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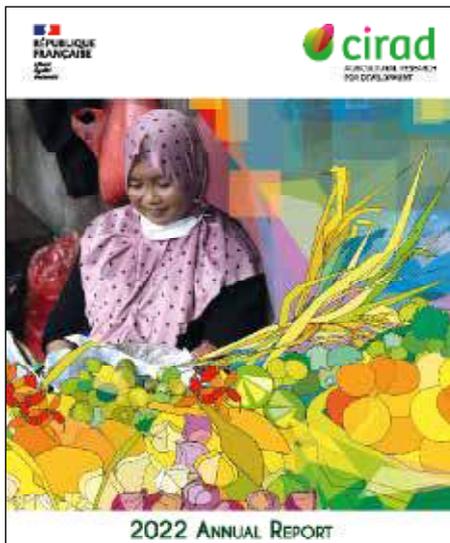
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AGRICULTURAL RESEARCH
FOR DEVELOPMENT



2022 ANNUAL REPORT



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EDITORIAL

A year of politics

Élisabeth Claverie de Saint Martin,
CIRAD CEO

The Russian invasion of Ukraine in February 2022 marked the entire year. Just as life was resuming after Covid, a new crisis emerged. In addition to the resulting mass destruction and deaths, the war in Ukraine highlighted the systemic aspect of farming and food systems: in this field as in many others, we are all governed by the choices made by others. In this context, CIRAD has played its part to the full. Its analyses have informed policymakers and citizens about the complexity of farming and food systems, while warning against false solutions. In addition to the war, two high-level international events allowed us to exert a degree of influence in terms of climate and biodiversity issues: we took part in COP27 (climate) and COP15 (biodiversity), advocating for more ambitious commitments to allow the world's most vulnerable countries to adapt the crops they grow to the effects of climate change and protect their biodiversity and manage it sustainably. Lastly, in 2022, we celebrated CIRAD's 60 years in Réunion. This gave us a chance to celebrate the progress made thanks to our collaborative operations in the region and to confirm our determination to make the superb platforms and infrastructures on the island a vital asset for working even more closely with the Indian Ocean countries on the major issues surrounding agriculture. Our ability to lead ambitious collective operations was also put to the test. We organized a meeting in Montpellier in June of our entire range of partners, enabling us to discuss how we work together and, thanks to suggestions from the partners present, launch new operations. We were also a driving force in strategic scientific events such as the international symposiums on horticulture and cocoa.

At the heart of the EU

Throughout the first half of the year, CIRAD took part in several meetings and events as part of the French Presidency of the European Union (PFUE). The 6th African Union-European Union Summit, for which we contributed to several preparatory workshops, was held in February. The PREZODE conference "Joining forces to escape the era of pandemics", also in February, organized as part of the PFUE, consolidated the political support of the EU member countries and the

European Commission for the PREZODE One Health initiative, which CIRAD is coordinating alongside IRD and INRAE. We also contributed to the Food & Agriculture Resilience Mission (FARM) initiative in favour of food security in the world's most vulnerable countries, launched by French President Emmanuel Macron in April, with the production of two policy briefs on food security. We achieved an unprecedented success rate following the calls for proposals from Horizon Europe, a leading European research policy instrument. That result confirmed both the scientific excellence of our work and the quality of our methods and partnerships in every scientific field.

Staying on course

On an internal level, we have stepped up our CSR policy. To quote just a few examples of this very productive dynamic, we have completed the Gender-SMART project, which has allowed us to make substantial progress in terms of gender equality. We have also moved ahead with encouraging sustainable local mobility and cutting our energy consumption. In terms of human resources, we are proud of our active recruitment policy, which has allowed us to take on 200 new staff members in the past two years. We have recruited more women and foreigners, who have boosted our scientific resources and are proving to be a great asset for CIRAD.

A time of renewal

After a particularly productive year in 2022, 2023 is set to be a year of renewal. A new set of contractual objectives linking us to the French State for the next three years will be negotiated during the year. At the same time, we will be revising our scientific and partnership strategy, which will be an opportunity for us to take a fresh look at our scientific priorities and our geographical and partnership strategy. We will also be drafting a new strategy for our operations in the French overseas regions, which we hope to complete by the end of 2023. ■

2022 HIGHLIGHTS

January

French Presidency of the European Union: CIRAD was mobilized



France held the presidency of the Council of the European Union for the first half of 2022, which was a chance to roll out France's main ambitions in terms of scientific research and innovation on an EU level. Within that framework, CIRAD mobilized its expertise in cooperation, agricultural research and partnerships, by organizing and participating in a range of events.

Launch of the Bio4Africa project

The project, supported by the EU Horizon 2020 Research and Innovation Programme and coordinated by CIRAD's Biomass, Wood, Energy, Bioproducts research unit (BioW-ooEB), set out to determine how agricultural waste could be used to diversify the income of farmers in Africa. The 13 African partners and 12 European partners have a period of four years to conduct this research.

One Ocean Summit: for increased commitment

To mark the first One Ocean Summit in Brest, France, CIRAD summed up its contribution to this topic of global importance. The aim of the summit was to foster commitment to maritime issues within the global community and to convert that commitment into concrete action.



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The RESCuE project enabled the study and rehabilitation of mangrove forest stands in Thailand

February

Africa-Europe Week



CIRAD took part in Africa-Europe Week throughout the week beginning 14 February 2022, alongside the European Union-African Union Summit. The aim was to promote and boost partnerships with Africa, particularly in the field of value chains.

58th Paris International Agricultural Show (SIA)

It will be possible to satisfy global food requirements long term, provided we rethink how we produce and consume. For this edition of the show, CIRAD and the Agence française de développement (AFD) invited participants to look at the levers for transforming current food systems.

The need for a One Health approach

In a document submitted to the government, the French Scientific Council on Covid-19 draws lessons from the crisis, which shows "the need to implement integrated approaches to health", and in particular the One Health approach. Thierry Lefrançois, Director of CIRAD's Biological Systems Department, was involved in the preparation of this document along with the 15 other members of the Scientific Council.



© D. Cornelis, CIRAD

Wild birds (here, white-faced whistling ducks on the Niger River) can be a source of diseases that can spread to poultry flocks and then to farmers, such as avian influenza

March

TSARA, an Africa-France research partnership

The TSARA initiative (Transforming Food and Agricultural Systems through Research in Partnership with Africa) was launched at the Paris International Agricultural Show. TSARA was initiated by CIRAD and INRAE, with around 20 African universities and research institutes. It aims to strengthen cooperation in order to promote sustainable agriculture, food systems and landscapes.

A 2022 World Water Forum focusing on action and solutions

The 9th World Water Forum was held in Dakar, Senegal, from 21 to 26 March. This "Forum of responses" focused on solutions, and was aimed at inventorying and supporting initiatives with significant socio-economic, political and environmental impacts. CIRAD participated via the certification of three wide-ranging projects and two sessions on agroecology.



Dozens of pipes connected to motor pumps are steadily removing all the groundwater in Darou Khoudoss (Senegal). At this rate, water will be in short supply within the next 20 years

CIRAD's 60 years in Réunion

CIRAD has been working in Réunion since 1962 to support agricultural development and environmental protection through research programmes in partnership with various local players. This work has benefited from the exceptional technical infrastructures available on the island.

A range of videos and publications were produced for this anniversary year.



April

Partnering4Impact, a newsletter for financial partners

CIRAD has launched a second newsletter: Partnering4Impact. The newsletter is a quarterly, available in English and French, and is intended for public- or private-sector financial partners and other influential players interested in research or development. The first issue, published on 7 April, focused on One Health.

Subscribe to the English version >



"Making pandemics"

This documentary film, based on a book by Marie-Monique Robin, written in collaboration with Serge Morand, sets out to understand and document the link between biodiversity erosion and the emergence of infectious diseases. In the film, in which CIRAD was a partner and which previewed in France from 22 April to 22 May, scientists call for One Health approaches to be adopted.



First results of the ZooCov project

The project, which was rolled out in Cambodia over a year and a half, has published its main results, which will form the foundations of integrated emerging disease surveillance operations. The One Health approach has once again proved vital for preventing the emergence of new diseases and potential future pandemics.

May

Large-scale land deals are bad for the environment

Land deals for commercial farming pose a serious threat to forests, water supplies and the biodiversity that depends on these critical resources. On the eve of the Global Land Forum in Jordan, there was emerging evidence of this. CIRAD's Ward Anseeuw, co-author of a report by the Land Matrix Initiative, confirmed the urgent need to rethink large-scale land transactions.

COP15 on Desertification: agriculture as a buffer against the advance of the desert

The fifteenth session of the Conference of the Parties of the United Nations Convention to Combat Desertification was held from 9 to 20 May in Abidjan, Ivory Coast, with eleven days of talks between representatives of 196 countries. CIRAD provided its expertise on agroecology and the integration of pastoralism.



Ferlo region, Senegal

A new approach to the Great Green Wall

CIRAD is fully engaged in the current vision of development driven by the Great Green Wall (GGW) initiative, especially the goal of ensuring the fight against desertification becomes an opportunity for local economic development. In a position paper, it describes its commitment, alongside some 50 partners in seven of the GGW countries.

2022 HIGHLIGHTS

June

First CIRAD Partners' Meetings

CIRAD invited 40 of its partners from 23 countries in Africa, Asia and Latin America to Montpellier on 27 and 28 June, to take a fresh look at how to work together on research and training. The meetings were an opportunity to confirm a shared commitment to supporting the agricultural and food transitions required worldwide, to help preserve the planet.

Comment les arbres peuvent sauver l'agriculture

Agroforestry is establishing itself as an alternative to industrial farming. Emmanuel Torquebiau, an agroforestry specialist and CIRAD emeritus researcher, the author of this book (in French) on how trees could save farming, published by Actes Sud Nature, says it is intended for anyone keen to find out more about agroforestry practices and their advantages and disadvantages.

July

Worldwide Perspectives on Geographical Indications

Some 220 participants from around 50 countries attended this event in Montpellier from 5 to 8 July. It was organized jointly by CIRAD and FAO, in collaboration with oriGIn and the Swiss Federal Institute of Intellectual Property, and set out to discuss the past, present and future of GIs and make recommendations.

August

31st International Horticultural Congress

Horticulture specialists from all over the world met in Angers, France from 14 to 19 August. As Vice-Chair of the Congress, CIRAD worked to ensure a substantial presence of scientists, students and firms from Africa, Asia and Latin America. The issues covered included agroecology and innovations for horticulture.

September

Thierry Lefrançois appointed to the new French Committee for the monitoring and anticipation of health risks

The new committee (COVARIS) replaces the French Covid-19 Scientific Council. It will adopt a "One Health" approach, which CIRAD strongly supports.

First Global Forum of the UN Decade of Family Farming

CIRAD took part in this forum, co-organized by FAO and IFAD from 19 to 22 September 2022. It was seen as an ideal opportunity to invent more sustainable agrifood systems, notably by boosting the synergies between family farms and agroecological transitions.



T. Brevault © CIRAD

Public policy must include specific incentives to combine family farming and agroecology

Biodiversity maps

Nature Ecology & Evolution and *Nature Communications* published two world maps of tree and plant biodiversity, seen from different angles. Because of their scope and their unprecedented inventory efforts, these two studies, in which CIRAD participated with partners from Africa and the Amazon, will serve as new references for future conservation policies.

October

Launch of the BCOMING project

Given all the changes our society has faced in the last couple of years due to the Covid-19 pandemic and with a view to the future challenges, BCOMING started as a post-pandemic project that aims to limit the emergence of infectious diseases by means of biodiversity conservation strategies. It is coordinated by CIRAD, and involves 14 partners.

First PREZODE General Assembly

The event, on 11 October, was an opportunity to present the results of the consultations undertaken and outline strategic advances and the establishment of key partnerships. The World Health Organization (WHO) and PREZODE announced the creation of a joint working group to establish a body of indicators for appropriate prevention strategies.

New FAO-INRAE-CIRAD-IRD cooperation agreement for the transformation of agrifood systems

On 18 October, on the occasion of its Science and Innovation 2022 Forum in Rome, FAO signed a Memorandum of Understanding with three French Research Institutes for the period from 2022 to 2027. The agreement to support the transformation of agrifood systems conveys a strong desire to develop international partnerships.



L to R: INRAE CEO Philippe Mauguin, FAO Chief Scientist Ismahane Elouafi, IRD CEO Valérie Verdier, CIRAD CEO Elisabeth Claverie de Saint Martin

November

COP27 Climate Conference, Sharm El Sheikh (Egypt)

CIRAD was at COP27 as an observer of the talks and as organizer of several events, alongside its partners from France, Europe and the global South. This was an opportunity for it to promote certain major research results to policymakers and other participants: negotiators, country delegations, observers such as NGOs, the media, etc.

Podcast season 2: fostering biodiversity

Nourrir le vivant, the CIRAD podcast, is back for a second season, on biodiversity. From the Amazon forests to the orchards of Asia through African smallholdings, there are six episodes (in French) detailing how the interactions between people, plants, animals, the soil and the climate can foster and sustain the living world.



Is livestock farming a "climate killer"?

COP27 was an opportunity to take stock of the key issues associated with livestock farming in the context of climate change. With its partners in the global South, CIRAD presented livestock systems and practices that are beneficial in terms of mitigation and adaptation, and that also contribute to ensuring food security, combating poverty and protecting biodiversity.

December

Second International Symposium on Cocoa Research

In the runup to the festive season, Montpellier hosted the world's largest cocoa research conference, organized by the International Cocoa Organization and CIRAD, with more than 500 participants from some 30 countries. The fight against deforestation and fair wages for producers topped the agenda.



COP15 Biodiversity, Montreal (Canada)

As an observer to the talks, CIRAD was able to participate in the sessions on the new global biodiversity framework. It was also involved in several side events on transforming food systems, on information relating to the digital sequences of genetic resources, and on sustainable wildlife management.

Gilles Kleitz, new Chair of the CIRAD Science Council



The new CIRAD Science Council, appointed for three years, held its first meeting in early December. Its new Chair is Gilles Kleitz, currently Executive Director for Sustainable Development at the Agence française de développement, who says he hopes to provide a "clear, critical and constructive" view of its strategic guidelines.

2022 PORTFOLIO

Protecting biodiversity in Réunion from invasive species

The wealth of biodiversity in Réunion is under threat of invasion by alien species. This phenomenon is recognized as the fifth largest cause of increased biodiversity loss worldwide. A team led by scientists from CIRAD has been working on action research to fight such invasive species.

pauline.fenouillas@cirad.fr • mathieu.rouget@cirad.fr

Undergrowth in the Mare-Longue forest, which is emblematic of the biodiversity in Réunion

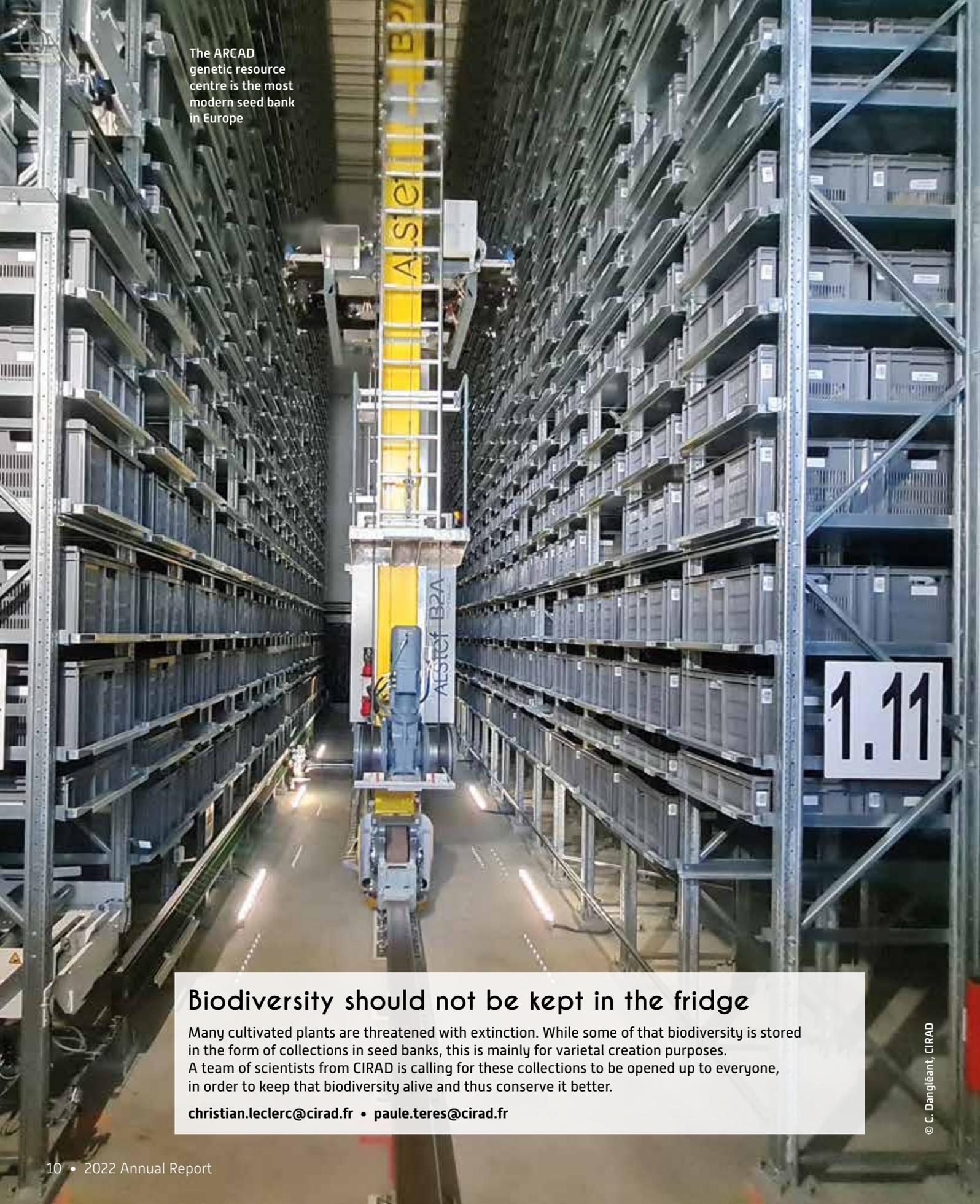


Vegetable seller
at the Vientiane organic
market (Laos)

Achieving long-term food security in the face of crises: the pathways offered by research

The crises currently affecting food systems worldwide were not primarily triggered by the conflict in Ukraine, although it has exacerbated tensions on global markets. They are actually a result of older, more structural factors. CIRAD's researchers suggest concrete actions to foster long-term transformation of food systems in *Science Horizon*, a document for the use of public policymakers.





The ARCAD
genetic resource
centre is the most
modern seed bank
in Europe

Biodiversity should not be kept in the fridge

Many cultivated plants are threatened with extinction. While some of that biodiversity is stored in the form of collections in seed banks, this is mainly for varietal creation purposes. A team of scientists from CIRAD is calling for these collections to be opened up to everyone, in order to keep that biodiversity alive and thus conserve it better.

christian.leclerc@cirad.fr • paule.teres@cirad.fr



83% of the genetic heritage of vanilla has been determined

Almost all the vanilla sold worldwide comes from a single species: *Vanilla planifolia*. The limited genetic variability of cultivated vanilla makes the sector particularly vulnerable to climate and health risks. In publishing the sequence for 83% of the *Vanilla planifolia* genome, a research consortium coordinated by CIRAD Réunion has paved the way for more effectively targeted, faster creation of new varieties.

carine.charon@cirad.fr

michel.grisoni@cirad.fr



Tomato and maize plants
in gardens in Magoli,
Zimbabwe

Reconciling local development and conservation in southern Africa

Promoting the livelihoods of local communities in transfrontier conservation areas is key to the sustainability of such protected areas. This is what prompted CIRAD and its partners to launch the EU ProSuLi project in southern Africa. The project, which was entirely co-constructed with local communities, ended in 2022, and the results look promising.

alexandre.caron@cirad.fr • christophe.le_page@cirad.fr





Mandarins grown
in the Kintamani region
(Bali, Indonesia)

The citrus value chain and yellow dragon disease

Huanglongbing (HLB), also known as yellow dragon disease, is a lethal bacterial disease of citrus fruits that is now threatening the Mediterranean. CIRAD is working with its partners to build integrated management strategies, through several projects, including Tropicsafe, which was completed in 2022.

raphael.morillon@cirad.fr



FOCUS



Crises and food security: what can research do?

Science has a vital role to play in dispelling misconceptions and informing public decision making, particularly at times of crisis. 2022 was not short on challenges for CIRAD in that respect, since both the fields in which it operates – tropical and Mediterranean countries –, and its line of activity – agricultural research for development – came under the spotlight as early as in February, with the Russian invasion of Ukraine. The issue is the subsequent threat to food security and how to respond to the impending crisis.

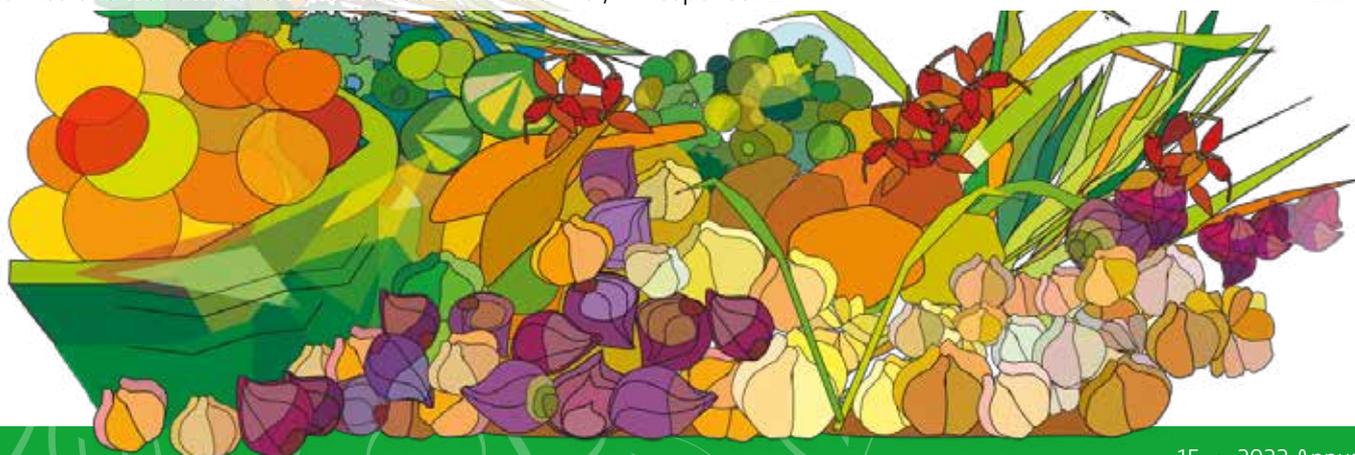
Throughout the year, CIRAD continued its research relating to food security, in line with its remit. However, as the crisis took shape, our researchers perhaps appeared more often than usual in the media (newspapers, television and radio). Many bodies requested their expertise, such as the Food & Agriculture Resilience Mission (FARM) on food security in the most vulnerable countries, which was launched in March by the French President, along with partners from the European Union, the G7 countries and the African Union.

“It would be a mistake to say we can prevent food crises in Africa and the Middle East by relaunching agricultural production in Europe. [...] Cultivating areas given over to biodiversity would be disastrous for biodiversity and would only have a marginal impact on global food security”, said several CIRAD researchers along with a group of scientists, members of institutions and specialists in global food security and markets in an opinion piece published on 31 March in the Le Monde newspaper. A few days later, two contributions to the FARM initiative called upon policymakers to view the crisis in a systemic, long-term context rather than responding with measures that would accelerate natural resource (water, soils, biodiversity) degradation and greenhouse gas emissions. Food systems as they currently operate are behind almost a third of greenhouse gas emissions worldwide. On the France 24 TV channel,

CIRAD CEO Elisabeth Claverie de Saint-Martin also stressed the importance of knowing food systems in tropical and Mediterranean countries better in order to respond more effectively to the crisis, which she said was not due to the war in Ukraine, but in fact began several months before. Contrary to what is often thought, Africa produces 80% of its food, thanks to its dynamic, diverse agricultural sector. As a result, contributing to its development means supporting local food systems and the players involved and promoting environmentally friendly, healthy agricultural production that is less dependent on inputs, which require vast amounts of fossil fuels. As Elisabeth Claverie de Saint Martin pointed out, CIRAD works with its partners to build innovative solutions and promote agroecological intensification.

This focus report gives three scientists the chance to express themselves. The first two interviews¹, with CIRAD researchers, cover possible solutions to rising food prices: price regulation or the development of local value chains. The third is with one of CIRAD’s partners, Faten Khamassi, who has a PhD in Rural Economics and Development from the Institut national agronomique de Tunisie (INAT) and is chief of staff to the country’s Minister of Agriculture, Water Resources and Fisheries. She discusses the impacts of the crisis in Tunisia and the steps taken by the government in response. ■

1. Interviews conducted between 6 and 10 January 2023.





Food price regulation: why? how?

Alongside the accumulation of the Covid-19 crisis, the Russian invasion of Ukraine and the climate crisis, the years 2021 and 2022 also saw a worrying rise in food prices. Global market prices of cereals, vegetable oils and some agricultural inputs (such as fertilizers) rocketed. Those price rises hit developing countries hard, compromising many people's access to food.

CIRAD economist Franck Galtier, who specializes in agricultural markets in developing countries, analyses how prices can be stabilized on three levels: global, regional (or national) and local.

2022 saw cereal and vegetable oil prices rocket – in some cases doubling – on a global scale. How can we slow that rise?

Cereals and vegetable oils are used for three things nowadays: to feed humans, to feed animals, and as agrofuels. Using these resources more efficiently in times of crisis would mean prioritizing feeding humans, then animals, with agrofuels in last position. However, current policy does the opposite: in Europe and the US, there are policies making it compulsory to add a certain percentage of agrofuels of plant origin (ethanol and biodiesel) to the fuel sold at service stations. As a result, in the event of a supply shortage, for instance in the current crisis, it is consumption by humans and animals that is hit first, due to sharp global price rises. Moreover, such price rises mainly affect poor countries and the most vulnerable people in rich countries. One simple, effective way of bringing global prices down to affordable levels would be to restrict the use of cereals and vegetable oils to make fuel until the crisis is over. The volumes involved are colossal: 15% of the vegetable oil, 15% of the maize and 5% of the wheat produced worldwide are used to make fuel. But above all, demand from the agrofuels industry for food products should be seen in relation to the "size" of global markets: its demand for vegetable oil represents 40% of the total traded on global markets and that for maize around 100%. Halving the volumes of vegetable oil and maize used to make fuel would therefore boost oil supplies on global markets by 20% and maize supplies by 50%. However, it would require a political will that is lacking, at least at present.

In the medium term (to manage future crises more effectively), this mechanism could be made perma-

nent. This would mean introducing an automatic mechanism to cap cereal and vegetable oil use in the event of sharp price rises. One further solution would be to foster the building of public grain stocks. Current World Trade Organization (WTO) rules discourage such stocks, and talks have been ongoing since 2012 about reforming them². The talks have so far failed, primarily due to opposition from the US and the European Union.

What possible steps could be taken to stabilize prices on a regional level?

On a national or regional level, it is important to distinguish between so-called "non-tradable" goods (that are difficult to find on global markets) and "tradable" goods. For the former, stocks are the only possible adjustment variable. For the latter, there is another variable: import regulations. If we look at West Africa, stabilizing (non-tradable) millet and sorghum prices would require huge public stocks (to cover between 8 and 10% of consumption whereas they currently cover less than 1%). For rice prices (rice is tradable and imported in vast quantities), it is possible to cut import taxes (or subsidize imports) when global prices rise and to raise them when they fall. Ideally, the rate of taxation should vary automatically, in other words be index-linked to global price fluctuations. The WTO does not allow this, but rates can be varied on an ad hoc basis.

Is there a way of regulating prices on a local level?

There is not much point in regulating prices on a local level, since markets within a given country are highly interdependent. However, we can try to protect producers and consumers against price fluctuations.

2. Galtier, F. (2023). Take an inch for a mile. About an error of metrics in WTO rules and its impact on the ability of countries to build public stocks for food security. *Food Policy*, forthcoming.

In particular, the aim is to enable producers (who are also consumers and are often food-insecure) to sell at the right time. The problem is that in many developing countries, producers are forced to sell a large share of what they produce right after the harvest, when prices are at their lowest. This is because they have limited, if any, access to loans, get into debt during the year, and thus have to sell a lot of their harvest immediately to pay off that debt. One solution could be inventory credit or warrantage systems, on which CIRAD is currently working³. In such systems, producers deposit their stocks in approved warehouses and are given “warehouse certificates” that can be used to guarantee loans from banks or microfinance bodies. They can then wait for prices

to rise before selling their products. However, warrantage only works if crop seasonality is consistent (producers need to be more or less certain that if they wait, they will get a better price).

Whatever the scale of intervention, it is important to recognize that the very idea of public intervention to stabilize prices is still seen in a very bad light, for ideological reasons. The experts are almost unanimous in considering that the use of cereals and vegetable oils to make agrofuel should be limited in times of crisis. However, this is not the case for policymakers, who are under pressure from economic interests and lobbies. ■

3. Le Cotty, T., Maître d'Hôtel, É., Subervie J., 2023. *Inventory credit to enhance food security in Burkina Faso*, Post-Print hal-03790571, HAL.

Developing local food value chains



Paule Moustier, Head of UMR MOISA⁴, answers the question of whether crises provide an opportunity to relaunch value chains, and goes on to present CIRAD's current research on food value chains and put the research issues for the organization as regards this topic into perspective.

Can recent crises (Covid-19, the war in Ukraine) be seen as an opportunity to relaunch local food value chains?

In regions with low or average incomes, the recent crises have not really provided an opportunity to relaunch local food value chains. In fact, they are more likely to have generated significant constraints. The key to efficient local value chain operations is logistics, and movement restrictions on a national level have caused major disruption. In this respect, the authorities have a major role to play in building and maintaining road and rail and infrastructures, waterways, etc. Furthermore, local value chains are dominated by small- and medium-sized firms with limited financial and technical capabilities. It is important to reduce the multitude of informal taxes and train producers in many fields, such as good hygiene practice or product conservation. Producers also need technical support,

particularly in terms of access to improved varieties to combat crop diseases, as conditions are even more difficult for them in times of crisis.

How is CIRAD tackling these issues to support value chains?

There is no single truth that applies to all value chains. To support them, we need to characterize them precisely. At CIRAD, we have produced a typology of urban food systems, based on their organization, their sustainability and their need for support⁵. We identified six types of value chains:

- non-market chains, which are essential in times of crisis;
- short relational chains with fewer than two middlemen between producers and consumers (perishable goods, fruit, vegetables, small animals), which have not been significantly affected by the crises);

4. MOISA is an interdisciplinary research laboratory associating researchers and teacher-researchers from complementary fields ranging from the social sciences to the life sciences. Its work covers food security and food sustainability, and is intended to provide a clearer understanding of how players and institutions behave.

5. Moustier, P., Holdsworth, M., Dao The Anh, Pape Abdoulaye Seck, Renting, H., Caron, P., Bricas, N. 2023. The diverse and complementary components of urban food systems in the global South: characterization and policy implications. *Global Food Security*, 36, 100663.

- national or regional long relational chains (for products such as cereals, plantain bananas, onions), which have suffered as a result of transport issues;
- three types of value-oriented food chains: SME-driven, supermarket-driven, and e-commerce-driven. The first two have suffered as a result of the loss of purchasing power among the middle classes. The crises have fostered e-commerce, although online purchases are beyond the reach of many consumers, particularly in rural areas.

Moreover, in 2022, CIRAD produced several “road-maps”. These documents each set out CIRAD’s ambitions and research priorities for a given value chain over the coming decade. [See interview with François Côte, p.34]

What about food systems?

CIRAD also participated in an EU-funded operation to diagnose food systems in various countries, working alongside FAO. Those diagnoses were based on secondary data and multi-stakeholder workshops, and attempted to pinpoint key sustainability issues⁶. For Laos⁷, the diagnosis revealed major assets in terms of biodiversity and quality rice, coffee and tea production. However, food production operations are not sufficiently diversified, with a lack of healthy fruit and vegetables and animal products. The opening of the Lao market to China is cause for concern, since it will favour agribusiness and investment in single-crop farming, with massive use of inputs, as with banana in the North of the country. Researchers recommend diversifying cropping and livestock systems to diversify food supplies.

6. David-Benz, H., Sirdey, N., Deshons, A., Orbell, C., Herlant, P., 2022. Catalysing the sustainable and inclusive transformation of food systems - Conceptual framework and method for national and territorial assessments. Rome: FAO-CIRAD. <https://www.fao.org/documents/card/en/c/cb8603en>.

7. FAO, European Union and CIRAD, 2022. Food systems profile – The Lao People’s Democratic Republic. Catalysing the sustainable and inclusive transformation of food systems. Rome, Brussels and Montpellier, France, <https://doi.org/10.4060/cc0302en>.

Apart from the price crisis and food security, what are the research priorities for CIRAD?

Modelling logistical flows is a major research issue. In many countries, new wholesale and retail markets have been created on the fringes of towns, but they are not used because they mean increased costs for traders in terms of transport and market access fees. It is important to compare different food supply options in relation to the location of market and transport infrastructures, taking account of the economies of scale achieved by grouping products.

It would be worth investigating the question of how the public authorities could intervene to support producer or trader groups in situations where financial resources are limited. Work has already been done on this at CIRAD, for instance on participatory quality guarantee systems as an alternative to third-party certification.

The issue of conflicts and conflict zones in which it is increasingly difficult to intervene – notably in the Sahel – is also significant. How can we measure disruption to food systems? How can we ensure that people are more resilient? How can we reach them? Certain solutions exist, while others are yet to be invented.

Lastly, the link between diversification of food supplies and diversification of the crops grown also warrants further study. New modelling work is required to optimize local supply depending on nutritional requirements and agricultural potential. ■

Organic market in Vientiane, Laos



Tunisia: the climate crisis and food crisis have prompted a paradigm shift in terms of agricultural policy

Mediterranean countries, which have been in the spotlight since the start of the war in Ukraine due to the threat to their food security, have in fact been affected in different ways. Some that are major imported wheat consumers and do not have sufficient resources of their own, have been hit hard, while others have been much less affected. The case of Tunisia sheds light on the capacity of governments to intervene and the role of public policy in food security.

Faten Khamassi, chief of staff to the Minister of Agriculture, Water Resources and Fisheries (Tunisia), a former teacher-researcher at the Institut national agronomique de Tunisie (INAT), looks back at the past year. She has a particularly edifying dual viewpoint: that of a policymaker and holder of a top political position, and that of an experienced researcher.



What is the food situation in Tunisia as we move into 2023?

Our food situation is much the same as that of all the other southern Mediterranean countries. Since the start of the war in Ukraine, the leap in raw material and energy prices has primarily affected our capacity to import raw materials and production costs, hence cost prices. It is mainly basic commodities such as dairy products of animal origin (primarily milk) and imported goods such as sugar, rice and vegetable oils other than olive oil (corn and soybean) that have been affected.

As regards wheat, Tunisia imports 50% of its durum wheat, 90% of its soft wheat and 70% of its feed barley. It is therefore highly dependent on supplies from wheat producing countries, primarily Ukraine (60% of supplies). The price hike as of the start of the war in Ukraine in February 2022 resulted in a substantial gap between our planned budget and actual prices. We therefore had to manage that price gap. This issue compounded an existing marked upward trend on cereal markets due to strong demand from the Mediterranean and reduced supplies due to climate conditions from September 2021 onwards. However, as far as wheat is concerned, the situation has been kept under control: Tunisia bought enough wheat in January 2022 to cover its requirements up to June 2022. With those purchases and domestic production, requirements are covered up until February 2023. At the same time, we managed national distribution circuits and the agricultural season as

“Since the crisis began, an action plan has been adopted to cover the entire value chain, from seed to production, in the hope of achieving durum wheat self-sufficiency by June 2023.”

efficiently as possible, to boost production and reduce losses.

The most significant disruption has concerned dairy products. The sharp hike in soybean, maize and feed barley prices has driven up the cost price of a litre of milk, one of the staples whose price is set by the government. This rapidly affected the entire value chain, with cost prices rising and producers unable to sell at a loss, and this has disrupted milk supplies.

Global market price rises also disrupted imports of other staples, oils, sugar and coffee. The Tunisian government is therefore having to seek additional funding to be able to satisfy requirements.

What role has public policy played during the crisis?

Let's look at cereals. The government quickly raised funds to satisfy requirements and respond quickly to the price hikes on global markets. At the same time, public policy was steered towards self-sufficiency in terms of durum wheat. Since the crisis began, an action plan has been adopted to cover the entire value chain, from seed to production, in the hope of achieving durum wheat self-sufficiency by June 2023. The first support measures have been funded by the government, but donors such as the African Development Bank, the World Bank and the European Investment Bank will also be contributing.

Tunisia has embarked upon a paradigm shift. Our priority from now on will be to grow cereals for domestic consumption. The current crisis is not just geopolitical, it is also climate-related. As a result, we

intend to reduce exports of market garden products, which require a lot of water, and switch to crops and farming practices that save water: cereals, fodder and arboriculture.

Has your experience as a teacher-researcher at INAT helped you manage the crisis? What lessons can we draw from the crisis in terms of research activities?

Having been a teacher-researcher at INAT, I have certain types of expertise, but I am also capable of questioning myself. Having doubts every time one looks at a problem or suggests action to prepare for making a decision makes one able to question one's choices and decisions and imagine their possible impact. This "researcher mentality" has also enabled me to look at issues from different angles. And having a systemic, rather than purely technical, economic or social approach is another asset I can draw on to inform any decisions I make. As a teacher, my communication and listening skills have helped me to communicate better with my colleagues. I know how to let people express themselves and build a consensus on the issues under discussion.

I see the crisis as a source of information. There is a lot to be done in terms of scientific research. We need to bring scientific research and decision-making circles closer together. Personally, as a researcher, I was doing research on major issues, but my work never reached policymakers. This disconnect between research and the public authorities must be scrapped. Since moving to the ministry, I have been able to see how the public administration operates, the constraints it faces, and this has been a valuable experience for me. Agricultural policy and public policy in general are so intertwined with territorial and business development initiatives and value chain development. It is this system as a whole that we need to study. We should also be working to analyse how policymakers behave in times of crisis, to develop methods to facilitate and support the decision-making process. ■

Find out more

In addition to the publications quoted in the interviews, CIRAD published several other works relating to the food crisis in the course of 2022. They include:

Achieving long-term food security in the face of crises: the pathways offered by research

Science Horizon collection, 2022, 12 p. [see p.9]

In this issue, CIRAD researchers suggest concrete actions to foster long-term transformation of food systems in order to achieve food security without jeopardizing biodiversity or the environment, worsening climate disruption or increasing socioeconomic inequalities.

Science Horizon is a series of position papers intended for policymakers and opinion leaders, on topics relating to food, farming and environment. Each issue contains a list of recommendations based on a synthesis and overall analysis of a given topic.

Intervention on biofuels and the Japan WTO rice stock to stabilise world food prices

Franck Galtier, *Perspective*, 2022, 4 p.

In this issue of *Perspective*, CIRAD economist Franck Galtier suggests two levers for limiting cereal and vegetable oil price rises on global markets: limiting the use of cereals to produce biofuel and, in the event of a rise in rice prices, authorizing Japan to export its WTO rice stock.

Perspective is a four-page CIRAD policy brief that has been published since 2009. It is intended to fuel debate, propose new ideas and support decision making. The authors draw on their research findings to explore new avenues for discussion and action on strategic issues regarding tropical and Mediterranean countries.

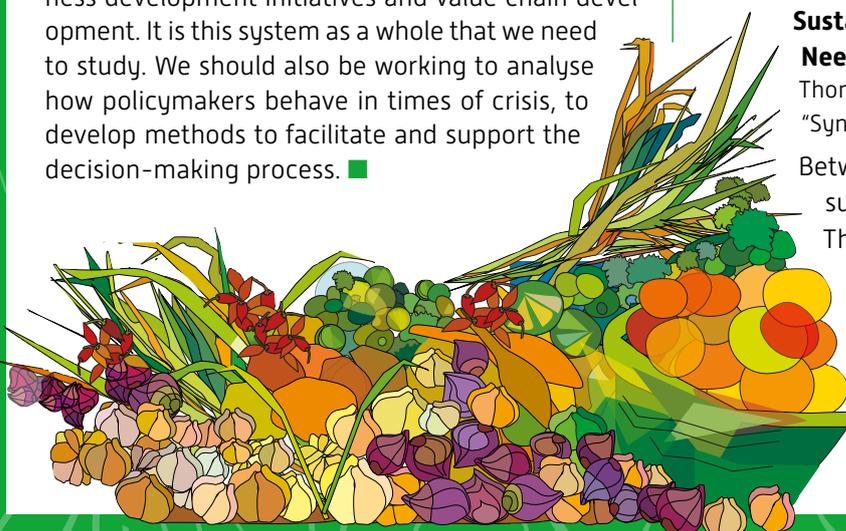
Sustainable food systems for food security.

Need for combination of local and global approaches

Thomas, A., Alpha, A., Barczak, A. & Zakhia-Rozis, N. (eds.), Quae, "Synthèses" Collection, June 2022, 222 p.

Between 2014 and 2020, INRAE and CIRAD joined forces to support interdisciplinary research on global food security. This book presents the results of this flagship programme, showing the diversity of approaches, study areas and scales of investigation.

E-book can be downloaded free of charge on the publisher's website.



Scientific research



In the light of the challenges posed by sustainable development in the global South in the current demographic, climate, environmental and social context, CIRAD and its partners are convinced that there is a growing need for knowledge and innovations. To tackle those challenges and ensure that it is capable, through science, of helping societies in the global South to make a range of unprecedented transitions, CIRAD has identified six priority research topics.

Each of those topics relates to a major research issue shared with our partners in the global South, on which CIRAD has chosen to work collectively, in an integrated, multidisciplinary way, so as to reinvent, diversify and broaden its scientific and partnership-based output.



Agroecological transitions

TA Territory-based approaches

CC Climate change

IPA It is possible to produce more zero-pesticide plantains

Plantains are crucial to food security and food sovereignty in numerous Central and West African countries. In order to meet growing demand, yields need to increase. CIRAD and its partners propose zero-pesticide ecological intensification.

In central and West Africa, annual plantain production currently stands at 10 million tonnes. Local demand, for fresh products as well as raw materials for the agrifood industry, represents twice that amount. CIRAD and its partners have proposed an alternative to conventional intensification to increase plantain yields. This is the goal of the Initiative for the ecological intensification of Plantains in Africa (IPA). This initiative, launched on 1 March at the Paris International Agricultural Show, aims to bring together African plantain sector stakeholders to develop a production system that is efficient, profitable, and preserves human and territorial health.

Some fifteen organizations and programmes have already signed up to the initiative.

In addition to a forum for exchange and sharing of experience, knowledge and resources, the members of the IPA plan to build joint advocacy capacities for the production of zero-pesticide plantains. Institutions, professional organizations, agricultural training and research centres, public and private donors and private stakeholders (processors, distributors, etc.) are all invited to join the initiative. The IPA aims to extend to all producer countries in central and West Africa the exchanges between plantain sector stakeholders in Cameroon and Ivory Coast, launched in the context of the FABAs (agricultural training for plantain growers in Africa) project, financed by the French Ministry for Europe and Foreign Affairs solidarity fund for innovative projects.

sylvain.depigny@cirad.fr

A zero-pesticide plantain field in Ivory Coast



Agroecological transitions
All our news items

BREEDCAFS:

Key results for the coffee of the future

Over four years, the EU H2020 BREEDCAFS project worked across several scientific fronts, in Cameroon, Nicaragua, Vietnam and at several European organizations (roasters, universities and research centres), to improve varieties and cropping techniques and assess the performance of coffee agroforestry systems. The results are unequivocal. The coffee sector is extremely vulnerable to global warming, at least as things stand today: genetically very similar Arabica coffee trees, mainly grown in full sunlight and particularly sensitive to the rising temperatures and diseases brought by climate change. CIRAD's researchers feel that growing coffee – a shade-living shrub that originated in the forests of Ethiopia – under trees is the best way of adapting production to climate change.

benoit.bertrand@cirad.fr • herve.etienne@cirad.fr



More information:

News item



Project note



Legumes increase crop yields by more than 20%

Introducing legumes into cropping systems improves yields of the main crops by around 20%, according to a new study published in *Nature communications*. A team of scientists from the China Agricultural University, Aarhus University in Denmark, CIRAD, the University of Western Australia and the University of Aberdeen in the United Kingdom synthesized 462 field experiments, totalling almost 12 000 yield observations across 53 different countries. The greatest benefits of legumes were observed in Africa, and in organic farming.

damien.beillouin@cirad.fr

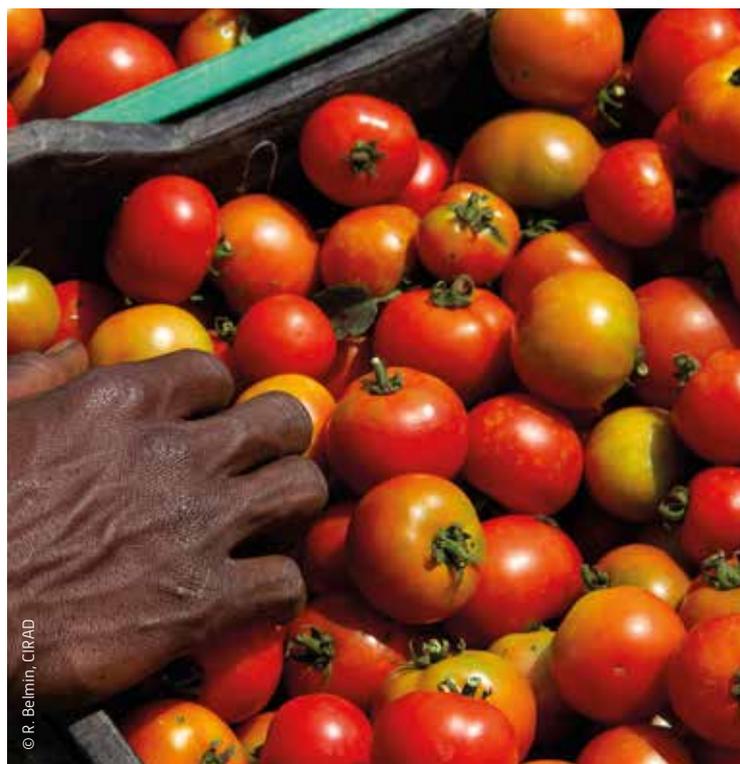


In Senegal, in this case in Ndiob, groundnuts (a legume) are generally cultivated in rotation with millet or sorghum

CERTIFICATION

Participatory guarantee systems, a model worth taking a fresh look at

Participatory guarantee systems (PGSs) are a non-market certification scheme based on peer assessment. By fostering the creation of networks of stakeholders within a given agricultural area, they fit in with a dynamic geared towards progress, supported by CIRAD.



Organic agriculture, Label rouge (red label), Rainforest Alliance, Sustainable Fisheries, the AOC label (controlled designation of origin), and so on. Faced with growing demand for healthy, environmentally-friendly food, labels are gaining momentum. In Europe, most of these schemes are based on assessment and attribution by a private, independent certification body. However, *“this third-party certification system tends to exclude certain producers”*, says Sylvaine Lemeilleur, an economist at CIRAD, *“either because of excessive costs (auditors’ salaries and travel expenses), or because farmers refuse to accept the commodification of guarantees”*. For these producers who are excluded from conventional certification schemes, participatory guarantee systems (PGSs) are an excellent alternative. They are based on assessment by peers and the whole of the community concerned (consumers, processors, distributors) to measure compliance with commitments made collectively.

sylvaine.lemeilleur@cirad.fr



Biodiversity

CC Climate change

AT Agroecological transitions

SEED

How farmers' access to crop diversity impacts on their resilience

Bambara groundnut diversity in southeastern Senegal (Kédougou region)



© R. Pocard-Chapuis, CIRAD

Vanesse Labeyrie, an agronomist and ethnoecologist at CIRAD, was recently awarded a 1.5-million-euro grant from the European Research Council (ERC), to investigate seed circulation and its consequences for farm resilience.

The aim of the study is to understand how farmers access the crop diversity they need to cope with disruption, particularly climate change. It will cover 3000 farms in semi-arid parts of Morocco, Senegal and Madagascar, where farmers mainly grow cereals and pulses in rainfed systems.

Through the project "Access to crop diversity and small farms' resilience to climate variability in African drylands" (ARISER) funded over five years, Vanesse Labeyrie will be looking to identify which characteristics of such networks serve to maintain broad

crop diversity on farms over time. She will assess the links between network characteristics and agricultural production stability at farm level, and how farmers' socioeconomic characteristics affect their access to seed and to a range of information.

She will be working with researchers in those countries: Dr Ndeye Fatou Faye Mané from ISRA in Senegal, Dr Verohanitra Rafidison from the University of Antananarivo in Madagascar, and Dr Salama el Fatehi from the Polydisciplinary Faculty of Larache in Morocco. The project will also be an opportunity to promote the role of women in research for and with countries in the global South.

The young researcher is one of 53 French scientists selected among a total of almost 400 in Europe. Fewer than 10% of applicants were successful.

vanesse.labeyrie@cirad.fr

The Amazon: loans to fund virtuous livestock farming and preserve the forest CC AT

In the Amazon, it is possible for natural forest and its biodiversity to co-exist with profitable, low-GHG livestock farming. How? By ensuring that cattle graze in the right place, at the right time. This means a change in habits for most farmers, but one that can be funded by means of a "Pecuária Verde" (Green husbandry) loan, an experimental scheme launched by Banco de Amazônia and CIRAD, with support from the AFD and GIZ. "Pecuária Verde" loans are low-interest loans intended to fund more efficient landscapes, in other words ones that combine natural forest zones and livestock farming zones that produce fodder efficiently. The former address the region's environmental issues, while the latter satisfy farmers' economic needs.

"Pecuária Verde" loans are being developed as part of TerrAmaz, a project to support territories in the Amazon.

pocard@cirad.fr



Talks with a livestock farmer in the Amazon

© R. Pocard-Chapuis, CIRAD

A new global biodiversity framework: a necessary step, but does it go far enough?

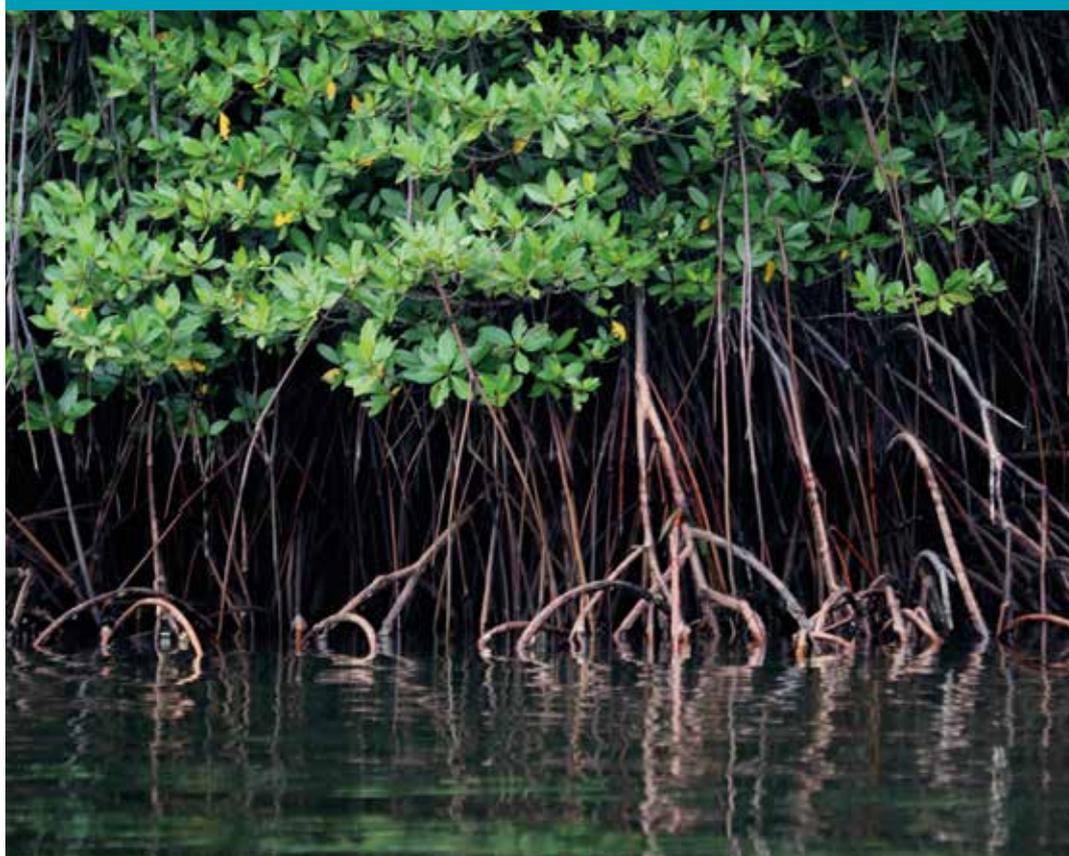


From 7 to 19 December, Canada hosted the fifteenth Conference of the Parties (COP) to the UN Convention on Biological Diversity. Participants were expected to adopt a new global biodiversity framework, for the decade 2020–2030. CIRAD was an observer of the talks, and participated in the sessions at which the various country delegations were required to reach an agreement on the new framework.

CIRAD was directly involved in several side events on transforming food systems, on information relating to the digital sequences of genetic resources, and on sustainable wildlife management. As an observer, it was looking to defend several points, such as the importance of grouping certain targets so as to analyse them simultaneously, and not focusing all efforts on expanding protected areas.

By the end of the talks, more than 190 countries had reached a historic agreement, the “peace pact with nature”, which aims to protect 30% of the planet by 2030. This is a huge challenge: at present, just 17% of land and 8% of sea areas are protected. However, although such areas are vital instruments for protecting biodiversity, CIRAD’s researchers are quick to point out that they are not enough: *“Guaranteeing that a certain percentage of areas will be protected must not serve as an excuse not to manage agricultural systems, for instance, which cover the remaining 70%, in a sustainable way”*. As regards the thorny but crucial issue of funding, countries in the global North will be providing 30 billion dollars a year to those in the global South, between now and 2030. Sélim Louafi, CIRAD’s Deputy Director General in charge of Research and Strategy, who was at COP15, says that the agreement *“still requires some work, but is a good sign. Its strength is that it pinpoints levers for action that countries and stakeholders can use to move towards a shared target”*.

Natural regeneration of a mangrove forest, Gilimanuk Bay, West Bali National Park (Indonesia)



A. Rival © CIRAD

The world’s biodiversity has been mapped

Less than a month apart, *Nature Ecology & Evolution* and *Nature Communications* published two world maps of tree and plant biodiversity, seen from different angles. Because of their scope and their unprecedented inventory efforts, these two complementary studies will serve as new references for future conservation policies. CIRAD contributed to this research with its partners in Africa and the Amazon, providing data from inventory plots in tropical areas. The scientists also provided their expertise on the measurement of biodiversity and interpreted the original results obtained for the intertropical zone.

bruno.herault@cirad.fr



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Biodiversity
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Open and dense forests
in Akagera National Park, Rwanda



Climate change

COP27 A mixed bag of results

In December 2022, CIRAD participated in COP27 as an observer of the talks and as organizer of several events, alongside its partners from France, Europe and the global South. This was an opportunity for it to promote certain major research results to policymakers and other participants. On their return from Sharm El Sheikh, political science researcher Marie Hrabanski and pastoral ecologist Vincent Blanfort looked back at its mixed bag of results.

The agreement adopted at COP27 officializing the creation of a loss and damage fund was met with widespread applause. For CIRAD's Vincent Blanfort, the fact that agriculture is still on the agenda in international talks and recognized as a potential solution to the effects of climate change is a source of satisfaction. The completion of the Koronovia joint work (2017-2022) resulted in the adoption of a text recognizing the importance of adaptation and mitigation issues. Talks are due to continue as part of the Sharm El Sheikh four-year plan on agriculture and food security. While there are no specifics as to the direction to be taken or the framework for subsequent talks, "the text sends a strong political message and a call to donors", says CIRAD's Marie Hrabanski. Another advance that has yet to be put into practice is the extension of carbon markets, which were initially intended to develop carbon sinks via forests, to soils. Working with its partners to define more nuanced measuring tools that take account of the contribution agropastoral practices make to carbon capture in soils is central to CIRAD's research, particularly in places where references are



Agriculture, which is recognized to offer solutions to the effects of climate change, is still on the agenda in international talks

in short supply and grass-fed livestock systems are predominant. The 4 per 1000 initiative, coordinated by CIRAD, is also analysing and promoting practices that foster carbon storage in soils. There were also some glaring absences from the talks, notably the issues surrounding increased food insecurity as a result of climate change.

vincent.blanfort@cirad.fr • marie.hrabanski@cirad.fr

New varieties to rejuvenate coffee growing in northwestern Vietnam

In June 2022, CIRAD presented the fruits of five years of coffee varietal research in Vietnam at the French Embassy in Hanoi, in front of the Ambassador, HE Nicolas Warnery, Vietnamese partner organizations and representatives of the private sector. New Arabica varieties are now available, to rejuvenate coffee growing in northwestern Vietnam. They were initially bred and popularized in Central America, and should allow the sector to adapt to climate change and boost coffee quality.

The introduction and monitoring of these new varieties have been funded by the European Union (from 2017 to 2022, through the BREEDCAFS project), and by the European Union and AFD (since 2021, through the ASSET project).

pierre.marraccini@cirad.fr
clement.rigal@cirad.fr



Tour of a coffee plantation in Son La province, Vietnam



Climate change
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FAIRCARBON Aiming for carbon neutrality

FairCarboN is co-coordinated by CNRS and INRAE, in partnership with CIRAD, and aims to develop the role of continental ecosystems in climate change mitigation and the attainment of carbon neutrality.

More information



The FairCarboN (“Carbon in continental ecosystems: levers and pathways for carbon neutrality”) exploratory Priority Research Programme and Infrastructure (PEPR) was launched on 11 April 2022. It has a six-year budget of €40 million, and issued an initial call for proposals as soon as it was launched. FairCarboN will be backing five target projects, to foster greater dialogue between the disciplines, locations, and parties involved. This exploratory PEPR should make it possible to precisely determine the contribution of continental ecosystems (natural, forest, agricultural, freshwater,

coastal, urban, and periurban environments) to climate change mitigation, and to identify the ecological, agronomic, and socio-economic mechanisms that can be activated for the transition to carbon neutrality.

> FairCarboN is funded through France’s fourth Programme d’Investissements d’Avenir (PIA4) funding mechanism

julien.demenois@cirad.fr

Dealing with drought: what is the future for agriculture and livestock farming?

What solutions are available to agriculture to deal with increasingly frequent drought events? For CIRAD, which has been addressing this problem for many years through its research in partnership in the countries of the South, this is now a crucial question because of climate change. For more than 20 years, CIRAD has been testing innovations in the Mediterranean and tropical countries to adapt agriculture and livestock farming to these climate events. Plant breeding, the choice of species grown, agroforestry, and so on are major

issues. As regards livestock systems, scientists agree on the advantages of livestock mobility. To develop ambitious and effective adaptation policies and to support farmers, CIRAD is calling for territory-based agricultural policies and far-reaching political mobilization.

From 27 November to 2 December, CIRAD co-organized the 7th Congress on Plant Production in Water-Limited Environments, with IRD and ISRA.

delphine.luquet@cirad.fr

Perforated pipe irrigation in the Popo region, Benin. This relatively low-cost technology saves a great deal of time for producers



More information



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Food systems

TA Territory-based approaches

AT Agroecological transitions

RELAX Boosting dietary diversity to address chronic malnutrition

A lack of dietary diversity means that people living in the cotton-growing regions in Burkina Faso still suffer from chronic malnutrition. Over four years, the RELAX project has brought together scientists from several disciplines to analyse the determinants of food diversity. It has produced operational recommendations to improve nutrition security for people in Burkina Faso.

More information



© A. Lourenço - Ruiz, CIRAD

In the cotton-growing regions of Burkina Faso, meals are based on a very limited number of foods

> RELAX was funded by Agropolis Fondation, the Fondation Daniel et Nina Carasso and Fondazione Cariplo.

Some parts of West Africa have considerably increased their agricultural production in recent decades. However, food and nutrition security for the people living there is still far from assured. In the cotton-growing regions of Burkina Faso, meals are based on a very limited number of foods: maize tô (a flour and water paste), groundnuts, okra, and a few leafy vegetables. Many perishable foods, such as mangoes, are seasonal, and gathered produce, such as fruits, is now much harder to find than in the past. Diversified foods are available on markets, but are unaffordable for most families. The lack of dietary diversity causes vitamin and mineral deficiencies that stunt growth in children, can cause irreversible physical and cognitive disorders and significantly increases mortality. As part of the RELAX project, a multidisciplinary scientific team has worked to understand how food diversity is shaped in rural households in Burkina Faso, between agricultural production, gathering and market purchases. Based on their in-depth studies, the researchers have identified different drivers and produced a number of operational recommendations, including the need to raise awareness of the importance of dietary diversity, to encourage variety in food production, and to promote agroforestry crops.

emmanuelle.bouquet@cirad.fr

Tunisia: women's dietary diversity is linked to varied agricultural production

A study by researchers from CIRAD, IRD and the Tunisian National Institute of Nutrition and Food Technology (INNTA) revealed systematic positive correlations between the diversity of farm products and that of the diets of women on 290 family farms in the governorate of Sidi Bouzid, Tunisia. The results, published in the journal *Plos One* on 8 February 2022, also highlight the role of the level of education and household incomes in diversifying diets.



Intercropping onions and olive trees in the Sidi Bouzid region, Tunisia. Varied crop production is a factor in dietary diversity

cedric.gaillard@cirad.fr

eric.verger@cirad.fr



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GEOGRAPHICAL INDICATIONS One international conference, two new GIs TA

2022 was a significant year for geographical indications (GIs), with an international conference and an initial two projects implemented with funding from Facilité IG (GI Support Fund): weda from Casamance and Karoo lamb. Things are looking good for this fast-growing concept.

The “Worldwide Perspectives on Geographical Indications” conference held in Montpellier from 5 to 8 July attracted more than 200 researchers, producers, policymakers and international organizations working on GIs, from 47 countries. It was organized by FAO and CIRAD, and served to pinpoint the future prospects for GIs. The topics covered included the legal definition, impacts in the marketplace, technical innovations and support for players. Also in 2022, two projects were launched with the support of Facilité IG, a fund for the development of geographical indications, launched in 2021 to run for four years and backed by the Agence française de développement (AFD). Weda or madd (*Saba Senegalensis*), a wild fruit from Senegal that is emblematic of Casamance, was the first project supported by the fund. The aim was to build a “Madd de

Casamance” geographical indication and structure the value chain, to make the Madd GI a sustainable territorial development tool. In South Africa, it was Karoo lamb, which is renowned for its taste and nutritional qualities, linked to the very specific semi-desert zone in which it produced, that was the object of a project supported by the fund, making the product South Africa’s second GI after rooibos tea. The next step will be to support the modernization of the existing traceability systems and train young chefs to use it.

coline.lenseigne@cirad.fr

mikael.oliveira_linder@cirad.fr

delphine.marie-vivien@cirad.fr

More information

“Worldwide Perspectives on Geographical Indications” conference



Madd project



Karoo lamb project



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Weda seller on the streets of Dakar [Senegal]

Will the French overseas regions be food self-sufficient by 2030?

A study coordinated by CIRAD and presented at the Paris International Agricultural Show presents 23 levers for boosting food self-sufficiency in the French overseas regions. The study, conducted at the request of the Agence française de développement with financial support from the Ministry for Overseas France, fits in with the objective set by the French President of adjusting farming policy to foster food self-sufficiency by the year 2030.

jacques.marzin@cirad.fr

sandrine.freguin@cirad.fr

Download the study [in French]:



Food systems
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Citrus fruits on a market stall in Réunion



© S. Della Muisia, CIRAD



One Health

B Biodiversity

BCOMING Protecting biodiversity to prevent the emergence of epidemics **B**

Human activity has reshaped natural habitats, resulting in the biggest threat to biodiversity to date. Its destruction facilitates the transmission of zoonotic diseases. In the current post-pandemic context, the BCOMING project aims to limit the emergence of infectious diseases by means of biodiversity conservation strategies.



© N. Porey, FFI

Julien Cappelle releases a bat fitted with a GPS beacon to track its movements and study its feeding habits

Officially launched in mid-September, BCOMING is a project on biodiversity conservation as a way of reducing the risks of infectious disease emergence, focusing on three tropical biodiversity hotspots (Cambodia, Guadeloupe and Guinea). BCOMING aims to develop a standardized data collection system and analysis framework to support, together with all the stakeholders, the co-construction of innovative biodiversity conservation strategies and zoonotic disease surveillance systems. It will comprise two stages: (i) Biological sample and standardized epidemiological, ecological, socioeconomic and environmental data collection, followed by processing and analysis specific to each study area, and (ii) Following an iterative participatory process in each study area, the knowledge and tools collected will be integrated to develop seven so-called agent-based models that will support the design of innovative biodiversity conservation strategies and zoonotic disease surveillance systems. BCOMING is coordinated by CIRAD and involves 14 partners from different sectors: academics from the biomedical, environmental and social sciences, private companies, NGOs and local and international stakeholders from Europe, Asia and Africa. Understanding the importance of preventing biodiversity loss in biodiversity hotspots is key to being able to react to future pandemics. BCOMING will therefore build on past international projects and join forces with the PREZODE initiative, to co-construct innovations with all stakeholders in the regions concerned.

julien.cappelle@cirad.fr

> The BCOMING project is co-funded by Horizon Europe, the European Union's Research and Innovation funding programme

Open-source tools for high-performance European health monitoring

How can we identify new signs of epidemics at an early stage, given the ever-greater risks of the emergence of new pathogens and the acceleration of their spread worldwide? The EU MOOD project, coordinated by CIRAD, is working on innovative, user-friendly tools to improve health monitoring in Europe. It is working on two fronts: research on the above questions (52 scientific articles published already) and the development of a health monitoring platform comprising three innovative open-source modules.

elena.arservska@cirad.fr

More information



Covid-19 information board on a street in Jakarta, Indonesia



A. Rival © CIRAD

ZooCov The One Health approach in action in Cambodia

Wild meat consumption is common in Southeast Asia, and can result in virus spillover to humans. Over a year and a half, the ZooCov project, coordinated by CIRAD, looked at the surveillance and early detection of pathogens hosted by wildlife in Cambodia.

It was probably in Southeast Asia that the SARS-CoV-2 virus behind the Covid-19 pandemic originated. The ZooCov project, launched at the start of the Covid-19 pandemic, is a concrete example of the merits of the One Health approach, which is vital for preventing the emergence of new diseases and potential future pandemics. ZooCov focused on four lines of research: identifying and analysing the main wildlife trade chains in two pilot areas; analysing wild meat consumption practices; documenting (i) the diversity of betacoronaviruses in wild meat and in certain bat and rodent colonies in the study areas, (ii) human exposure to those betacoronaviruses, and (iii) predictors of that human exposure to betacoronaviruses; and developing a methodological framework to incorporate early detection of betacoronavirus spillover to humans. Two years on, the project has delivered its results. The first success is the concrete implementation of the One Health approach, which consists in tackling animal health, human health and environmental health issues simultaneously. The inclusion of social sciences right from the start of the project is another of its successes, and served to build a substantial anthropology component. The figures compiled by the project will serve to anchor the future integrated surveillance network for which CIRAD and its partners have already laid the foundations, in line with the One Health approach.

veronique.chevalier@cirad.fr



© V. Chevalier, CIRAD

Samples were taken from humans as well as from animals

> The ZooCov project was funded by the Agence nationale de la recherche and the Occitanie Regional Council.

African swine fever: launch of an international cooperation programme on biosecurity

The international cooperation programme BIG (biosecurity in pig production) led by France in ASEAN countries (Cambodia, Laos, Philippines, Vietnam) has been officially launched, following a study visit to Brittany and Paris by coordinators from the four beneficiary countries. The programme, to be rolled out between 2022 and 2025, aims to

control African swine fever (ASF). It is led by ENSV-FVI/VetAgro Sup on behalf of the Ministry of Agriculture and Food Sovereignty, in partnership with IFIP, CIRAD and AVSF.

> BIG is funded by the Standards and Trade Development Facility (STDF) and the French Ministry of Europe and Foreign Affairs.



Pig farm in Laos

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One Health
All our news items



Territory-based approaches

CC Climate change

AT Agroecological transitions

FS Food systems

BIO4AFRICA Farm income diversification through residual biomass AT FS

A consortium of 25 partners involved in the Bio4Africa project is exploring ways to make use of agricultural waste. Processed through seven different methods that are adapted to local conditions and needs, this waste is turned into animal feed, fertilizers or pollutant removers.



Agricultural waste, or residual biomass, is a veritable gold mine. It can be turned into animal feed, fertilizers, pollutant removers, cooking fuel or packaging

Using agricultural waste to diversify the income of farmers in Africa is the goal of an international consortium involved in the Bio4Africa project since June 2021. If integrated into a circular economy approach, agricultural waste – or residual bio-

mass – is a veritable gold mine. It can be turned into animal feed, fertilizers, pollutant removers, cooking fuel or packaging.

In total, seven processing methods are being implemented in four pilot areas in Ivory Coast, Ghana, Uganda and Senegal: green biorefining, pyrolysis, hydrothermal carbonization, briquetting, granulation, biocomposites, and bioplastics. These simple bio-based technologies, which are adapted to residual biomass and to local needs and contexts, are being tested in real conditions by 300 individual farmers and farmers' groups of all sizes. From March 2022, a first technology will be tested in Uganda, then in Ghana. This is a biorefining unit. Local farmers will provide residual biomass from legume production. Once processed into press cakes, this waste is a good source of animal feed. Ultimately, the consortium aims to reach a production capacity of one tonne of residual biomass per hour. In Ivory Coast, one of the objectives is to set up water filtration systems using activated carbon. The originality of the process, developed in partnership with Universidade Federal de Viçosa in Brazil, lies in the use of agricultural waste (cashew nut shells and palm kernel shells) that is turned into charcoal by pyrolysis.

> Bio4Africa is supported by the EU H2020 Research Innovation Action programme

jean-michel.commandre@cirad.fr
patrick.rousset@cirad.fr

Including women and young people in decisions about the future of their territory in Tunisia CC

It was young people in rural areas who started the revolutions of 2011 by protesting against poverty, unemployment and social inequalities. Ten years on, those inequalities remain, and young people still have few prospects. By working to include certain groups, the PACTE project (Programme of adaptation to climate change in vulnerable territories in Tunisia) has been helping to change matters over the past four years. CIRAD has provided its expertise in terms of participatory processes. In five rural parts of Tunisia, 4000 people

from all walks of life have been contributing to a vast participatory territorial planning process. Participatory workshops have been organized and managed in such a way as to encourage women and young people to express themselves. CIRAD's researchers have supported the participatory and inclusive aspects of the programme. They have co-written a chapter in a recent book, *Inclusion for transformation*.

emeline.hassenforder@cirad.fr
guillaume.lestrelin@cirad.fr

PACTE project >



< Download the book "Inclusion for transformation"



LAND ACQUISITIONS Large-scale land deals exact a high price on the planet

Despite the progress made on national and international policy, there has been little change in land investment and governance practices. A new study on land deals in Africa showed their staggeringly low compliance with the principles set out in the Voluntary Guidelines on the Responsible Governance of Tenure adopted by the international community in 2012.

Emerging evidence shows that large-scale land acquisitions in low-income countries are associated with a range of negative environmental impacts. Land investments for commercial agriculture often result in the conversion of cropland, pasture and forest to large-scale monocultures for mechanized production, supported by the construction of dams, greenhouses, buildings and irrigation systems. A direct causal relationship has been identified between land use conversion and biodiversity loss. To date, 87% of LSLAs have been in regions of medium to high terrestrial biodiversity. The new study on land deals in Africa, published in May 2022 by the Land Matrix, an international initiative set up to monitor land acquisitions, of which CIRAD is a member, revealed that that 78% of the 540 land acquisitions assessed did

not comply with international land tenure policy guidelines and showed scant respect for the 2012 Voluntary Guidelines on the Responsible Governance of Tenure. In the light of the results of its study, the Land Matrix Initiative recommends fast-tracking land reform and imposing more stringent and binding corporate and investor country accountability. *"With increased transparency and monitoring"*, the researchers advocate.

ward.anseeuw@cirad.fr • jeremy.bourgoin@cirad.fr



Land investment zone in the Sahel

© J. Bourgoin, CIRAD

Download the study:



Giving visibility to pastoral activities in Senegal: a question of justice

In the region of the Senegal River delta, pastoral livestock systems concern more than 50 000 people, twice as many as sedentary livestock systems. The herds are also much larger and supply local meat and dairy markets. Despite the demographic, economic and social

importance of pastoralism, it still lacks visibility on most maps showing agricultural activities in the country. It is therefore generally ignored by public policy and investment. A group of scientists including researchers from CIRAD has developed a simple method to

assess pastoral activities in the Senegal River delta, which it published in *Land Use Policy*, and is calling for the inclusion of these activities in governance processes.

jeremy.bourgoin@cirad.fr

Read the study:



Movement of livestock between cultivated fields, Senegal River delta



Territory-based approaches
All our news items



Sustainability

Value chain research in the spotlight

Value chains were originally the basic framework for CIRAD’s research. This type of research is still a major priority for us, and is relevant for addressing more modern-day issues such as sustainability. Interview with François-Xavier Côte, Head of Tropical Supply Chains, who presents the shift in CIRAD’s research priorities in terms of value chains and gives examples of related alliances and projects.

CIRAD has launched a reflection on “value chains”. What does that actually mean?

The “value chains” reflection is one of three institutional reflections* at CIRAD. As such, it is written into the establishment’s contractual objectives, set out in the 2020-2024 Scientific partnership and strategy objectives (OSSP2), with the ambition of renewing CIRAD’s value chain research. This means identifying inter-unit research priorities and methods for their implementation. That value chain research consists both in generating knowledge of a given plant or crop and “action research” in collaboration with various value chain stakeholders, to build innovations to help make value chains more environmentally and socially sustainable. CIRAD has expertise in more than 35 value chains (primarily crops but also livestock). For the value chains that are most important for CIRAD, we have produced roadmaps setting out the current and future challenges and priority research topics and innovations for the coming decade. Nine roadmaps had been completed by the end of 2022 (banana and plantain, cocoa, rice, coffee, rubber, oil palm, roots and tubers, cotton, and sugarcane), and four are due in early 2023 (horticulture, sorghum and millet, milk and dairy products, and coconut).

Could you tell us a bit more about the research priorities set out in the roadmaps?

They are specific to each chain, but can be loosely classed in four categories: reducing the adverse environmental impacts of production systems and adapting chains to global change, particularly climate change; promoting diversity within production systems and developing new varieties, to make chains more sustainable; supporting smallholder capacity building and incomes within the framework of chains that form the building blocks of sustainable food systems; and helping to develop multi-stakeholder alliances to ensure greater sustainability.

These value chain priorities are closely related to CIRAD’s six priority research topics. From a practical point of view, we are currently drafting summaries of the roadmaps, to facilitate discussions with our partners. These short documents contain an analysis of the challenges and CIRAD’s ambitions for each value chain. In 2022, the cocoa roadmap summary was widely distributed at the International Symposium on Cocoa Research co-organized by CIRAD in Montpellier.

Cocoa roadmap summary



And how will the priorities set out in the roadmaps be implemented?

In house, at CIRAD, through transverse approaches, both across units and across disciplines. Those approaches will be facilitated by specific staff members: our “value chain correspondents”. They are scientists specializing in each value chain, with extensive knowledge of stakeholders and of the situation on the ground. They are important contact points for people and institutions looking to work with CIRAD. The key to implementing the roadmaps is also research in partnership. The value chain roadmaps are intended to be discussed and supplemented with our research partners and the various stakeholders and decision makers in the value chains. It is those discussions and exchanges of views that will serve to build synergies, projects and alliances in favour of more sustainable value chains.

You mention alliances and projects in partnership as a logical consequence of the renewal of CIRAD’s value chain research. Can you give a few examples?

As far as projects are concerned, one example is the PRETAG (Pesticide Reduction for Tropical Agriculture) initiative, which was launched in 2022 and is supported by Agropolis Fondation and FARM. This interdisciplinary project associates scientists (from CIRAD, IRD, Institut Agro, CNRS and INRAE) and value chain stakeholders. It aims to document, test and implement technical, organizational and economic strategies for cutting pesticide use in five major tropical value chains: market gardening, rice, coffee, cocoa and banana.

The alliances I referred to are multi-stakeholder consortiums (producers, processors, distributors, public policymakers, NGOs, scientists, etc), which CIRAD develops or in which it participates. The aim is to co-build solutions and facilitate the implementation of inter-player “governance”, to foster the development of sustainable value chains. The ECOFFEE R&D initiative and the French sustainable cocoa initiative are two examples. Within those initiatives, CIRAD researchers provide scientific data to inform decision making and feedback for use in building impact pathways. ■

*The other two institutional reflections are “Gender” and “Software platforms”.

ECOFFEE R&D > initiative



< French sustainable cocoa initiative

Find out more about tropical agricultural value chains



CIRAD's commitment

Science with and for society



Society's confidence in scientific research has been put to the test lately, notably due to the many crises affecting humanity. This has prompted CIRAD to take a stand in favour of new relations between science and society, built on commitment, openness and exemplarity.

Interview with Sylvain Perret, Director of CIRAD's "Environments and Societies" Department and author of the position paper on "Science with and for society", of which a summary was published in June 2022.

Why has CIRAD taken a stand on science-society relations?

There are three main reasons. Firstly, we included science with and for society in our strategic vision, through our "training" and "innovation with impact" ambitions. Aside from our specific commitment, the national context has encouraged us to practise research with and for society: this is the framework set by the 2021-2030 research programming act, which sees strengthening the links between science and society as a priority. Lastly, the EU has also made it a priority.

What are the main bones of the paper?

CIRAD's position rests on three pillars, defined in accordance with our values, and seven priorities, based on a range of activities already underway and on existing internal structures. A commitment to sustainable development, openness and exemplarity are the three pillars that guide our operations in favour of science that works with and for society. Two priorities relate to that commitment: research determined to assess its societal impact, and science of use to public action for sustainable development. Three relate to openness: open science, more participatory science, and science focused

on society. Lastly, two priorities relate to exemplarity: a research organization that sets an example in terms of its environmental and social impact, and is responsible in its relationships with partners, and rigorous ethics practices and frameworks. Those priorities, which are intertwined, take the form of active engagement on various levels, on the part of different groups within CIRAD.

How was the summary drafted?

It is a short version of the paper presented to the CIRAD Science Council in March 2022, which was the fruit of a debate within the organization between 2019 and 2021 by a specific working group. It was widely discussed in house and validated by the Science Council before being presented to and approved by the Board of Trustees.

A position paper... and then what?

It is important to stress that a dynamic has been triggered, and that this summary is a first step towards a long-term, structured, concrete commitment on CIRAD's part. An action plan is due to be drafted in the near future, which I hope will be backed by specific resources and a range of in-house contributions. ■



Seven priorities for action

Commitment

Research determined to assess its societal impact

Science of use to public action for sustainable development

Openness

Open science

More participatory science

Science focused on society

Exemplarity

A research organization that sets an example in terms of its environmental and social impact, and is responsible in its relationships with partners

Rigorous ethics practices and frameworks

Read the summary of the position paper:



Meeting of the territorial committee for Kairouan within the framework of the Programme of adaptation to climate change in vulnerable territories in Tunisia (PACTE project)

Publications, research data

Commitments and output in favour of open science

Institutional recommendations for knowledge sharing, global Coalition for Advancing Research Assessment, second international *Science ouverte au Sud* symposium, etc, etc. A look back at some of the highlights of 2022.

In 2022, in line with its commitment to open access to knowledge and open science, CIRAD drafted recommendations regarding publications, research data management and dissemination, and assessment of its scientific output. It has adopted a five-point code of conduct, set out on the CIRAD open access portal: CIRAD is committed to open access to knowledge; it promotes the publication of its research by reputable publishers; it recommends open access journals to publish in or to review articles; it develops management and dissemination of its research data; and it reports on the diversity of its scientific output.

On 29 September, it joined the global Coalition for Advancing Research Assessment (COARA), led by the European Union. The agreement includes four core commitments, to: recognize the diversity of contributions to, and careers in, research in accordance with the needs and nature of the research; base research assessment primarily on qualitative evaluation for which peer review is central, supported by responsible use of quantitative indicators; abandon inappropriate uses in research assessment of journal- and publication-based metrics, in particular inappropriate uses of Journal Impact Factor; and avoid the use of rankings of research organ-



izations in research assessment. In signing the agreement and joining the coalition, CIRAD, along with the 360 other signatory organizations, including 38 in France (as of 18 November 2022), has committed to contribute to the reform and share relevant progress with the other signatories and with the community as a whole.

With IRD and the Académie nationale des Sciences, Arts et Lettres du Bénin (ANSALB), CIRAD co-organized the second *Science ouverte au Sud* (open science in the global South) symposium in Cotonou (Benin), from 25 to 27 October. The chosen topic was research data management and accessibility, and the aim was to inventory corresponding approaches in Africa, particularly French-speaking Africa, and to share and promote good practice. The symposium was an opportunity for CIRAD to share its experiences and achievements in this field and give its partners in the global South the new, supplemented version of its “Liberate Science” research data game.

Since its launch in 2021, the CIRAD “Sharing knowledge in sciences” open access portal has included its “Where to publish” database of reliable journals in the life sciences, social sciences and engineering sciences applied to agriculture. The portal provides access to all the open-access recommendations, scientific journals, publications and research data produced or co-produced by CIRAD. ■

marie-claude.deboin@cirad.fr

Find out more:



CIRAD's commitments to open science



Coalition for Advancing Research Assessment



Sharing knowledge in sciences: the CIRAD open access portal



Science ouverte au Sud symposium



Where to publish



Partnerships, training and communication



Partnerships Strong institutional commitments

March

CIRAD and AVSF jointly commit to sustainable rural development in the global South

On 2 March 2022 at the Paris International Agricultural Show, CIRAD and Agronomes & Vétérinaires Sans Frontières (AVSF) signed a framework agreement aimed at enhancing their capacity for action research, innovation and training to support rural populations and family farming in the global South. Building on complementary expertise, they will work together to help their partners to develop solutions that are in line with the major transitions underway (in agroecology, food, climate and health).

June

Territorial management in the Amazon: CIRAD and the state of Pará continue their cooperation and sign a new agreement

On 24 June 2022, CIRAD and the state of Pará Environment and Sustainability Secretariat (SEMAS Pará, Brazil) signed a new technical cooperation agreement, which fits in with the implementation of a new territorial development policy for the state of Pará. Under the new agreement, CIRAD will be providing the state of Pará with support and technical expertise to draft that policy, which is one of the pillars of the "Amazônia Agora" programme, a development plan introduced by the current state governor.

October

New cooperation agreement between FAO and INRAE, CIRAD and IRD to support the transformation of agrifood systems

On 18 October, on the occasion of its Science and Innovation 2022 Forum in Rome, FAO signed a Memorandum of Understanding with three French Research Institutes – INRAE, CIRAD and IRD – in order to continue their collaboration to support agrifood systems transformation for the period from 2022 to 2027. This cooperation agreement conveys a strong desire to develop international partnerships to tackle the challenges of climate change, biodiversity, sustainable management of natural resources and the transformation of agrifood systems.



An ever more active network

A meeting in Montpellier, assessments, expansions, a new platform in partnership for research and training (dP) in the Indian Ocean, and more. 2022 was an eventful year for the dPs, which have boosted their dynamism and impact, after the two-year health crisis.

Following the lifting of the restrictions due to the Covid-19 pandemic, the dPs were able to meet in Montpellier in late June 2022. It had been three years since they had been able to meet face-to-face. The eagerly awaited meetings were a reminder, if such a reminder were needed, of how important it is for the dPs to meet in person rather than remotely. There was another specificity in 2022: for the first time, the dP coordinators not from CIRAD were able to take part. Eleven partners were invited, from Brazil and several countries in Africa and Asia. A half day was devoted to transverse presentations, and the rest of the time primarily to round tables. Communication, one of the ambitions set out in the roadmap, was centre-stage, with a presentation of the presence of the dPs on social media, notably a highly active Twitter account: "InteR_dPs". The topic of open science also proved very interesting. The partners will be meeting again in Montpellier on 29 and 30 June 2023.

Assessments, to develop better

The texts formalizing the existence of the dPs stipulate that each platform must be assessed every five years by an independent panel of three international experts with complementary expertise. A first series of assessments was conducted in 2016 and 2017, and a second was launched in 2021, and conducted in 2022. For each assessment, the panel spent around a week on site, meeting the range of partners, conducting field visits, and attending scientific events. For the PP-AL platform, with no fewer than 17 partners, remote bilateral discussions were organized with the partners ahead of the mission. These assessments are vital for the dPs concerned, serve to build cohesion and allow debate, analysis and forward planning. Choosing their assessors also dPs to promote their activities to potential new members.

Agile structures

The dPs are not set in stone. Indeed, their flexibility is one of their main assets. While most were extended in 2022, some have changed and others have expanded. For instance, the GovInn platform, which initially covered just South Africa, has broadened to cover other countries in southern and West Africa, and is now called PP&G. In Latin America, the Agroforesta platform took on four new members in 2022, from Colombia, Ecuador, Mexico and Nicaragua. A debate is under way within the Amazonie platform, which is aiming to expand to cover other areas in Brazil, Colombia and Peru. In this last case, the priority is territory-based approaches, with a focus on land use management and biodiversity protection.

Biocontrôle-OI: a new dP

In most Indian Ocean countries, agriculture is a major part of the economy. There is growing demand from society for an agroecological transition to more resilient, environmentally-friendly farming. Biocontrol at least partly satisfies that demand, by making use of natural mechanisms. To support that transition, CIRAD and its partners in the Indian Ocean have launched a new platform in partnership for research and training, Biocontrôle-OI. The new dP associates 11 partners, notably with a view to facilitating a reduction in synthetic pesticide use, improving territorial monitoring and plant health early warning and quarantine systems, and building scientific, economic and technical skills. ■

tanguy.lafarge@cirad.fr



Maize is widely cultivated in the Indian Ocean region, but is threatened by several pests and diseases

© H. Delatte, CIRAD

The dPs, a novel type of scientific partnership

CIRAD and its partners have been building platforms in partnership for research and training (dPs) since 2009. They are long-term alliances with shared governance, fostering critical mass and interdisciplinarity. Shared research programming has resulted in a portfolio of projects, often funded following competitive calls.

The dPs in figures:

CIRAD is a member of **22 dPs**

700 people, including **144** assigned by CIRAD

179 partner organizations

77 countries

2 international institutions

7 CGIAR centres

Ceva santé animale **A public-private partnership to benefit animal health**



08

Almost a decade after their fruitful partnership began, Ceva santé animale and CIRAD have signed a framework agreement and been given funding from BPI France for a project on the rapid development of RNA vaccines against avian influenza and swine flu.

Interview with Gwenaëlle Dauphin, coordinator of Ceva’s scientific operations.

WHAT IS CEVA, AND HOW DID YOU COME TO WORK WITH CIRAD?

Ceva santé animale is the world’s fifth largest veterinary pharmaceuticals group, with 6500 employees in 46 countries. CIRAD and CEVA first worked together in 2013, on a tool for assessing vaccine and animal disease control strategies within livestock value chains, developed by CIRAD: EVACS. Ceva santé animale enabled the tool to be applied to highly pathogenic avian influenza management in several countries (Bangladesh, Egypt, Indonesia, Tunisia and Vietnam). Our partnership was built mainly around avian influenza A(H5) in developing countries, since Ceva has a novel approach: vaccinating in hatcheries rather than on farms. This work showed that using the Ceva vaccine in hatcheries provides better vaccine coverage. Scientific publications, reports and national meetings were held. Our research served to convince the veterinary authorities that our technological approach is better. This public-private partnership continued in 2018 with a French government-funded PhD thesis, resulting in a 3.5-year collaboration and the improvement of the EVACS tool and the development of new modules. Like CIRAD, Ceva santé animale is a member of the PREZODE global initiative for the prevention of epidemics.



WHAT WAS 2022 AN IMPORTANT YEAR FOR THE PARTNERSHIP BETWEEN CEVA SANTÉ ANIMALE AND CIRAD?

The year began with the signing of a framework agreement, which came into force on 1 January, to run for five years. The agreement sets the rules of our collaboration; it includes studies, research and support work, and also supervision of internships, theses, post-doc courses, etc. A specific agree-

ment has also been signed as part of the framework agreement, relating to the BioFluARN project. The project, with a 1.1-million-euro budget 50-50 co-funded by the BPI (French public investment bank) and Ceva, aims to set up a rapid, efficient structure to develop vaccines against avian influenza and swine flu, ranging from field data gathering to the selection of usable sequences, and vaccination strategies for livestock value chains. In addition to co-funding the project, we are co-supervising it, and have provided a large volume of data thanks to studies by our subsidiaries in a range of countries.

WHY WORK WITH CIRAD?

CIRAD’s status as a Public Industrial and Commercial Establishment (EPIC) ensures a significant amount of room for manoeuvre for this type of public-private partnership, giving it substantial freedom of action. Moreover, CIRAD has internationally recognized expertise in the field of veterinary epidemiology. ■

<https://www.ceva.com/fr/ceva-accueil/>

MORE INFORMATION:



A partnership between GeoWatch Labs and Cirad’Innov® is helping sugarcane producers see more clearly

Two questions for Thibaut Humbert, GeoWatch Labs co-founder

What is GeoWatch Labs?

GeoWatch Labs is an agricultural season monitoring solution combining satellite data, agronomy and artificial intelligence. This involves detecting crops in the fields and studying the conditions they grow under (rainfall, temperatures, air humidity, soil moisture, sunshine levels, etc), from emergence to harvesting. The data gathered are then cross-referenced with agronomic formulas

and satellite images. The aim is to update yield forecasts throughout the season. We can provide forecasts on an agricultural plot scale or for all the plots across a given country, for instance. Our methodology was developed to work in any situation: developed and less developed countries, family farms or vast, intensive plots.

What form does your partnership with Cirad’Innov® take?

Our partnership with CIRAD centres on sugarcane. We talked to the MASH (Mapping Sugar-

cane Harvest) project team. MASH combines several Earth observation satellites, which overcomes the cloud cover issues that often affect the data we work with. The tool serves to see if and when fields are harvested. It is a valuable decision support tool for sugarcane, which is often partially harvested. We have included MASH in our analytical value chain, working constantly since October with teams at CIRAD, and are working together on possible improvements.



© Unsplash

Training

Innovation is the watchword

In 2022, CIRAD's training team continued along the same lines as 2021: implementing capacity-building projects on the one hand and supporting training within CIRAD's research units on the other. Those activities benefited from a consolidated team, with innovation as its watchword.

Partnerships with the global South are booming

POLLENIS, the new joint research unit with Institut Agro combining training and the global South, is helping to build synergies between the two organizations in order to respond better to demand from partners in the global South. For instance, two projects in partnership with African establishments [PEAs] have gained momentum: PETTAL, in Senegal, aims to make graduates of USSEIN University more employable and centres on the topic of "agroecology and sustainable food production", working with socioeconomic players within a "university-territory-business" continuum. The BIOVALOR project in Benin, for its part, is working to professionalize students from the Faculty of Agricultural Science at Abomey-Calavi University. In the past year, eight theses have begun and curricula have started to evolve to include skill-building aspects.

The TALENT programme, coordinated by CIRAD to raise sustainability awareness among managers of agricultural plantations in Southeast Asia through training, was launched following a feasibility study. Many operations have begun with the partner universities in Indonesia and Thailand, to renovate courses or short training sessions and offer summer schools, backed by a multidisciplinary group of experts, academics and practitioners from France and Southeast Asia. A digital programme, e-TALENT, is also under construction and will offer a novel type of training in plantation sustainability issues.

A plantain banana project ends, an initiative on pulses begins

A training component was included when building LegAE, a project to support the agroecological transition and food security in Africa aiming to identify the opportunities, obstacles and levers along the value chain, from pulse production to consumption. The project, funded by the French Ministry for Europe and Foreign Affairs since April 2022 and for two years, centres on systematic co-construction, from formulation to implementation, monitoring and assessment.

Two projects came to an end in 2022: one, on agricultural training for plantain banana growers in Africa (FABA), produced a range of results. It triggered a real partnership dynamic within the plantain banana value chains in Cameroon and Ivory Coast. The second, Erasmus+ Geomag, coordinated by the University of Carthage (Tunisia), primarily set out to help optimize agricultural territory and environment management in Tunisia via better use of geomatics. Fourteen training modules were built and tested at universities, providing 1070 students and 380 professionals with training. ■

magali.dufour@cirad.fr



RR

The CIRAD alumni network is taking shape

Interview with Gabriel Denis, who joined the training team in 2022. His job includes setting up a CIRAD alumni network.

Gabriel is deputy to Magali Dufour, Higher Education and Training Officer at CIRAD.

What was your professional background before you joined CIRAD?

My background – a management science qualification, specializing in quality and environment management – allowed me to build up a range of experience, both of the topics covered directly and of the surrounding geographical and cultural environment. For instance, I had the opportunity to oversee sustainable development and CSR policy, firstly within firms and then at a school of engineering. I was a research assistant at a Swiss business economics college (HEIG-VD) and I also went to Quebec for a short time (after spending my childhood there), to work in fair trade coffee and sugar, with a Peruvian producer cooperative. Most recently, I mainly worked building international higher

education and research collaborations: in seven years, I worked in Grenoble (INP), Toulouse (INSA) and then Norway, at the French Embassy.

What will you be doing at CIRAD? Tell us about 2022 and your plans for 2023

I joined CIRAD in September 2022, and will be supporting its training operations in three ways. I will be helping to build academic training partnerships, in both the global North and the global South, supporting and promoting the role of training in research projects, and launching an alumni network. Above all, 2022 allowed me to discover the wealth of activities and people at CIRAD. I arrived just in time to participate in the debate on and initial activities relating to the launch of an in-house community of

practice on training. But it's in 2023 that things will be hotting up for me! We intend to launch an alumni network, primarily to federate former CIRAD PhD students. This is vast operation in which we will have to juggle the expectations of that community (400 PhD students pass through CIRAD each year) and the need to mobilize CIRAD staff members in France and overseas to lead the network. In the aftermath of Covid, such networks are keener than ever to return to "normality", with the possibility of holding face-to-face meetings again. In May 2023, Campus France (the body set up by the French Ministry for Europe and Foreign Affairs and the Ministry of Higher Education and Research to promote higher education) will be launching the first World Alumni Day, so we can expect to see a range of events all over the world. ■

IDBio, France-Africa Chair in sustainable biosourced product engineering training: more innovation and jobs

Our team, in conjunction with the BioWooEB research unit, helped to build a new UNESCO Chair, IDBio, due to begin in January 2023 and headed by INSA Toulouse, with six French higher education and research establishments (INRAE, CNRS, CIRAD, Toulouse INP, IMT Mines Albi and Agro Montpellier) and six African universities (UAC in Benin, UJKZ in Burkina Faso, INP-HB in Ivory Coast, the University of Lomé in Togo, UGB in Senegal and the University of Antananarivo in Madagascar). The network of excellence will generate innovations with repercussions for sustainable and local economies, by targeting eco-designed renewable resource and waste (bio) processing technologies to make products for use in the chemicals, energy, health, biomaterials, nutrition and environmental fields. The Chair will thus fit in with most of the UN sustainable development goals (SDGs). New initial training and training through research programmes are due to be built collaboratively, to enable the professionalization of graduates. French and African industrial firms will be associated, to guarantee that the training is relevant, that students are employable and that the project has a long-term future, through the provision of continuing training. Skill sharing will be combined with the use of innovative teaching methods, to build programmes to attract as many young people as possible, particularly young women, to a career in scientific engineering.



2022 PUBLICATIONS

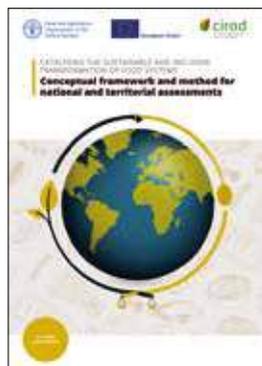
2022 saw a wealth of publications by CIRAD and its partners: scientific works and studies, co-published reports and guides, and books for the general public, amongst others.

There is a selection below, and we suggest you find out more via our website (cirad.fr) and that of Editions Quae, of which CIRAD is a co-founder (quae.com).

Co-publications

Catalysing the sustainable and inclusive transformation of food systems

CIRAD has co-signed a guide to analysing food systems, with the European Union and FAO. The methodology, which was developed by scientists from CIRAD, has been used to assess food systems in 54 countries. The diagnoses were conducted within the framework of the Food System Assessment project.



Conceptual framework and method for national and territorial assessments – Catalysing the sustainable and inclusive transformation of food systems

H. David-Benz, N. Sirdey, A. Deshons, C. Orbell and P. Herlant, 2022, Rome, FAO, Brussels, European Union and Montpellier, France, CIRAD

<https://doi.org/10.4060/cb8603en>

The Forests of the Congo Basin: a new report to foster better management of Congo Basin forest ecosystems

The 2021 report on the state of forests in central Africa was officially presented on 7 July in Libreville (Gabon), alongside the 19th Meeting of the Parties to the Congo Basin Forest Partnership, which was celebrating its 20th anniversary. Some 20 CIRAD scientists were involved in drafting the report.



The Forests of the Congo Basin: State of the Forests 2021

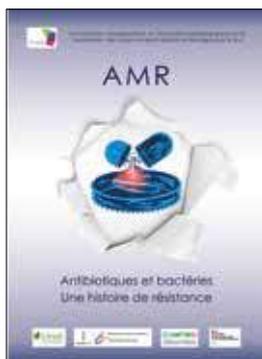
R. Eba'a Atyi, F. Hiol, G. Lescuyer, P. Mayaux, P. Defourny, N. Bayol, F. Saracco, D. Pokem, R. Sufo Kankeu and R. Nasi, 2022. Bogor, Indonesia: CIFOR, 474 p.

<https://doi.org/10.17528/cifor/008700>

Books for the general public (in French)

Antimicrobials and bacteria, a story of resistance

Antimicrobials are both over-used and used inappropriately, and bacteria are becoming increasingly resistant to them. This book provides keys to understanding the complex phenomenon of antimicrobial resistance (AMR), an understanding that is vital to any change in practice.



AMR | Antibiotiques et bactéries Une histoire de résistance
G. Charbonnier, G. Laveissière, CIRAD, 2021, 103 p.

Are mosquitoes public enemy no. 1?

Where do mosquitoes come from? Are they just pests? Can we rid France of tiger mosquitoes? These and many other questions are answered in this summary of current knowledge of mosquitoes and control methods.

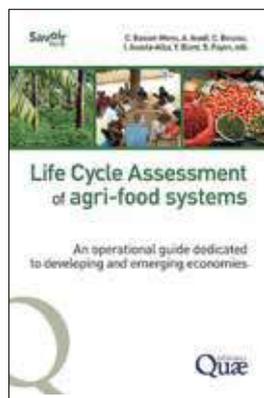


Le moustique, ennemi public n°1?
S. Lecollinet, D. Fontenille, N. Pagès, A.-B. Failloux, Editions Quae, 2022, 168 pages

Scientific works and studies (in English)

Life Cycle Assessment of agri-food systems

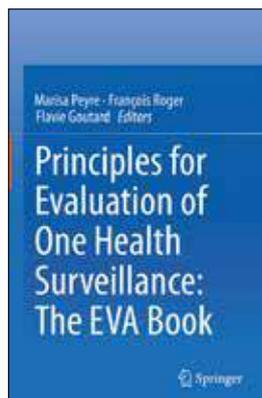
An operational guide devoted to emerging and developing economies has just been published. The book provides recommendations based on more than ten years of scientific experience, for conducting Life Cycle Assessments of agrifood products.



Life Cycle Assessment of agri-food systems
Editorial coordination:
C. Basset-Mens,
A. Avadi,
C. Bessou,
I. Acosta-Alba,
Y. Biard, S. Payen,
Editions Quae,
2021, 210 p.

Principles for Evaluation of One Health Surveillance

In view of the growing importance of health surveillance and in response to the threats posed by epidemics such as the coronavirus pandemic, this book is an essential guide for stakeholders in health systems worldwide. It offers a step-by-step approach with a detailed methodology, examples and practical tools. It explains how to communicate the results of such evaluations to decision-makers, and includes a chapter on the challenges of evaluation and innovation requirements.

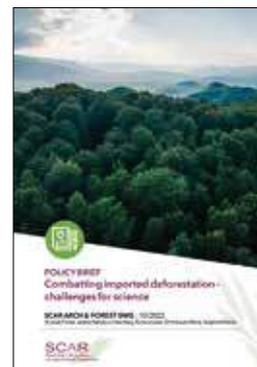


Principles for Evaluation of One Health Surveillance: The EVA Book
M. Peyre,
F. Roger,
F. Goutard,
Springer, 2022,
320 p.

<https://doi.org/10.1007/978-3-030-82727-4>

Combatting imported deforestation: challenges for science

European imports are responsible for some 16% of global deforestation due to trade. In response, the European Union recently laid the foundations for legislation banning imports of products linked to deforestation. However, everything remains to be done as regards implementation, and there are still several gaps in knowledge and lines of research. Experts from the Standing Committee on Agricultural Research, of which CIRAD is a member, have issued a policy brief pinpointing those gaps and making several recommendations for decision makers and donors.



Combating imported deforestation - challenges for science
N. Picard,
J. Rebola
Lichtenberg,
R. Groven,
E. Albina,
S. Harrer,
SCAR ARCH &
Forest SWG, 2022,
8 p.

Scientific works and studies (in French)

Pasture-livestock farming and sustainable development

In Mediterranean and tropical zones, family pasture-ruminant farms contribute directly to eight of the seventeen 2030 UN sustainable development goals (SDGs). They have undeniable assets in terms of achieving the SDGs, in interaction with other types of livestock farms in the territories concerned. However, such farms were for a long time marginalized by agricultural investment efforts, and they face a range of constraints that threaten their long-term future.



Élevages au pâturage et développement durable des territoires méditerranéens et tropicaux
Editorial coordination:
A. Ickowicz
and C-H. Moulin
Editions Quae,
2022,
210 p.

Sharing territories between multiple users: the commons approach

Forests, water tables, fish, and so on... a multitude of natural resources are under threat of over-use by humans. Between public management and private management, Elinor Ostrom and other scientists have been calling for over 30 years for a 'third way': commons. A group of researchers from CIRAD recently published a book based on that work, proposing a new way of looking at international cooperation. The book covers 20 years of field research and a dozen disciplines.



Les communs. Un autre récit pour la coopération territoriale
Coordination:
S. Aubert
and A. Botta,
Editions Quae,
272 p.

Rearing large camelids

This is a reference book on dromedaries and Bactrian camels. These animals' resistance and the quality of their products – milk, meat and wool – make for a prosperous value chain well beyond the desert regions of Africa and Asia. This practical guide gives comprehensive information on these species and technical and medical advice.



L'élevage des grands camélidés
B. Faye,
G. Konuspayeva,
C. Magnan,
Editions Quae,
2022, 204 p.

Communication: podcast, newsletters, videos...

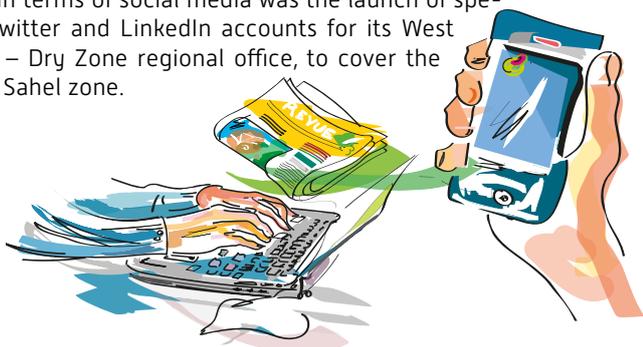
CIRAD is constantly innovating, to promote its scientific research

Along the lines of *Nourrir le vivant*, its podcast launched in March 2022, CIRAD innovated throughout the year, to boost the attractiveness and quality of its communication operations. One of the aims was to help re-establish the connection between science and society.

In 2022, the CIRAD Communication Office multiplied the number of different products to reach its wide range of targets: scientific partners, donors, public institutions and local authorities in both the global North and the global South, civil society organizations, socioeconomic players, journalists and students. Its new products included *Nourrir le vivant* (Feeding the living world), a podcast, which was launched at the Paris International Agricultural Show in March. The podcast now has two seasons under its belt – the first on food and the second on biodiversity – and each episode includes interviews with a CIRAD scientist and a local partner, from across all the continents on which CIRAD works. It now has a loyal listenership. A second newsletter, *Partnering4Impact*, for public- or private-sector financial partners and other influential players, was also launched in 2022. It includes a wide range of information on CIRAD's projects, our research and sustainable development expertise, our partnerships and our impact on the ground, and is available in both English and French. Three thematic issues were published in 2022: One Health, biodiversity and climate.

Social media: a growing community

In 2022, the upward trend on social media continued for CIRAD: it attracted 20 305 new followers (+21.7%) on Facebook, LinkedIn, Twitter and YouTube, which now total more than 100 000 followers. On a daily basis, CIRAD posts news items, press releases, podcasts and videos, to promote its scientists' work and communicate with donors, policymakers and partners. More than 1200 posts were shared in 2022, generating more than 3.5 million impressions. To continue the dynamic, CIRAD launched on Instagram in September 2022. In joining the network, the aim was notably to become more visible to the general public and strengthen the connection between science and society. Another new development in terms of social media was the launch of specific Twitter and LinkedIn accounts for its West Africa – Dry Zone regional office, to cover the entire Sahel zone.

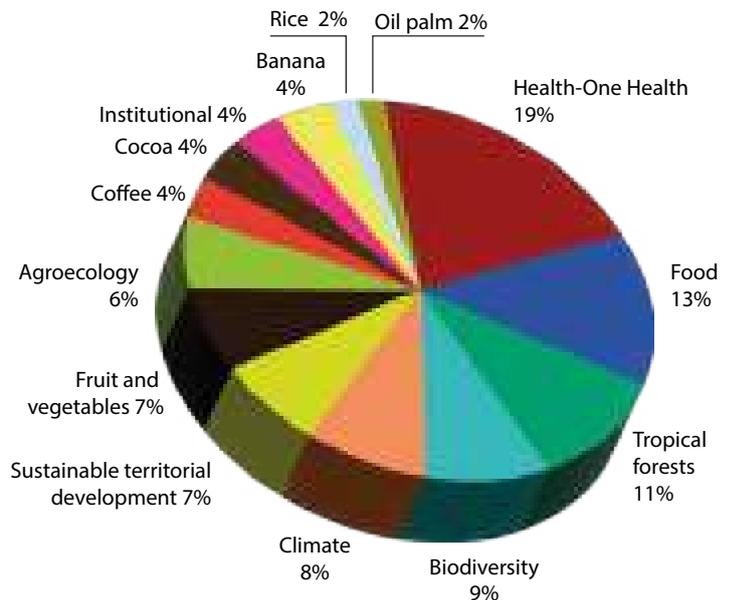


Media relations marked by the war in Ukraine and the COPs

In 2022, CIRAD was mentioned some 250 times in online publications worldwide, with more than 500 quality items in the French media. The latter (print and audiovisual) meant a potential audience of 1.4 billion people. The 60 press releases issued in 2022 triggered 10% of online items and 20% of recorded press enquiries. The topic that attracted the most media interest in 2022 was health, and the One Health concept is now omnipresent in the French media. Food was in second place, with 7% of online quotes on the consequences of the war in Ukraine. This was followed by tropical forests. Climate and biodiversity accounted for around 9% of items, following a major effort made to promote our research ahead of COP27 and COP15. In the runup to COP27, CIRAD provided support and content for the meeting of the AJSPI, an association of journalists from Quebec, Switzerland and various African countries, during their visit to Dakar (Senegal).

RFI, *Midi Libre* and *Le Monde* were the three media that most commonly mentioned CIRAD in 2022, whether on line, in print or on air. As regards audiovisual operations, there were four times

Topic-by-topic distribution of the best online media coverage of CIRAD in 2022



the usual number of shoots at CIRAD in 2022: documentaries, reports and other programmes. A documentary on the Brazilian Amazon (*Amazonie brésilienne : un autre regard*) produced by CIRAD and funded by the French Embassy in Brazil was shown in Brasilia (Brazil) in December, during a Science Café organized by the Alliance française in Brasilia (AFB), the French Embassy in Brazil, IRD and CIRAD, and is due to be on wider release shortly. Marie-Monique Robin's documentary "Making Pandemics", co-produced by CIRAD, was also released in 2022, with previews in April and May.

CIRAD's partnership with the popular science outlet *The Conversation*, which was relaunched in 2021, was consolidated in 2022 with 25 articles published, most of which were republished on CIRAD's institutional website or those of the research units concerned.



Watch the CIRAD institutional video on YouTube

Institutional communication and advocacy

Everything you ever wanted to know about CIRAD can be found in a 3½-minute institutional video, available in six languages (dubbed or subtitled). 2022 also saw the publication of an institutional brochure devoted to CIRAD's French West Indies-French Guiana-Caribbean regional office. The institutional website revamp continued, notably with the launch of regional office newsletters. At the same time, the Communication Office contributed to the production of position papers in English and French – « CIRAD's Position » on science-society, « Science Horizon » on food security, a note on CIRAD's support of the new approach to the Great Green Wall, amongst others – and produced a summary of the CIRAD roadmap for the cocoa sector for the coming decade (in three languages: English, French and Spanish).

Events: CIRAD was present at recurrent events and at three high-level scientific meetings

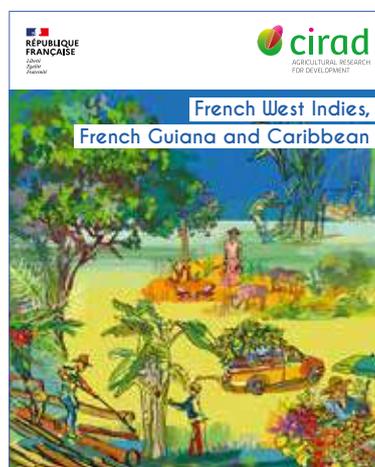
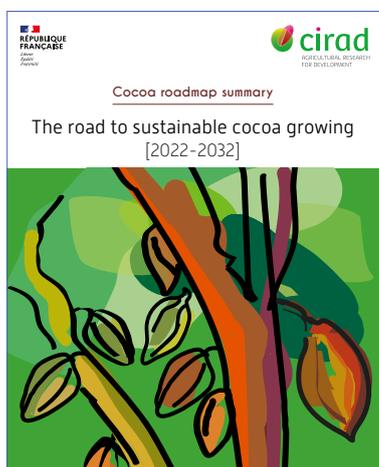
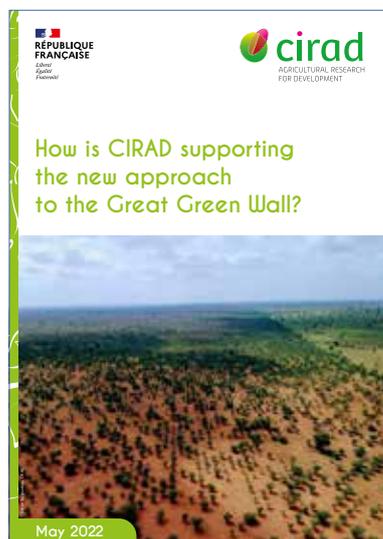
The high spots of the year included CIRAD's participation in a number of recurrent events: the Fête de la science, the Rencontres du développement durable, and the Paris International Agricultural Show (SIA). On the global stage, CIRAD co-organized three major scientific meetings: the Worldwide Perspectives on Geographical Indications Conference, co-organized with FAO, in Montpellier in July; the 31st International Horticultural Congress in Angers in August; and the International Symposium on Cocoa Research in Montpellier in December.

In-house communication: fostering cohesion and openness

We were once again able to organize our regular face-to-face in-house events in 2022, reviving a tradition that is very popular with our staff members: induction days for new recruits, and our yearly meetings open to all staff members. The induction days had a new feature this year: short videos of various places where CIRAD works, shining the spotlight on our expatriates in all four corners of the globe. Several distinguished guests did us the honour of taking part in various events, including Valérie Masson-Delmotte, Co-Chair of IPCC Working Group 1, and IPCC Vice-Chair Youba Sokona. Our celebration of the completion of the Gender-SMART project included a talk by the distinguished philosopher Manon Garcia, on how social norms and gender stereotypes influence behaviour. ■



Feminist philosopher Manon Garcia was at CIRAD in November 2022 for a talk to mark the completion of the Gender-SMART project.



delcom@cirad.fr



Ethics, CSR, key figures and organization

The “C3E4” ethics committee becomes “Ethics in Common”

In 2022, the ethics committee covering four institutes, including CIRAD, changed its name and developed a new website. A renewed identity to respond to ever greater challenges. The year has been rich, with two new statements and the organization of a day of tribute to Axel Kahn, former Chair, who passed away in 2021.

The INRAE-CIRAD-IFREMER-IRD Ethics in Common Committee examines ethical issues that may arise through research, in France and abroad, in the areas of food, agriculture, oceans, the environment and sustainable development, especially those that concern the relationships between science and society. Its remit is to reflect, advise, raise awareness and, if necessary, alert. In 2022, Michel Badré was appointed Chair and Bernadette Bensaude-Vincent Vice-Chair. In addition to institutional changes, and in accordance with the wishes of its former Chair Axel Kahn, who died in 2021, the committee has moved towards greater proximity to researchers, who are now invited to refer issues of their choice directly to the committee, and to express their views on the statements issued. At the same time, by presenting its views to CIRAD’s Science Council, the Ethics in Common Committee has sought to develop its interactions with the institution’s management bodies. A completely open policy for dealing with increasingly significant ethical challenges.

Refusing to accept that contradictions are insoluble

In July 2022, two statements were published on the Committee’s own initiative, No. 13 and No. 14. One is on water and the other on soil quality, both of which have been translated into English. A new referral was initiated on “Exploration, exploitation and preservation of unknown and slightly anthropized environments”. Statements 13 and 14 are the results of reflection undertaken since 2019 on reconciliation, in the research undertaken by the four organizations, between meeting human needs, natural resources and preservation of the biosphere. Axel Kahn was the inspiration for the approach taken by the Committee, having presented the underlying motivations in a short text published as a preface to the two statements, in which the geneticist advised against accepting that contradictions are insoluble, writing that what modern humans have been able to use to establish their humanity will also determine the construction of future generations and that it is the responsibility of today’s actors to preserve it. He stated that the aim of the ethics committee of the four organizations, its ambition, was to provide governing bodies, researchers and all members of staff with ways to progress in this context of diverging and seemingly irreconcilable objectives, interests and analyses, based on concrete situations. He declared that there may be a

path, but identifying it called for a method, and following it required determination.

Statement No. 13 notes that water, the very source of life on Earth, is today, more than ever, threatened by ever increasing human needs. The issues surrounding water are major and urgent and concern both its quality [...] and its quantity [...]. Given this major challenge facing humanity, how can we develop more integrated, more global and more respectful management of water in coastal areas?

For its part, statement No. 14 notes that soils are essential to human life as they are a key element in agriculture and food production, which is necessary for our subsistence. But above all, soils are living environments that host a great diversity of organisms that fulfil important ecological functions. In recent years, the constant pressures of human activity have led to many concerns about the health of soils. How can an ethic of care and attention, aiming at the preservation, remediation and even regeneration of soils, be integrated into research which is often driven by an instrumentalist approach?

Enriching the dialogue between science and ethics for the benefit of society: a day of tribute to Axel Kahn

For five years, Axel Kahn, a renowned physician and geneticist, was Chair of the INRAE-CIRAD-IFREMER-IRD joint consultative committee on ethics, which has become the Ethics in Common Committee. He carried out his role with conviction and enthusiasm, placing ethics at the heart of the issues raised by research activities and processes. At the beginning of 2021, when he accepted the renewal of his mandate for another four years, Axel Kahn outlined the perspectives and impetus he intended to bestow: be more attentive to the expectations and ethical questions of the staff in the four research organizations, and share the opinions of the committee more widely with the general public to provide food for thought on the major issues facing society. On 23 September 2022, the Ethics in Common Committee paid tribute to Axel Kahn’s visionary action by organizing a day of reflection on the subject of “Enriching dialogue between science and ethics for the benefit of society”. ■



Find out more:

Ethics in common website



Download statement No. 13



Download statement No. 14



Sustainable development and social responsibility (SD&SR)

A keyword: coherence

In 2022, CIRAD took many corporate social responsibility initiatives. For instance, a major institutional step forward was the issue, at the end of the year, of our blueprint for sustainable development and social responsibility, intended for the organization's Board of Trustees and for dissemination in early 2023. Here is an overview.

CIRAD's blueprint for sustainable development and social responsibility encompasses five areas. The first four concern its remit, social policies, environmental policies, and fair operating practices (ethics, scientific integrity, regulatory compliance). Their purpose is to set out the organization's priority orientations and contributions designed to develop its positive social impacts, whilst reducing undesirable socio-environmental effects. The fifth area, which covers the organization of SD&SR, endeavours to render our organization's "Responsible" project explicit.

Combating sexual harassment and sexist behaviour

CIRAD takes steps to combat all forms of sexual harassment and sexist behaviour through prevention, training, information and the strict application of clear rules, and is committed to dealing fully with situations and penalizing any proven sexual harassment. Two sexual harassment contact officers were appointed in 2021. In 2022, measures to combat sexual harassment were reinforced. Online training (identification of critical situations and an understanding of possible risks and abuses) is now compulsory for all CIRAD employees and is available to anyone working at CIRAD. A procedure has been developed so that anyone witnessing a situation suggesting possible sexual harassment or sexist behaviour can support the victim and report the facts to the contact officers, or to anyone capable of liaising with the officers.

Including people with disabilities and keeping them in employment

In October 2022, a new agreement to foster the professional inclusion of people with disabilities and keep them in employment at CIRAD was signed between management and all the trade unions for the 2023-2026 period. The commitments cover access to employment, successful inclusion, maintaining their employment, career development, training and monitoring employees throughout their career. Awareness raising and communication for all staff will be stepped up. This agreement reflects the collective ambition to go further in terms of inclusion, while allowing for the person's state of health and their working environment.

Achieving gender equality in the workplace

CIRAD has adopted successive company-wide agreements on gender equality in the workplace and on the worklife balance, which entered a third cycle of development in 2022, covering awareness raising and changes in mindsets in-house, outside recruitment, career paths, wage equality and the worklife balance. The end of the year saw the closure of the European Horizon 2020 "Gender-SMART" project led by our organization. This project enabled CIRAD to adopt a three-pronged strategy: integrating gender equality in the organization's governance and in-house operations, integrating the gender dimension in the scientific and partnership strategy, and promoting CIRAD's actions on gender equality issues in the workplace. In 2022, the cycle of seminars continued to provide input on, among other things, women's access to positions of responsibility, or gender in our research.

Renewing the quality of work life (QWL) management system

For several years now CIRAD has been taking measures to prevent psychosocial risks, and support networks are now available to everyone. Today, the QWL policy goes further. It covers inclusion, equal opportunities, professional development for all, labour relations, trust and innovation for increasingly collaborative and meaningful work. After the creation, in 2020, of a QWL steering committee, then the provision to managers since 2021 of a management tool for QWL indicators, the "social barometer" survey was launched in 2022 to fuel policy and action plans.

Developing sustainable buildings to support the energy transition

In 2022, CIRAD continued to implement its multi-year real estate strategy plan (SPSI-2), which aims to gradually renew its buildings and improve their energy efficiency. It has also set out the main elements of the Energy Master Plan (SDE) for 2030, in liaison with the French Agency for Ecological Transition (ADEME). The Master Plan sets out the pathway and main actions to be undertaken to reduce energy consumption and carbon impact. In-depth





© Adobe Stock

analyses (photovoltaic, geothermal, biomass) to define changes in the energy production mix have also been carried out. At the same time, CIRAD has completed some major work and taken very concrete measures to meet the objectives of the energy sobriety plan (10% reduction in consumption 2019-2024) and comply with “performance of tertiary buildings” ambitions. From now on, the analysis of consumption in Montpellier will be carried out per building and per use, in order to identify savings targets. In mid-2022, CIRAD finalized the construction of a 3200-m² scientific platform at the Plant Protection Centre in Réunion (ERDF funds, €13 million), a bioclimatic infrastructure project awarded the PREBAT label. In Montpellier, it is also preparing the first phase of the “Ecosite-Lavalette” project (CPER 2021-27, €6.1 million) including the construction of a 2000-m² positive energy building and the major renovation of a 3500-m² building. A grant of €1.5M has been obtained under the State’s “France Relance” (France Revival) plan for operations from 2021 to 2023. New projects have been submitted for all our sites (renewable energies, LED lighting, metering). A new Occitanie operation and maintenance contract with a commitment to energy performance has been drawn up to begin in 2023, incorporating photovoltaic and biomass energy.

Improving biosafety and animal welfare

Managing the biological risk arising from research activities is an issue for the health of staff, the population and the environment, and is high on the agenda for CIRAD, but also for the authorities and donors. Apart from biological risks in the strict sense of the term, regulatory compliance with the holding and use of any biological material is a challenge for our organization. To meet that challenge, CIRAD adopted a company policy this year on biological risk management and appointed a “biological risk” officer, Vincent Michaud, to implement it. The deployment of establishment-wide biosafety and biosecurity arrangements will enable CIRAD to meet the regulatory and

Jérôme Filippini (1st right), Prefect of Réunion, and Jean-Paul Normand, Sub-prefect of Saint-Pierre (4th from left), visiting the photovoltaic power plant at CIRAD’s 3P centre (Réunion), along with Éric Jeuffrault, CIRAD Regional Director (2nd from left)



© CIRAD

ethical compliance requirements for its research facilities (premises and equipment) and practices. The exhaustive inventory of activities subject to regulation is currently being updated within the organization.

CIRAD in the race towards responsible mobility

Commuting between home and work, and between sites, is now covered by a project designed to result in employer mobility plans per site and the negotiation of a sustainable mobility package to financially support employees’ efforts to end solo car use. To that end, a large-scale survey to ascertain commuting practices was conducted by several working groups in Montpellier, Paris, French West Indies-French Guiana and Réunion to draw up appropriate action plans. In this context, 150 additional bike shelter places have been provided in Montpellier and CIRAD has entered into a partnership with a carpooling application in mainland France and is promoting this type of transportation via three applications adapted to our worksites. Lastly, during European Mobility Week in September, CIRAD offered a series of events (free ID marking and diagnosis of bicycles, production of a mobility mural, electric bicycle tryouts, etc) to raise awareness of the use of softer forms of home-work commuting and help people to take the plunge.

As part of its annual Social Responsibility Days, CIRAD particularly addressed the issue of the social impact of longhaul travel for missions and assignments. During that event, Elisabeth Claverie de Saint Martin, CIRAD CEO, invited all professions to review their travel arrangements in order to be in line with our remit, which is to be as close as possible to the field, while reducing our carbon footprint and ensuring that our travel is a justified investment.

In-tune communication

CIRAD’s institutional communication has been committed to sustainable development for several years in its different fields. CIRAD’s new website incorporates several responsible communication levers, such as user guidance, reduced information overload and compliance with personal data regulations. Audiovisual output is designed in short formats, with reused images. The environmental cost of institutional media is minimized by choosing between a paper and a digital format, a commitment to responsibility on the part of printers, limited print runs, reduced packaging and optimized transport. As regards events, they satisfy eco-responsible measures such as the reuse of stand components, choice of paints, online programmes and choice of caterers. In 2022, the Communication Office undertook two projects integrating strong responsibility criteria. An institutional video, entrusted to a local agency in Montpellier, benefited from the reuse of pre-existing video images, thereby removing the need for any filming outside Montpellier. A podcast, a 100% audio product, enables the distribution of longer contents than videos while minimizing the environmental impact. The episodes of the first CIRAD podcast were entirely produced remotely. ■

cathy.grevesse@cirad.fr



2022 key figures

SCIENCE

Number of articles published*

* Source Agritrop, figures as of 31 January 2023

694

in peer-reviewed journals, including:

369

co-published with partners from the global South

414

with open access



32 projects helped to boost impact by **impresS**
IMPACT OF RESEARCH IN THE SOUTH

PARTNERSHIP

Number of senior scientific staff members on assignment outside mainland France in 2022 (in FTEs*)

* FTE: full-time equivalent Source: SIRH-DGDRD, as of 31 December 2022

French overseas regions

129
FTEs

Africa

125
FTEs

Asia & Oceania

29
FTEs

Americas & Caribbean

24
FTEs

Europe

6
FTEs

Total

313
FTEs



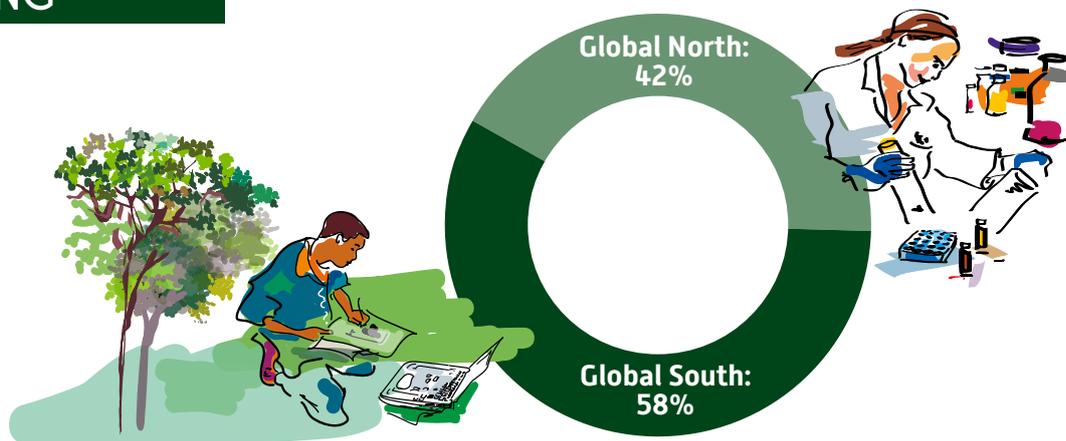
22 platforms in partnership for research and training

with national and international institutions in tropical and Mediterranean countries

TRAINING

402 PhD students supervised by CIRAD in 2022

Source: SIRH - DGDRD



2022 key figures

PROJECTS

CIRAD manages a portfolio of **900 active multi-year projects**

In 2022, **307 project agreements** were signed:

34% with public research donors

21% with public development donors

31% with private donors

14% with overseas territorial authorities



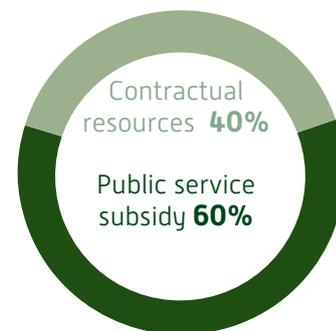
101 new project agreements signed with socioeconomic players

IN A NUTSHELL

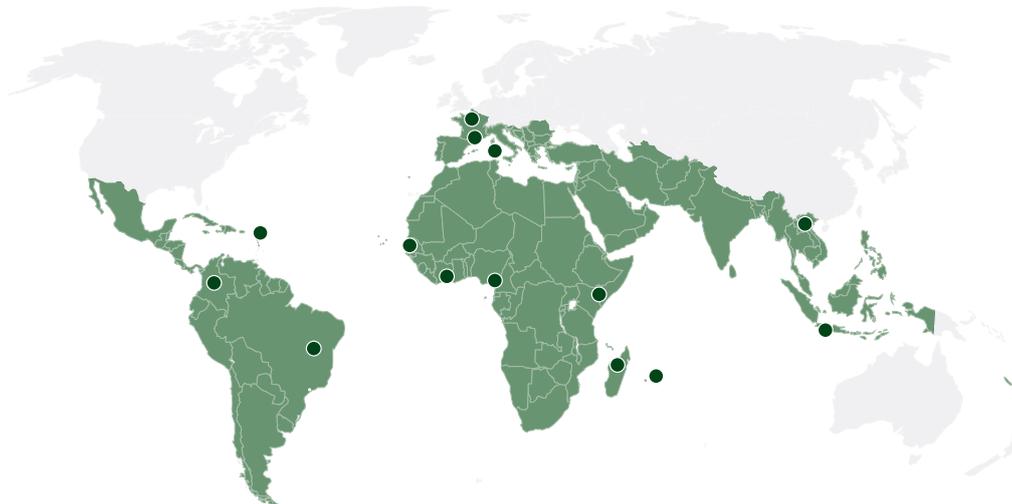
CIRAD employs
1700 people,
including **1140 scientific staff members,**
of whom **800 are researchers**



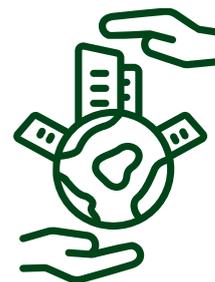
Annual budget
€ 220M



14 regional offices
in mainland France, the French overseas regions and elsewhere



200 partner institutions



Organization chart (as of 19 March 2023)



INRAE-CIRAD-IFREMER-IRD
"Ethics in Common" Committee
Chair **Michel BADRÉ**

Ethics and Research Integrity Office
Philippe FELDMANN

Science Council
Chair **Gilles KLEITZ**

Works Council (CSE)
Secretary **Pierre DEFAUT**

Director General in charge of
Resources and Organization (DGD-RD)
Anthony FARISANO

▼
Performance of Tropical Production
and Processing Systems Department
(PERSYST)
Jean-Paul LACLAU

▼
Environments and Societies
Department (ES)
Sylvain PERRET

▼
PERSYST

UPR AIDA
Krishna NAUDIN
UPR ABSYS
Bruno RAPIDEL
US Analyses
Marie TELLA
UPR BioWooEB
Jean-Michel COMMANDRÉ
UPR Eco&Sols
Laurent CURNAC (IRD)
UPR GECO
Luc DE LAPEYRE
UPR HortSys
Fabrice LE BELLEC
UPR ISEM
Nicolas GALTIER
(University of Montpellier)
UPR QUALISUD
Dominique PALLET
UPR Recycling and Risk
Frédéric FEDER

▼
ES

UMR ART-Dev
Denis PESCHE
UMR CIRED
Franck LECOQ (Agro Paris Tech)
UMR ECOFOG
Stéphane TRAISSAC
(AgroParis Tech)
UPR F&S
Plinio SIST
UMR G-EAU
Marcel KUPER
UMR INNOVATION
Jean-Marc TOUZARD (INRAE)
UMR MOISA
Paule MOUSTIER
UMR SENS
Philippe MÉRAL (IRD)
UMR SELMET
Guillaume DUTEURTRE
UMR TETIS
Pierre MAUREL (INRAE)

See the list of research units with full names on page 56

Regional Offices in mainland and overseas France

Île-de-France: **Anthony FARISANO**
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Jean-Cyril Dagallier, Deputy Regional Director, Réunion-Mayotte and Indian Ocean

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Guilhem Lacombe, Associate Director

David Berthier, Associate Director

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Centre for International Research on Environment and Development (UMR CIRED)

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Montpellier Interdisciplinary center on Sustainable Agri-food systems (social and nutritional sciences) (UMR MOISA)

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Water Management, Actors, Territories (UMR G-EAU)



UMR: Joint research unit • UPR: Internal research unit • US: Service unit

ÎLE-DE-FRANCE

42, rue Scheffer
75116 Paris - France
Tel.: +33 1 53 70 20 21
drif@cirad.fr

MONTPELLIER-OCCITANIE

Avenue Agropolis
TA 178/04
34398 Montpellier Cedex 5
France
Tel.: +33 4 67 61 49 34
dr-mo@cirad.fr

**MEDITERRANEAN
AND MIDDLE EAST**

Avenue Agropolis
TA 179/04
34398 Montpellier Cedex 5
France
Tel.: +33 4 67 61 49 47
sandrine.dury@cirad.fr

**CONTINENTAL
SOUTHEAST ASIA**

Cité diplomatique de Van Phuc
Bureau 102, Bâtiment 2G
298 Kim Ma
Hanoi
Vietnam
Tel.: +844 37 34 67 75
francois.roger@cirad.fr

**FRENCH WEST INDIES,
FRENCH GUIANA AND CARIBBEAN**

Station de Neufchâteau
Sainte-Marie
97130 Capesterre-Belle-Eau
Guadeloupe
Tel.: +590 5 90 41 68 68
dir-reg.antilles-guyane@cirad.fr

**MEXICO, CENTRAL
AMERICA AND
ANDEAN COUNTRIES**

Parque Central Bavaria
Oficina 237-239
Bogota
Colombia
Tel.: +57 314 2362437
philippe.vaast@cirad.fr

**BRAZIL AND
SOUTHERN CONE
COUNTRIES**

Predio FINATEC
Campus Univ Darcy Ribeiro
Caixa Postal 4522
CEP. 70842-970
Brasilia-DF
Brazil
Tel.: +55 61 33 66 16 01
brasil-conesul@cirad.fr

**WEST AFRICA
DRY ZONE**

37, avenue Jean XXIII
BP 6189
Dakar-Étoile
Senegal
Tel.: +221 33 822 44 84
dregional@orange.sn

**WEST AFRICA
FOREST AND
HUMID SAVANNAH**

Université
Houphouët-Boigny
Cocody, Bâtiment IRD
01 BP 6483
Abidjan
Ivory Coast
Tel.: +225 07 22 48 18 41
ciradci@aviso.ci

CENTRAL AFRICA

Rue Joseph Essono
Balla
BP 2572
Yaoundé
Cameroon
Tel.: + 237 222 21 25 41
cirad-cm@cirad.fr

**SOUTHERN AFRICA
AND MADAGASCAR**

Ampandrianomby
BP 853
Antananarivo 101
Madagascar
Tel.: +261 20 22 406 23
dregion@cirad.mg

EAST AFRICA

C/o ICRAF,
United Nations Avenue
Gigiri - PO Box 30677
00100 Nairobi
Kenya
Tel.: +254 207 224 653 / 652
dr.afora@cirad.f

**RÉUNION,
MAYOTTE AND
INDIAN OCEAN
(EXC. MADAGASCAR)**

Station de La Bretagne
40 chemin de Grand Canal
CS 12014
97743 Saint-Denis Cedex 9
La Réunion
Tel.: +262 2 62 72 78 00
dir-reg.reunion@cirad.fr

**SOUTHEAST
ASIAN ISLANDS**

Graha Kapital 1
Jl. Kemang Raya n° 4
Jakarta 12730
Indonesia
Tel.: +62 21 71 98 641 / 642
jean-marc.roda@cirad.fr

Publication Manager: Élisabeth Claverie de Saint Martin, CIRAD CEO

Coordination: Béatrice Louvet, CIRAD Communication Office

French texts: Anne Perrin, CIRAD Communication Office;

Translation: Helen Burford Buttazoni, CIRAD Communication Office;
Peter Biggins

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It works with its partners to build knowledge and solutions for resilient farming systems in 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, health (of plants, animals and ecosystems), sustainable development of rural territories, and their resilience to climate change. CIRAD works in some fifty countries on every continent, thanks to the expertise of its 1700 staff members, including 1140 scientists, backed by a global network of some 200 partners. It also supports French scientific diplomacy operations.

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42, rue Scheffer
75116 Paris
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