

2022 ANNUAL REPORT FOR THE CODE OF CONDUCT

The CAOBISCO-ECA Joint Cocoa Research Fund

Background

The [Joint Cocoa Research Fund \(JRF\)](#) finances applied research projects aiming at the development of innovative solutions to current and upcoming key challenges of the cocoa sector. The transfer of the research results to the user group, e.g., the farmers, is a key element of all JRF projects. The Fund hereby helps increasing economic, social, and environmental sustainability of cocoa production. CAOBISCO administers the JRF jointly with the [European Cocoa Association \(ECA\)](#). It has currently 14 international member companies.

The research strategy of the JRF covers three areas:

- ✦ **Cocoa Bean Quality and Food Safety:** The research work is committed to the development of innovative tools allowing full conformity with regulations also in the future, with a focus on heavy metals, crop protection product and mineral oil residues, mycotoxins and acrylamide. Work on the International Standards for the Assessment of Cocoa Bean Quality is part of the strategy as well.
- ✦ **Integrated Pest and Disease Management:** follows a three-component approach. First, the prevention of pest and disease spreading. Second, monitoring of pest and disease levels and detection of emerging diseases. Third, reduction of the dependency on chemical crop protection and development of integrated biological approaches for priority pests and diseases.
- ✦ **Resilient cropping systems.** Erratic weather and climate change, combined with degradation of natural resources including soils, pose a major threat to cocoa production and the livelihoods of cocoa farming communities. Building resilience requires a range of interventions, such as the adoption of climate smart practices, crop diversification including agroforestry and conservation and restoration of natural resources. Therefore, the strategy does focus on three main areas: resilient agronomy, weather-informed agro-advisories as well as enhanced natural resources and ecosystem services.

Completed Projects

Mitigation of Cadmium contamination (2022-2025, West Africa and Latin America).

The project developed nuanced, locally adapted approaches for farmers to mitigate cadmium bioaccumulation. The approaches comprise: i) management of soil properties to decrease the cadmium bioavailability, ii) nutrient management to decrease the uptake of available cadmium and iii) identification of low cadmium-accumulating rootstock as a long-term solution.

Throughout the project, low-accumulating rootstock proved to be the most practicable solution. Therefore, the Joint Cocoa Research Fund is working on a financing concept for a project extension, comprising a Genome Wide Association Study (GWAS). The chromosomal regions detected by GWAS will be a very important deliverable for future breeding in medium-long term.

Understanding the genetic basis of resistance to Vascular Streak Dieback (VSD) (2018-2022, Asia). The study successfully identified QTL regions on chromosome 8 and chromosome 9 that are associated with VSD resistance. These results aligned with the QTL mapping study of Epaina (2014) as both QTLs detected were collocated within the same region. Microsatellite markers were developed for the QTL regions. These marker sequences can be utilized to test other existing populations for VSD resistance and susceptibility.

4th Edition of the Pesticides Manual (2021-2022).

The manual contains a Strategic list for key pests, emerging pests and the respective pesticides. It informs about technical aspects of pesticide use, with a focus on worker and environmental safety as well as food safety. Information about pesticide regulations and a list of pesticides that must not be used for cocoa are also included.

The final version is attached to the present report.

Mineral oil hydrocarbons (MOH) (2017-2019, West Africa).

Jute bags were identified as an important source of contamination. Ring tests provided the necessity to still improve the methods for the determination of MOSH and MOAH and of the chosen markers for assessing the contamination. A communication strategy to inform about the findings was developed. Workshops with stakeholders, jointly organized with ECA and ICCO, held in 2022. A major outcome of the workshops was the formation of a Technical Working Group (TWG) on MOH, with participation from the jute industry. Main objective of the TWG is the supply of jute bags that are virtually free or low in MOH contamination according to the ALARA principle.

Ongoing Projects

Spatially-explicit recommendations for optimal levels of shade-tree cover for sustainable cocoa production – Shade-tree project (2020-2023, Ghana).

We made significant progress in the machine learning part of the project. We were able to process an additional 70 higher-shade farms and 90 farms in Côte d'Ivoire and add them to the dataset now comprising 828 cocoa farms in total. We retrained our shade cover machine learning model and made a prediction for the shade cover in cocoa farms across Ghana and Côte d'Ivoire. The models reach an absolute deviation of 5.77 percentage points from the true shade level, indicating that we can predict shade cover quite accurately solely from satellite images. The average shade tree cover was 13.8% in Ghana and 12.8% in Côte d'Ivoire, with little variation in shade levels between administrative regions.

In combination with climatic and productivity data, scientific evidence-based recommendations about the suitable increase of shade tree density can be provided.

Mitigation of Aluminum contamination (2022-2025, West Africa and Latin America).

The project aims are to identify major sources and entry points of aluminum contamination and to develop an effective mitigation strategy. In a first step, a sampling exercise in Ivory Coast, Cameroon, Brazil and Ecuador has been initiated. Based on the exercise, farms with high contamination will be selected for detailed studies regarding the main entry points and to test mitigation strategies.

Pollination in cocoa - Identifying pollinators and enhancing pollination in cocoa (2022-2026, Ghana).

Cacao productivity is constrained by inadequate pollination, and the lack of sufficient nutritional / water resources to support it.

Here we intend to systematically test four major predictions:

1. Enhanced pollination is sustainable long-term only if trees are well-resourced with moisture and fertilizer.
2. Pollinators of cacao represent a diverse insect community that includes Ceratopogonidae and other species.
3. Four conditions will increase the diversity and abundance of cacao pollinators: proximity to forest, agroforestry on farms, ample breeding material, and use of less damaging pesticides.
4. The abundance and behaviour of pollinators can be manipulated by a range of interventions, with different affordability, meaning there are strategies appropriate for different farms.

Update of the Manual - Cocoa Beans: Chocolate & Cocoa Industry Quality Requirements (2023 -2024).

The manual describes the cocoa bean quality requirements of the industry. Making relevant information more accessible, it is a key tool for communication with all stakeholders. The manual covers food safety aspects, cocoa bean and butter quality and sensory quality amongst others. Freely available in English, Spanish and French, and can be downloaded from the JRF homepage <https://jointcocoaresearchfund.eu/>

The manual will be revised entirely by experts from the CAOBISCO and ECA member companies, as well as with the support of external experts. In addition to the PDF format, an online Knowledge Base will be established. The Knowledge Base will increase the accessibility of the information in the manual through search engines and allows fast and frequent update of the information e.g., Maximum Residue Levels.

Establishment of a Knowledge Base for the 4th Edition of the Pesticides Manual (2021-2022).

In addition to the PDF format, an online Knowledge Base is currently established. The Knowledge Base will increase the accessibility of the information in the manual through search engines and allows fast and frequent update of the information such as the list of pesticides.

Communication Strategy - Dissemination of Project Results

To support knowledge transfer and the application of the project outcomes, the JRF disseminates the research results via its homepage www.jointcocoaresearchfund.eu, through manuals such as the one on Cocoa Beans, through presentations at International Symposiums and through workshops with stakeholders e.g. on cadmium mitigation, in producing countries. For 2022, webinars on MOH contamination, Food Safety in general and the developed pesticides manual, are in preparation. They are jointly organised by CAOBISCO, ECA and the ICCO (the International Cocoa Organisation of the United Nations).

Progress report

Progress will be reported on an annual basis, aligned with the annual progress report of each project submitted annually to the JRF, CAOBISCO and ECA. Additional information will be also available via the [JRF website](#).