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[Carolina Raquel Dias de Almeida Barreto Leite](#) *

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Article

Promotion of Green Business for Climate Neutrality: New Proposals for Carbon Farming

Carolina Raquel Dias de Almeida Barreto Leite

Polytechnic Institute of Viseu (IPV), 3504-510 Viseu, Portugal; carolinabarretoleite@gmail.com

Abstract

Agriculture in Europe needs to progress towards a new business system, where sustainable agricultural practices are the driving force behind this business. These sustainable practices will contribute to Europe's climate neutrality by 2050. Carbon farming has practices that help to sequester CO₂ in the soil and mitigate CO₂ from the atmosphere. Increasing SOC (Soil organic carbon) in soil through carbon farming practices will promote soil quality and fertility, which is essential for soil ecosystem services protection. This study aims to identify new proposals, such as technical and policy instruments, that help promote carbon farming practices through a bibliometric analysis of carbon farming, as there is a gap in bibliometric review studies on carbon farming in the scientific literature. The bibliometric analysis results showed that the principal common terms include "carbon farming," "carbon sequestration," "climate change" and "Australia" and there is a lack of terms related with carbon credit market and adaptation from farmers. Australia is the country with the most published carbon farming documents. Carbon farming aims to be an eco-agrosystem to be broadly embraced by farmers.

Keywords: carbon farming; bibliometric analysis; carbon credit market; regenerative agriculture

1. Introduction

The European Green Deal strategy promotes a competitive and resource-efficient economy. It targets no net greenhouse gas (GHG) emissions by 2050, protecting natural resources and citizen health from the effects of environmental hazards (European Commission, 2020). Continued greenhouse gas emissions will cause global warming to reach 1.5°C in the near future. To limit human-caused global warming, it is necessary to restrict total CO₂ emissions and achieve net-zero CO₂ emissions, along with significant cuts in other greenhouse gases. This includes deep reductions in CO₂ and methane and requires carbon dioxide removal for net negative emissions (IPCC, 2023). Carbon removals are required to become the focus after achieving climate neutrality, as negative emissions will help stabilize temperature increases. Solutions from natural ecosystems and industrial carbon capture and storage should be efficiently and sustainably used. Both types of carbon removals must meet strict monitoring, reporting, and verification standards to support EU climate and environmental goals (European Commission, 2021).

The agricultural sector can contribute to reducing GHG emissions via mitigation technologies or better farming practices, creating a carbon sink through soil organic carbon accumulation, sustainable production of biomass for bioeconomy and food security, reducing the use of fossil fuels as phytochemicals and energy, losses, and waste (European Commission, 2019).

Carbon farming is defined by the European Commission (2021) as:

a green business model that rewards land managers for taking up improved land management practices, resulting in the increase of carbon sequestration in living biomass, dead organic matter and soils by enhancing carbon capture and/or reducing the release of carbon to the atmosphere, in respect of ecological principles favourable to biodiversity and the natural capital overall. (p.5)

Carbon farming practices will improve carbon sequestration in soil, such as afforestation and reforestation, agroforestry which combines trees with crops or livestock; techniques like catch crops,

cover crops, and conservation tillage that can help protect soil, converting cropland to grassland and restoring peatlands and wetlands, decreasing oxidation of current carbon stock, and aiding carbon sequestration (European Commission, 2021).

There is a gap in scientific research on bibliometric review studies regarding carbon farming, as shown in surveys made on scientific platforms, such as Scopus (Scopus, 2025) and Web of Science (Web of Science, 2025). A bibliometric analysis is done to identify new proposals, such as technical, technological, legislative, or policy instruments, to promote carbon farming practices.

The following section (2) is a carbon farming literature review, followed by the methodology section (3) where a bibliometric analysis is done, followed by a systematic review with objective criteria. Afterwards, there is a discussion section (4). The conclusion section (5) of the study is then presented.

2. Literature Review

Soil Health and Carbon Farming

Soil, as a non-replaceable resource, is a vital part of the natural environment and serves important environmental, social, and economic roles (Blum, 2005).

Soils can be considered healthy when they exhibit good chemical, biological, and physical conditions. It allows them to provide diverse ecosystem services, such as producing food and biomass, filtering water and nutrient recycling, supporting life and biodiversity, storing carbon, providing cultural services, a human activities platform, supplying raw materials, and serving as a heritage stock (European Commission, 2021; European Commission, 2023).

An integrated view of healthy soils includes both the inherent and dynamic properties of soils and the desired level of soil quality needed for soil functions and ecosystem services (Baritz, et al., 2023). FAO (2020) defines soil health as “the ability of the soil to sustain the productivity, diversity, and environmental services of terrestrial ecosystems”.

European Commission Soils Vision is:

“By 2050, all EU soil ecosystems are in healthy condition and are thus more resilient, which will require very decisive changes in this decade. By then, protection, sustainable use, and restoration of soil will have become the norm. As a key solution, healthy soils contribute to addressing our big challenges of achieving climate neutrality and becoming resilient to climate change, developing a clean and circular (bio)economy, reversing biodiversity loss, safeguarding human health, halting desertification, and reversing land degradation.” (European Commission, 2021 a, p.2)

Agriculture, forestry, and other land-use practices are choices that can help adapt to and mitigate climate change. Effective adaptation strategies include agroforestry, social adjustment, diverse farmland and countryside, urban agriculture, and improved cultivars (IPCC, 2023; Kell, 2012). Conservation agriculture improves soil health by enhancing its physical, chemical, and biological properties (Francaviglia et al., 2023).

The Communication on Sustainable Carbon Cycles outlines measures to promote carbon farming as a sustainable business pattern, including the promotion of carbon farming practices under the Common Agricultural Policy (CAP) and the standardization of monitoring, reporting, and verification methodologies. (Kyriakarakos et al., 2024; Sharma et al., 2021. Carbon farming increases soil carbon, improves soil quality, and boosts agricultural production (Sharm et al., 2021). The conservation agriculture principles and practices, such as conservation tillage, permanent cover, and crop diversification (Francaviglia et al., 2023), also improve food security and reduce greenhouse gas emissions. (Francaviglia et al., 2023; Sharma, et al., 2021).

SOC and Agricultural Productivity

Soil organic carbon (SOC) concentration, as well as the soil's quality and dynamics, are crucial for soil functions and ecosystem services. The main components of SOM (soil organic matter) are plant and animal residues, active SOM, and stable SOM. It contains 45–60% SOC and is a major

energy source for soil microorganisms. SOC includes decomposed plant and animal materials, microbial biomass, and their outgrowths. Maintaining SOC level above 1,5 – 2,0 % in the root zone supports soil structure, water use, nutrient retention, root processes, and greenhouse gas control. Sustainable SOC management is a key to soil health and can be achieved through conservation agriculture, diverse farming systems, and organic amendments (Lal, 2016).

An evaluation of 61 topsoil and 26 subsoil observations found that soil organic carbon in agroforestry systems is higher than in areas without trees. Agroforestry enhances SOC in temperate zones and improves carbon storage, despite possible SOC losses during planting. Agroforestry can effectively reduce carbon emissions and be eligible for carbon credit certificates (Mayer et al. 2022). Carbon sequestration increases with silvopastoral compared to agroforestry and reduces greenhouse emissions (Sharma et al. 2021). SOC (Soil organic Carbon) sequestration for organic amendments, cover crops, poplar plantations, conservation management, organic management, and combined carbon farming practices was found with median SOC absolute gains varying from 0.32 to 0.96 Mg C/ha/yr at a depth of 0–30 cm (Petersson et al., 2025). Kell (2012) verified that most soil carbon comes from roots rather than from shoots and leaf litter, yet plants with deeper roots could capture more carbon. Farmers can improve productivity and soil carbon by enhancing soil structure and increasing microbe and earthworm populations (Mattila & Vihanto, 2024). SOC isn't a complete substitute for mineral fertilizer, but increasing SOC with low N inputs may help maintain yields and minimize fertilizer use. The least carbon-rich soils and the least productive have the biggest sequestration potential, which means that marking those soils for land change would have a low opportunity cost. In contrast, the most productive land also sequesters more carbon, having a big opportunity cost for land use change (Pretty et al., 2005).

Francaviglia et al. (2023) embolden Member States to introduce mandatory eco-schemes in their CAP Strategic Plans, which focus on carbon farming practices to increase SOC content and protect soil conditions. SOC accumulation targets for assessment of trade-offs between increasing SOC storage and GHG emissions should be included in CAP Strategic Plans. Farmers need to embrace advisory services to understand carbon farming, face high costs, and be enlightened about yields. (Pretty et al., 2005; Sharma et al., 2021).

SOC and Carbon Credit Market

Farmers to adopt new methods for carbon sink restoration need financial support, the carbon credit markets may help to finance these efforts. However, there are challenges around permanence, verification, additionality, certification cost, and equity (Liu, 2022). Due to significant uncertainty in SOC estimations at farms, lasting monitoring is advised to assess SOC gains from conservation agriculture practices; shortened-term monitoring is also necessary for informed agricultural policy decisions (Francaviglia et al., 2023). To a precise measure of carbon sequestration opportunity cost, it is important to consider externalities when calculating the costs of changing land use or management practices (Pretty et al. 2005).

For credits to represent real reductions in GHG emissions and be tradable, frameworks have been created that outline how to measure, monitor, report, and verify soil carbon sequestration (Kyriakarakos et al., 2024). A public certification system is essential to build trust in CO₂ storage technologies and lower monitoring costs. Certification can also boost carbon credit markets in carbon farming and biogenic sources (Wolf, 2022). Carbon farming policies could lead to higher payments for carbon credits that provide additional environmental advantages. Likewise, increases in soil organic matter may bring environmental benefits, justifying government payments to support sustainable agriculture (Pretty et al., 2005). Farmers with carbon credit certificates will determine the impact of carbon farming on agriculture, raising farmers' income while removing and storing atmospheric carbon (Kyriakarakos et al, 2024).

3. Bibliometric Analysis

A bibliometric analysis was conducted using VOSviewer 1. 6. 20 software. This software builds networks of journals, researchers, organisations, and countries based on citation, bibliographic coupling, co-citation, co-occurrence, or co-authorship links (VOS viewer, 2025). VOSviewer Manual (Van Eck et al., 2023) content provides the following information about bibliographic data links analysis:

- 1. Bibliographic coupling link connects two items citing the same documents.
- 2. Co-citation link connects two items cited by the same documents.
- 3. Citation link is a connection where one item cites another.
- 4. Co-authorship link counts publications that two researchers co-authored.
- 5. Co-occurrence link counts publications where two terms/keywords appear together.

The Scopus Collection was chosen as the data source due to its broad and credible scholarly source database status (Scopus, 2025). The search on Scopus Collection database was carried out with the terms” Carbon Farming”, in the “article title, abstract and keywords” query, without filters, so that all records could be analysed. A total of 343 documents were identified and all selected. The dataset was exported in a “Comma-Separated Values file (.csv). Afterwards, the VOSviewer software analysis was applied to the csv data extracted.

3.1. Results

Following the bibliometric analysis using VOSviewer on 343 documents about Carbon Farming research and considering the bibliographic data analysis map of bibliographic coupling on documents (Figure 1), there are 11 clusters being cluster 1 with red colour and includes 65 documents, cluster 2 with dark green colour and contains 50 documents, cluster 3 with dark blue colour and consist of 46 documents, cluster 4 with dry green colour and comprises 44 documents, cluster 5 with purple colour and incorporates 38 documents, cluster 6 with light blue colour and holds 30 documents, cluster 7 with orange colour and covers 19 documents, cluster 8 with old pink colours and contains 4 documents, cluster 9 with pink colour and with 4 documents, cluster 10 with Light pink colour and contains 3 documents and cluster 11 with light green colour and with 2 documents included (Table 1).

Table 1. Relation of Clusters and articles from documents' bibliographic coupling analysis.

Cluster	Colour	Documents
1	Red	65
2	Dark green	50
3	Dark blue	46
4	Dry green	44
5	Purple	38
6	Light blue	30
7	Orange	19
8	Old Pink	4
9	Pink	4
10	Light Pink	3
11	Light Green	2

The bibliographic map (Figure 1) shows isolated clusters, the old pink (8) and Light pink (10). The clusters 1 (red), 3 (dark Blue), 4 (dry green), 5 (purple), 6 (light blue) are close together (Figure 1- a and Figure1- b). The clusters 11 (light green) (Figure 1-a) and 7 (orange) (Figure 1- a) are further away from that group of clusters (1, 3,4, 5, 6) but closer to those clusters, than the clusters 8 (old pink) and 10 (light pink) (Figure 1). The clusters 2 (dark green) and 5 (purple) are more related to each other and still closer to the main group of clusters (1, 3,4,5, 6) (Figure 1- b and Figure 1-c).



Figure 1. bibliographic coupling/documents map (Full view).

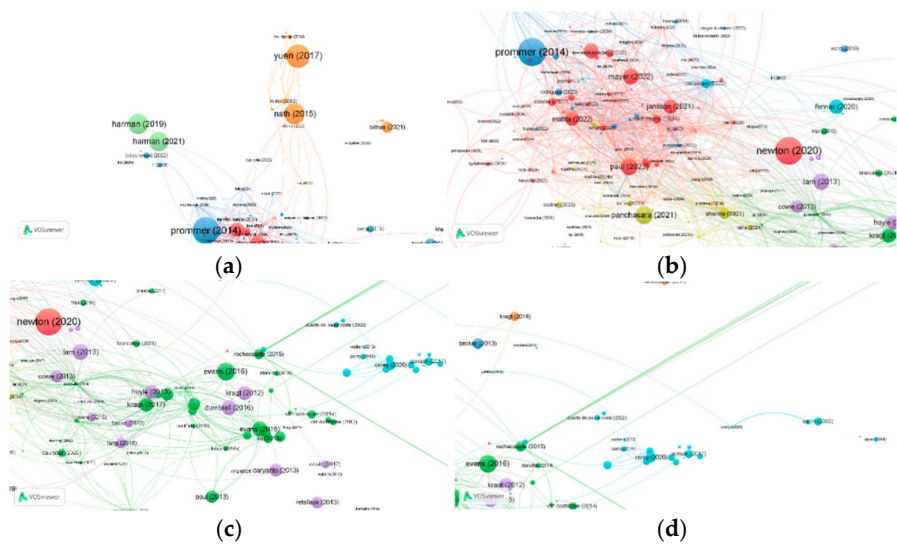


Figure 1. (a) Results of documents' bibliographic coupling (b) Results of documents' bibliographic coupling (c) Results of documents' bibliographic coupling (d) Results of documents' bibliographic coupling.

The five most cited documents were by Prommer J., Newton P., Yuen J. Q., Nath A. J., Harman G. E. (Annex Table 4). "PLOS ONE", "Agricultural Systems", "Frontiers in Sustainable Food Systems", "Forest Ecology and Management", and "Environmental Science and Policy" are the sources with the highest citation numbers for "Carbon Farming" research (Figure 2)

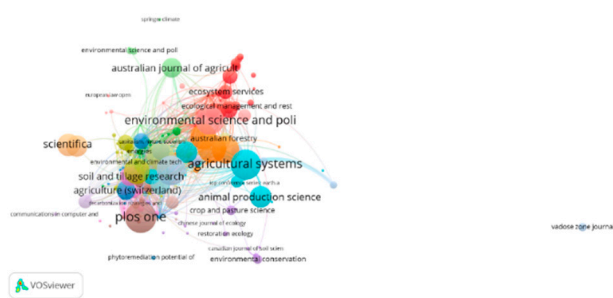


Figure 2. Results of sources' bibliographic coupling links map.

The top five sources with the highest number of documents on Carbon Farming are "Sustainability (Switzerland)", "Rangeland Journal", "Soil and Tillage Research", "Journal of Environmental Management", and "Agronomy" (Table 2).

Table 2. First 15 Sources with the highest number of documents, for bibliographic coupling links, considering full counting and 1 minimum number of documents of a source.

Sources	Documents	Citations	Normalised Citations	Average Publication Year
Sustainability (Switzerland)	12	784.7945		2022.8333
Rangeland Journal	11	874.1056		2018.2727
Soil and Tillage Research	8	11213.162		2023.75
Journal of Environmental Management	6	20223.0418		2022
Agronomy	6	262.6749		2022.6667
Animal Production Science	6	1414.6479		2014.5
European Journal of Soil Science	5	304.6633		2023.8
Agricultural Systems	5	25010.1252		2014.8
Land Use Policy	5	2068.8322		2017.8
Agriculture, Ecosystems and Environment	4	19018.7424		2020.5
Geoderma	4	564.6992		2022.75
Environmental Science and Policy	4	2246.4354		2016.25
Carbon Management	4	171.0634		2018.5
Agriculture (Switzerland)	4	1114.2524		2023.25
Environmental and Planning Law Journal	4	210.7356		2012.75

The countries with more documents published on carbon farming are Australia, the USA, Germany, Italy, and China, and with the greatest connection are Germany, the USA, Australia, Italy, India, and the United Kingdom (Figure 4)

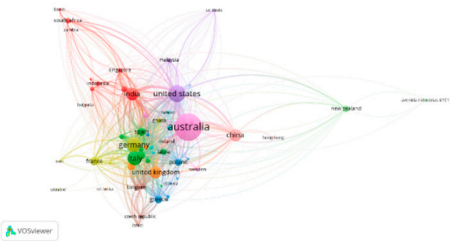


Figure 4. Results of countries bibliographic coupling links map.

The most common author keywords are “carbon farming”, “carbon sequestration”, “climate change”, “climate change mitigation”, and “Soil Organic carbon” (Figure 5)

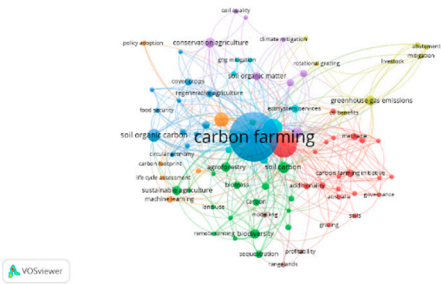


Figure 5. Results of co-occurrence links of Author keywords.

The most current terms in carbon farming research are “carbon farming”, “carbon sequestration”, “climate change”, “carbon”, and “Australia” (Figure 6)

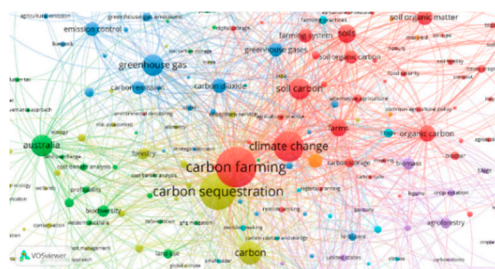


Figure 6. Zoom of results of All – keywords co-occurrence links.

3.2. Systematic Review with Criteria

A systematic review was conducted, selecting the 15 articles with the most citations on carbon farming research (Annex, Table 4). The articles cover various topics related to carbon farming. These topics include the effects of biochar on nitrogen (Prommer et al., 2014), the definition of regenerative agriculture (Newton, 2020), and the role of bamboo as a carbon sink (Nath et al., 2015; Yuen et al., 2017). Other subjects discussed are the development of Enhanced Plant Holobiomes for climate mitigation (Harman et al., 2019; Harman et al., 2021), carbon farming potential, and policies for private land conservation to reduce deforestation in Australia (Evans et al., 2016). The review also notes the adoption of climate-smart practices that blend traditional methods with technology to boost productivity and lower greenhouse gas emissions (Panchasara et al., 2021). Implementing carbon farming practices can be expensive, but soil carbon certificates may offer financial support if standard methods, indicators, and monitoring are established (Paul et al., 2023). Some findings indicate that adding woody litter preserves soil carbon from drought (Fenner & Freeman, 2020) and that controlled traffic farming can prevent soil compaction (Chamen et al., 2015). Management practices have been shown to store carbon only in the top 0-10 cm of soil (Lam et al., 2013). Additionally, agroforestry is noted to enhance soil organic carbon and biodiversity conservation (Mayer et al., 2022; Evans et al., 2015). Lastly, farmers' choices are influenced by their views on climate change and past experiences with carbon farming, highlighting the need for informed policies for practice management selection (Dumbrell et al., 2016).

4. Discussion and Conclusions

The European Green Deal aims for no net greenhouse gas emissions by 2050 (European Commission, 2020), and the European soil monitoring law targets healthy soils by the same year. This leads to sustainable agricultural management practices that reduce CO₂ emissions and increase organic carbon in the soil (European Commission, 2023). Carbon farming as a green business enhances soil carbon sequestration, preserves natural resources, and rewards farmers through the carbon credit market (European Commission, 2021). Australia, the USA, Germany, Italy, and China have the most published documents on carbon farming (Figure 4). European countries, Germany, Italy, and the United Kingdom publish the most documents, followed by France, Spain, Greece, Switzerland, Finland, and Belgium. There is a concern about this theme in countries from the north and from the south of Europe, but not in Eastern Europe. Outside Europe, countries such as Australia, the USA, China, India, Japan, and Brazil contribute to the publication of carbon farming documents. In Europe, many countries are releasing many documents on carbon farming, but the rest of the world needs to research and publish more on this topic.

Australia has an average publication date in 2017, while Italy and Spain have 2023, France has 2022, and Germany has 2021 (Table A1), which demonstrates that in Europe, the carbon Farming theme became prominent later in scientific publications. Those average publication dates are related to the date of publications of regulations and policies like LULUCF in 2018 (European Commission,

2025 a) and the new Common Agriculture Policy (2023-2027) that supports the goals of the European Green Deal with incentives for eco-farming practices such as organic farming, agro-ecology, carbon farming, and animal welfare (European Commission, 2025). As well as events such as the Paris Agreement in 2015 and the Kyoto Protocol (2013-2020) for climate neutrality (UN, 2025).

The top sources for carbon farming documents are “Sustainability (Switzerland)”, “Rangeland Journal”, “Soil and Tillage Research”, “Journal of Environmental Management”, and “Agronomy” (Table 2), and shows that articles about carbon farming are published in several journals, ranging from research areas of environment, soils, animal production, agronomy, and policy showing to be a multidisciplinary concept. The five most cited documents were written by Prommer J. in 2014, Newton P. in 2020, Yuen J. Q. in 2017, Nath A. J. in 2015, and Harman G. E. in 2019, showing that after 2014, carbon farming theme became increasingly interesting for scientific research. (Annex Table 4)

The principal common terms (Figure 6) in carbon farming research include “carbon farming,” “carbon sequestration”, “climate change,” and “Australia”. Carbon sequestration and climate change are concepts that are strongly related to carbon farming, important for climate neutrality. Australia was one of the first countries to establish a carbon credit market by the government (Parliament of Australia, 2025), and thus, has many published carbon farming-related documents. From the most common 15 author keywords (Figure 5), it is noticed that there is a lack of terms related to the carbon farming carbon market, farmers' carbon farming adoption, carbon farming economic effects, and the relation of carbon farming with regenerative agriculture, which reveals a gap in scientific research. More studies on the opportunity cost regarding carbon farming practices and land use change should be conducted to determine exact cost calculations, assess the risk of adoption, and see if it is worthwhile to join the carbon credit market.

Policy Proposals

Carbon farming practices could be encouraged through the existence of a Regenerative Agriculture Production EU Regulation, in which policymakers could financially support the introduction of this agroecosystem, so that farmers' transition to this climate mitigation production method would be with minimal risk.

The new Common Agriculture Policy (2023-2027) encourages eco-farming practices. Carbon farming practices could be monitored for soil carbon accumulation, with financial incentives applied for increases in SOC. A standard MRV (monitoring, reporting, verifying) methodology of SOC could be regulated by the European Community, to be used on CAP and on the carbon credit market. Carbon farming is a sustainable agricultural method that preserves natural resources, conserves biodiversity, achieves carbon neutrality, and offers economic compensation for ecosystem services provided by the carbon credits market. Farmers adopting carbon farming practices and the CRCF Regulation (EU/2024/3012) will earn extra income by selling carbon credits to polluting companies that compensate for their GHG emissions.

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Appendix

Table A1. First 15 Countries with the highest number of Total link Strength, for bibliographic coupling links, considering full counting and 1 minimum number of documents of a country.

Countries	Total Link	Documents	Citations	Normalised citations	Average Publication
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	Strength				Year
Germany	5044	32	502	58.4773	2021.9688
United States	4872	44	1113	45.599	2020.2955
Australia	4619	113	2402	99.7286	2017.1858
Italy	3800	31	207	30.5355	2023
India	2923	22	314	24.4154	2021.8636
United Kingdom	2629	21	349	22.4879	2019.0476
France	2087	11	159	13.9946	2022.6364
Spain	2026	10	107	9.3411	2023.1
China	1913	23	360	34.4401	2020.6087
Switzerland	1894	10	160	19.9914	2023.2
Greece	1713	10	126	9.3065	2023
Belgium	1586	6	73	5.7172	2023.6667
Brazil	1499	5	118	3.9615	2020.8
Japan	1065	6	50	1.3623	2021.8333
Finland	1040	9	135	18.9102	2022.4444

Table3- Systematic review of 15 th more cited documents		
Author	DOI	Main Subject of the article
Prommer (2014)	https://doi.org/10.1371/journal.pone.0086388	The study spotlights the soils nitrogen cycle and verifies how organic and inorganic nitrogen levels is affected by biochar in a field trial in Lower Austria.
		It was found that biochar increased total organic carbon in soil but decreased extractable organic pool and soil nitrate. Conversely, biochar promoted soil ammonia oxidizers and sped up gross nitrification rates. Our results indicate a link between organic and inorganic N cycles in soil, with organic N accumulation and slowed inorganic N release. Adding inorganic nitrogen with biochar could offset the decrease in organic nitrogen mineralization.
Newton (2020)	https://doi.org/10.3389/fsufs.2020.577723	There is no legal or regulatory nor a common usage definition of “regenerative agriculture” term, although general concern about it. To describe the term “regenerative agriculture, It was reviewed 229 journal articles and 25 practitioner websites” The study has shown that many definitions of regenerative agriculture were being used, established on processes like(cover crops, livestock combination, and lowering or eradicating tillage), and on outcomes like (soil health rise, carbon sequestration, and biodiversity

		increments), a mixture of processes and outcomes. The definitions discrepancy used could bring ambiguity about what the meaning when stakeholders refer to regenerative agriculture. Authors suggest that the term “regenerative agriculture”, for any circumstance or usage must be cautiously defined.
Yuen (2017)	https://doi.org/10.1016/j.foreco.2017.01.017	In bamboo ecosystems, the total carbon range is similar to rubber plantations and tree orchards, higher than agroforests, grasslands, shrublands and pastures, and lower than that of most forests. Annual carbon accumulation rates are estimated at 8–14 Mg /ha and falling to 4 Mg /ha after when a choicy harvest happens. A capable bamboo stands management will reinforce favourable carbon farming. Bamboo should be recognized for its importance as a carbon sink and its ecosystem services, such as preventing soil erosion and providing construction and food resources.
Nath (2015)	https://doi.org/10.1016/j.gecco.2015.03.002	Nath, et al., (2015) shown the potential of woody bamboos in biomass carbon storage and as an option for carbon farming and trading. The average carbon storage rate in woody bamboos is 30–121 Mg ha ⁻¹ , with a sequestration rate of 6–13 Mg ha ⁻¹ per year. Bamboo grows quickly, completing its cycle in 120 to 150 days, and contributes significantly to carbon sequestration. Despite its benefits, the role of bamboo in Clean Development Mechanism and REDD schemes needs further exploration. It has potential for generating tradable carbon and providing income for rural communities.
Harman (2019)	https://doi.org/10.1155/2019/9106395	Endophytic microorganisms improve plant performance, they promote gene expression that produces proteins to detoxify reactive oxygen species (ROS). ROS increase due to environmental stresses or overexcitation of photosynthetic pigments. Enhanced photosynthesis rates from these endophytes lead to improved plant growth. The development of enhanced plant holobiomes (EPHs) can reduce nitrogen pollution, mitigate stresses from climate change, minimize methane production, enhance carbon sequestration, and increase farmers' incomes through carbon credits.
Harman (2021)	https://doi.org/10.1111/jam.14368	Bettering the crop plants photosynthesis can aid the production of enough food and fibre for a rising population meanwhile also contributing for climate mitigation. Some

		fungi from the Trichoderma genus can augment photosynthesis by stimulating specific genes and pigments. These fungi also help reduce damage from reactive oxygen species (ROS), leading to better shoot and root growth, increased crop yields, and carbon storage in soil.
Evans (2016)	https://doi.org/10.1071/pc15052	The study discusses deforestation directions, motives and policy feedback in Australia, over the past 40 years, looking into the institutional, economic, and environmental factors related to forest loss. Also, it appraises past native vegetation policies and recent changes in legislation and reviews. The study highlights the potential of policies with incentives, as carbon farming and private land conservation to reduce deforestation. It points out the need for an improved policy fuse and better monitoring and evaluation to adequately undertake deforestation in Australia.
Panchasara (2021)	https://doi.org/10.3390/agriculture11020085	Agriculture contributes significantly to greenhouse gas emissions, impacting climate change directly and indirectly. In Australia, livestock farming generates 70% of emissions, mainly from methane. To reduce these emissions, the agriculture sector should adopt climate-smart practices that combine traditional methods with technology to enhance productivity while reducing GHG emissions and a resilient food system to climate change.
Table4- Systematic review of 15 th more cited documents		(Cont.)
Author	DOI	Main Subject of the article
Paul (2023)	https://doi.org/10.1016/j.jenvman.2022.117142	To rise SOC ranks implies agricultural management changes which demand costs for the farmer. Those costs could be covered with private soil carbon certificates, where farmers register fields with providers who certify SOC increases, and then sold as voluntary emission neutralizers. Those emissions offsets can not be guaranteed because of governance issues that includes lack of monitoring, challenges with proving additionality, leakage effects, and accountability for re-emitted SOC. Thus, it is necessary to establish standard methods, indicators, and monitoring systems.
Lam (2013)	https://doi.org/10.1038/srep02179	A meta-analysis assessed the technical and economic viability of increasing soil C through better management practices. The findings suggest that these practices can only store C effectively in the top 0–10 cm of soil,

		and the benefits decrease over time. Also, deeper soil layers do not show significant C gains. It appears that pasture can aid C sequestration but poses challenges like increased methane emissions, higher irrigation needs, and inefficiencies in using land for animal food compared to crops. Ultimately, enhanced practices raised soil C by only 0.05–0.15 Mg C ha⁻¹ year⁻¹ in the top 10 cm, and the economic feasibility remains low.
Mayer (2022)	https://doi.org/10.1016/j.agee.2021.107689	An evaluation of 61 topsoil and 26 subsoil observations found that soil organic carbon in agroforestry systems is usually higher than in areas without trees. Hedgerows have the highest SOC rates, comparing to alley cropping and silvopastoral systems, especially at 20–40 cm depth. Agroforestry enhances SOC in temperate zones and improves carbon storage. Despite possible SOC losses during planting, agroforestry can effectively reduce carbon emissions and be eligible for carbon credit certificates.
Evans (2015)	https://doi.org/10.1016/j.envsci.2015.02.003	The study of Evans, et al., (2015) shows that Assisted Natural Regeneration (ANR) is a cost-effective way for reforestation, that helps carbon sequestering and biodiversity conservation. In Queensland, north-eastern Australia It was verified that carbon farming needed little incentive for farmers to adopt, with low to moderate carbon prices. If the carbon price is (\$50 t CO₂e), 10.5 million hectares could sequester 1825 million tons of CO₂e in 100 years.
Dumbrell (2016)	https://doi.org/10.1016/j.landusepol.2016.02.002	Dumbrell, et al. (2016) conducted a survey with dryland cropping and mixed crop-livestock farmers in Western Australia to identify carbon sequestration practices. Farmers' choices were influenced by their views on climate change and experience with carbon farming. Preferred practices included stubble retention and no-till cropping, while tree planting was less selected. Farmers affected by climate wished to adopt tree planting. Policies should allow farmers flexibility to choose practices and should provide useful information. The chance to reduce emissions and sell carbon credits seemed unimportant to farmers, but improved soil quality and reduced erosion were viewed as top rewards, while uncertainties in policy, carbon prices and profits were viewed as concerns to farmers.

Fenner (2020)	https://doi.org/10.1038/s41558-020-0727-y	This study shows that adding woody litter, it helps to preserve external carbon and protects soil carbon from drought by leaching polyphenolics, at northern peatlands. These compounds limit microbial activity and growth by restricting access to iron and nutrients. This method could arise new carbon-farming strategies.
Chamen (2015)	https://doi.org/10.1515/ata-2015-0014	The intention of controlled traffic farming is to manage machinery use by limiting field vehicles to specific lanes to prevent soil compaction. In Australia, researchers began creating these on- farm machinery systems in the 1990s, leading to a large adoption on about 13% of cropped land. On the turn of the century, although changes to extension services in northern Europe, the control traffic model adoption remained unchanged. The transfer of this technology has depended on dedicated individuals rather than institutions, with a similar pattern in Australia.

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