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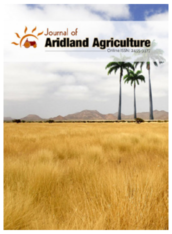

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# Unlocking the potential of conservation agriculture for soil carbon sequestration influenced by soil texture and climate: A worldwide systematic review

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## ABSTRACT

Conservation Agriculture (CA) systems have gained significant attention as a sustainable cropping approach that not only improves crop yields but also contributes to climate change adaptation and mitigation through enhanced soil organic carbon (SOC) sequestration. However, a comprehensive understanding of the influence of soil texture and climate conditions on SOC sequestration under CA remains limited. To address this knowledge gap, we conducted a systematic review using the PRISMA method, analyzing data from 35 peer-reviewed articles encompassing 71 field experiments and 451 observations worldwide. Our findings demonstrate the substantial positive impact of CA on SOC sequestration, with an overall increase of approximately 78%. Remarkably, only a mere 2% of observations reported neutral effects, while 20% indicated adverse outcomes. Notably, SOC sequestration rates were highest in tropical regions experiencing dry winters, reaching an impressive 2.50 Mg/ha/year in the topsoil layers. Moreover, fine and moderate textured soils, such as clay, clay loam, loam, and clay sandy, exhibited higher SOC sequestration rates (20-27%) compared to coarse-textured soils dominated by sandy proportions (9%). These findings emphasize the significance of climate conditions and soil texture in shaping the impact of CA on SOC sequestration.

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## INTRODUCTION

The international scientific community accepts that the climate crisis leading to global warming is a serious and critical global environmental issue (Sanson *et al.*, 2019). Despite multiple efforts to combat climate change, the average annual Greenhouse Gas (GHG) emissions during 2010-2019 were higher than in any previous decade (IPCC, 2022). Therefore, there is a strong and urgent need for GHG mitigation options that will account for specific challenges relevant to every sector of the economy (Fellmann *et al.*, 2018). Agriculture is one such strategic sector that has the potential to reduce GHG emissions and thus decrease its contribution to global warming (Howden *et al.*, 2007; Lenka *et al.*, 2015; Diffenbaugh *et al.*, 2021). Agriculture is not only considered as a regulator of GHG fluxes, but also has the potential to address other vital challenges, such as food insecurity (Smith & Olesen, 2010). As a result, there has been increased interest in sustainable land management with an emphasis on improved farming practices that promote yields, sustain natural resources, and reduce GHG emissions with a particular focus on carbon dioxide ($CO_2$) (Branca *et al.*, 2013; Verschuuren, 2016).

In light of this, there are several international strategies to promote sustainable land management which can also address the climate crisis (Wang *et al.*, 2010). One such strategy is the ‘4 per 1000: Soils for Food Security and Climate’ initiative, launched at the COP21 in Paris, which aims to increase soil organic carbon (SOC) stocks for food security and climate change mitigation (Lal, 2020). This initiative aims to enhance the SOC content of world soils to a 40 cm depth at the rate of 0.4% annually (Lal, 2016). The application of this approach is promising as it involves the concept of soil carbon sequestration through extracting $CO_2$ from the atmosphere and storing it in a carbon reservoir on land for the long term (Lal, 2003, 2008). Soil carbon sequestration can occur mainly through the elimination of conventional farming practices (e.g. intensive tillage, monocropping, excessive irrigation) and the adoption of alternative agricultural systems that enhance the soil carbon sequestration process, such as no-tillage, crop rotation, residue retention, organic amendments, crop diversification and agroforestry (Nair *et al.*, 2015).

One strategy that utilizes some of these alternative sustainable farming practices is Conservation Agriculture (CA). This alternative cropping system has been widely promoted for its potential to increase crop yield and mitigate climate change through the sequestration of organic carbon in soil (Kassam *et al.*, 2009; Kassam *et al.*, 2014; Page *et al.*, 2020; Valkama *et al.*, 2020). It is an approach that emphasizes the importance of minimizing soil disturbance, increasing crop diversity and keeping soil covered with plants as much as possible. CA is based on three principles: no-tillage, crop diversity and cover crops (Singh *et al.*, 2018). No-tillage, also known as conservation tillage, has an important positive effect on soil structure by improving the physical environment (e.g., water retention, soil aggregation and porosity) (Bronick & Lal, 2005). As soil structure is more protected in no-tillage due to the elimination of disturbance by mechanical breakdown, more SOC is sequestered and less $CO_2$ is released into the atmosphere (Blanco-Canqui & Ruis, 2018). Second, crop diversity or crop rotation has a significant impact on SOC by enhancing the quantity and quality of residue and roots due to the practice of varying the types of crops (Nair *et al.*, 2015). Finally, cover crops or residue retention has been claimed as an essential component of the CA system. It affects the physical condition of soils (i.e., soil temperature) by improving the intake of nutrients in soils (including carbon) as a result of the microbial decomposition of the soil (Palm *et al.*, 2014).

There are some systematic reviews and meta-analyses on the impact of CA on soil carbon sequestration in specific regions such as the United States (Bai *et al.*, 2019), Sub-Saharan Africa (Corbeels *et al.*, 2019), and tropical regions (Powlson *et al.*, 2016). Nevertheless, there are limited comprehensive synthesis studies on a global scale. Although in one meta-analysis of global data from 69 field experiments, Luo *et al.* (2010) found that no-tillage alone resulted in an increase in the SOC stock in soils. However, the authors suggested that more information on the effect of crop rotation and cover crops is needed to increase our understanding of the potential for agricultural soils to sequester more carbon under CA.

Against this background, the objective of this systematic review is to bridge this research gap by evaluating the potential of CA to increase carbon storage in agricultural soils on a global scale. We conducted a literature search of peer-reviewed publications to collect data from experimental studies on the variation of SOC stocks under CA treatment. Then, the key factors (soil texture and climate) were examined to provide comprehensive insights into the role of soil texture and climate in influencing SOC sequestration under Conservation Agriculture.

## MATERIALS AND METHODS

### Data Collection (Literature Search)

All data required for this systematic review were collected through a literature search conducted in March 2022, through three electronic databases: Science Direct (http://www.sciencedirect.com/), Scopus (http://www.scopus.com/) and Google Scholar (http://www.scholar.google.com/). The following combination of keywords was used: “Conservation Agriculture” OR “Conservation Tillage” OR “No-Tillage” OR “Reduced-Tillage” AND “Soil Carbon” OR “Carbon Sequestration” OR “Soil organic Carbon” OR “Carbon Stock” OR “Carbon Storage”. The initial search yielded 1810 articles and the first screening of these articles by title resulted in 1032 articles. The second screening based on abstracts and keywords resulted in 374 articles (Figure 1 shows the details of the screening steps). The elimination of duplicate articles resulted in 176 candidate articles.

### Data Selection (Inclusion and Exclusion Criteria)

These articles were read in full and included according to the following selection criteria:

- Papers written in English (to the exclusion of papers written in other languages).
- Peer-reviewed articles that reported the SOC stocks under conservation agriculture.
- All locations were included: field experiments conducted anywhere in the world were considered.
- SOC data was measured and reported ($t/ha^{-1}$ or $Mg/ha^{-1}$ for the control treatment and the conservation agriculture treatment).
- Studies that indicated that the absence of or minimum tillage with residue retention was tested.
- Experimental conditions (i.e., fertilization, irrigation, cropping system) were equal between the control and CA application.
- For each study all observations values were considered; they varied essentially according to the sampling layer depth and the age of the treatment.
- In some studies, reduced or minimum tillage and no-tillage were simultaneously examined; in this case, we considered all obtained observations.

Papers were excluded if they:

- Provided repeated data reported in other publications already included.
- Provided incomplete data to calculate the variation of SOC Stocks between the control treatment and the CA treatment.
- Only included one component of the CA tested.

After screening the full texts of the articles according to the above selection criteria, 35 eligible peer-reviewed articles were considered in the final dataset. These articles included 71 field experiments.

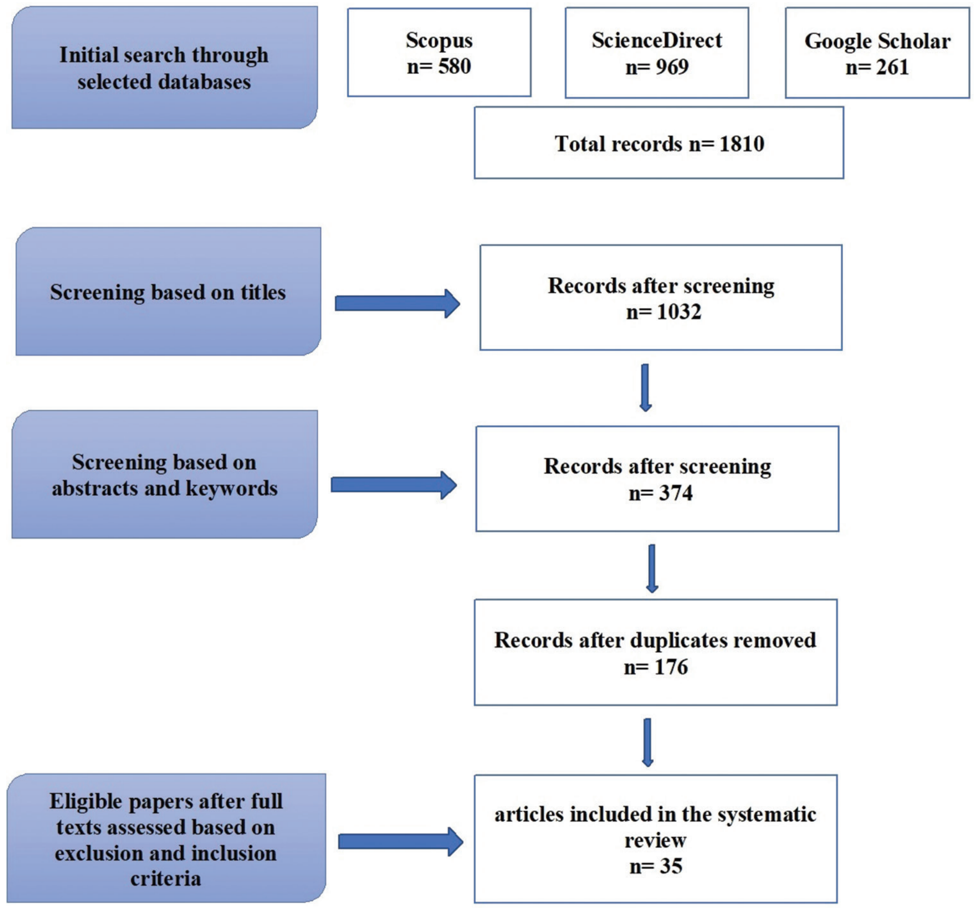


**Figure 1:** Diagram of the paper selection process

## RESULTS AND DISCUSSION

### Distribution and Characteristics of Studies

The final database included 35 articles, yielding 451 observations from 71 sites around the world (Figure 2).

Field experiments included in this present study occurred on six continents (i.e., Asia, Africa, Australia, Europe, North America, and South America), 21 countries and in 9 climate zones according to the Koeppen-Geiger classification, including temperate (Csa, Cwa, Cwb, Cfa, Cfb,) tropical (Aw, Am) and cold climates (Dfb, Dfa) (Figure 3).

Most of the observations were in humid subtropical climate (Cfa; n=75), hot-summer Mediterranean climate (Csa; n= 90), tropical wet and dry climate (Aw; n= 74), and humid continental climate (Dfb; n=69) (Table 1).

Around half of the studies (45%) were carried out in Africa, and the most represented countries are Mozambique (10 Studies), Zimbabwe (7 studies) and Malawi (7 studies). The most represented country outside of Africa is Canada (15 studies). The dominant cropping system was cereal/legume (75 % of studies). Overall, 11 soil textures were identified, and categorized into five main textural classes clay, clay loam, loam, sandy loam and clay sandy according to the USDA soil texture triangle. The duration of the studies varied from one to 48 years with an average duration of 11 years. The summary of the database is given in Table 2.

### General Assessment of the Variability of Soil Organic Carbon Sequestration under Conservation Agriculture

CA has mainly been studied and promoted as a sustainable farming system affecting the ecosystem services provided by soils, especially its contribution to GHG mitigation through increasing carbon sequestration in soils (Chen *et al.*, 2020). Our systematic review indicated that adopting CA led to an increase in SOC sequestering rates for 78% of the observations included. Only 20% of observations reported an adverse effect and 2% reported a neutral effect. The highest rate of SOC sequestration under CA in topsoil was 2.50 Mg/ha/an.

Most of the observations extracted (n= 397) covered soil depth between 0 and 40 cm due to the fact that the majority of the measurements had been made in the top layers (0-10, 0-20, 0-30 and 0-40). In fact, Franzluebbers (2021) highlighted that the effect of CA on SOC sequestration occurred in the topsoil

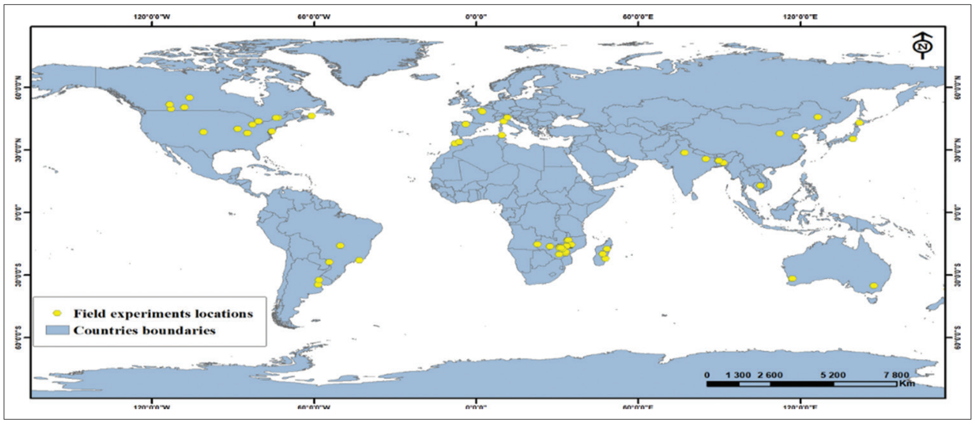


**Figure 2:** Geographical distribution of the 71 study sites included in the present systematic review

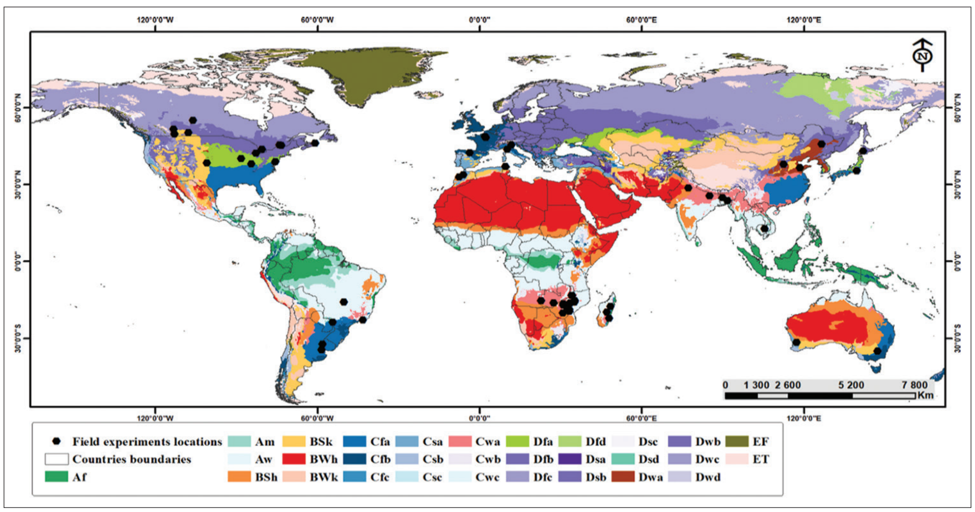


**Figure 3:** The Koeppen-Geiger climate classes of the study sites included in the present systematic review

Table 1: Number of observations according to Koeppen-Geiger climate Zones

| Climatic Zone according to Köppen-Geiger | Number of observations | Country |
|---|---|---|
| Csa | 90 | Australia, Italy, Morocco, Spain, Tunisia |
| Cwa | 36 | Malawi, Zimbabwe |
| Cwb | 4 | Madagascar, Zimbabwe |
| BSh | 10 | Zambia, Zimbabwe, |
| Am | 28 | Madagascar, China, Cambodia, Bangladesh |
| Cfa | 75 | Argentina, Australia, Brazil, China, India, Madagascar, USA |
| Aw | 74 | Brazil, India, Malawi, Mozambique, Uruguay, Zambia |
| Cfb | 59 | France, Italy |
| Dfb | 69 | Canada, Japan |
| Dfa | 6 | USA |

and that the low impact of this system on soil functions in subsoil layers had been recorded. Therefore, the present study conducted an analysis of factors controlling SOC sequestration under CA for the topsoil.

## Factors Influencing Soil Organic Carbon Sequestration under Conservation Agriculture

### *The importance of soil texture for carbon sequestration*

While soil texture is a key factor affecting the accumulation of organic carbon in soils (Wiesmeier *et al.*, 2019), few studies that assess the effectiveness of CA practices in sequestering SOC consider soil texture and other edaphic conditions (Rosinger *et al.*, 2023). This study shows that soil texture influenced SOC sequestration under CA. Indeed, SOC increased by 27%, 26%, 21%, 20% and 9% in clay loam, clay, clay sandy, loam and sandy loam, respectively, in comparison with soils where CA was not applied (Supplementary Table S1). We noticed that more SOC was sequestered in fine-textured and moderately textured soils (i.e., clay, clay loam, loam, and clay sandy) than in coarse-textured soils (i.e., sandy loam) which are dominated by sand. This aligns with results obtained by Kumara *et al.* (2023) as they demonstrated that moderately fine textured soils had higher carbon sequestration under sustainable agriculture practices, such as those of CA. The effect of soil texture on the physical protection of SOC was also studied by Balesdent *et al.* (1999),

Table 2: Summary of Field experiments chosen for our systematic review

| Code | site | Climate Zone | Soil Texture | Crop | Trial Period | Duration | Number of observations | References |
|---|---|---|---|---|---|---|---|---|
| 1 | Settat, Morocco | Csa | Clay | Cereal/legumes | 1987-1998 | 11 | 3 | Mrabet *et al.*, 2001 |
| 2 | Kemisset, Morocco | Csa | Clay | Cereal/legumes | 2008-2016 | 9 | 11 | Lembaid *et al.*, 2021 |
| 3 | Madziwa, Zimbabwe | Cwa | Sandy | Cereal/legumes | 2007-2012 | 5 | 4 | Thierfelder *et al.*, 2012 |
| 4 | Henderson, Zimbabwe | Cwb | Sandy-silt | Cereal/legumes | 2008-2012 | 4 | 3 | Thierfelder *et al.*, 2012 |
| 5 | Monze, Zambia | BSh | Clay-Silt | Corn | 2005-2010 | 5 | 6 | Thierfelder *et al.*, 2013 |
| 6 | Mateur, Tunisia | Csa | Clay-Silt | Cereal/legumes | 2000-2007 | 7 | 10 | Jemai *et al.*, 2012 |
| 7 | Manakara, Madagascar | Am | Sandy | Cereal/legumes | 2006-2012 | 6 | 4 | Razafimbelo *et al.*, 2018 |
| 8 | Lac Alaotra, Madagascar | Cfa | Sandy | Cereal/legumes | 2006-2012 | 6 | 4 | Razafimbelo *et al.*, 2018 |
| 9 | Antsirabe, Madagascar | Cwb | Clay | Cereal/legumes | 2006-2012 | 6 | 1 | Razafimbelo *et al.*, 2018 |
| 10 | Chinguluwe, MaLawi | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 11 | Mwansambo, MaLawi | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 12 | Zidyana, MaLawi | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 13 | Herbert, MaLawi | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 14 | Lemu, MaLawi | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 15 | Malula, MaLawi | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 16 | Matandika, MaLawi | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 17 | Pumbuto, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 18 | Malomwe, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 19 | Nhamatiquite, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 20 | Nhamizinga, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 21 | Lamengo, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 22 | Vunduzi, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 23 | Gimo, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 24 | Maguai, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 25 | Nzewe, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 26 | Ulongue, Mozambique | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 27 | Malende, Zambia | Aw | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 28 | Hereford, Zimbabwe | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 29 | Chavakadzi, Zimbabwe | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 30 | Madziwa site 2, Zimbabwe | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 31 | Musami, Zimbabwe | BSh | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 32 | Chikato, Zimbabwe | Cwa | Sandy-silt | Cereal/legumes | 2004-2009 | 7 | 4 | Cheesman *et al.*, 2016 |
| 33 | Versailles, France | Cfb | Clay-Silt | Cereal/legumes | 1998-2014 | 16 | 8 | Autret *et al.*, 2016 |
| 34 | Burgos, Spain | Csa | Clay-Silt | Cereal/legumes | 1994-2004 | 10 | 30 | Sombrero & de Benito, 2010 |
| 35 | Boigneville, France | Cfb | Clay-Silt | Cereal/legumes | 1970-2011 | 41 | 48 | Dimassi *et al.*, 2014 |
| 36 | San Piero a Grado, Italy | Csa | Loam | Cereal/legumes | 1986-2014 | 28 | 27 | Mazzoncini *et al.*, 2016 |
| 37 | Veneto, Italy | Cfb | Sandy-silt | Cereal/legumes | 2011-2014 | 3 | 3 | Piccoli *et al.*, 2016 |
| 38 | Tripura, India | Aw | Sandy-silt | Cereal/legumes | 2012-2014 | 2 | 6 | Yadav *et al.*, 2021 |
| 39 | Bihar, India | Cfa | Clay-Silt | Cereal/legumes | 2009-2019 | 10 | 15 | Mondal *et al.*, 2021 |
| 40 | New Delhi, India | Cfa | Sandy-loam | Cereal/legumes | 2013-2015 | 2 | 3 | Nath *et al.*, 2017 |
| 41 | Shanxi, China | Cfa | Silty-Loam | Cereal | 1992-2009 | 17 | 7 | Liu *et al.*, 2014 |
| 42 | Beiqiu, China | Am | Silty-Loam | Cereal | 2003-2012 | 9 | 10 | Huang *et al.*, 2015 |
| 43 | Kampong Cham, Cambodia | Am | Clay-Sand | Cereal/legumes | 2009-2013 | 5 | 12 | Le *et al.*, 2018 |
| 44 | Shandong, China | Cfa | Sandy-silt | Cereal/legumes | 2017-2020 | 3 | 8 | Zhao *et al.*, 2022 |
| 45 | Jamalpur, Bangladesh | Am | Silty-clay-loam | Cereal | 2019-2020 | 2 | 2 | Rahman *et al.*, 2021 |
| 46 | Hokkaido, Japan | Dfb | Clay-loam | Cereal/Sugar beet | 2007-2011 | 4 | 8 | Koga, 2017 |
| 47 | Kanto, Japan | Cfa | Sandy-loam | Cereal/legumes | 2008-2018 | 10 | 12 | Gong *et al.*, 2021 |
| 48 | Wagga Wagga, Australia | Cfa | Clay-loam | Cereal/legumes | 1979-2004 | 25 | 3 | Chan *et al.*, 2011 |
| 49 | Cunderdin, Australia | Csa | Sandy clay loam | Cereal/legumes | 2007-2019 | 12 | 9 | Passaris *et al.*, 2021 |
| 50 | Lexington, USA | Cfa | Silty-Loam | Corn | 1970-2018 | 48 | 5 | Huang *et al.*, 2020 |
| 51 | Urbana, USA | Dfa | Silty-Loam | Cereal/legumes | NI | 11 | 6 | Yang *et al.*, 2008 |
| 52 | Swift Current, Canada | Dfb | Clay-Silt | Fodder | NI | 23 | 1 | VandenBygaart *et al.*, 2010 |
| 53 | Lethbridge, Canada | Dfb | Clay-Silt | Fodder | NI | 30 | 1 | VandenBygaart *et al.*, 2010 |
| 54 | Scott, Canada | Dfb | Clay-Silt | Fodder | NI | 24 | 1 | VandenBygaart *et al.*, 2010 |
| 55 | Ellerslie, Canada | Dfb | Clay-Silt | Fodder | NI | 26 | 1 | VandenBygaart *et al.*, 2010 |
| 56 | Three Hills, Canada | Dfb | Clay-Silt | Fodder | NI | 11 | 1 | VandenBygaart *et al.*, 2010 |
| 57 | Breton, Canada | Dfb | Clay-Silt | Fodder | NI | 26 | 1 | VandenBygaart *et al.*, 2010 |

(*Contd...*)

Table 2: (*Continued*)

| Code | site | Climate Zone | Soil Texture | Crop | Trial Period | Duration | Number of observations | References |
|---|---|---|---|---|---|---|---|---|
| 58 | Woodslee, Canada | Dfb | Clay-loam | Fodder | NI | 22 | 1 | VandenBygaart *et al.*, 2010 |
| 59 | Woodslee site 2, Canada | Dfb | Clay-loam | Fodder | NI | 12 | 1 | VandenBygaart *et al.*, 2010 |
| 60 | Elora, Canada | Dfb | Clay-loam | Fodder | NI | 25 | 1 | VandenBygaart *et al.*, 2010 |
| 61 | L'Acadie, Canada | Dfb | Clay-loam | Fodder | NI | 13 | 1 | VandenBygaart *et al.*, 2010 |
| 62 | Harrington, Canada | Dfb | Clay-loam | Fodder | NI | 20 | 1 | VandenBygaart *et al.*, 2010 |
| 63 | Saskatchewan, Canada | Dfb | Silty-Loam | Cereal/legumes | 1982-2010 | 28 | 36 | Maillard *et al.*, 2018 |
| 64 | Elora site 2, Canada | Dfb | Silty-Loam | Cereal/legumes | NI | 23 | 6 | Yang *et al.*, 2008 |
| 65 | Woodslee site 3, Canada | Dfb | Clay-loam | Cereal/legumes | NI | 16 | 6 | Yang *et al.*, 2008 |
| 66 | Sainte-Anne-de-Bellevue, Canada | Dfb | Sandy-silt | Corn | 1991-2007 | 16 | 2 | Jiang *et al.*, 2022 |
| 67 | Buenos Aires, Argentina | Cfa | Clay | Cereal/legumes | 2006-2015 | 9 | 6 | Sokolowski *et al.*, 2020 |
| 68 | Eldorado, Brazil | Cfa | Sandy clay loam | Cereal/legumes | 1985-2014 | 29 | 12 | Veloso *et al.*, 2018 |
| 69 | Paysandú, Uruguay | Aw | Clay-loam | Cereal/legumes | 1993-2005 | 12 | 3 | Ernst & Siri-Prieto, 2009 |
| 70 | Rio de Janeiro, Brazil | Aw | Clay-sand | Cereal/legumes | 1995-2001 | 6 | 2 | Pinheiro *et al.*, 2015 |
| 71 | Goiás, Brazil | Aw | Clay-sand | Cereal/legumes | 1990-2003 | 13 | 7 | Corbeels *et al.*, 2016 |

who concluded that in coarse-textured soils the microaggregates containing SOC are easily dispersed by the rain action and released into the atmosphere as $CO_2$ giving it its biodegraded nature. Indeed, soils containing high proportions of silt and clay have a greater physical protection of SOM through the association of carbon with mineral particles (Six *et al.*, 2002).

Besides the role of clay and silt minerals in the physical protection of SOC, it is considered that there is chemical protection of the organic matter pool by interacting positively with microorganisms (e.g., fungi and bacteria) (Chen *et al.*, 2020). For instance, the positive correlation between fine particles (i.e., clay and silt) and the soil microbial biomass under conservation tillage in agricultural soils was demonstrated by many studies (Spedding *et al.*, 2004; Cookson *et al.*, 2008). On the contrary, soils with a high proportion of sand are very weakly structured as they have a small initial amount of carbon and provide limited protection to microbial biomass (Cookson *et al.*, 2008). With regard to soil texture, as one key factor controlling SOC sequestration under CA adoption in agricultural soils, this systematic review corroborates that CA has a positive correlation with fine and moderately textured soils.

***Impact of climatic conditions on SOC sequestration under CA***

Local climate conditions affect the response of SOC sequestration under CA implementation (Sun *et al.*, 2020), therefore exploring and understanding the climate conditions is an essential approach to assess the effect of adopting CA for enhancing SOC. For example, precipitation, temperature, solar radiation, and other climatic factors control soil respiration processes by influencing the biological activity of soil organisms and thus the resultant $CO_2$ emissions (Bronick & Lal, 2005; Wu *et al.*, 2011). This systematic review involves the evaluation of data collected from 71 field experiments conducted in diverse locations such as North Africa, South America, Canada, Asia, and Europe representing a wide range of climatic conditions.

The results suggest that under CA practices, the highest carbon sequestration rates occurred in the areas of tropical climate with dry winter (Aw), such as Mozambique 2.50 Mg/ha/an followed by the areas of tropical monsoon climate (Am), such as Madagascar 1.82 Mg/ha/an (S1). In dry summer or Mediterranean climates (Csa) such as Italy, Spain, and Tunisia, it was observed that adopting CA led to an increase in SOC sequestration in 97% of the experiments. The highest carbon sequestration rate in this region was 1.53 T/ha/an (S1). The above results are in line with those obtained in a synthesis study conducted by González-Sánchez *et al.* (2012) in Spain, which demonstrated that the implementation of CA can significantly enhance SOC sequestration as compared with that which is associated with conventional agriculture. In addition, it was noted that in regions located in fully humid zones with hot summer conditions (Cfa) namely China, Malawi, and Argentina, the adoption of CA led to an increase in SOC sequestration in 85% of the experiments. Additionally, the highest carbon sequestration rate in this climate zone was 1.10 Mg/ha/an (S1). This increase is in line with the findings of Díaz-Zorita *et al.* (2002), who demonstrated that in sub-humid areas such as the Pampas of Argentina CA application appeared to increase soil fertility.

This distinctive increase in carbon sequestration in soils located in tropical, subtropical (i.e., Mediterranean zones), and temperate (i.e., humid zones) regions has been shown to be related to an increase in the soil activity of microorganisms, given that these areas experience high temperatures and frequent precipitation, which facilitates the decomposition of crop residue and allows the accumulation of carbon in soils (Drenovsky *et al.*, 2004; Zhou *et al.*, 2017).

## CONCLUSION

CA has been identified and widely promoted as a promising sustainable farming system. It offers many benefits to farmers by increasing yields, improving soil health, and contributing to GHG reduction. While the effectiveness of CA to mitigate climate change through SOC sequestration is highly valuable, it is dependent on local pedo-climatic conditions. The results of this worldwide systematic review suggest that when CA farming methods are implemented there is an (measurable) increase in SOC sequestration in the topsoil layers as compared with that which results from conventional agricultural methods. It was observed that regardless of edaphic characteristics and climate conditions, 78% of observations obtained in this review revealed an increase in SOC as a result of CA. In addition, the results indicate that CA has a positive impact on SOC in tropical and temperate regions. The highest SOC rates were obtained in tropical climate with dry winter (Aw, 2.50 Mg/ha/an) and tropical monsoon climate (Am, 1.82 Mg/ha/an). These findings are in line with previous studies demonstrating that more SOC is sequestered in areas with high temperatures and elevated levels of precipitation. Another important factor influencing the potential of CA to enhance SOC sequestration is that of soil texture. This systematic review showed that more SOC was sequestered in fine-textured and moderately textured soils than in coarse-textured soils, which are dominated by sandy proportions. The studies considered in this systematic review indicate that fine particles provide important physical and chemical protection for microbial biomass by promoting SOC sequestration. The results of this systematic review suggest that the implementation of CA can be considered as a climate change mitigation solution in fine, moderate textured soils, and tropical and temperate regions.

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## SUPPLEMENTARY TABLE

Table S1: Complete dataset of studies included in the systematic review

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Morocco | Settat | Csa | Clay | Cereal/ legume | 1987-1998 | 11 | 0-25 | 0,25 | Mrabet *et al.*, 2001 |
| Africa | Morocco | Settat | Csa | Clay | Cereal/ legume | 1987-1998 | 11 | 0-70 | 0,28 | Mrabet *et al.*, 2001 |
| Africa | Morocco | Settat | Csa | Clay | Cereal/ legume | 1987-1998 | 11 | 0-200 | 0,31 | Mrabet *et al.*, 2001 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,03 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,09 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,15 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,02 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,02 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Morocco | Kemisset | Csa | Clay | Cereal/ legume | 2008-2016 | 9 | 0-20 | 0,00 | Lembaid *et al.*, 2021 |
| Africa | Zimbabwe | Madziwa | Cwa | Sandy-loam | Cereal/ legume | 2007-2012 | 5 | 0-10 | 0,26 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Madziwa | Cwa | Sandy-loam | Cereal/ legume | 2007-2012 | 5 | 0-20 | 0,40 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Madziwa | Cwa | Sandy-loam | Cereal/ legume | 2007-2012 | 5 | 0-30 | 0,52 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Madziwa | Cwa | Sandy-loam | Cereal/ legume | 2007-2012 | 5 | 0-60 | 0,70 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Henderson | Cwb | Sandy-loam | Cereal/ legume | 2008-2012 | 4 | 0-10 | 0,48 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Henderson | Cwb | Sandy-loam | Cereal/ legume | 2008-2012 | 4 | 0-20 | 0,62 | Thierfelder *et al.*, 2012 |
| Africa | Zimbabwe | Henderson | Cwb | Sandy-loam | Cereal/ legume | 2008-2012 | 4 | 0-30 | 0,77 | Thierfelder *et al.*, 2012 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-10 | 0,50 | Thierfelder *et al.*, 2013 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-10 | 0,66 | Thierfelder *et al.*, 2013 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-20 | 1,00 | Thierfelder *et al.*, 2013 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-20 | 1,18 | Thierfelder *et al.*, 2013 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-30 | 1,46 | Thierfelder *et al.*, 2013 |
| Africa | Zambia | Monze | Aw | Clay-loam | Corn | 2005-2010 | 5 | 0-30 | 1,78 | Thierfelder *et al.*, 2013 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/ legume | 2000-2007 | 7 | 0-10 | 0,64 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/ legume | 2000-2007 | 7 | 0-20 | 0,76 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/ legume | 2000-2007 | 7 | 0-30 | 0,13 | Jemai *et al.*, 2012 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2000-2007 | 7 | 0-40 | -0,76 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2000-2007 | 7 | 0-50 | -1,55 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2004-2007 | 3 | 0-10 | 0,40 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2004-2007 | 3 | 0-20 | 0,13 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2004-2007 | 3 | 0-30 | -0,39 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2004-2007 | 3 | 0-40 | -0,62 | Jemai *et al.*, 2012 |
| Africa | Tunisia | Mateur | Csa | Clay-loam | Cereal/legume | 2004-2007 | 3 | 0-50 | -1,24 | Jemai *et al.*, 2012 |
| Africa | Madagascar | Manakara | Am | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,80 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | Manakara | Am | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 1,82 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | Manakara | Am | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,55 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | Manakara | Am | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,00 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | LaC Alaotra | Cfa | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,14 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | LaC Alaotra | Cfa | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,22 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | LaC Alaotra | Cfa | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,73 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | LaC Alaotra | Cfa | Sandy-loam | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,60 | Razafimbelo *et al.*, 2018 |
| Africa | Madagascar | Antsirabe | Cwb | Clay | Cereal/legume | 2006-2012 | 6 | 0-20 | 0,33 | Razafimbelo *et al.*, 2018 |
| Africa | Malawi | Chinguluwe | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,04 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Chinguluwe | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,13 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Chinguluwe | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,32 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Chinguluwe | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 1,19 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Mwansambo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,54 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Mwansambo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,08 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Mwansambo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,25 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Mwansambo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 0,71 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Zidyana | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,05 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Zidyana | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,07 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Zidyana | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | -0,39 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Zidyana | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -1,19 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Herbert | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,16 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Herbert | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,29 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Herbert | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | -0,43 | Cheesman *et al.*, 2016 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Malawi | Herbert | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -0,35 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Lemu | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,09 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Lemu | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,01 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Lemu | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,01 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Lemu | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -0,53 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Malula | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,39 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Malula | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,59 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Malula | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | -1,28 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Malula | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -2,40 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Matandika | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,32 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Matandika | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,38 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Matandika | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,27 | Cheesman *et al.*, 2016 |
| Africa | Malawi | Matandika | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -0,51 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Pumbuto | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,14 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Pumbuto | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,13 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Pumbuto | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | -0,42 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Pumbuto | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -1,02 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Malomwe | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,43 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Malomwe | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 1,03 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Malomwe | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 1,53 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Malomwe | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 3,11 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamatiquite | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,09 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamatiquite | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,07 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamatiquite | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,04 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamatiquite | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | -0,07 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamizinga | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,26 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamizinga | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,13 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamizinga | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,06 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Nhamizinga | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 0,67 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Lamengo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | -0,18 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Lamengo | Aw | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | -0,02 | Cheesman *et al.*, 2016 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Mozambique | Lamengo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | -0,30 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Lamengo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | -0,92 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Vunduzi | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | 1,35 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Vunduzi | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | 2,13 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Vunduzi | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | 2,50 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Vunduzi | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | 3,75 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Gimo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | -0,26 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Gimo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | -0,13 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Gimo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | 0,06 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Gimo | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | 0,67 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Maguai | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | 0,36 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Maguai | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | 0,96 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Maguai | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | 1,66 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Maguai | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | -0,92 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Nzewe | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | -0,43 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Nzewe | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | 0,21 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Nzewe | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | 0,40 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Nzewe | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | 0,65 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Ulongue | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | -0,18 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Ulongue | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | -0,02 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Ulongue | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | -0,30 | Cheesman *et al.*, 2016 |
| Africa | Mozambique | Tete, Ulongue | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | 3,70 | Cheesman *et al.*, 2016 |
| Africa | Zambia | Southern, Malende | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | 0,20 | Cheesman *et al.*, 2016 |
| Africa | Zambia | Southern, Malende | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | 0,30 | Cheesman *et al.*, 2016 |
| Africa | Zambia | Southern, Malende | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | 0,48 | Cheesman *et al.*, 2016 |
| Africa | Zambia | Southern, Malende | Aw | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | 0,70 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Hereford | Cwa | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | 0,09 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Hereford | Cwa | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-20 | 0,10 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Hereford | Cwa | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-30 | -0,21 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Hereford | Cwa | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-60 | -0,46 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Chavakadzi | Cwa | Sandy-loam | Cereal/ legume | 2004-2009 | 7 | 0-10 | 0,28 | Cheesman *et al.*, 2016 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Zimbabwe | Mash Central, Chavakadzi | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,70 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Chavakadzi | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 1,08 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash Central, Chavakadzi | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 1,42 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Madziwa site 2 | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,19 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Madziwa site 2 | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,25 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Madziwa site 2 | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,34 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Madziwa site 2 | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 0,44 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash East, Musami | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,10 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash East, Musami | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,27 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash East, Musami | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,38 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Mash East, Musami | BSh | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 0,51 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Masvingo, Chikato | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-10 | 0,21 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Masvingo, Chikato | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-20 | 0,28 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Masvingo, Chikato | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-30 | 0,30 | Cheesman *et al.*, 2016 |
| Africa | Zimbabwe | Masvingo, Chikato | Cwa | Sandy-loam | Cereal/legume | 2004-2009 | 7 | 0-60 | 0,33 | Cheesman *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 1 | 0-10 | 0,60 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 1 | 0-20 | 1,50 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 1 | 0-30 | 1,50 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 16 | 0-10 | 0,52 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 16 | 0-20 | 0,56 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 16 | 0-30 | 0,64 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 16 | 0-40 | 0,75 | Autret *et al.*, 2016 |
| Europe | France | Versailles | Cfb | Clay-loam | Cereal/legume | 1998-2014 | 16 | 0-60 | 0,86 | Autret *et al.*, 2016 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,62 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,56 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,63 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,37 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,47 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,79 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,76 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,90 | Sombrero & de Benito, 2010 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,70 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-10 | 0,50 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 1,15 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 1,04 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 1,14 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,91 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,61 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,80 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,67 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,86 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,39 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-20 | 0,37 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,53 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,36 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,50 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,23 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 0,95 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,14 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 0,92 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 1,16 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 0,51 | Sombrero & de Benito, 2010 |
| Europe | Spain | Burgos | Csa | Clay-loam | Cereal/legume | 1994-2004 | 10 | 0-30 | 0,53 | Sombrero & de Benito, 2010 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1970-1982 | 12 | 0-10 | 0,28 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1970-1982 | 12 | 0-10 | 0,39 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1970-1982 | 12 | 0-28 | 0,06 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1970-1982 | 12 | 0-28 | 0,24 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-10 | 0,27 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-10 | 0,06 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-10 | 0,18 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-10 | 0,01 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-28 | 0,17 | Dimassi *et al.*, 2014 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-28 | 0,12 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-28 | 0,14 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1982-1994 | 12 | 0-28 | 0,09 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-10 | -0,57 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-10 | -0,36 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-10 | -0,16 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-10 | -0,08 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-28 | -0,89 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-28 | -0,77 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-28 | -0,22 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 1994-2002 | 8 | 0-28 | -0,37 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,29 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,13 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,21 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,27 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | -0,19 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | -0,07 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | -0,04 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,05 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,57 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,35 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,33 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-10 | 0,24 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,28 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,05 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,05 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,17 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | -0,13 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | -0,14 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,01 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/legume | 2002-2011 | 9 | 0-28 | 0,04 | Dimassi *et al.*, 2014 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 2002-2011 | 9 | 0-28 | 0,73 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 2002-2011 | 9 | 0-28 | 0,37 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 2002-2011 | 9 | 0-28 | 0,16 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 2002-2011 | 9 | 0-28 | 0,17 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 1970-2011 | 41 | 0-10 | 0,07 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 1970-2011 | 41 | 0-10 | 0,07 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 1970-2011 | 41 | 0-28 | -0,09 | Dimassi *et al.*, 2014 |
| Europe | France | Boigneville | Cfb | Clay-loam | Cereal/ legume | 1970-2011 | 41 | 0-28 | -0,05 | Dimassi *et al.*, 2014 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-1996 | 10 | 0-10 | 0,60 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-1996 | 10 | 0-20 | 0,72 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-1996 | 10 | 0-30 | 0,74 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2000 | 14 | 0-10 | 0,55 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2000 | 14 | 0-20 | 0,62 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2000 | 14 | 0-30 | 0,61 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2002 | 16 | 0-10 | 0,56 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2002 | 16 | 0-20 | 0,58 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2002 | 16 | 0-30 | 0,56 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2004 | 18 | 0-10 | 0,50 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2004 | 18 | 0-20 | 0,53 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2004 | 18 | 0-30 | 0,52 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2006 | 20 | 0-10 | 0,49 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2006 | 20 | 0-20 | 0,53 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2006 | 20 | 0-30 | 0,49 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2008 | 22 | 0-10 | 0,47 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2008 | 22 | 0-20 | 0,49 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2008 | 22 | 0-30 | 0,48 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2010 | 24 | 0-10 | 0,46 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2010 | 24 | 0-20 | 0,50 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2010 | 24 | 0-30 | 0,47 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2012 | 26 | 0-10 | 0,44 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2012 | 26 | 0-20 | 0,48 | Mazzoncini *et al.*, 2016 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2012 | 26 | 0-30 | 0,45 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2014 | 28 | 0-10 | 0,40 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2014 | 28 | 0-20 | 0,44 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | San Piero a Grado | Csa | Loam | Cereal/ legume | 1986-2014 | 28 | 0-30 | 0,44 | Mazzoncini *et al.*, 2016 |
| Europe | Italy | Veneto | Cfb | Sandy-loam | Cereal/ legume | 2011-2014 | 3 | 0-5 | 0,20 | Piccoli *et al.*, 2016 |
| Europe | Italy | Veneto | Cfb | Sandy-loam | Cereal/ legume | 2011-2014 | 3 | 0-30 | 0,16 | Piccoli *et al.*, 2016 |
| Europe | Italy | Veneto | Cfb | Sandy-loam | Cereal/ legume | 2011-2014 | 3 | 0-50 | -0,16 | Piccoli *et al.*, 2016 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-15 | 0,20 | Yadav *et al.*, 2021 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-15 | 0,20 | Yadav *et al.*, 2021 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-15 | 0,30 | Yadav *et al.*, 2021 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-30 | 0,20 | Yadav *et al.*, 2021 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-30 | 0,31 | Yadav *et al.*, 2021 |
| Asia | India | Tripura | Aw | Sandy-loam | Cereal/ legume | 2012-2014 | 2 | 0-30 | 0,52 | Yadav *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-7,5 | 0,18 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-7,5 | 0,28 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-7,5 | 0,23 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-15 | 0,23 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-15 | 0,46 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-15 | 0,30 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-30 | 0,29 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-30 | 0,68 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-30 | 0,37 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-45 | 0,39 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-45 | 0,67 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-45 | 0,39 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-60 | 0,30 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-60 | 0,70 | Mondal *et al.*, 2021 |
| Asia | India | Bihar | Cfa | Loam | Cereal/ legume | 2009-2019 | 10 | 0-60 | 0,46 | Mondal *et al.*, 2021 |
| Asia | India | New Delhi | Cfa | Sandy-loam | Cereal/ legume | 2013-2015 | 2 | 0-15 | 0,40 | Nath *et al.*, 2017 |
| Asia | India | New Delhi | Cfa | Sandy-loam | Cereal/ legume | 2013-2015 | 2 | 0-15 | 0,45 | Nath *et al.*, 2017 |
| Asia | India | New Delhi | Cfa | Sandy-loam | Cereal/ legume | 2013-2015 | 2 | 0-15 | 0,35 | Nath *et al.*, 2017 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-5 | 0,29 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-10 | 0,42 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-20 | 0,45 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-30 | 0,40 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-40 | 0,28 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-50 | 0,24 | Liu *et al.*, 2014 |
| Asia | China | Shanxi | Cfa | Loam | Cereal | 1992-2009 | 17 | 0-60 | 0,21 | Liu *et al.*, 2014 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-5 | 0,32 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-5 | 0,22 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-10 | 0,58 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-10 | 0,24 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-20 | 0,57 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-20 | -0,03 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-40 | 0,30 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-40 | -0,10 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-60 | -0,01 | Huang *et al.*, 2015 |
| Asia | China | Beiqiu | Am | Loam | Cereal | 2003-2012 | 9 | 0-60 | -0,36 | Huang *et al.*, 2015 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-10 | 0,00 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-10 | 0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-10 | 0,40 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-20 | -0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-20 | 0,00 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-20 | 0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-40 | -0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-40 | -0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-40 | 0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-100 | -0,40 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-100 | -0,20 | Le *et al.*, 2018 |
| Asia | China | Kampong Cham | Am | Clay-sandy | Cereal/ legume | 2009-2013 | 5 | 0-100 | -0,40 | Le *et al.*, 2018 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/ legume | 2017-2020 | 3 | 0-5 | 0,10 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/ legume | 2017-2020 | 3 | 0-5 | 0,00 | Zhao *et al.*, 2022 |

(*Contd...*)

Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-10 | -0,02 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-10 | 0,00 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-20 | -0,46 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-20 | -0,31 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-30 | -0,60 | Zhao *et al.*, 2022 |
| Asia | China | Shandong | Cfa | Sandy-loam | Cereal/legume | 2017-2020 | 3 | 0-30 | -0,85 | Zhao *et al.*, 2022 |
| Asia | Bangladesh | Jamalpur | Am | Loam | Cereal | 2019-2020 | 2 | 0-50 | 0,59 | Rahman *et al.*, 2021 |
| Asia | Bangladesh | Jamalpur | Am | Loam | Cereal | 2019-2020 | 2 | 0-50 | 0,43 | Rahman *et al.*, 2021 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | 0,71 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | -0,47 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | 1,09 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | -0,21 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | 1,62 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | 0,28 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | 1,53 | Koga, 2017 |
| Asia | Japan | Hokkaido | Dfb | Clay-loam | Cereal/sugar beet | 2007-2011 | 4 | 0-30 | -1,07 | Koga, 2017 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-2,5 | 0,43 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-2,5 | 0,27 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-2,5 | 0,25 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-7,5 | 0,63 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-7,5 | 0,44 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-7,5 | 0,38 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-15 | 0,74 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-15 | 0,54 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-15 | 0,35 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-30 | 0,62 | Gong *et al.*, 2021 |
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-30 | 0,50 | Gong *et al.*, 2021 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| Asia | Japan | Kanto | Cfa | Sandy-loam | Cereal/legume | 2008-2018 | 10 | 0-30 | 0,49 | Gong *et al.*, 2021 |
| Australia | Australia | Wagga Wagga | Cfa | Clay-loam | Cereal/legume | 1979-2004 | 25 | 0-30 | 0,09 | Chan *et al.*, 2011 |
| Australia | Australia | Wagga Wagga | Cfa | Clay-loam | Cereal/legume | 1979-2004 | 25 | 0-30 | 0,14 | Chan *et al.*, 2011 |
| Australia | Australia | Wagga Wagga | Cfa | Clay-loam | Cereal/legume | 1979-2004 | 25 | 0-30 | 0,20 | Chan *et al.*, 2011 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-10 | 0,09 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-10 | 0,29 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-10 | 0,25 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-20 | 0,21 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-20 | 0,71 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-20 | 0,67 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-30 | 0,03 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-30 | 0,06 | Passaris *et al.*, 2021 |
| Australia | Australia | Cunderdin | Cfa | Sandy-loam | Cereal/legume | 2007-2019 | 12 | 0-30 | 0,86 | Passaris *et al.*, 2021 |
| North America | USA | Lexington | Cfa | Loam | Corn | 1970-1980 | 10 | 0-30 | 0,11 | Huang *et al.*, 2020 |
| North America | USA | Lexington | Cfa | Loam | Corn | 1970-1990 | 20 | 0-30 | 0,07 | Huang *et al.*, 2020 |
| North America | USA | Lexington | Cfa | Loam | Corn | 1970-2000 | 30 | 0-30 | 0,13 | Huang *et al.*, 2020 |
| North America | USA | Lexington | Cfa | Loam | Corn | 1970-2010 | 40 | 0-30 | 0,18 | Huang *et al.*, 2020 |
| North America | USA | Lexington | Cfa | Loam | Corn | 1970-2018 | 48 | 0-30 | 0,05 | Huang *et al.*, 2020 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-5 | 0,25 | Yang *et al.*, 2008 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-10 | 0,41 | Yang *et al.*, 2008 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-20 | 0,48 | Yang *et al.*, 2008 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-30 | 0,30 | Yang *et al.*, 2008 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-40 | 0,32 | Yang *et al.*, 2008 |
| North America | USA | Urbana | Dfa | Loam | Cereal/legume | Non indiqué | 11 | 0-50 | 0,51 | Yang *et al.*, 2008 |
| North America | Canada | Swift Current | Dfa | Clay-loam | Fodder | Non indiqué | 23 | 0-15 | 0,10 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Lethbridge | Dfa | Clay-loam | Fodder | Non indiqué | 30 | 0-15 | -0,01 | VandenBygaart *et al.*, 2010 |
| North America | Canada | SCott | Dfa | Clay-loam | Fodder | Non indiqué | 24 | 0-15 | 0,25 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Ellerslie | Dfa | Clay-loam | Fodder | Non indiqué | 26 | 0-15 | 0,02 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Three Hills | Dfa | Clay-loam | Fodder | Non indiqué | 11 | 0-15 | 0,69 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Breton | Dfa | Clay-loam | Fodder | Non indiqué | 26 | 0-15 | 0,13 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Woodslee | Dfa | Clay-loam | Fodder | Non indiqué | 22 | 0-30 | 0,10 | VandenBygaart *et al.*, 2010 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| North America | Canada | Woodslee site 2 | Dfa | Clay-loam | Fodder | Non indiqué | 12 | 0-30 | 0,02 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Elora | Dfa | Clay-loam | Fodder | Non indiqué | 25 | 0-30 | -0,11 | VandenBygaart *et al.*, 2010 |
| North America | Canada | L'ACadie | Dfa | Clay-loam | Fodder | Non indiqué | 13 | 0-30 | 0,11 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Harrington | Dfa | Clay-loam | Fodder | Non indiqué | 20 | 0-30 | 0,00 | VandenBygaart *et al.*, 2010 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1986 | 4 | 0-30 | 0,92 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1986 | 4 | 0-30 | 0,97 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1986 | 4 | 0-30 | -0,10 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1986 | 4 | 0-30 | 0,06 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1990 | 8 | 0-30 | 0,76 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1990 | 8 | 0-30 | 0,87 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1990 | 8 | 0-30 | -0,06 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1990 | 8 | 0-30 | 0,00 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1994 | 12 | 0-30 | 0,84 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1994 | 12 | 0-30 | 1,03 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1994 | 12 | 0-30 | -0,04 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1994 | 12 | 0-30 | -0,05 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | 1,00 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | 1,13 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | -0,04 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | -0,06 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | 0,01 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-1998 | 16 | 0-30 | -0,04 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | 0,91 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | 1,03 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | -0,01 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | -0,04 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | 0,11 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2002 | 20 | 0-30 | 0,10 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2006 | 24 | 0-30 | 0,88 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2006 | 24 | 0-30 | 1,01 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/legume | 1982-2006 | 24 | 0-30 | 0,01 | Maillard *et al.*, 2018 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2006 | 24 | 0-30 | -0,02 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2006 | 24 | 0-30 | 0,20 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2006 | 24 | 0-30 | 0,17 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | 0,83 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | 0,95 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | 0,02 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | -0,02 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | 0,28 | Maillard *et al.*, 2018 |
| North America | Canada | Saskatchewan | Dfa | Loam | Cereal/ legume | 1982-2010 | 28 | 0-30 | 0,24 | Maillard *et al.*, 2018 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-5 | 0,10 | Yang *et al.*, 2008 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-10 | 0,24 | Yang *et al.*, 2008 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-20 | 0,37 | Yang *et al.*, 2008 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-30 | 0,46 | Yang *et al.*, 2008 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-40 | 0,59 | Yang *et al.*, 2008 |
| North America | Canada | Elora site 2 | Dfa | Loam | Cereal/ legume | Non indiqué | 23 | 0-50 | 0,71 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-5 | 0,38 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-10 | 0,76 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-20 | 0,87 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-30 | 0,88 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-40 | 0,81 | Yang *et al.*, 2008 |
| North America | Canada | Woodslee site 3 | Dfa | Clay-loam | Cereal/ legume | Non indiqué | 16 | 0-50 | 0,62 | Yang *et al.*, 2008 |
| North America | Canada | Sainte-Anne-de-Bellevue | Dfa | Sandy-loam | Corn | 1991-2007 | 16 | 0-20 | 1,37 | Jiang *et al.*, 2022 |
| North America | Canada | Sainte-Anne-de-Bellevue | Dfa | Sandy-loam | Corn | 1991-2007 | 16 | 0-20 | 1,76 | Jiang *et al.*, 2022 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2013 | 7 | 0-10 | 0,46 | Sokolowski *et al.*, 2020 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2013 | 7 | 0-20 | 0,14 | Sokolowski *et al.*, 2020 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2014 | 8 | 0-10 | 0,59 | Sokolowski *et al.*, 2020 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2014 | 8 | 0-20 | 1,10 | Sokolowski *et al.*, 2020 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2015 | 9 | 0-10 | 0,41 | Sokolowski *et al.*, 2020 |
| South America | Argentina | Buenos Aires | Cfa | Clay | Cereal/ legume | 2006-2015 | 9 | 0-20 | 0,38 | Sokolowski *et al.*, 2020 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,13 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,07 | Veloso *et al.*, 2018 |

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Table S1: (*Continued*)

| Continent | Country | Site location | Climate zone (Koppen -Geiger) | Soil texture | Crop | Trial period | Duration | Sampling depht (cm) | SOC sequestration after CA implementation (Mg/ha/an) | References |
|---|---|---|---|---|---|---|---|---|---|---|
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,01 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,06 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,16 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-30 | 0,15 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,66 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,28 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,15 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,42 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,30 | Veloso *et al.*, 2018 |
| South America | Brazil | Eldorado | Cfa | Sandy-loam | Cereal/ legume | 1985-2014 | 29 | 0-100 | 0,36 | Veloso *et al.*, 2018 |
| South America | Uruguay | Paysandu´ | Aw | Clay-loam | Cereal/ legume | 1993-1994 | 1 | 0-18 | 1,90 | Ernst & Siri-Prieto, 2009 |
| South America | Uruguay | Paysandu´ | Aw | Clay-loam | Cereal/ legume | 1993-2005 | 12 | 0-18 | 0,22 | Ernst & Siri-Prieto, 2009 |
| South America | Uruguay | Paysandu´ | Aw | Clay-loam | Cereal/ legume | 1993-2005 | 12 | 0-18 | 0,38 | Ernst & Siri-Prieto, 2009 |
| South America | Brazil | Rio de Janeiro | Aw | Clay-sandy | Cereal/ legume | 1998-2001 | 3 | 0-10 | 0,10 | Pinheiro *et al.*, 2015 |
| South America | Brazil | Rio de Janeiro | Aw | Clay-sandy | Cereal/ legume | 1998-2001 | 3 | 0-10 | 0,23 | Pinheiro *et al.*, 2015 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 2002-2003 | 1 | 0-40 | -8,10 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1998-2003 | 5 | 0-40 | -0,54 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1997-2003 | 6 | 0-40 | 0,90 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1995-2003 | 8 | 0-40 | 0,38 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1994-2003 | 9 | 0-40 | 1,13 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1992-2003 | 11 | 0-40 | 1,10 | Corbeels *et al.*, 2016 |
| South America | Brazil | Goiás | Aw | Clay-sandy | Cereal/ legume | 1990-2003 | 13 | 0-40 | 1,29 | Corbeels *et al.*, 2016 |