



# AGROECOLOGICAL BEST PRACTICES THROUGH FARMER FIELD SCHOOLS IN BENIN



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## Summary

In Benin, agroecology has gradually gained ground over the last decade, thanks to joint initiatives led by producers, NGOs (non-governmental organizations), national and international research centers, and public and private authorities. The support of these organizations has enabled the growing adoption of sustainable, high-quality agricultural practices, such as biological control, integrated pest management, and the promotion of indigenous knowledge. The case study analyzed the agroecological best practices introduced and implemented through the practical agriculture schools (EPA) created as part of various development projects and programs in Benin. These agroecological practices have brought numerous benefits, including climate change mitigation and adaptation, increased household income and food security, women's empowerment and gender equality, health and biodiversity benefits, social cohesion, and community strengthening. In order to enable widespread adoption of agroecology across Benin, policymakers are encouraged to develop and implement appropriate institutional, policy, financial, and technical policies and initiatives.

## Context

Agroecology in Benin has been growing steadily over the past decade, driven by joint initiatives involving producers, NGOs (non-governmental organizations), national and international research centers, and both public and private institutions. Organizations such as OBEPAB (Beninese Organization for the Promotion of Organic Agriculture), FAEB (Agroecological Federation of Benin) and several farmers' cooperatives have played a key role in the growing adoption of high-quality, sustainable agricultural practices such as biological control, integrated pest management, and the promotion of endogenous knowledge. The case study is supported by INRAB (National Institute for Agricultural Research of Benin), IITA (International Institute of Tropical Agriculture),

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**Partners involved:** National Institute for Agricultural Research of Benin (INRAB), International Institute of Tropical Agriculture (IITA), universities, agricultural colleges in Benin, ENABLE TAAT Project (Technology for African Agricultural Transformation), PRIMA (Regional Program for the Integration of Agricultural Markets), ENABEL (Rikolto).

universities, and agricultural colleges. It analyzes the agroecological best practices introduced and implemented through the farmer field schools (FFS) set up by development projects and programs such as ENABLE-TAAT (Technologies for African Agricultural Transformation), in youth entrepreneurship, Rikolto in the Rice program, and PRIMA (Regional Program for the Integration of Agricultural Markets) on vegetable, legume, and food crop production. These initiatives have been supported and funded by the African Development Bank (AfDB), the Belgian cooperative (ENABEL), and the International Fund for Agricultural Development (IFAD) in Benin.

With an economy largely based on agriculture, Benin faces significant challenges related to food security, sustainable management of its natural resources, and the growing effects of climate change. Soil degradation, variable rainfall patterns, and dependence on highly hazardous pesticides (HHPs) continue to threaten the health of producers, biodiversity, and the quality of ecosystems. In this context, the transition to agroecological practices appears to be a sustainable solution capable of improving the resilience of agricultural systems, reducing the use of harmful chemicals, and strengthening the country's food sovereignty.

## Methods

The methodological approach used is collaborative data collection, directly involving producers, Champs Écoles Paysans (CEP) facilitators, and partner project managers in the observation, experimentation, and evaluation of agroecological practices (the participatory approach) on demonstration plots, technical training, and peer exchanges. Focus groups were also held to gather the perceptions of producers, including men, women, and young people. Quantitative data was collected using the scoring method with pebbles. A literature review was also conducted to collect secondary data on agroecology in Benin.

Specifically, information was collected through semi-structured interviews, group discussions, and field observations conducted at CEP sites.



 Training young people in agroecological practices

Participants interviewed included beneficiary producers, technical managers, and coordinators of the programs mentioned (ENABLE-TAAT, Rikolto, PRIMA).

A total of seven (7) farmer field schools (FFS) were visited, covering the following crops: maize, cassava, rice, market gardening, fish farming, and perennial crops.

## Agroecological practices

The summary of the literature review conducted at the research centers revealed agroecological practices such as: the use of botanical extracts (neem extract, neem cake-based fertilizers), intercropping with lemongrass, mushrooms,



 Rice producers Farmer Field School

and *Vernonia amygdalina* as biopesticides and biofertilizers. Several private sector actors have been identified as being actively involved in the adoption and dissemination of these agroecological alternatives: Eléphant Vert, CIM-BIO, Biophyto, and FUPRO-Benin (Federation of Producers' Unions of Benin).

After investigation, the results of this study showed that crop diversification, crop combinations and rotations, integrated pest management, composting/bokashi, agroforestry, and soil conservation techniques are agroecological alternatives used by producers in the fields. In addition to these methods, mulching and vermicomposting (tea) were used by producers to maintain soil moisture and facilitate crop germination.



 Vermicomposting (Tea)



 Organic cucumbers

When planting annual crops (corn, cassava, rice), farmers adopt agroecological practices such as reduced tillage, compost made from animal manure, decomposed organic manure for soil restoration, the use of local farm seeds saved after harvest, and agroecosystem analysis to help farmers decide whether or not to treat their crops. For perennial crops, they adopt agroecological practices such as intercropping with legumes and tubers and the application of effective microorganisms. All these methods are accompanied by technical data sheets in which their principles and descriptions are detailed and made available to the facilitators of the Champs Ecoles Paysans (CEP) and also to producers in the local language.

In terms of the adoption of best agroecological practices in the CEPs visited, more than 2,500 producers are practicing agroecological alternatives in market gardening in southern Benin. Additionally, over 3,000 producers are practicing agroecological alternatives in rice farming in central Benin, and more than 1,200 producers are practicing agroecological alternatives in corn, cassava, and perennial crops in northern Benin.

## Benefits of agroecology

Agroecology, beyond a simple change in farming practices, generates multidimensional positive impacts for producers and their communities.

- **Climate change mitigation:** In terms of climate change mitigation, agroecological practices such as the use of compost and organic fertilizers reduce the use of chemical

fertilizers by 20 to 30%, thereby contributing to lower greenhouse gas emissions.

- **Carbon sequestration:** The introduction of hedgerows and agroforestry systems promotes carbon sequestration estimated at 1.5–2 t CO<sub>2</sub>/ha/year, thereby strengthening the role of farms as carbon sinks and also contributing to soil restoration.
- **Climate adaptation:** Producers who have adopted mulching and cover crop techniques (mucuna, stylosanthes) have seen a significant improvement in the resilience of their production systems.
- **Food security:** On average, rice farmers have seen a 25% increase in yields during periods of drought, which also translates into improved household food security, with nearly two additional months of food availability per year.
- **Biodiversity:** The introduction of legumes and hedgerows on plots has increased plant diversity by more than 40% on young farmers' farms. A 30% increase in the presence of pollinators, particularly bees and other beneficial insects, has been observed in agroecological plots, which enhances the productivity and stability of agricultural ecosystems.
- **Economic benefits:** Economically, producers benefit from a significant reduction in chemical input costs, estimated at between 20% and 35%. By selling crops grown using agroecological practices on local markets, they generate 15% to 20% more profit than with conventional practices.
- **Health benefits:** The use of biopesticides and the reduction in the use of chemical inputs have led to a 40% decrease in reported cases of poisoning in production areas, reducing the opportunity costs associated with hospitalization, monitoring, and healthcare expenses. At the same time, household dietary diversity has increased with the integration of a variety of crops (moringa, leafy vegetables), leading to a 25% improvement in the following dietary diversity index, particularly in female-headed households.
- **Gender equality:** Female participation is significant. In CEPs, women represent 45–50%

of beneficiaries, strengthening their role in decision-making, but also in the management of agricultural income. This increased involvement translates into greater decision-making power within households. Women involved in community organic gardens even earn up to 30% additional income, which contributes to their economic empowerment, enabling them to contribute to education, food, health, and community integration.



Focus group of women rice farmers

## Benefits for the community:

- In the project implementation areas, membership in cooperatives has increased by 30%, reflecting a stronger collective dynamic.
- Community initiatives such as tontines, seed exchanges, and community work promote solidarity and strengthen social cohesion.
- In terms of local knowledge and skills, around 80% of farmers trained in the Écoles Paysans fields report a better understanding of rational soil management and integrated pest and disease control.
- This acquired knowledge does not remain individual: on average, each trained farmer transfers their knowledge to two or three others, thus creating a horizontal dissemination of agroecological innovations.

## Challenges and solutions

Despite its observed positive effects on agriculture, the environment, and health, the implementation of agroecology in Benin faces several major challenges, many of which could be overcome with appropriate policy measures. These constraints include:

- Insufficient adequate and experienced labor in organic farming
- Poor access to irrigation systems
- Low adoption rate of agroecological practices, especially among young people, because agroecological practices are considered time-consuming insufficient organic inputs such as organic manure, compost, and crop residues land pressure and small cultivable areas, which make it difficult to implement integrated systems such as agroforestry or combined livestock farming
- High cost of products derived from biopesticide and agroecological alternatives for consumers, without taking into account the health benefits
- Lack of information and marketing around products derived from biopesticide and agroecological alternatives
- Lack of financing, credit, and subsidies for green agriculture
- Low level of commitment from governmental institutions and private investors to promote agroecology in Benin

However, producers and stakeholders in the field have suggested possible solutions, namely:

- Mechanization to reduce the drudgery of work
- Creation of community composting centers to increase the availability of organic inputs
- Securing land tenure and developing local labels, organic markets, and facilitating the granting of organic certification
- Capacity building for stakeholders through awareness raising, training, and advocacy for behavioral change towards agroecological practices for future generations
- Facilitation of access to financing to consolidate the adoption of agroecology in Benin

## Lessons learned

A key lesson learned from this study is that short-term development projects (3 years, renewable once) can be important means of stimulating learning and adoption of agroecological practices. However, to ensure wider adoption across Benin, the government will need to institutionalize farmer training programs to promote agroecology, establish a legal framework (law and decree) in favor of agroecology, and commit to phasing out highly hazardous pesticides and promoting alternatives to chemical pesticides.

## Recommendations

In light of the results of this study and the lessons learned in the field, several recommendations emerge to strengthen the adoption and sustainability of agroecological practices in Benin.

- *On a technical and operational level*, it is necessary to continue and intensify capacity building for producers. This involves increasing practical training in Farmer Field Schools (FFS), disseminating improved local seeds and accessible organic inputs, and promoting local innovations adapted to the socio-cultural realities of communities. The promotion of technical data sheets translated into local languages must also be systematized in order to facilitate the dissemination of agroecological practices.
- *At the economic and financing level*, targeted financial support mechanisms must be put in place. Selective subsidies for organic inputs and tax exemptions on these inputs and agroecological products could encourage the transition to agroecology. Access to credit and green microfinance must be facilitated, particularly for small-scale producers, young people, and women, so that they can invest in work equipment, inputs, and irrigation infrastructure.
- *At the institutional and political level*, the creation of marketing channels for organic products, supported by local organic certification labels (PGS-Participatory Guarantee System), would help to promote agroecological products and increase producers' incomes. Facilitating the integration of agroecology into national agricultural policies is essential. The Ministry of Agriculture and its partners must define clear strategies, aligned with food security and sustainable development objectives, to guide the agroecological transition. Strengthening applied research programs on agroecological practices and creating spaces for multi-stakeholder dialogue (producers, NGOs, cooperatives, research institutes, local authorities) will promote inclusive and participatory governance. The link is direct, because reducing the use of HHPs requires **credible local alternatives and coordination between actors**. Applied research can identify and disseminate these alternatives, while multi-stakeholder dialogue can be used to define concerted and sustainable strategies. This naturally extends the discussion on the risks associated with HHPs by proposing a systemic and collaborative solution that is in line with the spirit of agroecology.
- *At the regulatory level*, it is also necessary to establish a regulatory and legal framework (law and decree) that limits the misuse of chemical pesticides, phases out and ultimately bans highly hazardous pesticides (HHPs), in accordance with United Nations agreements.
- *At the environmental level*, recommendations focus on the conservation and sustainable management of natural resources. Crop rotation, agroforestry, intercropping, and the use of cover crops should be encouraged to preserve biodiversity and improve soil fertility. Sustainable water management measures, such as rainwater harvesting and localized irrigation, should be promoted to strengthen resilience to droughts. At the same time, it is crucial to raise awareness among producers about climate change issues in order to strengthen their capacity to adapt and anticipate extreme weather events.

The implementation of these recommendations is an essential step towards sustainably embedding agroecology in Benin's production systems, while improving the resilience of rural communities.

Overall, this case study provided an overview of the agroecological practices implemented in the CEPs established by projects, programs, and initiatives

in Benin. It also demonstrated the need for the Beninese government to commit to integrating agroecology into its development action programs.

The table below presents the agroecological principles, their description, their rationale, and their impacts on several aspects.

**Table: Agroecological principles, description, principles, and impacts**

Agroecological methods	Description/ Objective	Principles of agroecology	Impact on climate change mitigation	Impact on climate adaptation	Impact on biodiversity	Economic impact	Impact on socio-environmental health	Gender and equity
<b>Crop rotation</b>	Alternating different crops on the same plot to reduce disease and improve soil fertility	Diversification, synergy, soil health	Reduced use of chemical fertilizers (20-30%), lower GHG emissions	Improved resilience, higher yields (+25% during droughts)	Increased plant diversity (+40%), increase in pollinators (+30%)	Reduction in input costs (20-35%), net margin +15-20%	Decrease in cases of poisoning (-40%), diversified diet (+25%)	Female participation 45-50%, increased decision-making power within households
<b>Crop association/ intercropping</b>	Growing several species on the same plot to optimize resource use and limit pests	Diversification, synergy, reduction in inputs	Less chemical fertilizers, improved soil fertility	Increased resilience through the use of cover crops (mucuna, stylosanthes)	Plant diversity and increased presence of beneficial insects (+30%)	Added value on local markets, higher net margin (+15-20%)	Reduced use of chemical pesticides, improved food security	Additional income for women (+30%) in community gardens
<b>Agroforestry</b>	Integration of trees and shrubs into agricultural systems to improve fertility and biodiversity	Diversification, Synergy, Resource conservation	Carbon sequestration (1.5-2 t CO <sub>2</sub> /ha/year), carbon sink	Improved resilience and soil restoration	Increased plant diversity (+40%), habitats for pollinators	Reduced inputs, increased net margins	Enriched food (moringa, leafy vegetables), food diversity (+25%)	Increased community participation (+30% cooperative membership), strengthened solidarity
<b>Vermicomposting/ organic fertilization</b>	Use of organic matter to fertilize the soil	Reduced inputs, soil health, nutrient recycling	Reduced use of chemical fertilizers (20-30%), lower GHG emissions	Improved fertility and resilience of production systems	Increased plant and microbial diversity in soils	Reduced chemical input costs (20-35%)	Fewer chemical poisonings, improved producer health	Empowerment of women through additional income from value creation
<b>Mulching/ground cover</b>	Protects soil from erosion and maintains moisture	Conserves resources, improves soil health, reduces inputs	Conserves moisture, limits the use of chemical inputs	Increases yields (+25% during droughts)	Maintaining vegetation cover, increasing diversity	Reduced production costs, higher net margins	Improved food security (2 additional months of food availability)	Women involved in plot management and household food security
<b>Biopesticides / integrated pest management</b>	Pest control using biological methods and minimization of chemical pesticides	Reduced inputs, Synergy, Crop health	Fewer emissions linked to chemical inputs	Better crop protection against pests and diseases	Preservation of pollinators and natural auxiliaries	Reduction in costs linked to chemical inputs	Fewer cases of poisoning (-40%), better health for producers	Women more involved in production decisions and income management
<b>Water management (recovery, drip irrigation)</b>	Optimization of water use and climate adaptation	Resource conservation, energy efficiency, climate resilience	Optimization of water use, reduction of environmental footprint	Strengthening resilience to drought (+25% rice yields)	Indirect support for diversified crops and wildlife	Reduced water management costs, improved profitability	Increased food security through reliable water availability	Women beneficiaries in CEPs (45-50%) and strengthened role in water management
<b>Cover crops/ legumes</b>	Improved fertility and reduced erosion	Diversification, soil health, reduced inputs	Reduction in the use of chemical fertilizers through biological nitrogen fixation	Improved resilience of production systems and soil restoration	Increased plant diversity (+40%), habitats for pollinators	Reduced input costs, improved profitability	Improved food quality (moringa, leafy vegetables)	Significant involvement of women (+30% additional income, 45-50% CEP beneficiaries)

## Key resources

The resources presented here are essential references for understanding the dynamics and challenges of agroecological transition in Benin and sub-Saharan Africa. They highlight the need for a favorable policy framework, applied research, and participatory approaches to strengthen the sustainability of agricultural systems. The work of the FAO and AFSA offers a comprehensive and strategic vision, while that of the APRM and INRAB provides guidance and results specific to the Beninese context. Finally, the reports of PAN International and PAN Africa highlight the risks associated with the use of highly hazardous pesticides (HHPs) and the relevance of agroecological alternatives to protect health, the environment, and food sovereignty.

- *PAN International. 2023. List of Highly Hazardous Pesticides (HHPs). Pesticide Action Network International, Hamburg. <https://pan-international.org> (Liste mondiale de référence identifiant les pesticides hautement dangereux et proposant des alternatives agroécologiques durables.)*
- *Ministère de l'Agriculture, de l'Élevage et de la Pêche (MAEP). 2019. Stratégie nationale de développement de l'agriculture durable et plan d'action agroécologique 2019–2025. MAEP, Cotonou, Bénin. (Document de politique nationale définissant les axes stratégiques de promotion de l'agroécologie au Bénin.)*
- *Institut National des Recherches Agricoles du Bénin (INRAB). 2024. Rapport annuel sur les innovations agricoles durables. INRAB, Cotonou, Bénin. (Rapport de recherche appliquée présentant les résultats sur les innovations agroécologiques et la gestion intégrée des ravageurs.)*
- *Alliance for Food Sovereignty in Africa (AFSA). 2022. Agroecology for Resilient Food Systems in Africa. AFSA, Kampala. <https://afsafira.org> (Recueil d'études de cas africaines démontrant les impacts positifs de l'agroécologie sur la résilience, la sécurité alimentaire et la durabilité des systèmes agricoles.)*
- *Pesticide Action Network Africa (PAN Africa). 2022. État des pesticides hautement dangereux en Afrique de l'Ouest. PAN Africa, Dakar, Sénégal. (Analyse régionale des effets des HHP sur la santé humaine et l'environnement, présentant des alternatives agroécologiques adaptées au contexte ouest-africain.)*





**Pesticide Action Network International (PAN)** is a network of over 600 participating nongovernmental organizations, institutions and individuals in over 90 countries working to replace the use of hazardous pesticides with ecologically sound and socially just alternatives.

Web: [pan-international.org](http://pan-international.org)

Facebook: [PesticideActionNetworkInternational](https://www.facebook.com/PesticideActionNetworkInternational)

BlueSky: [pesticideaction.bsky.social](https://bsky.app/profile/pesticideaction.bsky.social)



Since 2006, **GAPROFFA** (Action Group for the Promotion and Protection of Flora and Fauna) has been working to promote the sound management of chemicals and chemical waste in Benin. It works closely with the Ministry of Living Environment and Sustainable Development and several international networks (PAN-Africa, IPEN), contributing to the development of laws, the implementation of environmental conventions (Stockholm, Minamata), and raising awareness among stakeholders about chemical risks.

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### **Agroecological best practices through farmer field schools in Benin**

This case study was produced by GAPROFFA in collaboration with PAN International. It is one in a series of PAN case studies showcasing the benefits and contributions of agroecology to climate resilience, food security, health and biodiversity protection. The series is produced by members of the PAN International Agroecology Workgroup. The full series is available in a number of languages via the QR code.

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