



“New AGRoecological approach for soil fertility and biodiversity restoration to improve ECONomic and social resilience of MEDiterranean farming systems”

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Theoretical and methodological framework to analyse agroecological farming

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Acronym and abbreviations

PRISMA-ScR: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews

WoS: Web of Science



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Executive summary

In the last years, agroecology has gained prominence as one of the innovative approaches that could positively contribute to achieving sustainable food systems. As a transdisciplinary science, agroecology could benefit from the contribution of the economic toolbox. This study aims to give an overview of how the agricultural economics discipline has contributed to this field of study. A scoping review was conducted by using the PRISMA methodology and its extensions for scoping reviews. After the identification, screening and selection stages, a total of 209 papers were included in our review, both from Scopus and Web of Science databases, according to eligibility criteria. The selected body of literature provides an overview of the key topics, the main methodological approaches applied, and the results achieved by scholars.

Keywords: agroecology, agricultural economics, sustainable food system, socio-technical transition, transdisciplinary.

Introduction

Agroecology is increasingly seen as a holistic and multidimensional approach (Méndez et al., 2013; Gliessman, 2018) to achieving sustainable food systems (HLPE, 2019). Although there are several definitions in literature, agroecology is widely considered a transdisciplinary science that includes elements from several disciplines (Dalgaard et al., 2003), increasingly focusing on the transformation of the whole agri-food system (Wezel and David, 2020) to enhance food security and nutrition (HLPE, 2019). Compared to other approaches concerning the transition toward more sustainable food systems, the agroecological literature still has several gaps preventing a full understanding of its potential (D'Annolfo et al., 2017). For example, it is still disputed whether the agroecological transition of food systems can deal with ongoing food security and nutrition challenges (Bezner Kerr et al., 2021). Furthermore, the impacts of agroecology on society at large are little explored (Gonzalez de Molina, 2013). Understanding socio-economic and political factors is necessary to identify drivers and barriers to foster the agroecological transition (Bellamy and Ioris, 2017; Giraldo and Rosset, 2018). Against this backdrop, the role of agricultural economics discipline can be relevant (Fresco et al., 2021), and the present research falls in this domain. More specifically, this study aims to provide an overview of how agricultural economics discipline has approached and contributed to the literature concerning agroecology. Seeking to systematize this body of literature, the research will focus on different relevant economic dimensions explored (e.g., farm management, provision of ecosystem services, extension and advisory services, governance of supply chains, consumer preferences, agricultural policies, and other relevant socio-political issues and environmental outcomes of agroecology). To reach this objective, a scoping review was performed to systematically map the research done in the field of agroecology by using the toolbox and tools from the agricultural economics domain. The literature review aims to reply to the following research questions:

What are the main economic topics analysed?

What are the main methodological approaches applied?

What are the main results achieved?



The results of the literature review pointed out the contribution of the agricultural economics discipline to the studies about agroecology and the research gaps that should be filled-in.

Materials and methods

The scoping review is the ideal tool to characterize scientific literature on a given topic, determining the amount and type of extant studies. Scoping reviews are useful to bring out underinvestigated areas of inquiry and to eventually suggest the formulation of specific research questions (Colquhoun et al., 2014; Munn et al., 2018).

The review protocol was drafted using the PRISMA methodology and its extensions for scoping reviews (PRISMA-ScR). We designed a searching protocol incorporating inclusion criteria and keywords for the application in two different databases, Scopus and Web of Science (WoS).

We performed a query based on the Boolean combination of the following keywords: “agroecol*”, “agroecol*” and “econom*” set in the fields "article title, abstract, and keywords".

These keywords were chosen with to identify studies that focus on agroecology and the economic dimension at different levels of analysis, from single farms to entire food systems. To get variants of the provided search terms, asterisks (*) at the end of the keywords were added. Databases search was conducted on 18 January 2023 and a total of 5,436 entries were retrieved from both databases (Tables 1).

Table 1 Databases search query

Databases	Search query	Records
Scopus	TITLE-ABS-KEY ([agroecol*OR agro-ecol*] AND econom*)	3,410
Web of Science	((TI=((agroecol* OR agro-ecol*) AND econom*) OR AB= ((agroecol* OR agro-ecol*) AND econom*) OR AK= ((agroecol* OR agro-ecol*) AND econom*))	2,026
Total		5,436

On each database, automatic filters were applied to identify articles that met the following criteria: published between 2013 and 2023, as we believed that scientists’ interest in this topic had increased following the International Symposium on Agroecology for Food Security and Nutrition held by FAO in Rome in 2014. To ensure high-quality publication, we included scientific articles published in peer-reviewed journals (Larson & Chung, 2012), written in English which is generally perceived as the universal language of science (Morrison et al., 2012). We also considered the inconsistency of empirical evidence showing that the exclusion of non-English language articles in reviews generates biases (Balshem et al., 2013; Hartling et al., 2017). The identification stage was further narrowed according to subject areas where it was almost certain to find articles falling under the domain of agricultural economics (Table 2 & Table 3).



Table 2 Identification criteria

Database	Automatic filters	Records
Scopus	<ul style="list-style-type: none"> • Document type: articles, review, short survey • Subject area: AGRI, BUSI, DECI, EART,ECON, ENVI, MULTI, SOCI, VETE • Language: English • Publication year: from 2013 to 2023 	2,903 2,789 2,482 1,772
Web of Science	<ul style="list-style-type: none"> • Document type: article, review • Subject area: AGRICULTURAL SCINCES, BIOLOGY & BIOCHEMISTRY, ECONOMICS & BUSINESS, ENGINEERING, ENVIRONMENT/ECOLOGY, MULTIDUSCIPLINARY, PLANT & ANIMAL SCINCE, SOCIAL SCIENCES, GENERAL, GEOSCIENCES • Language: English • Publication year: from 2013 to 2023 	1,951 1,919 1,723 1,279
Total		3,051

The studies identified by applying the automatic filters in each database (n = 1,772 in Scopus; n = 1,279 in WoS; n = 3,051 in total) were imported into excel for the de-duplication process.

After the elimination of duplicates (n = 1,168) the remaining abstracts (n = 1,883) were reviewed by two of the authors. The screening stage was performed by reading of "article title, abstract, and keywords" to ascertain if papers focus on agroecology and have significant agricultural economics content (Fresco et al., 2021).

When we were unable to deduce all the aforementioned information from the title or abstract, we included the paper for further examination via full-text reading. During the screening stage, we choose to eliminate the reviews (n = 203) from our database after ascertaining that their scope was different from our review objective.

At the end of the screening stage, 248 articles were recorded. After, a full-text assessment for the eligibility, 209 articles were included in the scoping review. Figure 1 shows the entire selection process.

Figure 1. PRISMA-ScR flow diagram, representing the stepwise process of record identification, de-duplication and abstract screening, full-text assessment for the scoping review.

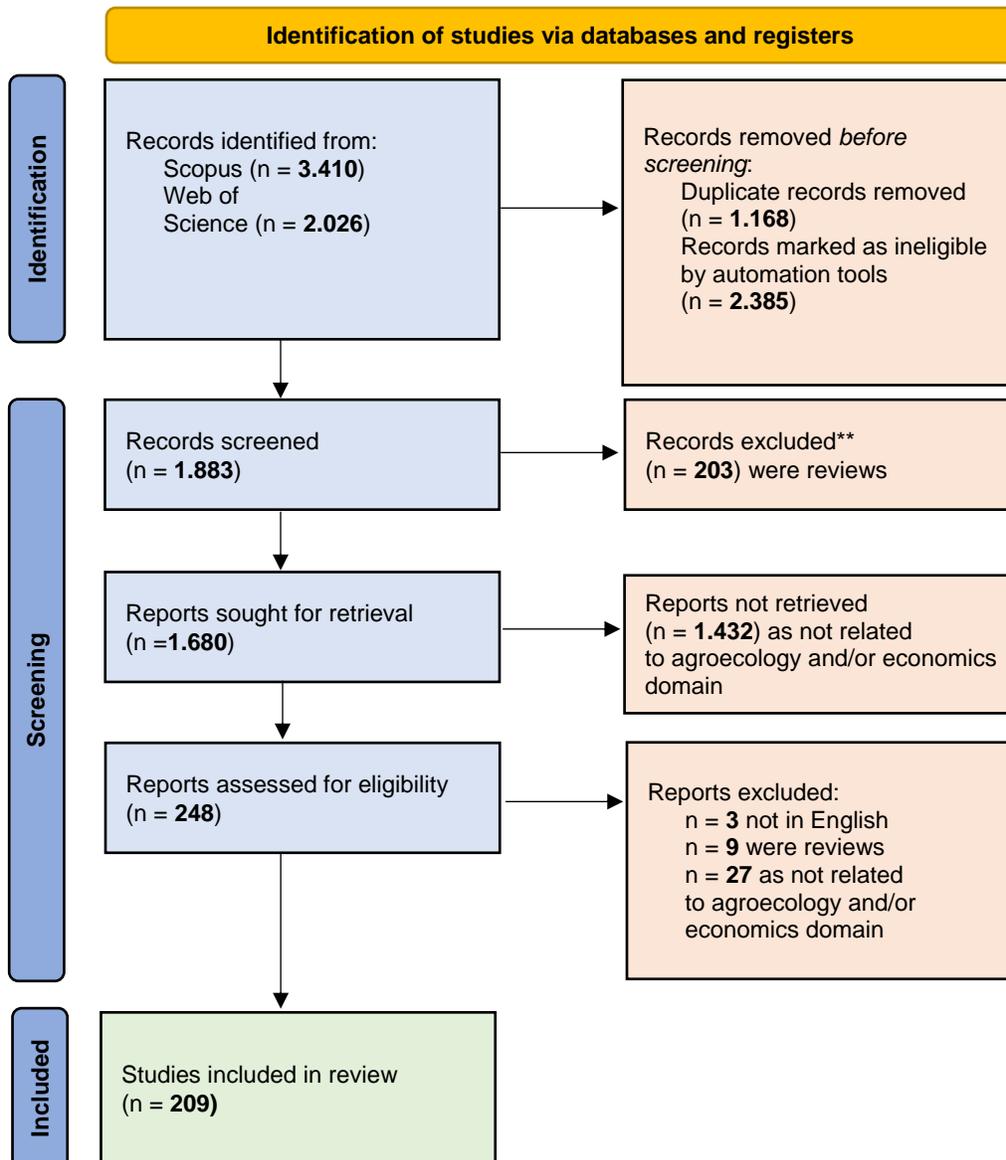


Table 3 Inclusion/exclusion criteria.

Inclusion criteria	Exclusion criteria
1. Peer-review studies	1. Not peer-review (e.g. proceedings)
2. Doctype: article, review, short survey	2. Were not articles, reviews or short papers
3. Subject areas	3. Not within selected subject areas
4. Only English language	4. Not in English or only abstract in English
5. Published between 2013-2023	5. Outside of target dates for publications
6. Focused on agroecology	6. Not focused on agroecology or the word agroecology referred to other themes
7. Fell within agricultural economics domain	7. Not included within the domain of the agricultural economics

Results

Through an iterative process and the analysis of full-text articles, a detailed categorization was carried out. At this stage, the key elements in common in the different works were combined to refine the categorization. The main research topics were identified according to the stated general objective of the selected studies. Within each main research topic, sub-topics were identified based on the stated specific objective. After such analysis, 8 main research topics were identified (see Table 4) and then further categorized. Each main topic will be briefly discussed in the paragraphs that follow, seeking to emphasize similarities among articles falling under each group of articles.

Table 4 Number of studies for each main topic

ID	MAIN TOPICS	N.
#1	AGROECOLOGICAL TRANSITION	44
#2	ASSESSMENT OF PRODUCTION SYSTEMS	52
#3	FOOD SECURITY AND FOOD SOVEREIGNTY	9
#4	MARKET STUDIES	24
#5	OVERVIEW OF AGROECOLOGY	20
#6	POLITICAL DIMENSION	35
#7	RESEARCH AND EDUCATION AGENDA	16
#8	RURAL AND URBAN DEVELOPMENT	9
	TOTAL	209

Main topic #1: Agroecological transition

This category contains publications that approach the topic of agroecological transition by exploring case studies from both the Global North and South of the world. Many studies examine the transition dynamics and trajectories by considering interactions between multiple levels, from field to farm, sectoral and territorial agri-food system, and socio-technical landscape, addressing the different challenges and pressures to change. Some of them propose comprehensive theoretical frameworks for studying transition pathways. Other works focus specifically on the multiple drivers and/or barriers to transition, on the crucial resources to foster the change, and on stakeholders’ involvement and relations, mainly adopting a multi-actor perspective. Another group of studies explores the factors affecting decision-making processes to understand farmers’ decisions to adopt agroecological practices, often identifying socio-economic trade-offs (Table 5).

Table 5 Sub-topics of AGROECOLOGICAL TRANSITION

AGROECOLOGICAL TRANSITION	N.
Impact of agroecological transition	5
Theoretical	1
Social and institutional aspects	7
Drivers and barriers	26
Modeling agroecological transition	3
System transformation	2
TOTAL	44

Main topic #2: Assessment of production systems

The selected studies focus on the assessment of productions systems in terms of sustainability performance of the agroecological paradigm at various scales of analysis (from plot scale and farm scale to entire agri-food system). Some articles covered sub-topics concerning the diversification of farming systems (e.g. crop diversification, crop-livestock integration, livestock farming practices), while others investigate the impact of adopting several others agroecological practices in conventional farms (e.g. biocontrol, organic fertilization, biostimulants). Few studies performed an analysis in terms of transitioning from conventional to organic farming, while others performed a comparison between conventional farming vs agroecological farming. An array of articles focused on the economic impacts of agroecological transition at territorial scale (Table 6).

Table 6 Sub-topics of ASSESSMENT OF PRODUCTION SYSTEMS

ASSESSMENT OF PRODUCTION SYSTEMS	N.
Crop diversification	6
Crop-livestock integration	8
Livestock farming practices	3
Other agroecological farming practices	9
Organic farming practices	6
Conventional farming vs agroecological farming	8
Impacts of agroecology at territorial scale	12
TOTAL	52

Main topic #3: Food security and food sovereignty

Articles under this category explore the relationship between agroecology and the issues of food security and food sovereignty. Specifically, food sovereignty is seen as an ideal aspiration widely shared by several socio-cultural and political movements, both in the South and in the North of the world, and understood as the right of people who produce, distribute, and consume food to also control the mechanisms and policies of food production and distribution. Therefore, these studies consider agroecology as an alternative paradigm for the design and the management of sustainable agri-food systems, and provide theoretical and empirical evidences on how and to what extent the adoption of agroecological practices may provide a direct contribution in reaching the ambition of global food security as well as food sovereignty (Table 7).

Table 7 Sub-topics of FOOD SECURITY AND SOVEREIGNTY

FOOD SECURITY AND FOOD SOVEREIGNTY	N.
Role of agroecology in promoting food sovereignty	5
Theoretical	3
Linkages between farmers' behaviour and diets issues	1
TOTAL	9

Main topic #4: Market studies

These studies investigate different market issues strictly related to the transition process of agri-food systems towards agroecology. Some of these studies analyse the role of labelling, and identify some strong limitations of this specific tool for supporting and fostering agroecological products on the market. Other studies focus on the role of consumers and highlighted the importance of integrating the stage of consumption, with those of production and distribution of agroecological food products. Another group of studies emphasize the importance of short distribution channels, like farmers’ markets, as a crucial factor to support peasant economy and foster the agroecological transition. Some studies highlight the strategic role of "alternative food networks" which are understood as specific market organizations based on the partnership and social cooperation between small-scale farmers and consumers at local level, with the aim to re-connect production and consumption using practices which are sustainable in economic, social and environmental terms (Table 8).

Table 8 Sub-topics of MARKET STUDIES

MARKET STUDIES	N.
Alternative food networks	16
Consumer analysis	5
Labelling issues	3
TOTAL	24

Main topic #5: Overview of agroecology

This category includes heterogeneous studies that discuss about agroecology. Each of these studies explore specific dimensions of agroecology including women engagement, social justice, ethical consumerism, valorisation of local historical knowledge, and community-based governance. In general, these studies highlight the opportunity to build a more comprehensive and shared conceptualization of agroecology (Table 9).

Table 9 Sub-topics of OVERVIEW OF AGROECOLOGY

OVERVIEW OF AGROECOLOGY	N.
Building shared understanding	1
Contribution to sustainable development	5
Theoretical	6
Gender approach	8
TOTAL	20

Main topic #6: Political dimension

This topic includes studies focused on the analysis of the economic and social impacts of public policies supporting the agroecological transition, and other studies aim at suggesting guidelines for design and implementation public policies. Also, studies that emphasized the role of grassroots action and social movements in making agroecology a dominant topic in political discourse (Table 10).

Table 10 Sub-topics of POLITICAL DIMENSION

POLITICAL DIMENSION	N.
Grassroot action	4
Impact of public policies	9
Investment in research and development	2
Policies design and implementation	11
Public food procurement program	3
Theoretical	5
System thinking approach	1
TOTAL	35

Main topic #7: Research and education agenda

This category embraces those studies that address concerns on the research and education programmes dealing with agroecology. Some articles faced different innovative approaches to research in order to grasp the complexity of the theme (e.g. transdisciplinarity and action orientation methods) or the educational initiatives such as training courses on the topic of agroecology. Finally, other studies highlight the gaps in the literature (Table 11).

Table 11 Sub-topics of RESEARCH AND EDUCATION AGENDA

RESEARCH AND EDUCATION AGENDA	N.
Educational initiatives	4
Knowledge gaps in agricultural research and policy	2
Theoretical	2
New research approach	8

TOTAL	16
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Main topic #8: Rural and urban development

The papers under this main research topic analyse the agroecology through the lens of urban and rural development. Authors consider agroecology, implemented through urban and peri-urban agriculture, as a strategy able to address challenges related to food security, health issues, biodiversity loss, and resource depletion, all of which are gravely affecting the linkage between the rural and urban environment (Table 12).

Table 12 Sub-topics of RURAL AND URBAN DEVELOPMENT

RURAL AND URBAN DEVELOPMENT	N.
Governance	2
Planning	3
Urban agriculture	4
TOTAL	9

Conclusions

The scoping review reached the aim to give an overview of how the agricultural economics discipline has contributed to the field of study on agroecology. By applying the PRISMA -ScR methodology, a total of 209 papers were identified. The selected body of literature was classified into 8 main research topics and then further categorized in several sub-topics, providing an overview of the main methodological approaches applied, the results achieved by scholars, and the research and policy implications.

The 8 main research topics identified were as follow: 1) agroecological transition; 2) assessment of production systems, 3) food security and food sovereignty, 4) market studies, 5) overview of agroecology, 6) political dimension, 7) research and education agenda, 8) rural and urban development.

The largest group of studies concern the “Assessment of production systems” in terms of sustainability performance of the agroecological paradigm at various scales of analysis (from plot scale and farm scale to territorial scale), using several methodological approaches. Another relevant topic is the “Agroecological transition” that explores the transition dynamics and trajectories by considering the interactions between multiple levels, from field to farm, sectoral and territorial agri-food system, and socio-technical landscape, addressing the different challenges and pressures to change.

The field of study concerning the “Food security and food sovereignty” provides theoretical and empirical evidences on how and to what extent the adoption of agroecological practices may provide a direct contribution in reaching the ambition of global food security as well as food sovereignty. The articles on

“Market studies” investigate different market issues strictly related to the transition process of agri-food systems towards agroecology.

A relevant topic concerns the “Political dimension” that focuses on the analysis of the economic and social impacts of public policies supporting the agroecological transition, aimed at suggesting guidelines for design and implementation public policies. Also, there are studies that emphasize the role of grassroots action and social movements in making agroecology a dominant topic in political discourse.

The topic “Research and education agenda” embraces those studies that address concerns on the research and education programmes dealing with agroecology. While the articles under the topic “Rural and urban development” analyse the agroecology through the lens of urban and rural development.

Finally, the topic “Overview of agroecology” includes heterogeneous studies exploring several dimensions of agroecology at system level. They include issues women’s engagement, social justice, ethical consumerism, valorisation of local historical knowledge, and community-based governance. In general, these studies highlight the opportunity to build a more comprehensive and shared conceptualization of agroecology.

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