



Objectives of the project

Clima-LoCa aims to foster the development and scaling of low cadmium and climate-relevant production practices and innovations that fit the diverse contexts of smallholder cocoa production.

Background

The region Latin American and the Caribbean (LAC) is the main producer of fine flavour cacao in the world and its contribution to global cacao production is growing rapidly. The governments of Colombia, Ecuador and Peru, supported by international development cooperation, actively promote cacao as a strategy for reducing rural poverty and

replacement of illegal



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crops. However, a sustainable transformation of the cacao sectors in the Andean countries requires that critical challenges are being addressed: low productivity, climate change, and high levels of cadmium in the cacao beans.

Food safety regulation for cadmium in cacao, first implemented by the European Union in January 2019, strictly limits maximum levels of cadmium in cacao products sold to the final consumer. The concentrations of cadmium in cacao from the Andean countries frequently exceed the levels that buyers find acceptable, although there is considerable geographic variation within the countries. At the same time, climate change is negatively impacting the production of cacao and the stability of production, due to longer and more intense periods of drought, greater incidence of pests and diseases and more irregular rainfall. But like cadmium, there is large geographic variation. Indiscriminate promotion of cacao production and technological packages without accounting for current and future cadmium and climate-related risks can exacerbate the vulnerability of smallholder cacao producers.

To be able to provide guidance for adequate production strategies and public policies, we need better information on the spatial variation and sources of cadmium in cacao production systems, and of the projected impacts of climate change on cacao production. There is also an urgent demand for scientific evidence on (i) cost-effective mitigation measures applicable to cacao production systems, such as the use of cacao cultivars or soil amendments that reduce the uptake of cadmium by cacao trees; and (ii) climate-smart production practices, including selection and management of shade trees in agroforestry systems, improvements in soil management, and drought-tolerant cacao genotypes.





The theory of change to achieve the objectives

The expected impact of the project is to contribute to a more resilient, competitive and inclusive cocoa value chains and reduced vulnerability of smallholder cocoa producers in Colombia, Ecuador and Peru to the consequences of new food safety regulation and climate change. The main outcome of Clima-LoCa is that different relevant actors in the cocoa value chains and innovation systems develop and implement low cadmium and climate-relevant production innovations and support scaling, through mobilization of science and better coordination among actors and policy incentives (Fig 1).

To achieve this, Clima-LoCa promotes interdisciplinary research to characterize the geographical distribution of cadmium and climate impacts on cacao production systems, and the needs for mitigation measures and provide scientific information to guide policies. Researchers are conducting experiments to analyse the cadmium dynamics with regards to cacao genotypes and agricultural practices and to test the potential of technologies and practices that may limit the uptake and accumulation of cadmium in cacao.

The project strengthens and coordinates research and knowledge sharing among research institutes, farmers, government agencies and private sector actors across the three target countries. Farmers have been involved from the beginning, through their participation in on-farm field trials and farmer field days. To enhance adoption and scaling, the project works closely with public and private sector, including farmer associations, and other actors along the cocoa value chain, to co-develop context-relevant and cost-effective technologies and innovations, and improved strategies and incentives for dissemination and scaling.

The private sector is a key partner contributing to our research and dissemination activities, thereby enhancing impact at scale. Different companies in the cacao sector are contributing to the field trials established by Clima-LoCa. Clima-Loca further seeks to foster dissemination and adoption of proven technologies by farmers and to scale adoption through other development operators. For example, in Colombia, Clima-Loca, is working closely with EUTF (European Union Trust Fund) partners that are developing sustainable practices at different stages of the cocoa value chain. Dissemination activities will target specifically farmers and farmer's organizations, to foster adoption, and the project intends to produce policy briefs to guide policy dialogues.







Figure 1. The impact pathway based on the theory of change, showing how research activities lead to outputs and outcomes and contribute to the impact





Main activities

Fifteen activities, organized into 4 interdisciplinary Work Packages (WP, Figure 2), generate the 4 main activity outputs shown in Figure 1.

WP1 develops baselines and impact assessments for cadmium and climate change, to guide public policies and interventions taking into account geographic variation in edaphoclimatic and socio-economic contexts and cacao genetics;

WP2 establishes and assesses multilocational research trials to generate scientific evidence for low cadmium and climate-relevant production practices and genotypes, while considering effects on productivity, soil health and the cost-benefit relationship for these practices;

WP3 pilots low-cadmium and climate-smart agronomic practices and genotypes through farmer participation and facilitates the co-development of mitigation and scaling strategies in multi-stakeholder platforms.

WP4 strengthens regional research coordination and research capacity, including laboratory capacity.

All WPs include activities dedicated to dissemination and development of decision support tools and training materials, targeting diverse stakeholders.



Figure 2. Overview of the project workplan, with 15 activities, organized in 4 interdisciplinary Work Packages.

Results achieved to date (September, 2023)

The project has achieved several results, mainly by WP1 (Baselines, impact assessment and policy support):

- ✓ The sampling (gap filling) and the development of a large regional database needed for the regional cadmium and soil mapping is still ongoing. Until September 2023, 2000 locations had been sampled across the 3 countries.
- ✓ The climate impacts on cacao production and adaptation needs, and the socio-economic impacts of the EU food safety regulation on cadmium (Cd) in cocoa have been evaluated. The results of climate and Cd impact assessments were published in country reports. Briefing notes are being disseminated, targeting a larger audience (Reports in https://climaloca.org/technical-reports/ and briefings in https://climaloca.org/informative-briefs/).





✓ In Colombia and Peru significant progress was made with the assessment of commercial clones. Preliminary results look promising in terms of the identification of clones that differ in Cd accumulation.

WP2 (low cadmium and climate-relevant practices and genotypes) has established (or maintained) 11 research sites in different agroclimatic regions across the three countries to assess the potential of production practices and genetic materials to mitigate Cd and climate related impacts. WP3 (Co-development of mitigation and scaling strategies with stakeholders) has set up 5 participatory on-farm piloting sites in the 3 countries and is collecting data on the use of soil amendments in collaboration with farmers and cacao cooperatives.

The project acquired the XRF (X-Ray Fluorescence) machines that are being used to strengthen the quality and efficiency of cadmium analyses, thereby contributing to the objectives of WP4 (Regional research coordination and scientific capacity building). The XRF can simultaneously analyze total element concentrations in plant and soil samples at low cost and the results are obtained instantly. In Peru, this equipment is already helping the NORANDINO cooperative and farmers in managing the commercial challenges associated with the high Cd levels.

The project has hosted a large number of students from diverse backgrounds and nationalities. Also, the following peer-reviewed scientific publications have been generated so far:

- Mitigating the level of cadmium in cacao products: Reviewing the transfer of cadmium from soil to chocolate bar;
- ✓ <u>The impact of Climate change in cocoa production in Colombia, Ecuador and Peru;</u>
- The distribution of cadmium in soil and cacao beans in Peru;
- Monitoring cadmium concentrations in cacao: inter-laboratory variation and the effect of sample size on variability among ready-for-sale beans;
- ✓ <u>Cadmium Accumulation in Cacao Plants (Theobroma cacao L.) under Drought Stress;</u>

Other publications include newsletters, brief notes and technical reports produced by the different WPs. Those can be found on the <u>Clima-LoCa website</u>.

Organization

The project is being implemented by a research consortium under the overall responsibility of the International Center of Tropical Agriculture (CIAT), and in close collaboration with the EU Delegations in Colombia, Ecuador and Peru. CIAT, part of the global CGIAR network, leads the overall project coordination and the regional implementation and streamlining of project activities according to four components: "soil and environment", "cacao genetics", "socio-economics" and "dissemination and decision support". For the regional streamlining regarding "cacao genetics", CIAT is being supported by CIRAD. According to the organizational structure of Clima-LoCa, partners have been assigned specific responsibilities, governance and implementation roles. Country-level focal points are CIAT in Colombia, ESPOL in Ecuador and BIOVERSITY in Peru. CGIAR institutes BIOVERSITY and CIAT are operating under the newly established CIAT-BIOVERSITY Alliance. An External Advisory Committee was set up involving key stakeholder organizations and EU Delegations of three countries. Other main stakeholders could be invited to the SC, if necessary.

Implementing organization

CIAT, operating under the Alliance of Bioversity International and CIAT, and research partners from LAC and Europe.





Partners of the project

- ✓ Escuela Superior Politécnica del Litoral (ESPOL, Ecuador),
- ✓ Corporación Colombiana de Investigación Agropecuaria (AGROSAVIA, Colombia),
- ✓ Centre de Coopération Internationale en recherche agricole pour le Développement (CIRAD, France),
- ✓ University of Leuven (KUL, Belgium),
- ✓ Wageningen University & Research (WUR, Netherlands).

ESPOL, AGROSAVIA, CIRAD, KUL and WUR are co-applicants.

- ✓ Instituto Nacional de Investigaciones Agropecuarias (INIAP, Ecuador),
- ✓ Instituto Nacional de Innovacion Agraria (INIA, Peru),
- ✓ Servicio Nacional de Sanidad y Calidad Agroalimentaria (SENASA, Peru),
- ✓ Institut de Recherche et Développement (IRD, France),
- ✓ Cocoa Research Center (CRC, University of the West Indies, Trinidad and Tobago).

INIAP, INIA, SENASA, IRD and CRC are associated partners.

Besides **public & private agreements** have been established with the following private sector entities and Farmers' Organisations:

In Colombia

- ✓ 12TREE-finance-gmbh (impact investment)
- ✓ Compañía Nacional de Chocolates
- ✓ Federación Nacional de Cacaoteros (FEDECACAO)
- ✓ Impulsa Bacao

In Ecuador

- ✓ Etiquable
- ✓ Olam

In Peru

- Cooperativa Agraria Norandino,
- Asociación Peruana de Productores de Cacao (APPCACAO),
- ✓ Choba-Choba

Other main stakeholders

Ministries of Agriculture and Ministries of Commerce (MADR, MINCIT) and associated authorities: Instituto Nacional de Metrología (INM), Servicio Geológico Colombiano (SGC), Instituto Colombiano Agropecuario (ICA), and Unidad de Planificación Rural Agropecuaria (UPRA) (Colombia), Agencia de Regulación y Control Fito y Zoosanitario (AGROCALIDAD) and Servicio Ecuatoriano de Normalización (INEN) (Ecuador); NGOs active in the cacao sector, EU Member States, Agencies for international cooperation, Colombia in Paz, Comisión Nacional para el Desarrollo y Vida sin Drogas (DEVIDA) (Peru), private sector (e.g. cacao producers, chocolate companies, traders) including Association of Chocolate, Biscuit and Confectionery Industries of Europe (CAOBISCO), European Cocoa Assocation (ECA) and Federation of Cocoa Commerce London (FCC) members in Colombia.

Location

Colombia, Ecuador, Peru.





Funding and co-funding

EU	€ 6,000,000
Co-funding (in-kind) not specified	
Total budget	€ 6,000,000

Duration

January 2020 - December 2024 (5 years)

Websites

- ✓ https://climaloca.org/
- ✓ https://blog.ciat.cgiar.org/regional-research-project-seeks-to-promote-the-development-ofcacao- to-continue-competing-in-the-european-market/

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