Agroecology TPP

Agroecological practices are widely used by African farmers

The Viability of Agroecological Practices in Africa Project Team

WORKING PAPER 2

FEBRUARY 2023

WORKING PAPER 2

Agroecological practices are widely used by African farmers

The Viability of Agroecological Practices in Africa Project Team

The Transformative Partnership Platform on Agroecology (Agroecology TPP)

Working Paper 2

DOI: 10.17528/cifor-icraf/008817

Viability Project Team. 2023. *Agroecological practices are widely used by African farmers.* Working Paper 2. Bogor, Indonesia and Nairobi, Kenya: CIFOR-ICRAF: The Transformative Partnership Platform on Agroecology.

The Transformative Partnership Platform on Agroecology

CIFOR Headquarters
Jalan CIFOR
Situ Gede, Sindang Barang
Bogor Barat 16115
Indonesia

ICRAF Headquarters
C/O World Agroforestry Centre
United Nations Avenue, Gigiri
Mailing address: P.O. Box 30677 – 00100, Nairobi,
Kenya

T +62-251-8622-622
E agroecology-tpp@cifor-icraf.org

bit.ly/AgEc_TPP

Cover photo: An integrated tree-crop-livestock system in Kairouan (Tunisia), by M.Fahrat/ICARDA

We would like to thank all donors and partners of the Agroecology TPP. For a full list of the Agroecology TPP partners and donors, please visit: bit.ly/AgEc_TPP

Contents

List of tables, boxes and figures

Tables

Boxes

Figures

Acknowledgements

The Transformative Partnership Platform for Agroecology (TPP) hosted the project. Le Direction de dévelopment durable, Ministère de l'Europe et des affraires étrangères, France provided funding.

Case studies were led by the Alliance of Bioversity and CIAT, CIRAD, CIFOR-ICRAF, Cornell University, ICARDA, IMWI and SAT Tanzania.

Data platforms were built by Statistics for Sustainable Development.

A Methods Group with staff from CIRAD, INRAE, CIFOR-ICRAF, Cornell and Statistics for Sustainable Development coordinated methods for data collection and analysis.

We thank all the farmers and organizations on the ground that contributed to the project.

Contact for further information

This report was produced by the Viability Project Team. For further information please contact the project coordinators, Nadine Andrieu, CIRAD (nadine.andrieu@cirad.fr) or Richard Coe, CIFOR-ICRAF (r.coe@cifor-icraf.org).

Summary of key messages

The project aimed to collect evidence on and understand the viability of agroecological practices for smallholders in Africa. It is based on 11 case studies in eight countries. Analysis and interpretation of the data is still in progress, but some important messages are emerging. These are summarized in this paper.

The position of agroecology in African farms

- Agroecological practices are used widely.
- Agroecological practices used are diverse.
- Practices are used in many combinations.
- The agroecological practices used have multiple origins.
- Farmers can use such practices in spite of unsupportive regimes.

Who uses agroecological practices?

- Nearly all farmers we surveyed use some agroecological practices.
- Different farm types use different combinations of agroecological practices.

Why agroecological practices are used

- Farmers use agroecological practices for a wide variety of reasons.
- Farmers make trade-offs between advantages and disadvantages of agroecology.
- Labour is not always a barrier to the use of agroecological practices.

Overall

- Assessing viability of agroecological practices is complex.
- There are at least three contrasting narratives of agroecology in Africa.

1 Background to the Viability of Agroecological Practices in Africa project

- There is widespread recognition of the need for alternatives to current agricultural and food systems to ensure they provide diverse and healthy food, support rural livelihoods and do not destroy or degrade the environment.
- Agroecology is a body of knowledge, practices and political movements that aims to support transformation of food and agricultural systems to long-term social and environmental sustainability. Agroecology is founded on principles that are implemented in diverse ways dependant on local context.
- African farmers face multiple challenges, and agroecology has been proposed as contributing to solutions. However, the viability of agroecological practices for African farmers has been questioned.
- Using a case study approach, with 11 case studies in eight African countries (Figure 1), the project aims to investigate the viability of agroecological practices in Africa. The concepts of 'agroecological practice' and 'viability' are hard to define in ways that are relevant and adaptable across very different farm situations. We defined practices as agroecological if they addressed

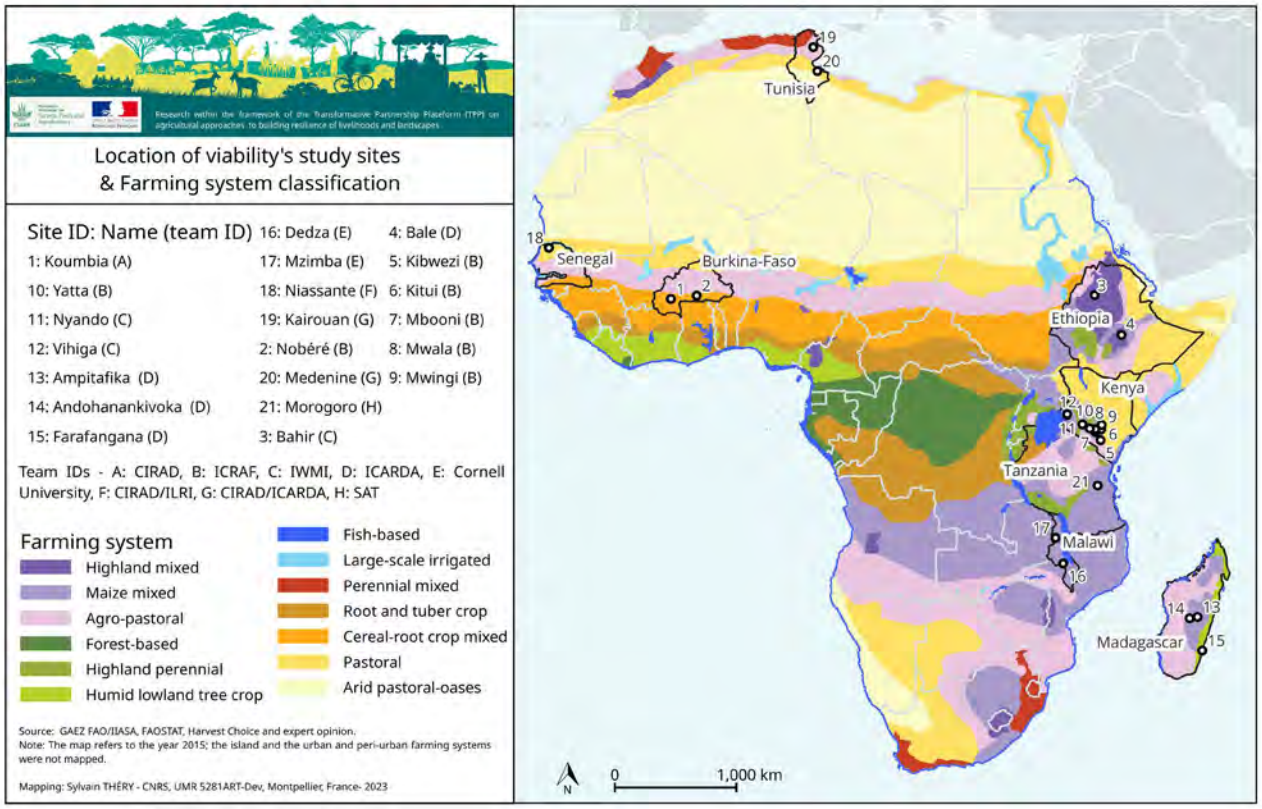


Figure 1. Study sites of the Viability Project

Mechanical weeding of cowpeas using animal traction under a wooded park in Koumbia, Burkina Faso. Agroecological practices illustrated: cultivation of legumes, animal work, wooded park.

Photo by E.Vall/CIRAD

at least one of the set of 13 principles drawn from the scientific literature and highlighted in the United Nations High Level Panel of Experts report on agroecology (HLPE 2019; Wezel et al. 2020). Farming systems are qualified as more or less agroecological depending on the extent to which agroecological practices and principles are used. A practice, or more usually a combination of practices, is considered viable from a farmer perspective when they choose to use it while alternatives that are less agroecological are used in the same context.

- We developed a common method able to capture farmers' perceptions of the viability of agroecological practices and the factors that contribute to these assessments, along with a more detailed investigation of lock-ins and drivers of use, and the impact of practices on labour and quality of work. Methods are outlined below.

- Case study teams collected data during 2021 and 2022. Most data collection was completed by the end of 2022, and an initial meeting on results was held. Further analysis and detailed interpretation is still to be done. Some important key messages are emerging, however preliminary. These key messages are reported here along with examples of the evidence on which they are based. They are not final or definitive, but the evidence so far is sufficiently compelling for us to share them.

- Many aspects of agroecology are contentious, and we are not attempting to resolve arguments here.

2 Overall role of agroecology

2.1 Agroecological practices are used widely

Farmers across the continent are using agroecological (AE) practices as part of their systems and livelihoods (Figure 2). The survey of farmers included both those who had been active in projects promoting agroecological practices, and those who had not. However, in all sites almost all farmers are using at least some of the practices, and many are using multiple ones.

Our findings from a large and diverse set of farmers across Africa indicate that agroecological practices are not fringe alternatives to conventional or mainstream practices, but are often deeply embedded in a wide range of African farming systems often based on systems of agroforestry, crop-livestock integration or silvopastoralism.

2.2 Agroecological practices used are diverse

Farmers use a very wide range of practices at field, herd and farm level that are aligned with AE principles (Table 1). In our cases, these are dominated by practices that limit use of or reduce the need for external inputs, improve and maintain soil health, and increase synergies and recycling. The principles that are underrepresented in our study are those that are less relevant at farm level, which is the scale of this investigation. The numbers here are also a reflection of the case studies selected, the way agroecology has been talked about within those case studies, and the questions asked in the study.

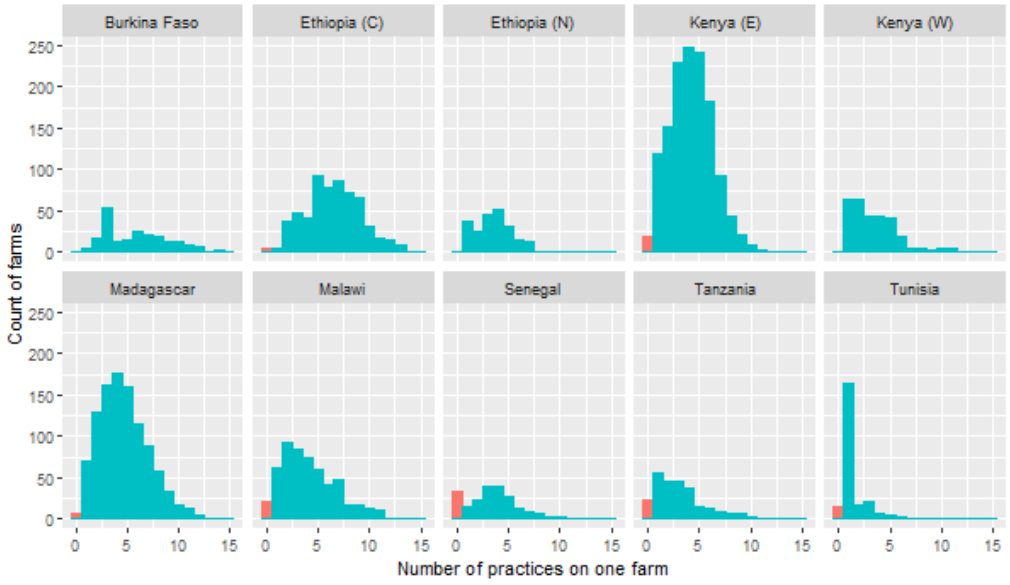


Figure 2. Numbers of agroecological practices used on each farm, as identified by farmers, across 10 case studies (zero coloured red)

Table 1. Numbers of practices that operationalize agroecological principles reported used by farmers surveyed across 10 case studies

Principle	Number	Examples of practices
Input reduction	29	Improved compost, legume integration, biopesticides
Soil health	26	Reduced tillage, green manure, erosion management
Synergy	16	Intercropping, agroforestry, home gardens
Recycling	12	Using crop residues, integrating rice and fish
Biodiversity	12	Agroforestry, using local varieties, exclosures
Economic diversification	11	Market gardening, seed production
Animal health	9	Biopesticides, local breeds, fodder storage
Social and diets	4	Local seeds and varieties, home gardens
Land governance	3	Livestock mobility, reforestation
Connectivity	2	Local seed production and use
Fairness	1	Local seed use
Participation	0	
Knowledge co-creation	0	
Total	**53**	

Many of the practices reported by farmers involve relatively simple changes in their farm systems, changing varieties for example. Our 240 key informant interviews identified twice as many agroecological practices as those from farmers in Table 1. Fifty percent of these are 'complex', meaning they involve changing many components and interactions of the farm system. For example, introducing integrated soil and water management, agroforestry or intensified crop-livestock interaction are all complex changes in practice.

2.3 Practices are used in many combinations that contribute to changing farm systems

Practices are used in combinations that interact at field, farm and larger scales, and that are different for different farms and in different contexts. There are no simple packages of practices that define agroecological farming in a given context. However, their incorporation into farms results in new systems that are more agroecological. Examples are illustrated in Figure 3. In the Tanzanian example, many farmers use both animal manure and legume intercropping, while in Ethiopia these two practices are both used, but are not so strongly associated. In Tanzania, using legume residues is well integrated with other crop management practices, but not so in Ethiopia.

In Burkina Faso it was possible to identify more and less agroecological farms based on the extent to which agroecological practices have become part of farm systems (Figure 4).

2.4 Agroecological practices used have multiple origins

The AE practices used by farmers have diverse origins and histories. Some are recent introductions and innovations supported by NGOs and research organizations, while others are well established within that context. Some are indigenous, having been developed by farmers without explicit external support, some have been brought from outside and some co-developed (Table 2). Co-development

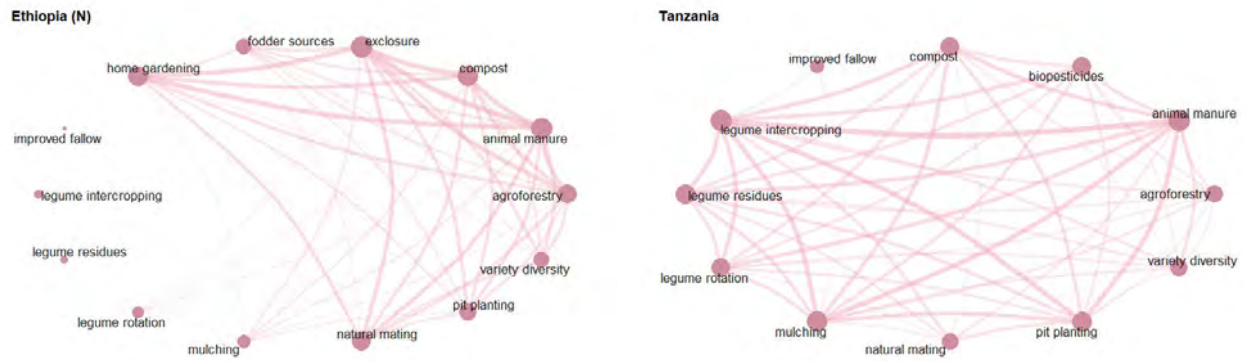
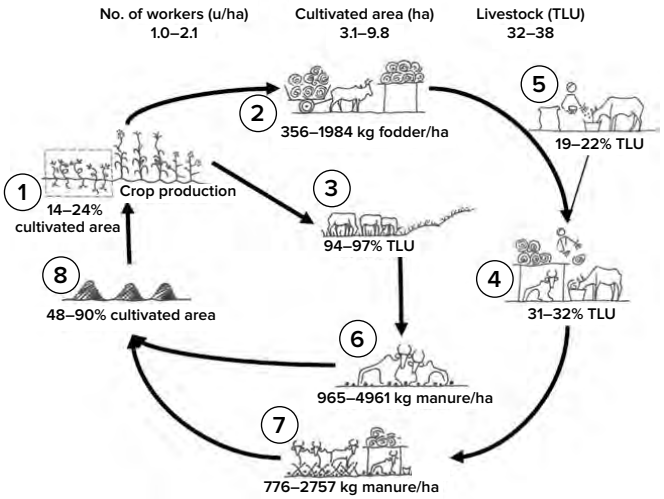


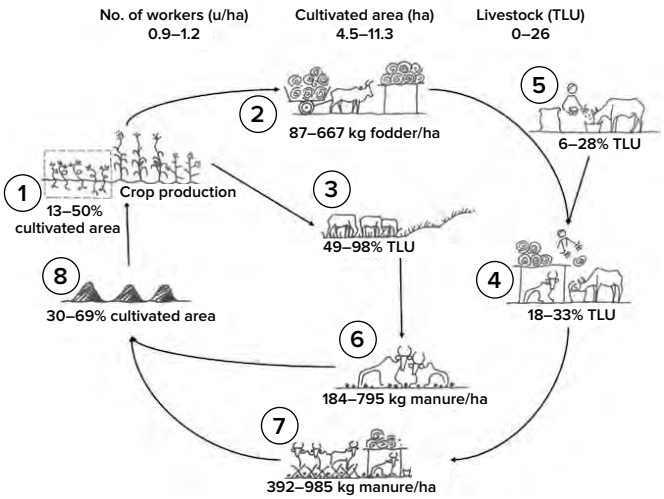
Figure 3. Examples of networks illustrating combinations of practices used on farms

Note: Line thickness indicates how often the two practices are used together, and point size indicates frequency of use.

a. Crop livestock integration in AE+ farming systems



b. Crop livestock integration in AE- farming systems



Legend

1. Cultivated pulses;
2. Fodder storage for livestock supplementation;
3. Use of rangeland to feed livestock;
4. Use of fodder to supplement livestock feed;
5. Moderate use of livestock feed;
6. Organic manure deposited in fields by grazing livestock;
7. Organic manure production in pens, pits and biodigesters;
8. Organic manure deposited on cultivated fields

Key

Arrow thickness is proportional to the intensity of the biomass and nutrient flows

Figure 4. Biomass and nutrients flows mediated by crop-livestock integration practices in more agroecological (AE+) farming systems (a) and less agroecological (AE-) systems (b)

Source: Adapted from Vall et al. 2022. Livestock farming and recycling: Two catalysts for agroecology in West African agro-silvo-pastoral systems. Agronomy for Sustainable Development (under review)

of practices is a principle of agroecology, but when a practice is well established in a location, little development is needed for further farmers to take it up, or it can be modified and adapted, eventually being recognized as a new practice. We know that co-creation of practices was part of some of the cases studies even though the actual practice of co-creation was not listed by respondents (Table 1). For example, exclosures in Ethiopia are co-developed and negotiated between communities, NGOs and government officers.

Table 2. Examples of agroecological practices of different genesis

		Well established	Recent
Origin	Indigenous	Using local varieties (all sites)	Pit planting (Senegal)
	Co-developed	Legume intercropping and rotations (many sites)	Doubled-up legumes (Malawi)
	Introduced	Agroforestry with exotic trees (many sites)	Biopesticides (Tanzania)

2.5 Farmers can use practices despite unsupportive regimes

Farmers are using these practices within regimes – policies, extension and research systems – that are not always supportive of them and may actively encourage other, non-agroecological alternatives (Box 1). In some cases, farmers are discouraged from using agroecological practices by various institutions (e.g., government, extension, private sector) with stated concerns about risks to food security, agricultural productivity and threats to farmer livelihoods if they are used. The practices must therefore be viable from farmers' perspectives if farmers are choosing to use them despite these barriers. However, in some other cases, such as Senegal or Burkina Faso, public policies more explicitly support agroecological practices with financial incentives for the use of organic fertilizers, for example.

Box 1. Examples of statements from key informants

"Ministry of Agriculture extension agents [are] … not against [agroecology] but encourage other practices which are not AE, e.g., use of herbicides and chemical pesticides." (Burkina Faso)

"… the tobacco companies … are really against agroecology because we promote afforestation." (Malawi)

"There is no one who is directly against agroecology, but in one way or another all dealers (in production, supply and use) of chemical fertilizers, chemical herbicides and chemical pesticides … their activities are against agroecology. Again, some university tutors of conventional agriculture courses discourage agroecology stating that it is less effective." (Tanzania)

"The seed companies campaign and sell their chemical products to farmers which are harmful and totally against agroecology." (Tanzania)

"We have our policies at the national level that we might need to question. For example, the seed policy is against using local and traditional seed." (Senegal)

Storage of cereal straw fodder, harnessed transport equipment and manure pit during the dryseason in Koumbia, Burkina Faso. Agroecologial practices illustrated: storage of fodder, organic manure, animal energy transport.

Photo by E.Vall/CIRAD

Companion cropping with *Tagetes minuta*, an ecological pest management practice, Tanzania.

Photo by Sustainable Agriculture Tanzania (SAT)

3 Who uses agroecological practices?

3.1 Nearly all farmers we surveyed use some agroecological practices

We sampled 5,000 farmers of different types, in some cases including those that had and had not been involved in activities developing and promoting agroecology. In all the contexts studied we find that there is a continuum of level of use of agroecological practices, from few to many (Figure 2). It is not possible to identify distinct groups of 'non-agroecological farmers' to contrast with 'agroecological farmers' on the basis of use of these practices. It appears that farmers using those practices that they find contribute to their multiple objectives and constraints (are 'viable') and ignoring others. This is consistent with a 'basket of choice' view of agroecology, rather than a value-based decision to use agroecology, although it may be that farmers are not exposed to other practices rather than selectively choosing to not use them.

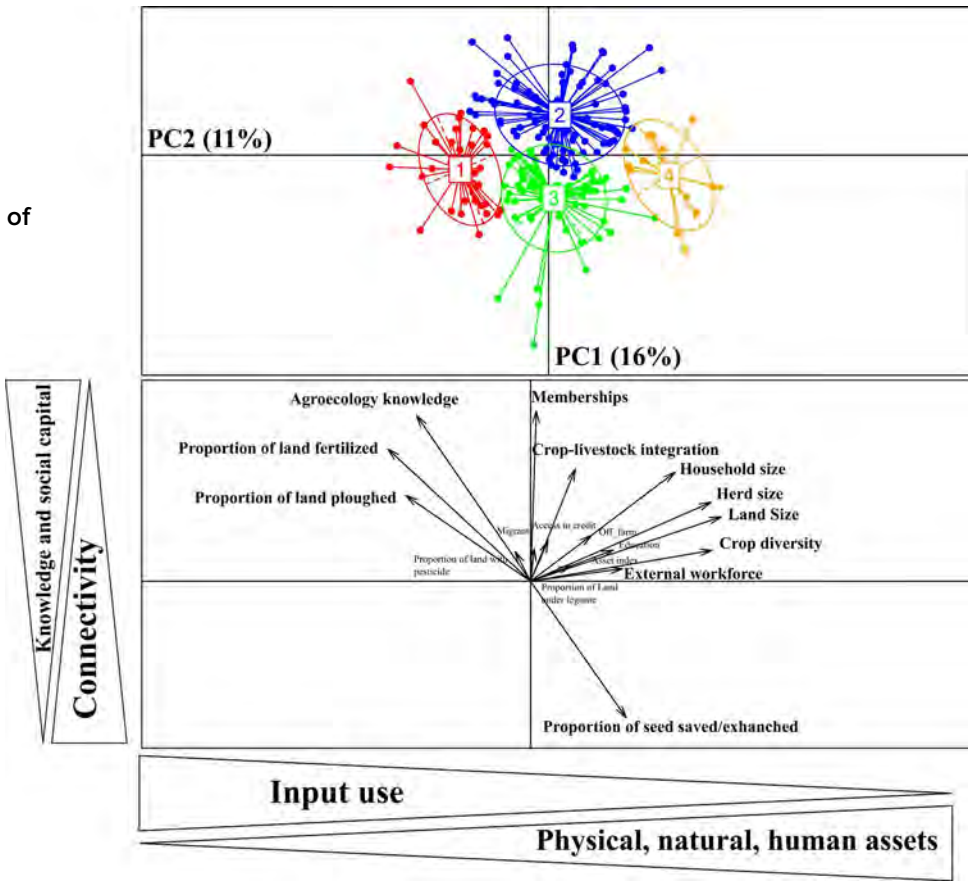
3.2 Different farm types use different combinations of agroecological practices.

Despite the preceding message, looking across the 5,000 farmers surveyed it is possible to see some links between intensity of use of agroecological practices and sociostructural characteristics of farms. A multifactor analysis we carried out highlights connections between practices and farm structural indicators. For example, in one Ethiopian site, we found that small farms with few animals and assets tended to use leguminous-based agroecological systems, while larger farms and households often had livestock-based systems, and some small farms with small households and few animals relied on conventional oriented systems (Figure 5). The cross-case analysis is in progress, but the preliminary results confirm these patterns hold between the intensity of use of particular agroecological practices and sociostructural characteristics of farms. The results point to there being multiple entry points and pathways to more agroecological systems, adapted to farmers in different circumstances.

3.3 Use of agroecological practices is not limited to any group

The broad structural analysis highlights that agroecological practices are used by diverse farmer types. Contrary to what is often claimed, the smallest or least well-resourced farmers are not always the most likely to implement agroecological practices. For example, in Burkina Faso all types of farmers are using agroecological practices; however, the number of agroecological practices adopted is higher for farmers with higher know-how, financial means, assets and workforces. In Malawi we found no relationship between level of agroecological practices and use of inorganic fertilizer or synthetic pesticides, probably because of public incentives subsidizing them.

a. Identification of four farm types



b. Key characteristics of those four types

TYPE 1: Small-scale family farms oriented to the use of inputs

- Low asset endowment
- Highest level of fertilizer and proportion of ploughed land
- Few AE principles implemented: mostly knowledge (may be trapped into input use)
- Lowest crop diversfication

TYPE 2: Medium-scale family farms oriented to to crop-livestock integration

- Medium asset endowment and strong social capital
- Highest lcrop-livestock inde and crop diversity
- Main AE principles implemented: synergy and knowledge

TYPE 3: Medium-scale farm oriented to autonomy

- Medium asset endowment
- Main AE principles implemented: autonomy (high seed exchange but no memberships and no AE knowledge)

TYPE 4: Large-scale family farms agroecological

- High asset endowment, high education and access to credit
- Several AE principles implemented: diversity, low input use, connectivity

Figure 5. Typology combining 13 AE indicators and structure indexes for an example from Ethiopia showing the configuration of farms and indicators that contribute to identification of four farm types (a), and key characteristics of those four types (b)

Source: Girard et al. 2002

4 Why agroecological practices are used

4.1 Farmers use AE practices for a wide diversity of reasons

The farm survey showed that farmers use agroecological practices for multiple reasons. When asked why they used practices, farmers most commonly gave reasons of increasing yield, along with reduced input costs and increased income (Table 3). These practices align with the most common AE principles addressed, namely input reduction and soil health (Table 1). Additional reasons are also important; however, with environmental protection and health benefits common in some situations. Resilience to climate shocks was mentioned in Kenya. In the case of Tanzania, more farmers gave environmental reasons than productivity reasons for using agroecological practices. These included reducing soil erosion and pollution of surface water; protecting biodiversity; and reducing environmental toxins. Farmers also highlighted social benefits, such as improvement of quality of life, happiness and decreases in social conflicts. These environmental and social dimensions are routinely ignored in assessments of agricultural systems.

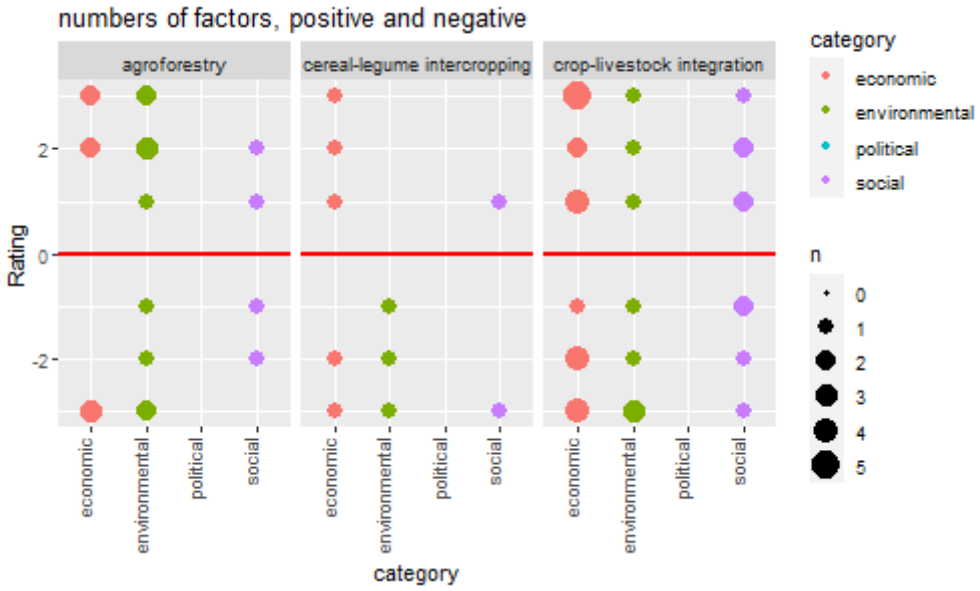
Table 3. Reasons for using agroecological practices reported by surveyed farmers (%)

Country	Increase yield	Cheaper	Increase income	Protect environment	Better health	Other
Burkina Faso	53	4	3	15	0	49
Ethiopia	78	9	32	27	5	6
Kenya	94	34	53	60	24	8
Madagascar	33	11	7	16	1	60
Malawi	78	29	7	47	25	7
Senegal	52	11	25	7	8	24
Tunisia	50	75	0	0	0	0
Tanzania	49	40	37	74	57	3

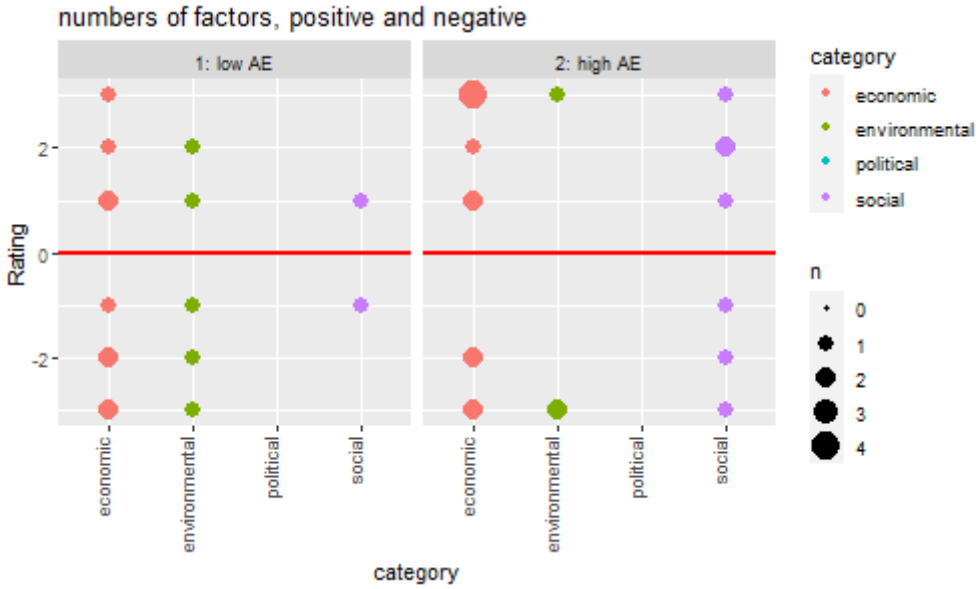
4.2 Farmers make trade-offs between advantages and disadvantages of agroecological practices

Decisions to use agroecological practices and perceptions of their viability involve farmers making trade-offs between advantages and disadvantages of alternatives. Eliciting these and the way farmers balance them shows that there are many factors involved. In Kenya, for example, farmers based their decisions on social, environmental and economic considerations (Figure 6a). In other contexts, political factors were also part of their assessment of these advantages and disadvantages.

Furthermore, the same system or set of agroecological practices can be assessed differently by different groups of farmers in the same location (Figure 6b).



a. Numbers of advantages (+) and disadvantages (-) of alternative farm systems described by farmers in Kenya



b. The crop-livestock integration system described by groups of farmers identified as less and more agroecological

Figure 6. Numbers of advantages (+) and disadvantages (-) of alternative farm systems described by farmers in Kenya (a), and the crop-livestock integration system described by groups of farmers identified as less and more agroecological (b)

4.3 Labour is not always a barrier to use of agroecological practices

Labour is often presented in the literature as a constraint to the adoption of agroecological practices. In various sites, labour was indeed a constraint. However, we found varying perceptions among farmers on the impact of agroecological practices on labour. This is, for example, the case in Malawi where some farmers mentioned that implementing agroecological practices required additional work, while others insisted that agroecological practices reduced working times by reducing the time needed to work to earn income to buy inputs, and by collectively undertaking tasks that had previously been done individually. Such contrasting views may be linked to individual characteristics

Integration of crop, trees and livestock in a mixed crop-livestock system in Ethiopia.

Photo by W.Mekuria/IMWI

such as experience or skills, and will also depend on the community and national context. They also depend on the balance made by farmers between increased labour generated by the practice and other economic, social and environmental factors. In Burkina Faso, for example, some farmers rejected the profitable cotton-based systems because of health concerns about the agrochemicals involved. In some areas, for example Madagascar, wage labour is a means of dividing agricultural incomes between very small holdings with family workers who are underemployed and slightly larger holdings with activities that increase productivity but demand more work. Agricultural intensification is occurring through labour inputs to agroecological practices.

Deeper investigations on work organization within farms show gender differentiated effects linked to the division of tasks between men and women. For example, in Tunisia and Madagascar, manure application is a matter for women, and changes in its use will directly affect their workloads. In crop-based farms, introducing agroecological practices also had implications for temporary workers who are very important contributors of planting and organic fertilization tasks. In Madagascar, the introduction of one or two dairy cows in small crop-based farms (with all the associated benefits for organic fertilization, soil fertility, but also for income) require permanent wage earners for all the tasks that remain manual (from cutting grass to cleaning barns and milking).

5 Overall

5.1 Assessing viability of agroecological practices is complex

Reflection on the methods used, alternative methods and the results we are seeing highlights the fact that assessment and understanding of agroecology and agroecological practices is itself complex. For example:

- We set out to understand 'practices' but these are used in many different combinations and cannot be pulled apart from other components of a system.
- We focused on farms and households, but the viability of practices, combinations of practices and systems at that level depends on factors operating at other levels, such as at different parts of the food system, at landscape and territory levels, and through the policy and support regimes in place.
- The viability of practices and systems cannot be understood by careful selection of metrics and indicators alone. Opinions and points of view matter, and the same practice or system can be judged different by different people in the same context. Co-assessment of practices and systems by a diversity of actors may generate valuable knowledge on the viability of agroecology in Africa.

Farmer Mwombeki Cleophase in his Sunflower field, Tanzania

Photo by Sustainable Agriculture Tanzania (SAT)

5.2 There are at least three contrasting narratives of agroecology in Africa

The cross-case analysis of the key informant surveys highlighted three different narratives of agroecology in Africa (Figure 7):

1. Agroecology is for poor people and may be a poverty trap.
2. Agroecology provides a basket of options that can be combined with non-AE practices, extending the set of tools farmers have.
3. Agroecology is a holistic vision of food and agricultural systems working for combined social, environmental and economic outcomes.

Many of the key messages from the project so far can be understood better in terms of these different views of the nature and role of agroecology and agroecological practices.

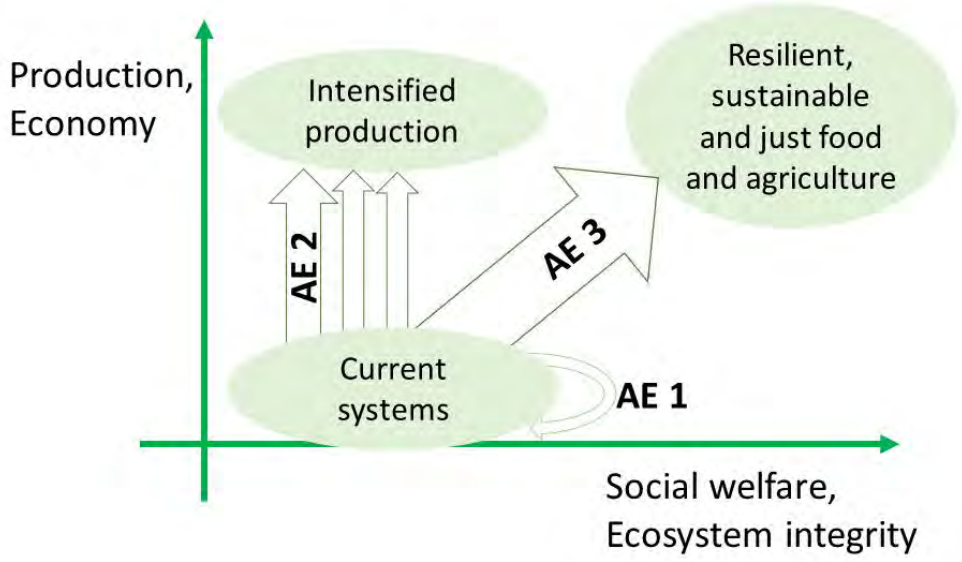


Figure 7. Three narratives of agroecology: AE 1 – keeps poor farmers trapped/is an adaptation for poor farmers; AE 2 – a complementary part of intensified systems; AE 3 – a trajectory to sustainable, resilient and just food and agriculture systems

6 Methods summary

The methods developed for this project are based on using a common approach across the 11 case studies, but allowing them to be adapted to specific contexts as needed. Agroecology concerns moving agricultural and food systems in directions as described by its principles. Therefore, the ideal approach would be a longitudinal one in which change is tracked over time and at various scales (from the plant or animal up to global). This was not possible in a short-term project, so we sought to understand agroecological practices through: (1) comparison of those using and not using such practices within the same context; and (2) farmers self-reported changes in practice, the reasons for them and the consequences.

This project only considered the farm and farm household scale.

The approach used a sequence of data collection and data analysis steps designed to inform each subsequent step, followed by an overall analysis after the collection of all data (Table 4). Analysis of data from each case study is the responsibility of the team that collected it. Analysis across cases is led by members of the project who propose analysis topics. Results and examples presented in this data are based either on data from a single case, that is named; or data from all cases available at the time of analysis.

Table 4. Data collection steps in data collection used in the project. Analysis steps follow steps 2, 4, 6 and 8.

Step	Method	Purpose	Data assembled to date
1	Assembly of secondary data about each site	Describe and understand the context of each case study site	21 sites from 11 case studies
2	Key informant interviews	Elicit grounded information on the status of agroecology and use of agroecological practices	239 interviews
4	Farm and farm household surveys	Understand farm structure, patterns of use of agroecological practices and relations between them	5,025 farms surveyed
6	Focus group discussions	Validate results from Step 4 and investigate other drivers and lock-ins influencing use of agroecological practices	85 FGDs recorded
8	Detailed studies on labour	Understand implications of agroecological practices for labour and work – changes in work patterns and quality of work, including by gender	In process
	Participatory cost-benefit analysis	Generate insights on relative roles of economic, social and environmental dimensions in decisions to use agroecological practices	

References

HLPE. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition (July issue). High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security.

Wezel A, Herren BG, Bezner Kerr R, Barrios E, Luiz A, Gonçalves R, Sinclair F. 2020. Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. Agronomy for Sustainable Development 40(40).

DOI: 10.17528/cifor-icraf/008817

Agroecology is a body of knowledge, practices and political movements that aims to support transformation of food and agricultural systems to long-term social and environmental sustainability. African farmers face multiple challenges, and agroecology has been proposed as contributing to solutions and hence is being supported and promoted on the continent. However, the viability of agroecological practices for African farmers has been questioned.

The project that produced the results in this paper was set up to understand more about the viability of agroecological practices at farm and household level, identifying the lockins and drivers of use of agroecology and paying particular attention to labour and work. A case study approach was used, with 11 cases across eight countries from Tunisia to Madagascar contributing evidence. A common framework was used in all cases but with adaptation of details to local contexts. After two years collecting data, case-study and coordinating teams met in December 2022 to look at results and plan detailed analyses. Although the analysis of the extensive data had only just begun, some important messages were emerging. These have been summarised in this paper and are presented with examples of the evidence supporting them.

About the Agroecology TPP

The Agroecology TPP convenes a broad group of scientists, practitioners and policymakers working together to accelerate agroecological transitions. Since its official launch on 3 June 2021, the TPP has begun addressing knowledge gaps across eight domains that will support various institutions and advocacy groups in key decision-making processes. Its online 'Community of Practice' on GLFx is open to all, providing a space for members to share their insights, knowledge and experience.

This partnership was founded by CIRAD, The Alliance of Bioversity International and CIAT, BioVision, UNEP, FAO and CIFOR-ICRAF.