high standards of quality and productivity whereby cocoa is safe for consumer consumption, complies with manufacturers' quality requirements, and meets the growing global demand.

The European Cocoa Association (ECA), the Chocolate, Biscuits and Confectionery of Europe (CAOBISCO), and the Federation of Cocoa Commerce (FCC) are committed to working towards more sustainable cocoa which complies with such requirements for consumer, manufacturer and farmer benefit.

As the overall productivity for cocoa has not changed significantly in decades (current average cocoa yields are around 400kg/ha), the rehabilitation of existing cocoa producing land (by using improved planting material), improving soil fertility, and the management of cocoa pests and diseases are considered key priorities. Over the last few years, ECA, CAOBISCO, and FCC have successfully worked on defining Good Agricultural Practices for food safety in cocoa.

Given deteriorating yields and quality levels in several countries, the growing consumer interest in cocoa sustainability, and to develop closer links with producing countries, a review of sustainable industry needs in terms of quality and productivity is a key priority.

In 2013, the three associations joined forces by setting up a Joint Research Fund. The Fund is currently administered by ECA. On average, three projects (that typically run over a two to five year timespan) are administered and managed via the Fund at the same time.

As a value chain approach is crucial to tackling quality and productivity issues, the joint WG regularly exchanges information and cooperates directly with cocoa producing countries' governments, research institutes, the International Cocoa Organization (ICCO) and the European Institutions. Moreover the joint WG aims to ensure that the research programme is aligned with other national and international efforts.

Several projects supported by the Joint Research Fund have been successfully completed, i.e.:

- A Cocoa Bean Quality Requirements Guide, available online under <http://www.cocoaquality.eu/>
- A research project on the molecular diversity of the complex of viral species responsible for Cacao Swollen Shoot Disease
- Phase 1 of a research project to investigate the mitigation of Cadmium bioaccumulation in Theobroma cacao L.

These completed projects as well as currently ongoing projects are described in further detail below.



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Project 1: "Mitigation of Cadmium (Cd) Bioaccumulation in Theobroma Cacao L."

Partner Organisation: The University of the West Indies (Cocoa Research Centre), St. Augustine, Republic of Trinidad and Tobago

Objectives:

- Development of a comprehensive and pragmatic **strategy to mitigate the level of cadmium in cocoa beans** grown in cadmium contaminated soils in any cocoa producing country
- Determine **genetic differences** for Cd levels in leaves & beans to identify various **mechanisms for avoidance** and determine specific low Cd **bioaccumulators**
- Validate observation in **hydroponics** based controlled greenhouse experiment
- Field test **rooted cuttings** of various cocoa varieties (low, medium, and high accumulators)
- Investigate influence of **seedling vs. rooted cuttings, age of tree, and soil type**; investigate incremental effects of **raking leaves, coppicing, liming and biochar addition** on the effect of Cd in leaves & beans

Duration: Phase 1 – 3 years (June 2014 – May 2017); Phase 2 – 2 years (2018-2019) TBC

Geographical focus: Trinidad and Tobago

Main outputs:

- A better understanding of the factors affecting **Cadmium availability in the soil** and **uptake by the cocoa plant**, including the impact of soil pH and composition, effects of soil ameliorants and the genetic background of the planting material
- Three potential **strategies to mitigate cadmium bioaccumulation are under investigation:**
 - Grafting of elite accessions of cocoa on to low cadmium bioaccumulating root stock plants to reduce the cadmium uptake
 - Genetic markers can be used to breed for tolerance to cadmium uptake or identify varieties in various countries that uptake low cadmium
 - Modification of soil conditions to reduce plant Cd uptake



Project 2: “Understanding the extent of molecular diversity of the complex of viral species responsible for Cacao Swollen Shoot Disease in order to improve CSSV detection and identify genuine alternative host plants”

Partner Organisations:

- University of Reading
- University of the West of England
- CIRAD (French Agricultural Research Centre for International Development)

Objectives:

- Development of a **detection test** (i.e. a streamlined & robust method which can reliably indicate whether a tree is infected – both for symptomatic and non-symptomatic trees)
- Improvement of the **molecular diagnostic** for the disease
- Provision of recommendations to **combat CSSV propagation** (definition of preventive and remedial measures)
- Characterisation of the **CSSV geographical distribution** in Côte d'Ivoire, Ghana, Nigeria and Togo
- Identification of genuine **alternative hosts**

Duration: Two years

Geographical focus: West Africa (Côte d'Ivoire, Ghana, Nigeria and Togo)

Main outputs:

- Determination of the **range of diversity of the viral species** responsible for CSSV disease in West Africa
- Evaluation of the **number of different species** responsible for the disease
- Development of **molecular tools to detect the full range of viral species** in cocoa leaf tissue samples
- Successful evaluation of citrus, coffee and rubber as **barrier crops**
- **Method for effective sampling** of potentially infected trees



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Project 3: "Cocoa Beans: Chocolate & Cocoa Industry Quality Requirements"

Objectives:

- **Improve cocoa quality** by better communication of industry needs, post-harvest processing and quality assessment
- Obtain consistently **high standards of quality** in cocoa beans
- **Enhance food safety** by wider promotion and adoption of Good Agricultural Practices
- **Provide a comprehensive, up-to-date reference document** which brings together the key information from a range of publications covering aspects of cocoa farming practices, food safety and quality, and provides linkages to sources of further details

Duration: 2 years

Geographical focus: All cocoa producing countries

Main outputs:

- Make **relevant information more accessible**. The guide is available as a free download (English, French and Spanish versions) from www.cocoaquality.eu.
- Provide **information on various aspects of bean quality** including physical attributes, off-flavours and contaminants, standards and regulatory limits
- Guidance on **good agricultural and post-harvest practices**
- Highlight the factors influencing the **quality requirements**
- **Raise awareness** of current legislation affecting cocoa/cocoa products

Further Reference Document: The UK Biscuit, Cake, Chocolate and Confectionery Alliance (BCCCA) publication "Cocoa Beans- Chocolate Manufacturers' Quality Requirements" which was last revised in 1996 (BCCCA, 1996).



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Project 4: "Integrated approach to improving yield efficiency and resilience to climate change through better use of cocoa genetic resources"

Partner Organisation: Bioversity International (The International Plant Genetic Resource Institute)

Objectives:

- Development of a detailed research programme to **identify materials with promising characteristics for the yield efficiency/climate change** so that they can be **fast-tracked for use in breeding programmes** as part of the Collaborative Framework for Cacao Evaluation (CFCE)
- **Review of the current status of research** on cacao genetic diversity and efficiency/climate change including the CFC/ICCO/Bioversity Project (1998-2010)
- Development of **recommendations for the evaluation of promising materials** on yield efficiency and drought tolerance on multi-site locations for the development of a 3-5 research programme

Duration: Six months

Geographical focus: N/A

Main outputs:

- In-depth **review on cacao drought and heat tolerance** and the role of **genetic diversity**
- In-depth **review of the Common Fund for Commodities (CFC)/ International Cocoa Organisation (ICCO)/Bioversity projects** that took place between 1998 and 2010
- **International expert consultation to develop the research framework** and components of the CFCE on drought and heat tolerance



Project 5: "Main sources of Mineral oil hydrocarbon contamination and entry points into the cocoa supply chain"

Partner Organisations: Nestlé, the German reference office for proficiency testing and reference materials (DRRR) and the Swiss quality testing services laboratory (SQTS)

Objectives:

❖ **Part 1: Sampling exercise:**

- Investigate the risks of mineral contamination in the supply chain from bean to warehouse, including origin, transport and packaging
- Determine the key sources of MOH contamination as well as obtain further information of possible entry points along the cocoa supply chain

❖ **Part 2: Ring trial**

- Inter-laboratory exercise on the identification of markers and mineral oils in comparison with natural occurring hydrocarbons
- Analyses of spiked and uncontaminated samples of cocoa and chocolate products as well as relevant packaging material

Duration: 12 months – 15 months (September 2017- December 2018)

Geographical focus: West Africa (Sampling exercise/first phase)

Main expected outputs:

❖ **Part 1: Sampling exercise:**

- Determination of the key sources of contamination and main entry points of Mineral oil hydrocarbons into the cocoa supply chain
- Better understanding of potential entry points and contamination sources is crucial to considerably limit and mitigate MOH contamination in cocoa products

❖ **Part 2: Ring trial**

- Confirmation of contamination source
- Factual results on MOH analysis in cocoa products
- Validation of the methodology