

Cocoa roadmap summary

The road to sustainable cocoa growing [2022-2032]



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The coming years will be crucial for the cocoa value chain. The main issue is not just whether we will still be able to eat chocolate, but how we can support a sector on which between 40 and 50 million people depend worldwide, from Africa to Latin America by way of Asia. The cocoa value chain faces a range of challenges, and needs to adapt. CIRAD has pinpointed four priorities for the sustainable development of the chain and for informing the choices stakeholders need to make. ■

Cocoa: how can we produce better?

Production is rising, but at the expense of forests

Cocoa (*Theobroma cocoa*) is an understory tree. Its natural habitat is the lower storeys of the rainforests of Central and South America, from sea level up to a height of 1250 m. Cocoa trees like very rainy conditions, and require more than 1100 mm of average annual rainfall, evenly distributed throughout the year. Although they appreciate shade, they can also be grown in full sunlight.

Cocoa is a subsistence activity for between 40 and 50 million people worldwide, including around 5.5 million small-scale cocoa producers and some 14 million rural workers. The West African cocoa belt, which stretches from Ivory Coast to Cameroon, currently accounts for over 70% of global output, with the remainder coming from the Americas (whose share is currently growing) and Asia (whose share is shrinking). Europe

is the world's largest consumer of cocoa products, with a vast cocoa processing industry (annual turnover: 62 billion euros) and per capita consumption figures of more than 10 kg/year in some cases, compared to an estimated global average of just 0.9 kg/year.

The area planted with cocoa has expanded significantly over the past 60 years, from around 4.4 million hectares in the 1960s to almost 12 million in 2021, producing more than five million tonnes of cocoa. That increase in planted area, which accounts for the growth in global output, has contributed to large-scale deforestation, particularly in Africa. This situation is notably due to the poor yields per surface area, for want of technical management solutions and planting material suitable for the socioeconomic conditions in producing countries.

The long and winding road to sustainable production

By 2050, climate change and increased land use for food production will probably reduce the available areas naturally suitable for cocoa growing. Full-sun growing systems with massive use of agrochemicals and irrigation – backed by private investors and agroindustrial firms with high investment capacity – will foster the

emergence and spread of cocoa pests and diseases and reduce natural resource availability, making the sector more vulnerable to climate change. Moreover, such systems, which contribute to deforestation, have a high adverse impact on biodiversity and landscape resilience.

Moreover, the vast majority of cocoa plantations worldwide are managed by family farmers with very low investment capacity, most of whom do not even earn a "living income". Some have to resort to child labour, in systems that mix cocoa and other plants that provide different benefits. They also run counter to growing consumer demand for healthy, ethical products, European Union policy on imported deforestation, and the EU Green Deal to cut pesticide use by 50% between now and 2030.

In short, sustainable cocoa production is impossible under current conditions, and major structural changes are essential. CIRAD has pinpointed four major types of challenges and proposes four priorities for action, or "ambitions" for sustainable cocoa growing. ■

* As defined by the Living Income Community of Practice (living-income.com)



Inventing the cocoa sector of the future: four ambitions to frame our research

CIRAD has been a global cocoa research player for decades. Its multidisciplinary work encompasses agronomy, genetics and genomics, plant health, quality and processing, and socio-economics, among others. It has cocoa research infrastructures, in the form of the biological resource centre (BRC) in French Guiana and laboratories in Montpellier. CIRAD is a world leader in terms of publications on cocoa*. CIRAD has ten research units doing research on cocoa, under the umbrella of its three departments, focusing on biological systems (BIOS department), tropical production and processing systems (PERSYST department), and environments and societies (ES department). These resources will serve to work towards the four ambitions set.

Ambition 1

Rehabilitate cocoa plantings by exploiting agrobiodiversity

Rehabilitating degraded cocoa production zones is a priority for Ghana and Ivory Coast, but also for Central America and the Amazon. That rehabilitation is a way of both limiting the establishment of new cocoa plantings at the expense of forest and improving the livelihoods of rural households, particularly by diversifying plots (agroforestry) and by virtue of the ecosystem services agroforestry provides.

Ambition 2

Help to build markets that combine sustainable production with quality

Consumer and market recognition of producers' efforts to work in a more environmentally friendly way, without using child labour, is vital for developing sustainable cocoa growing. It guarantees family farmers and rural households a living income. The opportunities for and obstacles to a rollout of collective approaches to promote

sustainable value chains on a local, national and global level should be explored by introducing certification schemes (PGIs, organic, etc). Such drives must be combined with a push to improve quality, from farm to ready-to-eat chocolate.

Ambition 3

Know, maintain and promote cocoa genetic diversity

Tackling the current and future challenges for the cocoa sector means growing a broad range of varieties suited to different growing and consumption situations. CIRAD is keen to be a major player in promoting and exploiting cocoa varietal diversity. To this end, it is applying its expertise in the field of genetics and genomics and stepping up its research on pest- and disease-resistant cocoa varieties suitable for agroforestry, with excellent organoleptic properties. This ambition will be backed by CIRAD's wide-ranging international partnerships in both North and South, and by its research infrastructures, notably in French Guiana.

Ambition 4

Make cocoa producers more independent and build capacity

First and foremost, this ambition is intended to make stakeholders on the ground more independent, by means of initial and continuous training. It is also aimed at helping to structure agricultural professions involved in different types of systems. Steering the cocoa value chain towards sustainable systems will not be possible without analysing the constraints on farmers, who need better technical, organizational and institutional resources. To boost family farmers' and rural households' innovation capacity and independence, CIRAD is embarking on research and partnerships focusing on strengthening organizations, knowing the strategies and negotiating power of the various stakeholders in the sector (on a local, national and global level), and reducing information asymmetries between stakeholders. ■

* To access CIRAD's publications on cocoa: <https://agritrop.cirad.fr>

Action research in Cameroon



Details

Rehabilitating degraded cocoa plantings, improving quality, exploiting genetic diversity, supporting producers, and so on... We look at the key points of the roadmap with CIRAD's cocoa value chain research coordinators Christian Cilas, a geneticist specializing in cocoa, and Renaud Boulanger, a specialist in food science and organoleptic quality.



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The main ambition of the roadmap is to help with rehabilitating degraded cocoa plantings. Why is that?

Christian Cilas: It is crucial that we rehabilitate degraded cocoa plantings to boost productivity and control pests and diseases, while reducing the pressure on forests. Restoring existing plantings avoids the need to extend the areas planted at the expense of natural ecosystems. We suggest using resistant varieties and training producers in effective, ecoresponsible farming practices, including integrated pest management, and promoting agroforestry.

Renaud Boulanger: For a long time, cocoa production was based on the pioneer front

method. However, this is no longer acceptable given the situation the planet is in, and in view of climate change. It is now clear that production must not be at the expense of either biodiversity or forests. Rehabilitation is therefore one way of allowing producers to continue to produce without being stigmatized for their environmental impact.

What are the main levers for helping to improve cocoa quality?

R.B.: Quality is a major issue for cocoa. It depends on several parameters. The variety planted is key to obtaining fine cocoa. Growing conditions can also affect the development of specific aromatic notes. Lastly, postharvest processing, notably managing fermentation, is a determining lever for ensuring fine beans. When done badly, fermentation hinders aroma development and may cause aroma defects.

C.C.: Limiting pest and disease pressure and considering the quality of the cocoa produced when breeding new varieties are also major levers for improving quality. These operations should be included in systems aimed at recognizing quality criteria (ethical, socioeconomic, organoleptic and environmental factors, etc).

What added value can CIRAD bring in terms of exploiting cocoa genetic diversity?

C.C.: CIRAD's major added value in that respect is its expertise in genetics and genomics: it characterizes, conserves—notably in French Guiana—and promotes genetic resources, identifies molecular markers of disease resistance and quality, and develops hybrid varieties tailored to climate and agronomic constraints. It helps establish and conserve international col-

lections, with longstanding partnerships in Trinidad [CRC] and Costa Rica [CATIE]. It also works to develop marker-assisted breeding tools that enable optimum use of diversity for sustainable, resilient cocoa growing.

R.B.: CIRAD was behind the full decoding of the cocoa genome. It is now turning towards the identification of candidate genes that could provide a better understanding of the mechanisms behind quality construction during fruit growth and the postharvest stages.

Why is supporting producers' organizations one of the main ambitions in the cocoa roadmap?

R.B.: In a value chain in which there are generally huge distances between the site of production and those of consumption, there are two reasons for structuring producers. The first is to allow them to master and share the best production practices for a given context. The other is to give them the means to promote their cocoa better, by allowing them to learn about what the value chain expects and to improve the quality of their product.

C.C.: Supporting producers' organizations serves to make them more independent and allow them to build their skills, to facilitate the adoption of cost-effective agroecological practices, and to make cropping systems both more profitable and more resilient. It also helps to structure the value chain as a whole, to build a sustainable economy that is attractive to smallholders, and to respond to climate, socioeconomic and environmental issues.■

Find out more:
cocoa@cirad.fr

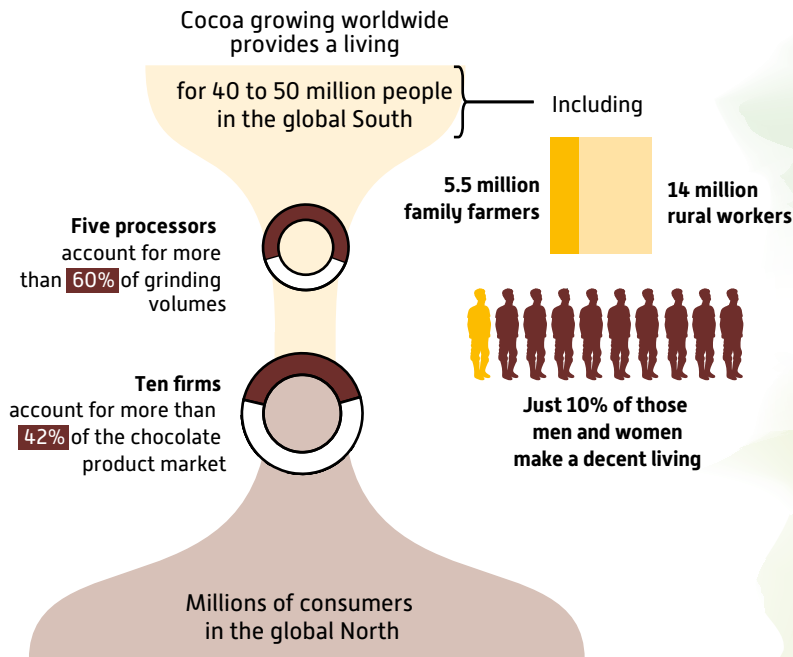
INDOKAKAO, a structuring project

The INDOKAKAO project, co-funded by France and Indonesia, aims to modernize the cocoa value chain in Indonesia and make it sustainable. It supports smallholders, targeting young people and women in particular (50% of the beneficiaries), through training and access to microfinance and digital technology. It is led by CIRAD and local partners, and is also working to increase the proportion of top quality cocoa produced, notably for the bean to bar market, while structuring the value chain by building bridges between it and the prime French chocolate sector.

Inventing the cocoa sector of the future

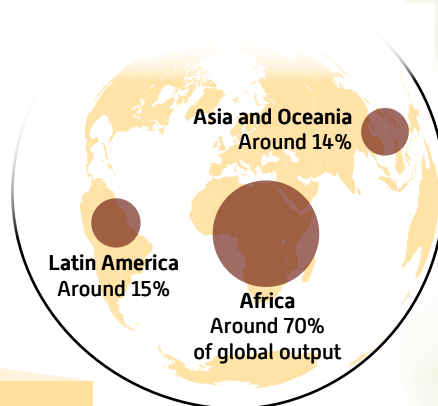
What CIRAD is doing to tackle the challenges

A market dominated by just a few players

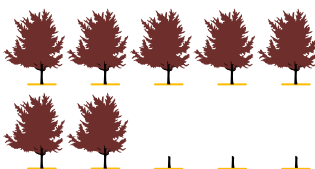


Many upheavals under way

The area planted with cocoa has exploded recently in the global South

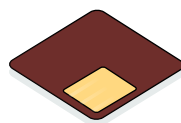


... at a cost: widespread deforestation, particularly in Africa



In Ivory Coast and Ghana, cocoa growing is responsible for 30% of deforestation

Climate change is currently upsetting everything



The zones suitable for cocoa growing are shrinking



Emergence and spread of cocoa pests and diseases

Our ambitions...



Rehabilitate cocoa plantings by exploiting biodiversity



Help to build markets that combine sustainable production with quality



Know, maintain and promote cocoa genetic diversity



Make cocoa producers more independent and build capacity

...in partnership



Our means and resources

60

scientists in 10 research units

12

disciplines mobilized, from genetics to anthropology

207

publications in scientific journals between 2020 and 2026

1st

in the global publication rankings on cocoa agricultural science



open-access collections and analysis laboratories

1st

in the world to sequence the cocoa genome, in 2011

Partnerships, the core of CIRAD's research

CIRAD's operations are founded on long-term partnerships. National agricultural research structures in both North and South, producers, national and international cocoa organizations, universities and agricultural colleges, non-governmental organizations, national, European and international governmental bodies and private firms are some of its main partners. CIRAD's partnerships are bolstered by the ongoing presence of its scientists on the

ground, working hand in hand with stakeholders in the cocoa sector.

CIRAD is also very active in promoting – and participating in – a number of networks and initiatives centring on cocoa, such as the French Sustainable Cocoa Initiative (IFCD). The initiative associates the French government, industry, traders, retailers, and civil society and research organizations. It is also part of the French National Strategy to Combat Imported Deforestation (SNDI), adopted in 2018.

CIRAD is currently working with numerous producing countries, and a range of players have called upon its expertise (countries, research organizations, private operators, etc).

Most of CIRAD's cocoa partnerships centre on Africa and Latin America, but it also has joint operations in Asia and elsewhere. This international dimension facilitates fruitful exchanges between continents, countries and regions, and between stakeholders in the global South. ■

A word from our partners

Research in partnership is an essential aspect of CIRAD's work. Be they longstanding or recent, it has a large number of different research partnerships.

The interviews below illustrate that diversity and the synergy between CIRAD's operations and those of its partners. They look at a historic partnership between CIRAD and CATIE, a Latin American research centre based in Costa Rica, and a more recent collaboration with ECAM, a cocoa cooperative in Ivory Coast.



Interview with Eduardo Somarriba,
professor and senior researcher
in agroforestry at the Tropical Agricultural
Research and Higher Education Center
(CATIE)

What is the history of the partnership between CATIE and CIRAD?

Our relationship goes back a long way. It dates back to the 1960s and 70s, when CATIE was chosen to be the custodian of a major collection of coffee and cocoa genetic material (germplasm). We began working together on arabica coffee, collaborating long term on conservation and breeding. We then created and disseminated a set of F1 hybrids that are now spreading throughout Latin America. CATIE has benefited from CIRAD's expertise in clonal propagation and biotechnology. Five years ago, we began working on a second generation of F1 coffee

hybrids, which are currently being tested in various agricultural environments in Latin America.

We have also been working with CIRAD for 14 years on agroforestry, initially within a skills and partnership platform (PCP) and primarily on coffee and cocoa. The strategy adopted has proved very fruitful in terms of science, training and development. In 2019, the PCP subsequently became a platform in partnership for research and training (dP), "Agroforesta": a network devoted to research and development on tree crop-based agroforestry systems. The platform is extremely active and has a novel strat-

egy, working on “new” topics such as climate change from a socioeconomic and political point of view, and with new partners.

What are the main things CIRAD and CATIE’s cocoa roadmaps for the next decade have in common?

I would say that the four priorities set out in CIRAD’s roadmap fit perfectly with what we are doing at CATIE. For instance, as regards the crucial issue of cocoa rehabilitation, we recently published a CATIE-CIRAD document. Some 3.5 million

hectares worldwide need to be rehabilitated, which will mean providing producers with vast amounts of financial support. Our use of agroforestry to rehabilitate and renew cocoa plantations allows for their diverse nature: they generally include fruit and timber trees, along with early intercrops including food crops. In terms of markets, we also have shared objectives and ambitions. For instance, CATIE’s agrifood unit is focusing on ambitions 2 and 4: supporting producers’ organizations and helping cooperatives access markets. As for cocoa genetic

diversity, CATIE celebrated 70 years of cocoa conservation last year. And there are many opportunities for expanding collaboration between CATIE and CIRAD. For instance, we could use our open-access germplasm collection to support cocoa breeding in West and Central Africa. ■

Find out more:

<https://www.catie.ac.cr/>

<https://agroforesta.org/>



Interview with Assata Doumbia,

Chair of the Board of Trustees of the Méagui farmers’ cooperative (ECAM) in Ivory Coast

How and why did ECAM join forces with CIRAD?

Let me start by telling you a bit about ECAM, our cocoa cooperative, of which I am Chair. ECAM was founded in 2004 and now has more than 2400 member producers, of whom 422 are women, cultivating more than 12 000 ha of cocoa in Méagui, 75 km from San Pedro in Ivory Coast. In recent years, our trees have been under attack from a devastating disease, cocoa swollen shoot, which is continuing to spread despite all our efforts. It only affects cocoa, and dries out the plants, which lose their leaves and stop producing pods. At the same time, farmers in our region are getting older and the climate is changing, which is significantly affecting yields. These are big challenges for a cooperative like ours. I met the CIRAD representative in Ivory Coast at a conference in Abidjan in 2019. I knew CIRAD was working in the region, notably on swollen shoot. I told him about

our difficulties, and CIRAD researchers came to our cooperative. We are hoping to organize producer training courses together, to help contain swollen shoot, and to draft advocacy statements aimed at guaranteeing a more sustainable future for cocoa growers.

How does the CIRAD roadmap, with its four main ambitions, fit with ECAM’s operating principles?

We share the four priorities set out in CIRAD’s roadmap, which is a sign of what we hope will be a fruitful partnership. To adapt, we have introduced a range of certification schemes: Rainforest Alliance, Fair Trade and Ecocert. All our plantings are geolocated, to facilitate certification. And in response to climate change, we intend to roll out organic practices. Fifty-five of our members already have organic certification. Climate change means we have to change how we work

and look seriously at using agroforestry as a way of growing cocoa more sustainably, and potentially generating extra income. Since 2016, our cooperative has committed to planting trees, but we want to know how to do it in a way that will benefit us. We cannot do everything alone: we need financial and technological resources. It is important to realize that in Ivory Coast, the government has begun clearing cocoa trees affected by swollen shoot, which is the only way of remedying the disease. But for producers, losing half their trees means losing their livelihood. We are therefore counting on CIRAD to help us develop other ways of making a living, and that means practising agroforestry. Training has a vital role to play in this. ■

Find out more:

<https://www.ecamcoop.com/>



CIRAD is the French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions.

CIRAD works with its partners to build knowledge and solutions and invent resilient farming systems for a more sustainable, inclusive world. It mobilizes science, innovation and training in order to achieve the sustainable development goals. Its expertise supports the entire range of stakeholders, from producers to public policymakers, to foster biodiversity protection, agroecological transitions, food system sustainability, plant, animal and ecosystem health, and sustainable development of rural territories and their resilience to climate change.

CIRAD is a public establishment (EPIC) under the joint authority of the Ministry of Higher Education, Research and Space, and the Ministry for Europe and Foreign Affairs.

CIRAD hopes that multi-stakeholder partnerships and alliances will discuss, share and support its four ambitions for sustainable cocoa growing. Contact us to find out more:

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Working together for tomorrow's agriculture

Find out more about
the cocoa value chain
at CIRAD



cirad.fr

