Working together for agriculture in the Caribbean

Food security

Agricultural development and employment

Climate change

Environment and biodiversity
The Caribbean and the Amazon are facing large-scale challenges

The Caribbean and the Amazon face new challenges: food security and safety, mitigation and adaptation to climate change, environmental conservation and biodiversity, economic development and jobs in agriculture. In these four areas – food, environmental, social and economic – CIRAD provides expertise through collaboration with partners, either within its regional networks or through the international networks of which it is a member.

Challenge 1 Food security and safety

To ensure food security for the Caribbean by increasing local agricultural production. To achieve this aim, high-yield plant varieties and animal breeds are needed, but crop and livestock losses (including post-harvest) caused by disease and pests need to be reduced. Networking between CIRAD and its plant and animal health partners in the Caribbean enables these pests to be monitored and controlled, whilst at the same time improving general surveillance. The networks will allow plant varieties preserved or created by CIRAD to be used. They are resistant to major pests and offer good yield potential, and are available to territories who have asked for them to conduct multi-location trials before disseminating seeds to farmers. The quality and safety of agricultural products are crucial for the health of local populations.

Challenge 2 Environmental conservation and biodiversity

Withholding chemical inputs is a major challenge for Caribbean agriculture because the stakes are so high. This is an important economic issue for farmers because of the high cost of importing fertilizers and pesticides; there is also the issue of public health and limiting the exposure of farmers and populations to chemicals (through residues in food). Finally, there is the environmental aspect: to prevent ecosystem pollution (soil, subsoil and water, river and sea). With its partners, the CIRAD has developed new, more efficient farming practices, while offering an environmental monitoring expertise. These new agricultural practices will promote plant and animal biodiversity and encourage natural processes. Many threatened crop species are kept in the CIRAD Antilles-Guayana biological resource centres.

Challenge 3 Mitigation and adaptation to climate change

Rises in temperature affect the Amazon rainforest, which itself plays a major role on climate regulation. How can future temperature increases be limited? And how will agriculture adapt? These are questions asked of the research scientists working in Caribbean and Amazonian territories. Reducing emissions of greenhouse gases (GHG) in livestock and agriculture is one way to limit the impact of human activities on climate. CIRAD is involved in measuring carbon fluxes of existing agricultural or silvicultural systems while offering new solutions which are more suited to extreme weather conditions (drought, floods, and cyclones). Through international networks, its researchers in Guyana are measuring the impact of temperature on the Amazon rainforest. They are developing timber production methods which store carbon more quickly and the timber can be used in High Environmental Quality buildings.

Challenge 4 Economic development and jobs in agriculture

Adopting sustainable agricultural practices is crucial for the economy and jobs in the Caribbean-Guayana region. These areas are seeking the expertise of CIRAD and its partners to revive niche sectors (e.g. coffee and cocoa), to strengthen major existing sectors (banana, cane and wood) and develop diversy sectors (fruit, tubers and vegetables). French overseas regions rely on the quality of their land, the biodiversity of their resources and expertise to develop new products; some, (with high added value) are aimed at local niche markets or export. Rare species like Guyana rosewood, prized for its unique scent, and certain aromatic plants (e.g. vetiver and vanilla), are also highly sought after.

French territories of America facilities assisting the Caribbean-Guayana region

Caribbean centre of research and surveillance for animal and zoonotic infectious diseases (Guadeloupe)

This centre, set up by CIRAD Guadeloupe, hosts a multidisciplinary research team and features hi-tech security level 2 and 3 laboratories for handling pathogens. It is the Caribbean’s regional diagnostic laboratory, the global benchmark for cowdriosis (ruminant disease, transmitted by ticks), and it also the seat of the Caribbean Animal Health Network, Caribbean’s regional diagnostic laboratory, the global benchmark for cowdriosis (ruminant disease, transmitted by ticks). With its partners, the CIRAD has developed new, more efficient farming practices, while offering an environmental monitoring expertise. These new agricultural practices will promote plant and animal biodiversity and encourage natural processes. Many threatened crop species are kept in the CIRAD Antilles-Guayana biological resource centres.

Territorial monitoring of water quality (French Guiana)

This scheme comprises two complementary drainage basins, one in Guadeloupe (Rivers Peres and Perou) and the other in Martinique (River Galion), built in partnership with BRGM, INRA and IRD, and is the seat of the Caribbean Animal Health Network. It is the Caribbean’s regional diagnostic laboratory, the global benchmark for cowdriosis (ruminant disease, transmitted by ticks), and it also the seat of the Caribbean Animal Health Network, Caribbean’s regional diagnostic laboratory, the global benchmark for cowdriosis (ruminant disease, transmitted by ticks).

Paracou Forest Scheme (French Guiana)

Spanning 125 hectares in Guayana, this scheme is linked to international forest networks to study climate change and its impact on the Amazon rainforest. 70,000 trees have been mapped and measured at regular intervals since 1984, providing key information for understanding the long-term functioning of the forest ecosystem.

Innovative cropping systems and crop improvement (banana, yams, citrus fruit) (French Antilles)

CIRAD and its partners are creating a new department to accommodate its Caribbean partners and soil samples. A quarantine approval is being requested. This analytical platform will help researchers better understand microbial biodiversity and the biology of tropical soils. This is a first in the Caribbean.

Analytical platform for soil management (Martinique)

CIRAD has bought new equipment for its Soil Biology and Ecology laboratory in Martinique and is creating a new department to accommodate its Caribbean partners and soil samples. A quarantine approval is being requested. This analytical platform will help researchers better understand microbial biodiversity and the biology of tropical soils. This is a first in the Caribbean.

Tropical Plant Biological Resource Centre (French Antilles)

The Tropical Plant Biological Resource centre, set up by CIRAD and INRA, preserves many cultivated tropical plant species. Most of the collections (mango, sugar cane, bananas, yams and taro) are in Guadeloupe, with one collection (pineapple) in Martinique. The centre is certified with the AFNOR NF S 96-900 standard.

The Perennial Plant Biological Resource Centre as set up by CIRAD in Guayana preserves coffee, cocoa and rubber collections.
> PREVENTING AND DEALING WITH EMERGING DISEASES OF BANANA
Objective: improve and disseminate knowledge on emerging diseases of banana including black Sigatoka, which has gradually invaded the entire Caribbean, and develop an early detection and monitoring network.

Interreg Cabaré Project (2011–2015)
Caribbean Network for the prevention and control of emerging banana diseases

13 benefiting islands: Cuba, Dominica, Grenada, Guadeloupe, Guyana, Haiti, Jamaica, Martinique, Puerto-Rico, Dominican Republic, St Lucia, St Vincent & Grenadines, Trinidad & Tobago
5 partners: Cirad (Guadeloupe), Inisav, Invit, IBP (Cuba), Idaf (Dominican Republic)

110 professionals
trained in laboratory diagnosis of black Sigatoka and viral diseases and recognition of scale insects (virus vectors)
3 doctoral thesis
(Dominican Republic, Cuba, Guadeloupe) and 1 Masters student (Haiti)

4 new banana hybrids
chosen for their resistance to black Sigatoka
1 molecular diagnostic test
for black Sigatoka developed and transferred to the LDA in Martinique
1 microscopic diagnostic test
transferred to 3 Windwards, allowing early detection of black Sigatoka in these territories

115 participants
from 15 countries and territories in coordination, launch and end of project meetings, and seminars organized on Sigatoka in Cuba & Guadeloupe

Find out more: http://cabare.cirad.fr

> REDUCING USE OF CHEMICAL INPUTS IN BANANA PRODUCTION
Objective: develop and transfer banana varieties resistant to major pests and low chemical input banana production systems.

Interreg Caribbean Sustainable Banana Program (2010–2015)

6 islands: Saint Vincent, Saint Lucia, Martinique, Dominica, Guadeloupe and the Dominican Republic
6 partners: UCPBAN, IT2, Cirad, Ministries of Agriculture, farmers’ unions

800 farmers
trained in the visual diagnosis and monitoring of Black Sigatoka
120 agricultural and scientific advisors
in the Caribbean

1 000 crossbreedings
conducted per year to create new varieties
12 000 tissue culture plants
of 4 varieties developed by CIRAD resistant to Sigatoka transferred to 3 Windwards
5 prototype cropping systems
using cover plants, over 15 hectares in the French Antilles
(10 tested)

180 participants
from 11 countries in technical workshops, launch and end of project workshops and Sigatoka seminars (Cuba, Guadeloupe)


> SUPPORTING ENVIRONMENTALLY FRIENDLY ORGANIC FRUIT, VEGETABLES AND BANANA PRODUCTION
Objective: the development and transfer of environmentally friendly fruit and vegetable production methods to improve local production.

Interreg Devag (2009–2013)
Caribbean network for the development of agroecological horticultural cropping systems

4 islands: Cuba, Haiti, Martinique, Guadeloupe
7 partners: Cirad, IIFT, IHLD, UNICA, MARNDR, FAMV, OSU

90 agroecology professionals
50 Caribbean scientists
assisted during the project
20 students
(Cuba, Haiti, Guadeloupe), including 2 doctoral theses
(Cuba, Haiti)

4 new yam varieties
and three new tomato varieties
10 ecological crop pest management methods des cultures (tomato, fruit trees) (using service plants or natural products)
2 ecological orchard grassing management methods (cover crops, sheep)
2 fertilization management methods (biofertilizers, legumes)

150 participants
from 3 countries in coordination and launch workshops and end of project seminars

Find out more: http://devag.tropical-agroecology.org/

> STRENGTHENING SURVEILLANCE TO PREVENT THE EMERGENCE OF NEW ANIMAL DISEASES IN THE CARIBBEAN
Objective: to improve knowledge and reinforce animal disease surveillance (avian, swine and zoonotic diseases and ruminant ticks) in the Caribbean; diagnostics, prevention and control capabilities, as well as early warning and emergency response in the event of a disease entering a Caribbean territory.

Interreg CaribVET (2009–2013)
Caribbean animal health and veterinary public health Network

43 partners: 33 veterinary services and diagnostic laboratories, 2 universities (UWI, Université du Guyana), 2 research institutes (Cirad, Censa), 6 regional and international organisations (OIE, FAO, IICA, PAHO, Caricom, USDA)
1 coordination unit led by CIRAD and communication campaigns by CaribVET

85 professionals
from 15 countries trained in health risk management, epidemiology, surveillance, diagnosis, simulation exercises, emergency planning
3 new epidemiologists
trained (Haiti, St Lucia, Nevis)

1 evaluation
of 21 surveillance networks
1 bird flu information pack
sent to network members
2 regional studies: diagnostic capabilities of avian influenza in each country, risk of introduction of avian influenza via fighting cocks
1 regional simulation exercise in case of FMD introduction into the Caribbean
2 online veterinary databases from diagnostic laboratories in the Americas (CIRAD / OIE) and Caribbean animal health organisations (CIRAD UWI)

150 participants
from 40 territories in workshops and network coordination

Find out more: http://www.caribvet.net/fr

FCR RESIST (2013–2015) - Assessment of Creole tick miticide resistance in the Caribbean

6 islands: Antigua & Barbuda, Dominica, Guadeloupe, Martinique, Nevis, St Lucia, collaborating
12 partners: veterinary services, Cirad, DAAF Guadeloupe and Martinique, Martinique Sanitary Defence Cluster
1 diagnostic test for tick resistance to custom-made miticides and 1 quick diagnostic test for partners in the Caribbean
4 technicians (Antigua, Dominica, Sainte-Lucia, Saint-Vincent) trained in diagnosing tick resistance to miticide
20 farms surveyed in Martinique 4 miticide compounds resistant to Creole ticks
Building cooperation in the Caribbean

Building on existing cooperation projects, CIRAD is developing a large new integrated project for 2015-2020 supporting the development of low environmental impact agriculture for healthy, high-quality food in the Caribbean.

**CIRAD expertise in the Caribbean-Guiana**

In the Caribbean-Guiana region, CIRAD is recognized for its expertise in forestry, veterinary services, agricultural-based agroecology concepts and integrated production. This expertise spans diverse scientific fields (agronomy, genetics, epidemiology, entomology, plant pathology, microbiology, modelling, population dynamics, tree science, production chains and networks) in the main plant sectors (pineapple, banana, cane, fruits & vegetables, coffee, cocoa, wood) and animal sectors (cattle, goats, poultry).

**CIRAD in the Caribbean and French Guyana, at a glance:**

- 250 jobs of which 100 highly skilled
- 185 hectares of agricultural test areas
- 500 hectares of forest
- 5,000m² of laboratories and offices
- 3,000 fruit varieties* preserved in biological resource centres

* pineapple, banana, cocoa, coffee, sugar cane, rubber, yam, mango

Each year:

- 40 young engineers and doctoral students trained
- 300 farmers advised

**Working towards a new integrated agro-environmental project**

This project, developed by CIRAD and its partners and modelled after major European projects, integrates the banana & plantain, fruit, vegetable and animal and plant health industries and includes an agricultural and environmental monitoring centre. This will encourage the development of sustainable agricultural practices based on agro-ecology, conservation, biological diversity and improved crop varieties. This forward-looking Caribbean agriculture project will measure the impact of innovation and regional cooperation networks. Training and capacity building will be carried out in these areas. All Caribbean countries and territories are involved.

**A joint project**

To support this great new project, various initiatives were launched in 2015 by CIRAD a joint project with Interreg 4. Eleven territories were involved (Guadeloupe, Martinique, Cuba, Jamaica, Trinidad & Tobago, Dominican Republic, Haiti, Dominica, St. Lucia and St. Vincent).

**Work on six major crops**

The project assesses production methods, health constraints and consumption patterns for six crops of major economic importance for the Caribbean islands (citrus, pineapple, banana, coffee, yams and tomatoes) and gauges varietal diversity. Soil quality, which is essential for organic crops, is being studied by the Cirad’s Soil Ecology Laboratory in Martinique. The goal is to study and analyse the biological quality of soil samples in the Caribbean.

**Active surveillance for two emerging animal diseases**

The project monitors two emerging diseases in the pig and poultry sectors (Epidemic Porcine Diarrhoea and Avian Influenza). Current initiatives on vector-borne diseases transmitted by ticks and mosquitoes continue.

**Revisiting policy to develop sustainable industries**

The project initiated a reflection on public policy and strategies in the sustainable development of cane and banana sectors. This will extend to other sectors in the future.

CIRAD is strengthening its links with the Caribbean States. In March 2015 it signed a Framework Agreement with the Cuban Ministry of Agriculture.