Practice Abstract #1

Characterization of Agroecological Living Labs

The Agroecology Living Lab (ALL) in the CANALLS project is a collaborative space where people work together to improve agriculture through the concept of agroecology. Farmers, scientists, and other community members work together to find solutions to problems faced by the community.

CANALLS currently has 8 Agroecological Living Labs, namely Biega, Bunia, Kabare and Uvira (DRC), Bujumbura and Giheta (Burundi), Ntui (Cameroon), and Kamonyi (Rwanda). Our ALLs consists of at least 20 stakeholders representing diverse organizations and sectors. They are driven by bottom-up activities that are networked and top-down by the CANALLS project management.

The main aim is to transform the different farming systems in the ALLs sites towards higher levels of agroecology by:

- Conducting co-creation workshops where key challenges and root causes are jointly identified, and agroecological solutions are jointly developed and implemented.
- Involving end-users and other stakeholders in various project activities from the start, based on their expertise and resources.

However, unrealistic high expectations and a lack of full commitment from the stakeholders and partners could limit the implementation of ALLs. This risk can be reduced by training and building the capacity of ALL coordinators and stakeholders, informing stakeholders which of their ideas have been taken up and why it was not possible to integrate all of their ideas, making the benefits for all stakeholders visible in the project, and defining their roles and expected contributions.

Genuine collaboration between the Living Lab coordinators, the local project partners, the multi-stakeholders and the project partners as a whole is important for the success of ALLs in the CANALLS project.

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Practice Abstract #1

Characterization of Agroecological Living Labs

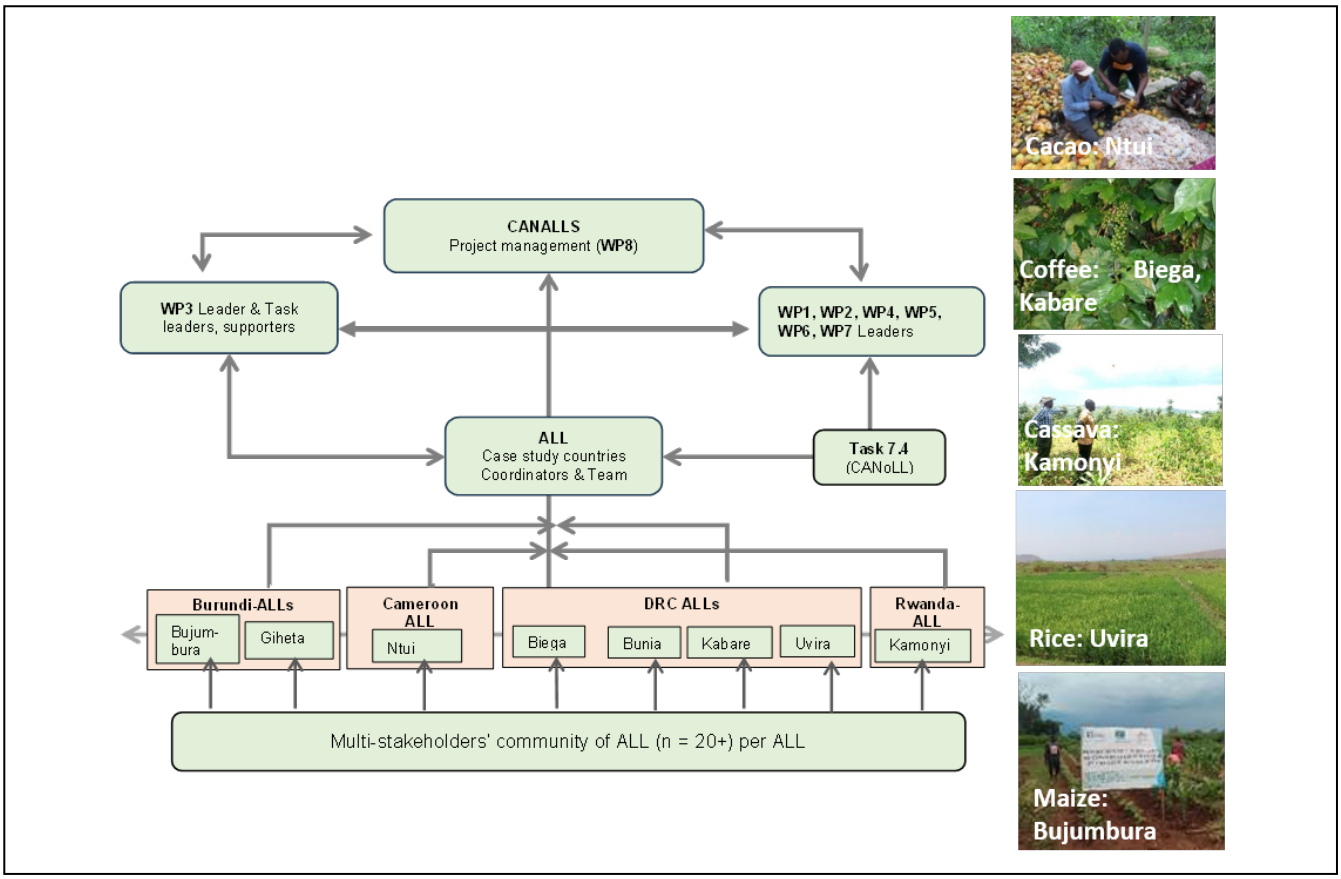

Figure: Organizational structure of the Agroecological Living Labs in the CANALLS project. Photos credit: Balume Kayani Issac (Ntui & Uvira), Balagizi Karhagomba (Biega), Vicky Ruganzu (Kamonyi), Marie-Chantel Niyuhire (Bujumbura), The organization structure: Own drawing

About CANALLS

CANALLS aims to drive agroecological transitions in the humid tropics of Central and Eastern Africa via multi-actor transdisciplinary Agroecology Living Labs (ALLs) and providing holistic agroecological solutions that meet the challenges of the local food systems.

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Practice Abstract #2

Co-creation as Key Component of Agroecological Transition within Living Labs

The co-creation process within the CANALLS project is a participatory and collaborative development of agroecological practices. This approach brings together various stakeholders to find solutions to their most pressing challenges. These stakeholders may include farmers, experts, government agencies, and representatives from the private sector and civil society.

The co-creation of agroecological practices follows a four-step cycle, beginning with:

1) Identifying and understanding the challenges,

2) Mapping, prototyping, and prioritizing agroecological practice combinations,

3) Evaluating the practice combinations in the field,

4) Evaluating the results and planning scaling strategies and the next co-creation cycle.

The types of agroecological practices identified in CANALLS include the use of biopesticides, alternative sources to synthetic fertilizers, erosion control techniques, intercropping systems, and improved shade management. Once specific practices were identified for each Living Lab, field experiments were co-designed in order to evaluate them on cocoa systems in Cameroon, cassava in Rwanda, maize-legume intercropping in Burundi, and coffee and rice fields in DRC.

A co-creation approach can help stakeholders to tackle their challenges by building both their own scientific knowledge in combination with bottom-up indigenous knowledge. This process requires mid- to long-term efforts. For co-creation to be successful and sustainable, it is important that the energy and commitment of the stakeholders are proportionate to the benefits they receive, and that their expectations for results align with reality.

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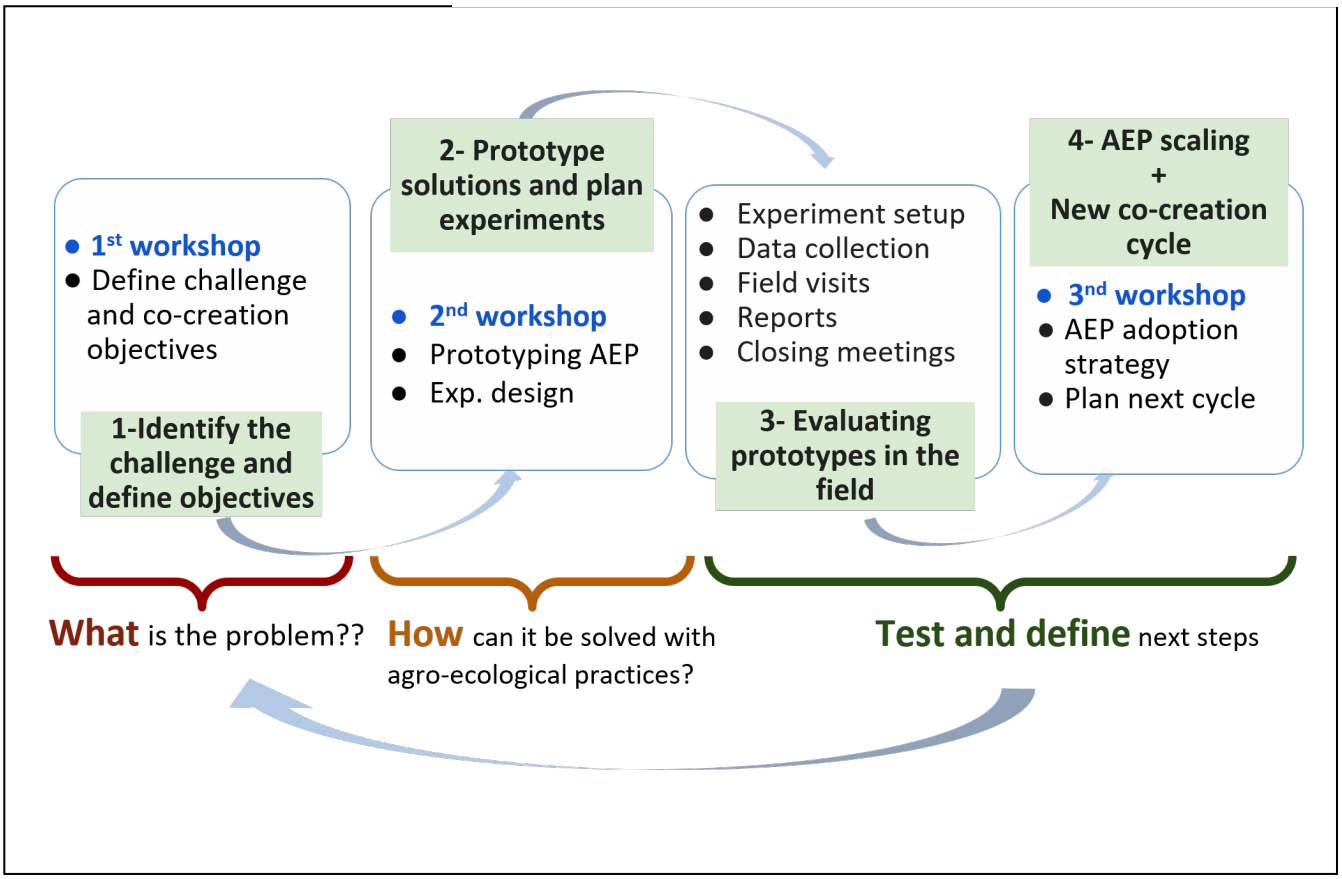

Figure: CANALLS co-creation cycle, Source: Framework developed within CANALLS

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Practice Abstract #3

Transformation of the Cocoa Farming System in Bunian

The Bunia Living Lab is located in the Mambasa Territory of the Democratic Republic of the Congo. It has a tropical rainforest climate and is situated at an altitude of about 1,200 meters. Bunia's population of 812,090 mostly practices agriculture, growing mainly food crops and cocoa.

Farmers within the Bunia Living Lab lack knowledge and awareness of agroecology. However, traditional agroforestry is practiced through a mix of cocoa with banana and palm oil with annual crops, mostly rice and maize. CANALLS can build on the Shade-Grown Cocoa project funded by USAID, which is developing a cocoa value chain platform and promoting stakeholder networking.

The main challenges faced by farmers include extreme weather events—especially erratic rainfall, prolonged dry seasons, and heavy rains—along with crop diseases, pests, and forest degradation.

The main objective of the Bunia Living Lab is to transform cocoa agroecosystems by improving input efficiency, reducing costly or polluting inputs, and reconnecting consumers and producers through alternative food networks. This will be realized in the Bunia Living Lab by testing agroecological practices, including intercropping with diverse shade trees, integrated soil fertility management, and integrated pest management. Additionally, economic and social interventions will address the organic value chain, circular and solidarity economy, culture and food traditions, co-creation, and knowledge sharing.

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Practice Abstract #3

Transformation of the Cocoa Farming System in Bunian

Figure: Participatory community work by women (shelling and preparation of beans for fermentation). Source: Charles Sivirihauma

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Practice Abstract #4

Overcoming Key Challenges in Coffee Production in Biega

The Biega Living Lab is located in upper lands around the Kahuzi-Biega National Park ranging from 1,700 to 2,000 meters above sea level, in the Democratic Republic of Congo. The moderate climate favors growing coffee, beans, bananas, sweet potatoes, vegetables, and yams. Livestock includes cattle, goats, pigs, chickens, rabbits, and guinea pigs. The Biega Living Lab is primarily composed of coffee-based farmers, representing approximately 5,000 small-scale producers.

In the Biega Living Lab, CANALLS can build on previous programs, such as the “World Coffee Research”, as well as the "Kahawa Bora ya Kivu Project ". These coffee programs aimed to empower smallholder coffee producers and organize them into cooperatives to develop sustainable markets for high-quality coffee.

Some agroecological practices are already used by the farmers in the Biega Living Lab. These include the use of manure and cover crops to increase soil fertility, the use of homemade biopesticides, and agroforestry practices to improve soil erosion control.

Through the CANALLS co-creation workshop, it was possible to identify pressing key challenges for the Biega Living Lab. A major issue is the aging of the coffee plantations. Additionally, the lack of adequate pest control and low soil fertility need to be addressed.

To overcome these challenges, good agroecological practices need to be disseminated in the local language. Farmers' capacity should be built through the use of leaflets and community outreach programs based on research findings and tested agroecological practices.

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Practice Abstract #4

Overcoming Key Challenges in Coffee Production in Biega

Figure: Coffee-banana intercropping system in Biega Living Lab in the Democratic Republic of the Congo.
Source: Innocent Balagizi Karhagomba

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Practice Abstract #5

Tackling pests and soil degradation in Kabare

The Kabare Living Lab is located north of Bukavu in the eastern Democratic Republic of the Congo. With a population of over 500,000 inhabitants, it covers the area between Birava and Kabamba, at altitudes of between 1,400 and 1,700 meters. The climate provides favorable conditions for agriculture. The main crops grown in the area are cassava, maize, sweet potatoes, sorghum, bananas, beans, coffee, tea, and sugarcane. Most of the production is either consumed locally or sold to nearby towns and villages.

In the Kabare Living Lab, CANALLS builds on the projects “Kivu Specialty Coffee”, “RUNRES”, and “Excellence in Agronomy”. Several sustainable farming practices are already in place in the Living Lab. Farmers use green manure and biopesticides instead of inorganic inputs. Erosion control is achieved through the use of ditches and anti-erosion hedges. The major challenges in the Living Lab identified during the CANALLS co-creation workshops include the aging of old coffee plantations, diseases and pests, inadequate shade management, and declining soil fertility and erosion.

Existing practices are being adapted by implementing agroecological practices, identified through the CANALLS co-creation process. The practices to be tested are the recycling of nutrients, the application of waste compost, the use of biopesticides, the retention of water, and the implementation of erosion control measures. These practices have been selected for testing due to their potential to overcome the most common pests and soil degradation issues observed in coffee-based systems in Kabare.

The high percentage of farmers with lower education levels suggests that new practices should be designed and disseminated in local languages.

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Practice Abstract #5

Tackling pests and soil degradation in Kabare

Figure: Second workshop on the co-creation of agroecological practices aimed at reducing key challenges identified by Kabare Living Lab stakeholders.
Source: Muniali Mudekereza Dieumerci

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Practice Abstract #6

Combining Agroecological Practices in Rice Production in Uvira

The Uvira Living Lab is located in the Democratic Republic of the Congo at an altitude ranging from 773 to 1,000 meters. It has a semi-arid climate with annual rainfall of approximately 1,600 millimeters. Subsistence farming is the dominant occupation among the 726,000 inhabitants. The main agricultural products are cassava, sweet potato, potatoes, maize, and rice, along with perennial crops such as banana, oil palm, citrus, coffee, papaya, avocado, and mango. About 55% of agricultural households grow paddy rice and cassava.

In Uvira, CANALLS can build on the "PIGAGL" project, which aims to increase sustainable production of rice and cassava through specific agroecological practices. The agroecological practices already used in Uvira include intercropping cassava with other crops, integrated soil fertility management, and rice intensification approaches.

During the CANALLS co-creation workshop at the Uvira Living Lab, farmers identified key challenges in rice and cassava production. Soil fertility was highlighted as the main challenge. Other challenges include deforestation coupled with erratic rainfall, extreme drought, landslides, annual bushfires, disease and pest management, lack of certified seeds, poor irrigation, and difficulties in transporting manure from farms to fields.

To address these challenges, the Uvira Living Lab is testing the combination of agroecological practices (biopesticides and organic and inorganic fertilizers) in rice production. Demonstration fields, capacity-building, and awareness-raising through media, brochures, and other channels, on the combination of agroecological practices by all actors in the value chain would be necessary to facilitate the adoption of these practices.

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Practice Abstract #6

Combining Agroecological Practices in Rice Production in Uvira

Figure: Rice field in Luvungi, Uvira Living Lab.
Source: Pierre Zibishire

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Practice Abstract #7

Brining Agroecology to the Next Level in Giheta

The Giheta Living Lab is located in the highlands north of Gitega Province in Burundi. It includes two coffee cooperatives: Mboneramiryango, with 3,700 members, and Nyarunazi, with 3,500 members. The average altitude of 1,500 to 2,000 meters, combined with annual rainfall ranging from 1,150 to 1,500 millimeters, creates favorable conditions for agriculture. Traditional farming in the area is characterized by small family plots. Coffee and bananas are the main crops cultivated.

In Giheta, CANALLS builds upon the "COCOCA" project, which has supported farmers in organic coffee production since 2014. Farmers in the Giheta Living Lab employ a combination of livestock, crops, and trees with integrated soil fertility management practices to improve crop yields, conserve soil, and reduce vulnerability to climate change. Agroforestry for coffee production has been adopted by some farmers, and the transition to organic coffee production is ongoing.

Despite the relatively advanced development of the agroecological system, the Giheta Living Lab faces major challenges. These include scarcity of arable land, inadequate agricultural inputs and production structures, crop diseases, and restricted market access.

To overcome these challenges, it is crucial to build multi-stakeholder communities to support the adoption of innovative farming practices that require fewer inputs. The market for agroecologically produced food products should also be analyzed and developed through approaches like the Participatory Guarantee System, a locally focused quality assurance system that links value chain actors. This approach will help farmers to profitably sell their products in local markets.

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Practice Abstract #7

Brining Agroecology to the Next Level in Giheta

Figure: Participants at the co-creation workshop in the Giheta Agroecological Living Lab. Source: Sam Fan

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Practice Abstract #8

Addressing Key Challenges in the Maize-Based Agricultural System of Bujumbura

The Bujumbura Living Lab is located on the northeastern shore of Lake Tanganyika at altitudes ranging from 774 to 1,000 meters in Burundi. Its population is estimated to be around 374,809 in 2023. The moderate climate is favorable for three cropping seasons per year. The soil characteristics support several cropping systems, with the maize-based farming system being the most important, offering many opportunities to test and adopt new technologies. Most staple crop production is either consumed locally or sold to nearby countries.

In the Bujumbura Living Lab, some sustainable agricultural practices are already in place. Farmers (about 35% being women) have been directly involved in the "PRDAIGL" project. Farmers use few external inputs. They commonly use green manure and recycle farm manure and crop residues for compost.

However, farmers in the Bujumbura Living Lab still face challenges such as low soil fertility, pest management, and disease control. To address these challenges, the CANALLS project is introducing effective agroecological practices focused on the maize-based agricultural farming system. These practices include the use of sanitized human urine and a combination of biopesticides.

To facilitate the adoption of these practices, farmers' capacity should be strengthened through tested agroecological practices supported by information materials and media. The maize seed supply chain requires improvement and support at all levels.

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Practice Abstract #8

Characterization of the Agroecological Living Lab in Bujumbura

Figure: Second co-creation workshop held in Mutimbuzi.
Source: ISABU, 2023

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Practice Abstract #9

Combining Agroecological Practices in Kamonyi

The Kamonyi Living Lab is located in the Kamonyi District of Rwanda's Southern Province and has a population of approximately 450,849. The Living Lab enjoys a moderate climate with adequate rainfall ranging from 1,200 to 1,400 millimeters and an average temperature of 20ºC throughout the year. It is situated at altitudes between 1,500 and 2,000 meters. The diversity of agricultural produce includes maize, beans, soybeans, fruit trees, cassava, vegetables, and bananas.

In the Kamonyi Living Lab, CANALLS builds on the Rural-Urban Nexus project, which has already introduced agroecological practices to local farmers. Key practices include nutrient recycling through waste management and animal husbandry. By using these practices, farmers optimize soil fertility and crop productivity while reducing dependency on synthetic chemicals. In addition, ditches and agroforestry play crucial roles in protecting soil and reducing nutrient loss through runoff.

Despite the presence of agroecological practices, several constraints still hinder effective adoption by farmers. Challenges identified during the co-creation workshops include the lack of suitable practice combinations and limited farmer knowledge to implement soil erosion control, soil fertility, and climate-smart agricultural practices.

Innovative solutions and support mechanisms are recommended to make the landscape more sustainably productive and provide socio-economic benefits through co-creation, co-testing, and co-validation. The co-creation workshops recommended testing three specific practices in the Kamonyi Living Lab: combining trenches with agroforestry species and fodder grasses, intercropping cassava with legumes, and using compost products.

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Practice Abstract #9

Combining Agroecological Practices in Kamonyi

Figure: Stakeholder of the Kamonyi Living Lab together with the organizational structure. Source: Jean Claude Siborurema

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Practice Abstract #10

Improving Cocoa Farming in Ntui with Shade, Fertilization, and Biopesticides

The Ntui Living Lab in Cameroon is located across three agroecological zones: the humid forest, the high Guinean savannah, and the western highlands with altitudes ranging from 328 to 912 meters. Agriculture is the main occupation of more than 23,000 of its inhabitants, with cocoa being the main cash crop, grown by approximately 77% of the population. Farmers also grow a wide range of food and vegetable crops.

In the Ntui Living Lab, the CANALLS project builds on the CocoaSoils initiative, which promotes the sustainable intensification of cocoa production through the development and dissemination of Integrated Soil Fertility Management (ISFM) options. Consequently, most cocoa-producing households already employ certain agroecological practices, such as tree planting, pruning, shade management, sun drying, and using plant-based green manure.

The main challenges to agroecological practices in Ntui's cocoa farming system include forest degradation, deforestation, plant diseases, pest issues, soil nutrient deficiencies, and a shortage of skilled labor. In addition, there is a need to establish an agroecological market that will encourage cocoa farmers to participate and create a standard for agroecological cocoa.

The CANALLS project will complement and document these practices by testing the response of cocoa physiology to shade, foliar fertilization, and biopesticides. During the first co-creation cycle, CANALLS will focus on evaluating specific agroecological practices and their interactions with shade gradients, along with testing combinations of Beauveria and Trichoderma against mirids (*Sahlbergella singularis*) and black pod disease (*Phytophthora palmivora*), as compared to synthetic pesticides.

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Practice Abstract #10

Improving Cocoa Farming in Ntui with Shade, Fertilization, and Biopesticides

Figure: Picture of cocoa pod breaking in the Ntui Living Lab
Source: Jonas Ngouhouo-Poufoun

About CANALLS

CANALLS aims to drive agroecological transitions in the humid tropics of Central and Eastern Africa via multi-actor transdisciplinary Agroecology Living Labs (ALLs) and providing holistic agroecological solutions that meet the challenges of the local food systems.

Project Partners

All Practice Abstracts prepared by the CANALLS Project in the EIP-Agri common format can be found here: https://www.canalls-project.eu/resources/public-deliverables.

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