Review

Overview of Research on Sustainable Agriculture in Developing Countries. The Case of Mexico

Claudia A. Ochoa-Noriega, Juan F. Velasco-Muñoz *[ID], José A. Aznar-Sánchez [ID] and Ernesto Mesa-Vázquez

Research Centre on Mediterranean Intensive Agrosystems and Agrifood Biotechnology (CIAIMBITAL), Department of Economy and Business, University of Almería, 04120 Almería, Spain; claudia08a@hotmail.com (C.A.O.-N.); jaznar@ual.es (J.A.A.-S.); ermeva@ual.es (E.M.-V.)
* Correspondence: jfvelasco@ual.es

Abstract: One of the principal challenges faced by Mexican agriculture is the development of management models that are able to increase production while respecting the environment and generating wealth for society as a whole. In recent years, the number of studies analysing the sustainability of Mexican agriculture has grown significantly. The purpose of this study is to analyse the evolution of the research on the sustainability of agriculture in Mexico. For this purpose, a review and bibliometric analysis of a sample of 867 articles was carried out. The results reveal that the research has focused on the development of sustainable agricultural models in vulnerable rural areas, the sustainable exploitation of agroforestry systems, the development of energy crops for different uses, water resource management and land uses and their changes, conservation farming and climate change. Although research focused on sustainability is still in its early stages, it has become a priority field. A need to promote research from the economic and social disciplines may be observed, together with holistic projects that include the three pillars of sustainability (social, economic and environmental). This study could be useful to researchers in this field as it identifies the recent trends and principal agents that drive knowledge.

Keywords: food security; agricultural production; sustainable development; sustainable management; bibliometric analysis; network analysis; Mexico

1. Introduction

Humankind has modified 75% of the earth's surface in an effort to meet the demand for food, fibre and bioenergy [1–3]. Currently, about one third of the Earth's land surface is used for agriculture [4]. The expansion and intensification of agriculture in recent decades has resulted in increased production, reducing the number of malnourished people [5–8]. On the other hand, the human population is experiencing the largest growth of its history and is expected to peak at 9.7 billion people in 2050 [9]. In addition, new consumer trends and the increased availability of income are factors driving higher demand [10]. In the worst-case scenario, this growth in the population will require an additional food production increase of up 110% [11]. In turn, this increase in production will necessitate a greater expansion of the cultivated area or the development of new intensive production systems. Moreover, there is the technological change as a factor that influences production growth, so required changes include not only intensification but sustainable innovation [10].

However, fulfilling these objectives may have strong impacts on the environment, which could be irreversible. Agriculture is the world's largest consumer of water resources [12,13], using from 60% to 90% of total available water, according to the climate and the economic development of the region [14,15]. An increase in irrigation to meet growing food demand could severely affect the availability of water for the natural ecosystems, and even for human supply [16,17]. On the other hand, due to deforestation practices, agricultural expansion is the world's second biggest threat to biodiversity conservation [18,19].

Currently, approximately three quarters of the earth's forests have been lost due to agricultural expansion practices [20]. Furthermore, the intensification of agriculture is being achieved through the application of large quantities of inputs such as fertilisers or herbicides, which have the potential to affect the environment and harm the health of the local population [21,22]. On the other hand, the consequences of climate change are one of the main factors to be considered in relation to agricultural management. These consequences include altered rainfall cycles, long-term droughts and imbalances in water supply; more frequent and more intense extreme weather; and changes in soil moisture, evapotranspiration flows and surface runoff [14,17]. Finally, the use of inappropriate agricultural practices can have a negative impact on soil erosion, contributing to the expansion of desertification [16,23]. Within this context, implementing agricultural management systems able to meet the nutritional needs of the population in a sustainable way has become an urgent priority.

The term 'sustainability', as we know it today, was forged in the Bruntland report of the United Nations World Commission on Environment and Development in 1987, which defined 'sustainable development' as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [24]. As a holistic concept, sustainable development integrates three dimensions, in reference to human-natural systems: social, environmental and economic [25]. For some authors, the terms "sustainability" and "sustainable development" are interchangeable [26]. Since the emergence of the term, other milestone events in the evolution of sustainability as a paradigm have followed: the Rio Declaration in 1992 (United Nations Educational, Scientific and Cultural Organisation (UNESCO, 1992), the Kyoto Protocol (United Nations Framework Convention on Climate Change (UNFCCC, 2008), and the United Nations Millennium Development Goals (UN, 2015), which provided guidelines for improving livelihoods and the environment globally. We are currently in the midst of the United Nations Sustainable Development Goals (SDGs), in its Agenda 2030, the latest major milestone in achieving a sustainable planet.

With respect to the management of agricultural systems, sustainability centres on understanding the essential nature of interactions of natural-human-social systems, as viewed from a broad range of academic fields of study, in order to develop sustainable agriculture [27–29]. Of the 17 SDGs, the development of sustainable agriculture is included in target 2.4, framed within Goal 2 for the eradication of hunger in the world. This target aims to "ensure the sustainability of food production systems and implement resilient agricultural practices that increase productivity and production, contribute to the maintenance of ecosystems, strengthen resilience to climate change, extreme weather events, droughts, floods and other disasters and progressively improve land and soil quality" [30]. Specifically, indicator 2.4.1. has been designed to measure progress towards this target, as the proportion of the agricultural area in which productive and sustainable agriculture is practised.

Since the last decades of the last century, sustainability was defined as a characteristic to refer to the capacity to support the flow of ecosystem benefits in a variety of contexts [31]. Agriculture supports a vast array of goods and services, including goods such as food, wood, or fibre and services such as groundwater infiltration and storage, habitat conservation to maintain biodiversity, and carbon sequestration [1,32,33]. On the other hand, agricultural businesses create employment, enhance economic growth and diversify the service sector in industrial areas [34,35]. Moreover, agriculture is a major activity in rural areas. In certain cases, agriculture is the only activity and, therefore, the engine of growth for the economies in these areas [36,37].

Mexico is an agricultural power in terms of cultivated area, production and volume of exports and is one of the world's principal suppliers of food [38]. Mexico has an area of 198 million hectares, of which approximately 73% are used for agricultural activities [39,40]. Of this area, 20.7% is dedicated to crop production, while the remaining 79.3% is used for grazing land. Despite its low share in the Gross National Product (GNP) of only 4%, agricul-

ture is an essential component for the country's development for several reasons [41]. The agricultural activity i) is a useful tool to help ensure food security, ii) is key to strengthening the development and growth of production, iii) contributes to improving standards of living, and iv) is a vital sector for rural areas, home to a quarter of the country's population, and accounts for 50% of the rural population's income [40,42,43]. In recent years, the share of Mexican agricultural goods in foreign markets has increased, thanks to their quality and diversity and to the tariff advantages resulting from the North American Free Trade Agreement (NAFTA). As a result, it has developed a strong specialisation in fruit and vegetable exports, principally to the United States. The eradication of poverty is another argument to strengthen agriculture. This is mainly due to the fact that about 20% of the population is considered to be in food poverty, and 5% is categorised as undernourished [40]. It is estimated that children in rural areas are 43.4% stunted, more than double the national average in Mexico, with negative effects on motor and cognitive development; this demonstrates that short stature is not an adaptation, but a condition of vulnerability that reduces the body size and capabilities of the subjects who present it, since mental functions (intelligence, memory and learning) affect learning abilities [44,45].

However, Mexico's agricultural development has certain limitations that put the sustainability of the sector at risk. First, there exist problems concerning the availability of water for irrigation in different parts of the country [38]. On the other side, the surrounding ecosystems are being severely degraded due to the over-exploitation of the water resources, particularly in the river basins and aquifers. Of the 653 aquifers in Mexico, a total of 105 are over-exploited, whereas about 69 of the country's 757 river basins have a water deficit, as the allocated flow is higher than the recharge capacity of renewable water resources [46–48]. Furthermore, the unequal development of water infrastructures generates inefficiencies and inequality between territories [48,49]. Therefore, in Mexico, there is an urgent necessity to develop management models in agriculture that ensure the stability of a sensitive sector for the economy, by increasing production in an environmentally friendly way and generating wealth for society as a whole [28,29,50].

A growing number of contributions studying the adoption of sustainable practices in Mexican agriculture have been published. To date, however, no study has analysed these contributions collectively. The purpose of this paper, therefore, is to study the evolution of the research on the sustainability of agriculture in Mexico. Given the nature and objectives of this work, bibliometric analysis has been considered the most appropriate methodology, due to its capacity to extract information by synthesising data from a large number of literature sources [51,52]. The findings will allow us to identify the main drivers of knowledge in these fields and the most significant lines of research. Finally, given that the extensive area of Mexico covers a diverse range of climate zones, the results of the study on Mexican agriculture could be extrapolated to other regions, including mountainous areas, regions with arid or semi-arid climates or those with mild or tropical climates [53,54]. In contrast to previous studies, this paper is the first to apply the bibliometric method to analyse research on sustainable agriculture using Mexico as a case study, given that previous works focus on different specific aspects of agricultural sustainability and their results mainly represent developed countries [19,55–57]. This is its main contribution.

2. Methodology

In order to meet the purpose of this study, a bibliometric analysis of scientific literature is used, based principally on the traditional approach of co-occurrence analysis. In order to evaluate the information relating to the bibliometric data, indicators of productivity, quality and structure are included [51]. First, we identified the most productive agents (including authors, journals, institutions and countries) based on the amount of contributions and, second, we examined the impact of the research of these authors. This analysis was carried out in the same way for journals, institutions and countries. This information could be relevant to researchers when assessing the relevance of the media in which they publish their findings, the centres with which to collaborate or the countries in which to undertake

research [58,59]. Finally, we use mapping techniques to analyse the trends in this line of research.

Scopus was used to collect the studies to be analysed. The main reason for using Scopus instead of Web of Sciences is that, according to Mongeon and Paul-Hus [52], the former offers a wider coverage of abstracts and journals. Therefore, Scopus allows to obtain a more representative sample of papers from the field of study. In addition, this database has a series of advantage over other repositories, such as (i) it is easy to access, (ii) it enables the visualisation of data analysis, and (iii) it makes it possible to download data in different formats for further processing by software applications [60]. It is very common for data available in statistical databases, or valuable grey literature, to be used in studies and published in the form of reports, conference papers, and/or book chapters. Therefore, to avoid duplication of information, only original articles have been included in the sample, which, in addition, have undergone a peer-review process, demonstrating the quality of the information [58,61].

The search parameters were used in the search engines based on the keywords, titles and abstracts. The intention of the authors in carrying out this work is to focus on the field of sustainability. For this purpose, general parameters have been used, which are already used in a similar way in other works in which only terms derived from the root sustain* are used [62–65]. In addition, to include the perspective of the 2030 Agenda, terms drawn from the definition of the target on sustainable agriculture, contained in SDG 8, have been included. The study period selected was 2000 to 2020, in order to assess the contribution made in this century so far, as the greatest development of this topic in this area of study has taken place in this period. To compare full annual periods, only documents up to 2020 have been included. Similarly, to avoid duplication, the sample only includes original articles [56,66]. The search was last updated in February 2021.

For the selection of the final sample of documents, a sequential process was followed, as shown in Figure 1. In this way, for a document to form part of the sample to analyse, it should address an aspect of agriculture from a perspective of sustainability and be related to the geographical area of Mexico (as part of the area of study of an empirical analysis or as an area of reference of a theory development study). Summing up, the introduced sample selection criteria are the following: (i) topic of study (sustainable agriculture), (ii) time period (from 2000 to 2020), (iii) geographical location (country of Mexico as case study), (iv) language (English and Spanish as dominant language in the field of study, finding no bias between them) and (v) type of document (only original articles). The sample of papers that will finally be analysed in this study consists of 867 articles. In parallel, a search for papers related to agriculture in Mexico with the same restrictions was also conducted to analyse the relative importance of sustainability in relation to the general topic (see Figure 1). We should remember that this study is conditioned by the selection process of the sample and that other search parameters or databases, or another subsequent updating of the search, could generate different results. Literature on the area is becoming more and more specific and beginning to consider other possible aspects, which may or may not mention the chain "sustain *", such as climate smart agriculture, resilience, agroecology, agroecosystems.

The number of articles, the name of the journals and the year in which they were published, the authors and institutions and countries of affiliation, the subject area in which Scopus classifies the documents, and the keywords were the variables analysed. The first task was to download the information in the appropriate formats. Next, duplications that could lead to errors in the counting of the data were eliminated. The filtered information was then organised into different tables and figures and the data were analysed. The different tools used were Excel and SciMAT. To create the network maps, VOSviewer was selected, which is widely used in this kind of study [67]. Lastly, in order to extract the main trends in the research, a keyword analysis was conducted [68].
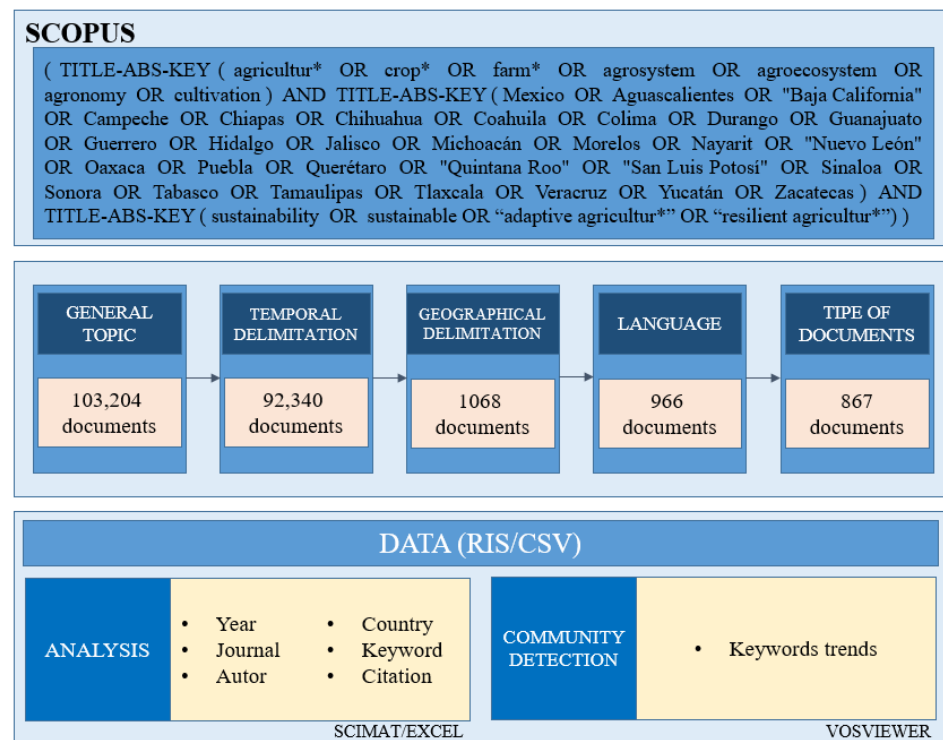
SCOPUS

(TITLE-ABS-KEY (agricultur* OR crop* OR farm* OR agrosystem OR agroecosystem OR agronomy OR cultivation) AND TITLE-ABS-KEY (Mexico OR Aguascalientes OR "Baja California" OR Campeche OR Chiapas OR Chihuahua OR Coahuila OR Colima OR Durango OR Guanajuato OR Guerrero OR Hidalgo OR Jalisco OR Michoacán OR Morelos OR Nayarit OR "Nuevo León" OR Oaxaca OR Puebla OR Querétaro OR "Quintana Roo" OR "San Luis Potosí" OR Sinaloa OR Sonora OR Tabasco OR Tamaulipas OR Tlaxcala OR Veracruz OR Yucatán OR Zacatecas) AND TITLE-ABS-KEY (sustainability OR sustainable OR "adaptive agricultur*" OR "resilient agricultur*"))

GENERAL TOPIC	TEMPORAL DELIMITATION	GEOGRAPHICAL DELIMITATION	LANGUAGE	TIPE OF DOCUMENTS
103,204 documents	92,340 documents	1068 documents	966 documents	867 documents

DATA (RIS/CSV)

ANALYSIS	• Year • Journal • Autor	• Country • Keyword • Citation	COMMUNITY DETECTION	• Keywords trends

SCIMAT/EXCEL　　　　　　　　　　　　　　　　VOSVIEWER

Figure 1. Overview of the methodology.

3. Results and Discussion

3.1. Sustainable Agriculture in Mexico Research

Table 1 presents data on the general variables concerning research on Sustainable Agriculture in Mexico (SAM) during 2000–2020. The number of documents published during the entire period on this topic amounted to 867, while in the case of research on Agriculture in Mexico (AM), there were 10,338. This indicates that the research on sustainability accounted for 8.4% of total research on Mexican agriculture. We searched for this information for other countries in order to compare this ratio. We have verified that this percentage is lower than countries such as China (11.6%), Spain (10.4%) or Australia (9.7%); similar to others, such as the United Kingdom (8.6%); and higher than others, such as the United States (6.8%). The number of papers on SAM increased from 12 in 2000 to 109 in 2020.

The rate of annual variation in the amount of documents on research in AM and SAM is shown in Figure 2. The average annual variation of SAM papers was 11.7% while that on AM was 8.4%. As we can see in the figure, the research on AM had a higher growth in almost the whole period analysed until the year 2010, when the trend reversed. This leads us to state that, in recent years, the research on SAM has been increasing in prominence within the research on AM.

In the 867 articles analysed, a total number of 3167 authors were involved. Over the years, this variable has shown a continuous growth trend. The amount of authors has increased from 33 in 2000 to 540 in 2020. The average amount of researchers per document has grown from 2.7 to 5.1. Therefore, the annual average growth of the authors was 15.1%. Of the total 3167 authors, 88.3% only participated in one of the articles of the sample analysed, while less than 1% participated in five or more articles. These data show that there is a high concentration of research on SA in a small group of researchers, who constitute the main drivers of this research topic.

In the year 2000, no two papers were published in the same journal. However, in 2020, the 109 papers on SAM were published in a total of 71 journals. The average volume of documents per journal has stayed constant over the entire period. In total, the 867

documents on SAM were published in 432 different journals. The average growth of the number of journals was 9.3% per year. Of the total sample of journals, 70.4% have published just one article on SAM, while 9.1% have published five or more. Again, we can confirm that the publication of the papers was concentrated in a small group of journals.

Table 1. General variables of Sustainable Agriculture in Mexico (SAM) research.

Year	D	AU	J	C	TC	TC/CD
2000	12	33	12	4	1	0.1
2001	14	50	13	4	8	0.3
2002	7	17	7	3	16	0.8
2003	20	100	19	16	39	1.2
2004	24	67	20	11	78	1.8
2005	14	45	14	8	120	2.9
2006	29	81	26	12	125	3.2
2007	24	91	23	12	208	4.1
2008	24	80	24	8	308	5.4
2009	27	116	26	16	391	6.6
2010	28	113	28	10	445	7.8
2011	41	147	33	12	536	8.6
2012	51	201	43	24	706	9.5
2013	64	202	48	17	852	10.1
2014	53	224	47	19	1011	11.2
2015	59	214	49	13	1168	12.2
2016	54	289	44	26	1309	13.4
2017	66	279	57	19	1584	14.6
2018	57	363	45	20	1829	16.1
2019	90	421	70	22	2053	16.9
2020	109	540	71	35	2504	17.6

D: annual amount of documents; AU: annual amount of authors; J: annual amount of journals; C: annual amount of countries; TC: annual amount of citations in cumulative documents; TC/CD: annual citation per cumulative documents.
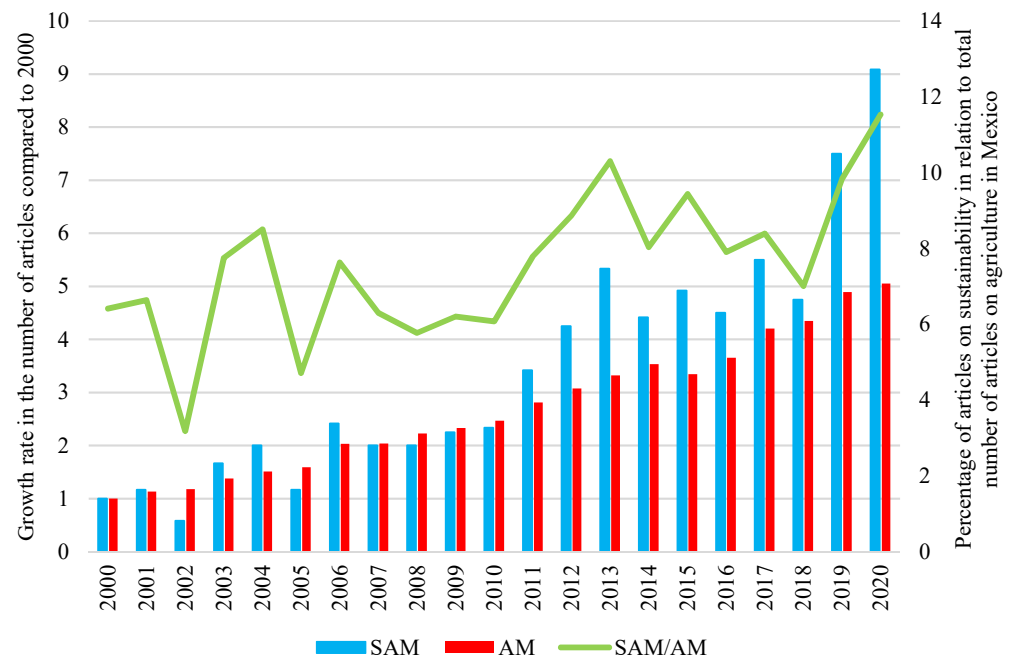

Figure 2. Evolution of Sustainable Agriculture in Mexico (SAM) and Agriculture in Mexico (AM) research.

A total amount of 71 countries participated in the elaboration of the studies. These countries are Mexico and 70 collaborating countries in research on SAM. The number of

these countries has grown from four in 2000 to 35 in 2020. Specifically, the average growth of the number of countries participating in research on SAM was 11.5% per year.

The studies on SAM as a whole obtained a total amount of 12,787 citations from 2000 to 2020. The research on AM as a whole accumulated a total of 166,356 citations. Therefore, research on SAM accounts for 7.7% of the total citations of the research on Mexican agriculture. This is due to the later development of research on SAM with respect to AM. The amount of citations has risen from one in 2000 to 2504 in 2020, which represents an average annual increase of 47.9%. The average of citations achieved per paper has grown from 0.1 in 2000 to 17.6 in 2020. In the case of research on AM, the average number of citations per document is 16.1. These data show that the research on SAM has been growing importance within the research on AM in recent years, not only with respect to the number of papers, but also in terms of its prominence measured through the cipher of citations.

3.2. Subject Area

Table 2 shows the data on the classification into thematic categories established by Scopus. It is important to note that the same paper can be simultaneously classified in several categories. In both the SAM and the AM documents, the most popular category is *Agricultural and Biological Science* with around 54% of the total in both cases. In these two lines of research, the next two prominent topics are *Environmental Sciences and Social Sciences*. Considering the different fields included within the concept of sustainability (environmental, economic and social), we can observe certain notable differences. If we talk about SAM research, higher values are observed in the environmental, social and economic categories, showing the greater significance of these areas in this line of research. Specifically, the *Environmental Sciences* category represents 49.3% of SAM papers, whereas it only accounts for 32.6% in AM papers. Similarly, the *Social Sciences* category accumulates 25.5% in SAM line, whereas it only accounts for 17.3% in AM research. The economic aspects (*Economics, Econometrics and Finance* and *Business, Management and Accounting*) represent 4.7% and 3.5%, respectively, in the case of SAM, and only 3.4% and 1.7% in the case of research on AM. These data highlight two realities. On the one hand, as we would expect, the research on SAM pays greater attention to the different aspects related to the environmental, social and economic fields, while the research on AM focuses on different technical and biological aspects. On the other hand, they also reveal that in the research on sustainability, topics focused on environmental issues are still predominant and those themes related to social and economic aspects still need to be developed. Therefore, there is a need to broaden research from these perspectives and to conduct holistic studies that consider the three dimensions of sustainability.

Table 2. Amount of documents published by subject category.

Sustainable Agriculture in Mexico (SAM)	Total	%	Agriculture in Mexico (AM)	Total	%
Agricultural and Biological Sciences	468	54.0	*Agricultural and Biological Sciences*	5613	54.3
Environmental Science	427	49.3	*Environmental Science*	3374	32.6
Social Sciences	221	25.5	*Social Sciences*	1786	17.3
Energy	91	10.5	*Biochemistry, Genetics and Molecular Biology*	1099	10.6
Earth and Planetary Sciences	75	8.7	*Earth and Planetary Sciences*	1018	9.8
Biochemistry, Genetics and Molecular Biology	59	6.8	*Medicine*	778	7.5
Economics, Econometrics and Finance	41	4.7	*Arts and Humanities*	566	5.5
Engineering	37	4.3	*Veterinary*	448	4.3
Business, Management and Accounting	30	3.5	*Immunology and Microbiology*	430	4.2
Medicine	29	3.3	*Engineering*	360	3.5
			. . .		
			Economics, Econometrics and Finance	348	3.4
			Business, Management and Accounting	176	1.7

3.3. Journals

Table 3 includes data on the most prolific journals in SAM during the period 2000–2020, in relation to the documents that form part of the analysed sample. Publication in these journals is much broader and covers a wide range of topics. However, in this section, we want to focus on the relevance of SAM publications for these journals, as measured by the different indicators shown in the table. This group is composed of Mexican and European journals but none from the United States stand out. They are highly diverse in terms of field of specialisation and level of relevance measured through the Scimago Journal Rank (SJR 2020) impact. Furthermore, we can observe large differences in terms of their incorporation in this line of publication and the date of publications of the last article on SAM. Together, this set of journals has contributed 177 papers to the sample, accounting for 20.4% of the total amount of documents published. *Tropical and Subtropical Agroecosystems*, with 39 papers, is the journal that has contributed the most to SAM publishing. This journal has an H index of 4 (this refers to the documents included in the SAM sample, and not to the total number of documents published by the journal), a total amount of 50 citations and an average of 1.3 citations per paper. Furthermore, it has an SJR factor of 0.249 and began publishing in this field in the last decade, with its first article on SAM in 2011. This is followed by *Sustainability* with 29 articles. This journal has an H index of 5, a total amount of 82 citations and 2.8 citations per paper, and its SJR factor is 0.612. This journal was one of the latecomers to this field, with its first article published in 2015. It continues to publish on the subject today. Meanwhile, *Wit Transactions on Ecology and the Environment* is in third place with 18 documents. This British journal show an H index of 2, a total amount of 12 citations, an average of 0.7 citations per document, and an SJR factor of 0.180. With only 12 papers on SAM, *Soil and Tillage Research* has the most prominent H index with a value of 12. It additionally has the highest total citations and average amount of citations per document, with 874 and 72.8 respectively. Moreover, *Soil and Tillage Research* is the longest-established journal in this field, publishing its first contribution on SAM in 2000. On the contrary, the journal that has most recently begun to publish in this field is *Terra Latinoamericana*, with its first article on this topic being published in 2016. This journal has published a total number of 10 documents. It was indexed in the SJR for the first time in 2020. It has an H index of 3, a total amount of 16 citations and an average number of 1.6 citations per paper. Finally, the journal with the highest SJR factor is *Journal of Cleaner Production*, which has published a total of nine articles on SAM.

Table 3. Main variables of the most relevant journals in relation to the analysed documents in the sample on SAM research.

Journal	D	SJR	H Index	C	TC	TC/D	1st D	Last D
Tropical and Subtropical Agroecosystems	39	0.249 (Q3)	4	Mexico	50	1.3	2011	2020
Sustainability	29	0.612 (Q1)	5	Switzerland	82	2.8	2015	2020
Wit Transactions on Ecology and the Environment	18	0.180 (Q3)	2	UK	12	0.7	2008	2019
Forest Ecology and Management	13	1.288 (Q1)	11	Netherlands	551	42.4	2004	2018
Soil and Tillage Research	12	1.708 (Q1)	12	Netherlands	874	72.8	2000	2016
Investigaciones Geograficas	10	0.290 (Q3)	3	Spain	22	2.2	2006	2020
Journal of Ethnobiology and Ethnomedicine	10	0.741 (Q1)	8	UK	156	15.6	2012	2019
Terra Latinoamericana	10	0.150 (Q4)	3	Mexico	16	1.6	2016	2020
Acta Horticulturae	9	0.181 (Q4)	3	Belgium	33	3.7	2009	2017

Table 3. *Cont.*

Journal	D	SJR	H Index	C	TC	TC/D	1st D	Last D
Environment, Development and Sustainability	9	0.597 (Q2)	5	Netherlands	196	21.8	2001	2020
Journal of Cleaner Production	9	1.937 (Q1)	6	Netherlands	125	13.9	2013	2020
Tecnologia y Ciencias del Agua	9	0.188 (Q4)	3	Mexico	16	1.8	2010	2017

D: annual amount of documents; SJR: Scimago Journal Ranking 2020; H index: only referred to sample documents; C: country; TC: annual amount of citations in cumulative documents; TC/D: total citation per document; 1st D: first document by journal; Last D: last document.

3.4. International Network

Table 4 includes information on the collaborative networks that Mexico has established in SAM and AM research. The average percentage of projects developed through international collaboration is more important in SAM than in AM research, with 41.4% and 34.3%, respectively. However, the total amount of international collaborators is significantly higher in AM (103) than in SAM (70) research. As sustainability research requires a multidisciplinary approach, this field of study is also considered to be more collaborative. However, the data presented here are explained by the incipient state of this line of research and the unequal number of publications with respect to the general line of research. As for the most relevant collaborators in each of the research lines, many similarities can be found. However, in terms of AM research, we find Australia and Brazil in the group of principal collaborators, whereas Belgium and Saudi Arabia are more important in the case of SAM. In accordance with the number of citations, the papers developed through international collaboration accumulate a higher amount in both lines of study, on average, than the documents without this international dimension. The average number of citations per paper written in collaboration is higher in the case of research on SAM than for AM papers (25.9 and 20.3, respectively).

Table 4. Principal variables related to Mexican research on SAM and AM.

Country	IC (%)	NC	Main Collaborators	TC/D	
				IC	NIC
SAM	41.4	70	USA, Spain, Germany, Netherlands, UK, Belgium, Colombia, France, Canada, Saudi Arabia	25.9	6.6
AM	34.3	103	USA, Spain, UK, Canada, France, Germany, Netherlands, Brazil, Colombia, Australia	20.3	8.1

IC: international collaborations; NC: international collaborators; TC/D: total citation per document; NIC: no international collaborations.

3.5. Institutions

Table 5 provides information on the institutions that have contributed the most to SAM research during the period 2000–2020. It should be noted that all these institutions may have a much longer publication history. However, as explained above, in this paper, we focus on research carried out in the current century. For example, some publications from 1997 by El Colegio de la Frontera Sur (ECOSUR, San Cristóbal de las Casas, Mexico) can be found. All of them are institutions with Mexican nationality. With 86 contributions, the National Autonomous University of Mexico is at the top of the table. This institution has the highest H index, which is 19. Furthermore, it has a total amount of 1321 citations, and an average of 15.4 citations per document. The institution in second position, with the most contributions, is the Instituto Politécnico Nacional with 38 papers. This center has achieved a total amount of 261 citations, an average of 6.9 citations per paper and an H

index of 10. The Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, with a final cipher of 35 documents, is the affiliation in third place in the table. This institution has a total of 571 citations, an average of 16.3 citations per document and an H index of 12. The International Maize and Wheat Improvement Center is the institution that has obtained the highest recognition for its research, using citation accumulation as an indicator, as it has achieved a total of 2020 citations and an average number of 59.4 citations per document. This institution, which is in fourth position in terms of the quantity of documents, with 34, has the highest H index. It should be noted that this centre is an international institution that is part of the Consultative Group on International Agricultural Research (CGIAR). However, given that it is based in Texcoco, and that it appears in Scopus as a Mexican-affiliated centre for all purposes, it has been considered appropriate to maintain it as such.

Table 5. Principal variables of the most prominent institutions on SAM research.

Institution	D	TC	TC/D	H Index	IC (%)	TC/D	
						IC	NIC
Universidad Nacional Autónoma de México	86	1321	15.4	19	36.1	24.0	10.5
Instituto Politécnico Nacional	38	261	6.9	10	29.0	6.2	7.1
Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias	35	571	16.3	12	42.9	29.1	6.7
Centro Internacional de Mejoramiento de Maíz y Trigo	34	2020	59.4	18	73.5	75.7	14.2
El Colegio de la Frontera Sur (ECOSUR, San Cristóbal de las Casas)	33	867	26.3	16	63.6	37.8	6.1
El Colegio de la Frontera Sur (ECOSUR, Tapachula)	31	500	16.1	11	41.9	31.3	5.2
Colegio de Postgraduados	30	338	11.3	7	30.0	29.8	3.3
Instituto de Investigaciones en Ecosistemas y Sustentabilidad	28	575	20.5	15	10.7	74.0	14.1
Universidad Autónoma del Estado de México	25	191	7.6	8	40.0	9.4	6.5
Universidad Michoacana de San Nicolás de Hidalgo	24	210	8.8	10	58.3	13.6	1.9

D: annual amount of documents; TC: annual amount of citations in cumulative documents; TC/D: total citation per document; IC: international collaborations; NIC: no international collaborations.

With reference to international collaboration, the average percentage of documents on SAM developed by this cluster of affiliations is 42.6%. In the table, we can see that in all cases a higher average amount of citations is obtained in projects implemented in collaboration, except for the Instituto Politécnico Superior. Those above the average are the Centro Internacional de Mejoramiento de Maíz y Trigo with 73.5% of its publications carried out through collaboration, followed by the Colegio de la Frontera Sur (ECOSUR, San Cristóbal de las Casas, Mexico) with 63.6%, and the Universidad Michoacana de San Nicolás de Hidalgo with 58.3%. It is worth pointing out that the three institutions with the highest average cipher of citations per document coincide with those that have the greatest difference in citations obtained in papers developed through international collaboration. The Centro Internacional de Mejoramiento de Maíz y Trigo, on average, obtains 61.5 citations more in studies carried out in collaboration, and is the institution with the highest average amount of citations per paper in the table. The Colegio de la Frontera Sur (ECOSUR, San Cristóbal de las Casas, Mexico) is the second institution in relation to the average amount of citations per document and, on average, obtains 31.7 citations more in its collaborative studies. The Instituto de Investigaciones en Ecosistemas y Sustentabilidad is the third institution in terms of citations per article. In this case, it obtains 59.9 more citations in studies implemented based on collaboration. Therefore, we can conclude that establishing quality collaboration relationships has a positive influence on the number of citations achieved by the studies published. However, the amount of studies carried out through collaboration is not directly related to the number of citations obtained.

3.6. Authors

Table 6 includes the most salient authors on SAM research considering the amount of contributions. Overall, the researchers in this group come from eight Mexican and three international institutions, two of them in the USA and one in Belgium. Six of the eight Mexican institutions are also on the list of most prolific institutions. The reason explaining the appearance of new institutions in this section is the establishment of collaboration networks between authors, which helps to position some of them in prominent positions. The most prolific author is Bram Govaerts, from the Centro Internacional de Mejoramiento de Maíz y Trigo, with 18 papers. This author has the highest amount of citations, with a total of 1350, the highest H index with a figure of 14, and an average of 75.1 citations per document. Govaerts shares authorship with other prominent authors from the same institution, such as Kenneth D. Sayre and Nele Verhulst, who hold the fourth and tenth positions, with 13 and 7 articles, respectively. Other prominent authors in the table who share authorship are Luc Dendooven of the Centro de Investigación y de Estudios Avanzados, who shares tenth position, and Jozef A. Deckers of the Catholic University of Leuven, who holds the sixth position. In second place, in terms of the number of contributions, is Alejandro Casas of the Instituto de Investigaciones en Ecosistemas y Sustentabilidad, with a total number of 17. This author is the longest established in the field, publishing his first article on SAM in 2001. This author has a total of 257 citations, an average of 15.1 citations per document and an H index of 9. In this subject field, he primarily collaborates with Ana I. Moreno-Calles of the Universidad Nacional Autónoma de México, with whom he has co-written seven studies, which also place her in the table. José María Ponce-Ortega is the author that holds third place in relation of the number of papers, with 16. This researcher of the Universidad Michoacana de San Nicolás de Hidalgo has achieved 179 citations, an average of 11.2 citations per document and an H index of 9. Those collaborating with this author include Mahmoud M. El-Halwagi of the Texas A&M University, and Fabricio Nápoles-Rivera, also from the Universidad Michoacana de San Nicolás de Hidalgo. He shares nine and seven articles, respectively, with these authors, who are also positioned amongst the most prolific in this field.

Table 6. Principal variables of the most prominent authors on SAM research.

Author	D	TC	TC/D	H Index	C	Affiliation	1st D	Last D
Govaerts, B.	18	1350	75.1	14	Mexico	Centro Internacional de Mejoramiento de Maíz y Trigo	2005	2020
Casas, A.	17	257	15.1	9	Mexico	Instituto de Investigaciones en Ecosistemas y Sustentabilidad	2001	2020
Ponce-Ortega, J.M.	16	179	11.2	9	Mexico	Universidad Michoacana de San Nicolás de Hidalgo	2012	2020
Sayre, K.D.	13	1270	97.7	12	Mexico	Centro Internacional de Mejoramiento de Maíz y Trigo	2005	2011
Nahed-Toral, J.	12	159	13.3	5	Mexico	ECOSUR, San Cristóbal de las Casas	2006	2020
Arriaga-Jordán, C.M.	11	114	10.4	6	Mexico	Universidad Autónoma del Estado de México	2013	2020
Deckers, J.	11	1231	111.9	11	Belgium	Catholic University of Leuven	2005	2011
El-Halwagi, M.M.	9	161	17.9	8	USA	Texas A&M University	2012	2017
Diemont, S.A.W.	8	274	34.3	8	USA	SUNY College of Environmental Science and Forestry	2005	2016
Astier, M.	7	92	13.1	5	Mexico	Universidad Nacional Autónoma de México	2006	2019
Dendooven, L.	7	545	77.9	6	Mexico	Centro de Investigación y de Estudios Avanzados	2007	2019
Guevara-Hernández, F.	7	15	2.1	2	Mexico	Universidad Autónoma de Chiapas	2010	2020
Moreno-Calles, A.I.	7	68	9.7	4	Mexico	Universidad Nacional Autónoma de México	2013	2020
Nápoles-Rivera, F.	7	109	15.6	6	Mexico	Universidad Michoacana de San Nicolás de Hidalgo	2013	2017
Verhulst, N.	7	213	30.4	6	Mexico	Centro Internacional de Mejoramiento de Maiz y Trigo	2011	2019

D: annual amount of documents; TC: annual amount of citations in cumulative documents; TC/D: total citation per document; C: country; 1st D: first document by journal; Last D: last document.

3.7. Keywords Analysis

Figures 3 and 4 illustrate the network maps of keywords used in the documents published on SAM based on their cluster groups and evolution over time, respectively. The size of the labels corresponding to each term (represented by a circle) varies according to the number of times it is repeated. Thus, larger circles represent terms that have been used in a greater number of articles and vice versa. In Figure 3, the terms have been grouped according to the number of co-occurrences in the sample documents. The resulting clusters have been represented in different colours in order to differentiate between them. In Figure 4, the colour varies depending on the moment of greatest use of each keyword, with the dark blue tones corresponding to earlier periods and the yellow tones to more recent moments.
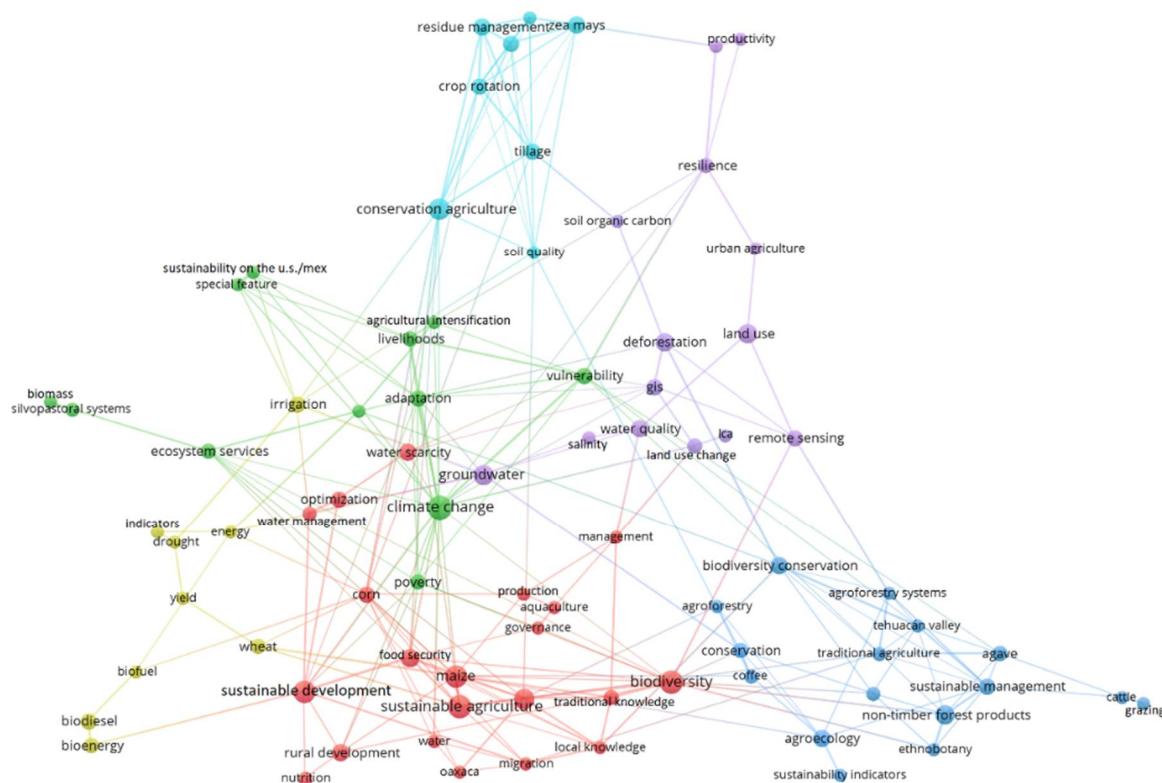

Figure 3. Clustering in main keywords related to SAM research.

In Figure 3, we can observe six different clusters, representing the different lines of research that dominate this field. These groups have been obtained using algorithms available in the software application, based on the application of the strength of association similarity index for the normalisation of co-occurrence values. The red cluster focuses on the development of sustainable agricultural models in vulnerable rural areas. The overall objective of this line of research is the development of agricultural models that provide a base for the rural development of the most disadvantaged areas, where other alternatives do not exist. The priorities are to ensure food supply and to maintain the rural population. To do this, this line is based on the local traditional knowledge and the rich biodiversity of Mexico. In this line, Ubiergo-Corvalán et al. [69] documented the edible plant agrobiodiversity of the agroecosystems in the indigenous area of *maya-ch'ol* in Chiapas. Castro-Sánchez et al. [70] investigated the relationships of native *Purépecha* communities with edible mushrooms and their environment, the place of mushrooms in the indigenous cosmovision and classification structure, the forms of management and the social and environmental issues associated with their usage. Moreno-Calles et al. [71] analysed the contribution of *ethnoagroforestry* to support biodiversity, including plants and

animals, ecosystems and landscapes, as a basis for food sufficiency and sovereignty for communities, regions and the whole of the Mexican nation. In Figure 4, we can see that this cluster corresponds to a recent line of research, given that the yellow and green tones are predominant among the keywords. The most prominent new concepts are *food security*, *traditional knowledge* and *local knowledge*. Given its recent incorporation, the number of studies on these aspects is even smaller and, therefore, the circles are smaller. If the shades turn darker without an increase in the number of publications, we can consider them to be terms that are in vogue.
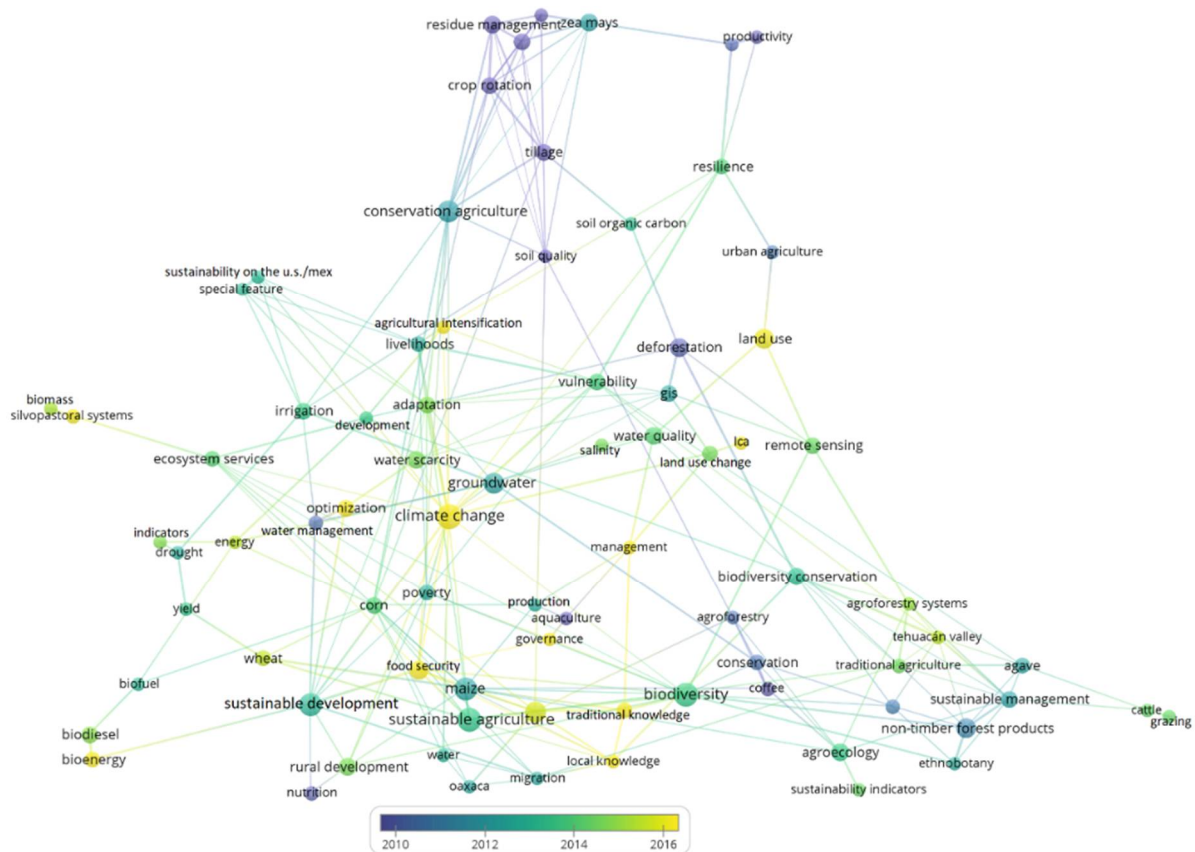

Figure 4. Trends in main keywords related to SAM research.

The blue cluster refers to the sustainable exploitation of agroforestry systems. Its objective is to obtain a series of products, other than wood, through the use of traditional mixed management system practices with grazing and livestock. Furthermore, all of this is carried out under the premise of conservation, based on the use of sustainability indicators. An example of these systems is bovine farming. Prospero-Bernal et al. [72] analysed the sustainability of small-scale dairy systems that are based on conventional irrigated cut-and-carry pastures and cereal straw and commercial feed concentrates in the highlands of central Mexico. Espinoza-Guzmán et al. [73] evaluated the dynamics of changes in the agroecosystem of a shade-grown coffee plantation in the upper La Antigua river basin, Veracruz, considered as one of the principal systems for the conservation of biodiversity. Albarrán-Portillo et al. [74] analysed the socioeconomic and productive characteristics of agrosilvopastoral systems that comprise different elements such as crops, pastures, trees and shrubs, and are seen as a way forward to satisfy future necessities for different commodities such as food, feed, fuel, and other products, as well as for providing environmental and social benefits. García-Pérez et al. [75] studied *Chamaedorea hooperiana* as an alternative crop in primary forest, capable of providing an economic return while contributing to forest sustainability, in Los Tuxtlas Biosphere Reserve in Veracruz. Ferguson

et al. [76] compared two systems of cattle ranching through the use of system indicators. While one used extensive grazing, annual burning of pastures and regular application of agrochemicals, jeopardising biodiversity and long-term productivity, the other employed holistic management with careful land-use planning, rotational grazing, diversified forage, and a lower amount of purchased inputs. With respect to the use of keywords over time, in Figure 4, we can see how within this line of research, there has been a replacement of terms over the years. During the first decade, the dominant terms were *conservation*, *agroforestry* and *coffee*, and today they have evolved towards the concepts of *conservation of biodiversity*, *agroforestry systems*, *cattle* and *grazing*. In this way, we can appreciate greater precision in the terms and a replacement of others, fruit of the development of the research.

The yellow cluster shows a very recent line of research, which emerged in approximately 2013. It specialises in the development of energy crops for different uses. Together with food supply, the availability of energy resources for the rural communities is a pressing challenge in Mexico. In accordance with the Law on the Use of Renewable Energies and the Financing of the Energy Transition, Mexico aims to achieve the use of 35% renewable energy for 2024. The development of agricultural models that include in their objectives the production of energy through energy crops or through the use of surplus biomass has emerged as a sustainable alternative. Within this field, we can find studies such as those by Molina-Guerrero et al. [77], who analysed the potentiality of agricultural residues generated by Mexico's principal crops to produce energy (including sorghum, sugar cane, corn, wheat, barley, beans and coffee). Similarly, di Bitonto et al. [78] analysed and characterised another group of Mexican biomass wastes (including different seeds and fruits such as jatropha, avocado, palm, peppers, flamboyant, coconut and nance) to obtain a complete exploitation of their energy potential. Medina-Santana et al. [79] used a water–energy–food nexus approach to evaluate the sustainability of a multi-objective agricultural model in a community in Michoacan. The findings indicate that the sale of bioethanol as an economic activity could be considered attractive by slightly increasing the price of biofuel and the yield of sugar cane.

The violet cluster combines two priority themes: water resource management and land use and its changes. Given that a large part of Mexican agriculture is developed in arid and semi-arid climates where the availability of water resources is the principal limiting factor, the sustainable management of this resource is an urgent need [38]. Mexican agriculture has advanced greatly in terms of adopting technology to improve efficiency in water use. Reyes-González et al. [80] created evapotranspiration maps using multispectral remote sensing vegetation indices in order to quantify crop water consumption in line with their physiological phases. López-Hernández et al. [81] analysed the productivity–evapotranspiration relationship, concluding that the determination of productivity through evapotranspiration has a direct relationship with crop yields, as it improves irrigation efficiency. The modifications experienced in land use have been related to the different environmental impacts but particularly the degradation of water masses [38]. Vanderplank et al. [82] reported that seawater intrusion into aquifers as a result of unsustainable extraction, mainly for agricultural irrigation, causes impacts on adjacent ecosystems, resulting in the loss of more than twenty native plants in the San Quintín valley. Furthermore, groundwater quality is also affected by salinisation and pollution as a consequence of wastewater use for agricultural irrigation and the fertilization [83]. In order to resolve these problems, different alternatives have been proposed. First, the search for new safe sources of water. González-Bravo et al. [84], for example, proposed the development of seawater desalination plants to contribute to supplying the growing water needs and to fight against the degradation of the over-exploited water masses. Studies such as those by Fernández et al. [85] proposed the development of agricultural models that contribute to supplying food, without modifying the natural environment and reusing resources, such as the urban agricultural systems.

The light blue cluster corresponds to the more consolidated line, given that in the map of the temporal scale, we can see how the dark shades dominate in the keywords.

The central theme of this cluster is conservation agriculture. These types of system are made up of a set of techniques including minimum tillage, permanent soil cover and the diversification of crops, which have the basic purpose of conserving the implementation of a more efficient system based on an integrated management of the soil, water, biological agents and external inputs [86]. The implementation of conservation agriculture jointly with an efficient use of fertilizers can improve the yields and quality of the production of the crops [87]. Fuentes et al. [88] studied maize and found that the application of conservation agriculture in this crop can increase soil carbon content and reduce carbon dioxide (CO_2) emissions. Rivers et al. [89] found that conservation agriculture can help in pest control by improving soil characteristics and reducing erosion, creating a better habitat for beneficial organisms.

Finally, the green cluster focuses on climate change and the impact of its consequences on the flow of ecosystem services derived from the agroecosystems. This cluster exemplifies how a new topic can become dominant within a field of study. In Figure 4, we can observe that the term *climate change* is not relevant until 2016; however, this concept is represented with one of the largest circles. This indicates that in a short time, it has attracted great interest in this field of study. One of the clearest impacts of climate change is the availability of water. Hernández-Bedolla et al. [90] estimated water availability under different baseline scenarios, concluding that the main factors affecting water availability are decreasing precipitation and high temperatures. Molina-Navarro et al. [91] concluded that in the Guadalupe basin, the run-off can be reduced by between 45% and 60%, while the recharging of the groundwater can fall by up to 74% as a consequence of climate change. There is a group of studies that analyse the characteristics of the crops and the soil under different scenarios of climate change. Díaz et al. [92] studied the bacterial community linked to the roots of three crops grown in semi-arid environments, under different growth cycles, to provide knowledge on the composition of their microbial community during the warm season in Northeastern Mexico. Baez-Gonzalez et al. [93] aimed to develop eco-efficient bean cultivars to be planted at high densities to sustain bean production in a changing climate. However, the impact of climate change can also give rise to economic and social consequences, particularly for more vulnerable countries such as Mexico, which represents important challenges for their development and agricultural well-being [94]. Another group of studies focuses on the impact on living conditions and the perceptions of the farmers. Orduño-Torres et al. [94] analysed the farmers' environmental perceptions and preferences in relation to climate change adaptation and mitigation actions. Shinbrot et al. [95] analysed the importance of vulnerability context, livelihood assets and climate perceptions of the farmers to adopt climate-related adaptation strategies.

4. Conclusions

The purpose of this study was to offer an overview of the development of the research on sustainable agriculture in Mexico during the 21st century. With this aim, a bibliometric analysis was conducted over a sample of 867 documents. Furthermore, in order to verify the magnitude of the evolution of this field of study, a parallel search of the general research on agriculture in Mexico has also been conducted. Subsequently, we performed a productivity analysis on the basis of the amount of documents, journals, subject categories, authors, affiliations and collaborations, and also a study of the principal topics developed based on the keywords used.

The findings indicate that both lines of research have increased in significance in recent years. However, even though the research on sustainability in agriculture in Mexico has emerged fairly recently, it has become a priority line over the last decade. This outcome is coherent with the trend observed worldwide in research in this area, especially in relation to the achievement of the Sustainable Development Goals of the 2030 Agenda promoted by the United Nations. Therefore, both in the general and in the sustainability lines of research, the dominant thematic categories were *Agricultural and Biological Science*, *Environmental Science*, and *Social Science*. In the case of the research on SAM, the series of topics related

to the concept of sustainability was given more emphasis than in the research on AM. It is, therefore, necessary to foster studies about social and economic perspectives and to conduct research that considers the three dimensions of sustainability.

Examination of collaborative networks has found that the quantity of international collaborative studies was higher for SAM than for AM research. Thus, we can observe that, compared to other areas of study, sustainability is more multidisciplinary, and also more widely studied through international collaboration between institutions. Among the different reasons for the increase in international collaboration between Mexican institutions and foreign centres is the large number of international initiatives that promote the creation of global networks for sustainable development in different areas, especially from the United Nations. Furthermore, we are able to verify that there is a direct relationship between the quality of the collaborative relationships and the average amount of citations achieved by the studies. However, we cannot determine a direct relationship between the quantity of the studies performed through collaboration and the number of citations.

The analysis of the keywords shows six clusters in the research on SAM, focused on topics such as the development of sustainable agricultural models in vulnerable rural areas, the sustainable exploitation of agroforestry systems, the development of energy crops for different uses, water resource management and land uses and their changes, conservation farming and climate change. Within these topics, we have found new concepts that can consolidate and become the central themes, as in the case of *climate change*, *food security*, *agricultural intensification* or *land use*; and others such as *agriculture*, *coffee*, *productivity* or *agroforestry*.

The results of this study show that, during the last decades, Mexican agriculture has undergone a strong modernisation process, placing it among the world's leading producers and exporters. This process has been mainly based on the adoption of new models of agricultural management, the use of technological innovations, and the diversification of crops to access new markets. These advances have allowed Mexico to move from traditional subsistence agriculture to highly professionalised and productive agriculture. However, this process has not developed in a balanced way. Once the goals of production and commercialisation have been achieved, Mexico must face new challenges in order to achieve a fully sustainable agriculture.

The main areas to work on, which constitute the main lines of research proposed, are the following: (i) from an environmental perspective, production models must be developed that are more respectful of the surrounding ecosystems as a whole, especially with regard to water bodies that are currently overexploited; (ii) from the perspective of the economic sphere, the development of ancillary industries should be promoted, as well as processing industries, capable of generating added value for the country; and (iii) with regard to the social sphere, it is here that the greatest efforts must be made, given that the current model is increasing inequality between northern and southern territories, between marginal rural areas and urban centres, and between employers and employees.

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References

1. Assessment, M.E. *Ecosystems and Human Well-Being*; Current State and Trends Island Press: Washington, DC, USA, 2005; p. 137.
2. Ellis, E.C.; Ramankutty, N. Putting people in the map: Anthropogenic biomes of the world. *Front. Ecol. Environ.* **2008**, *6*, 439–447. [CrossRef]
3. Ellis, E.C.; Haff, P.K. Earth science in the anthropocene: New epoch, new paradigm, new responsibilities. *EOS Trans. Am. Geophys. Union* **2009**, *90*, 473. [CrossRef]
4. FAOSTAT. *Food and Agriculture Organization Corporate Statistical Database*; Food and Agriculture Organization of the United Nations: Rome, Italy, 2010. Available online: http://www.fao.org/faostat/en/#home (accessed on 27 February 2021).
5. Smith, P.; Gregory, P.J.; van Vuuren, D.; Obersteiner, M.; Havlík, P.; Rounsevell, M.; Woods, J.; Stehfest, E.; Bellarby, J. Competition for land. *Philos. Trans. R. Soc. B* **2010**, *365*, 2941–2957. [CrossRef]
6. Foley, J.A.; Ramankutty, N.; Brauman, K.A.; Cassidy, E.S.; Gerber, J.S.; Johnston, M.; Mueller, N.D.; O′Connell, C.; Ray, D.K.; West, P.C.; et al. Solutions for a cultivated planet. *Nature* **2011**, *478*, 337–342. [CrossRef] [PubMed]
7. Tilman, D.; Balzer, C.; Hill, J.; Befort, B.L. Global food demand and the sustainable intensification of agriculture. *Proc. Natl. Acad. Sci. USA* **2011**, *108*, 20260–20264. [CrossRef] [PubMed]
8. Alexandratos, N.; Bruinsma, J. *World Agriculture towards 2030/2050: The 2012 Revision*; ESA Working Paper 12-03; FAO: Rome, Italy, 2012. Available online: http://www.fao.org/3/ap106e/ap106e.pdf (accessed on 27 February 2021).
9. United Nations. *World Population. Prospects 2019: Highlights (ST/ESA/SER.A/423)*; Department of Economic and Social Affairs, Population Division: San Francisco, CA, USA, 2019. Available online: https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf (accessed on 27 February 2021).
10. Springmann, M.; Clark, M.; Mason-D′Croz, D.; Wiebe, K.; Bodirsky, B.L.; Lassaletta, L.; De Vries, W.; Vermeulen, S.J.; Herrero, M.; Carlson, K.M.; et al. Options for keeping the food system within environmental limits. *Nature* **2018**, *562*, 519–525. [CrossRef]
11. Laurett, R.; Paço, A.; Mainardes, E.W. Sustainable Development in Agriculture and its Antecedents, Barriers and Consequences—An Exploratory Study. Sustain. *Prod. Consum.* **2021**, *27*, 298–311. [CrossRef]
12. Forouzani, M.; Karami, E. Agricultural water poverty index and sustainability. *Agron. Sustain. Dev.* **2011**, *31*, 415–432. [CrossRef]
13. Fu, H.Z.; Wang, M.H.; Ho, Y.S. Mapping of drinking water research: A bibliometric analysis of research output during 1992–2011. *Sci. Total Environ.* **2013**, *443*, 757–765. [CrossRef]
14. Pedro-Monzonís, M.; Solera, A.; Ferrer, J.; Estrela, T.; Paredes-Arquiola, J. A review of water scarcity and drought indexes in water resources planning and management. *J. Hydrol.* **2015**, *527*, 482–493. [CrossRef]
15. Adeyemi, O.; Grove, I.; Peets, S.; Norton, T. Advanced monitoring and management systems for improving sustainability in precision irrigation. *Sustainability* **2017**, *9*, 353. [CrossRef]
16. Cunningham, S.A.; Attwood, S.J.; Bawa, K.S.; Benton, T.G.; Broadhurst, L.M.; Didham, R.K.; McIntyre, S.; Perfecto, I.; Samways, M.J.; Tscharntke, T.; et al. To close the yield-gap while saving biodiversity will require multiple locally relevant strategies. *Agric. Ecosyst. Environ.* **2013**, *173*, 20–27. [CrossRef]
17. Mancosu, N.; Snyder, R.L.; Kyriakakis, G.; Spano, D. Water scarcity and future challenges for food production. *Water* **2015**, *7*, 975–992. [CrossRef]
18. Maxwell, S.L.; Fuller, R.A.; Brooks, T.M.; Watson, J.E.M. Biodiversity: The ravages of guns, nets and bulldozers. *Nature* **2016**, *536*, 143–145. [CrossRef] [PubMed]
19. Aznar-Sánchez, J.A.; Piquer-Rodríguez, M.; Velasco-Muñoz, J.F.; Manzano-Agugliaro, F. Worldwide research trends on sustainable land use in agriculture. *Land Use Pol.* **2019**, *67*, 104069. [CrossRef]
20. Kissinger, G.; Herold, M.; De, V.; Angelsen, A.; Bietta, F.; Bodganski, A.; Boucher, D.; Boyle, T.; Brickell, E.; Defries, R.; et al. *Drivers of Deforestation and Forest Degradation: A Synthesis Report for REDD + Policy Makers*; Lexeme Consulting: Vancouver, BC, Canada, 2012.
21. Kirkhorn, S.; Schenker, M.B. *Human Health Effects of Agriculture: Physical Diseases and Illnesses*; National Agriculture Safety Database: Washington, DC, USA, 2001; p. 18.
22. Tilman, D. Global environmental impacts of agricultural expansion: The need for sustainable and efficient practices. *Proc. Natl. Acad. Sci. USA* **1999**, *96*, 5995–6000. [CrossRef]
23. Foucher, A.; Salvador-Blanes, S.; Evrard, O.; Simonneau, A.; Chapron, E.; Courp, T.; Cerdan, O.; Lefèvre, I.; Adriaensen, H.; Lecompte, F.; et al. Increase in soil erosion after agricultural intensification: Evidence from a lowland basin in France. *Anthropocene* **2014**, *7*, 30–41. [CrossRef]
24. Brundtland, G.; Khalid, M.; Agnelli, S.; Al-Athel, S.; Chidzero, B.; Fadika, L.; Hauff, V.; Lang, I.; Shijun, M.; de Botero, M.M.; et al. *Our Common Future (Brundtland Report)*; Oxford University Press: Oxford, UK, 1987; p. 383. ISBN 019282080X.
25. Meadowcroft, J. Who is in charge here? Governance for sustainable development in a complex world. *J. Environ. Policy Plan.* **2007**, *9*, 299–314. [CrossRef]
26. Holden, E.; Linnerud, K.; Banister, D. Sustainable development: Our common future revisited. *Glob. Environ. Chang. Hum. Policy Dimens.* **2014**, *26*, 130–139. [CrossRef]
27. Komiyama, H.; Takeuchi, K. Sustainability science: Building a new discipline. *Sustain. Sci.* **2006**, *1*, 1–6. [CrossRef]

28. Yarime, M.; Takeda, Y.; Kajikawa, Y. Towards institutional analysis of sustainability science: A quantitative examination of the patterns of research collaboration. *Sustain. Sci.* **2010**, *5*, 115–125. [CrossRef]

29. Velasco-Muñoz, J.F.; Aznar-Sánchez, J.A.; Batlles de la Fuente, A.; Fidelibus, M.D. Sustainable Irrigation in Agriculture: An Analysis of Global Research. *Water* **2019**, *11*, 1758. [CrossRef]

30. United Nations. *The Sustainable Development Goals Report 2020*; United Nations Publications: New York, NY, USA, 2020. ISBN 978-92-1-101425-9.

31. Becker, B. *Sustainability Assessment: A Review of Values, Concepts and Methodological Approaches*; Issues in Agriculture 10; World Bank-Consultative Group on International Agriculture Research (CGIAR): Washington, DC, USA, 1997.

32. Lahmar, R. Adoption of conservation agriculture in Europe: Lessons of the KASSA project. *Land Use Pol.* **2010**, *27*, 4–10. [CrossRef]

33. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; López-Felices, B.; del Moral-Torres, F. Barriers and Facilitators for Adopting Sustainable Soil Management Practices in Mediterranean Olive Groves. *Agronomy* **2020**, *10*, 506. [CrossRef]

34. Galdeano-Gómez, E.; Perez-Mesa, J.C.; Aznar-Sánchez, J.A. Internationalisation of SMEs and simultaneous strategies of cooperation and competition: An exploratory analysis. *J. Bus. Econ. Manag.* **2016**, *17*, 1114–1132. [CrossRef]

35. Du Pisani, J.A. Sustainable development—Historical roots of the concept. *J. Environ. Sci.* **2006**, *3*, 83–96. [CrossRef]

36. Velasco-Muñoz, J.F.; Aznar-Sánchez, J.A.; Batlles-delaFuente, A.; Fidelibus, M.D. Rainwater Harvesting for Agricultural Irrigation: An Analysis of Global Research. *Water* **2019**, *11*, 1320. [CrossRef]

37. Dias, C.S.L.; Rodrigues, R.G.; Ferreira, J.J. What's new in the research on agricultural entrepreneurship? *J. Rural. Stud.* **2019**, *65*, 99–115. [CrossRef]

38. Ochoa-Noriega, C.A.; Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; Álvarez-Bejar, A. The Use of Water in Agriculture in Mexico and Its Sustainable Management: A Bibliometric Review. *Agronomy* **2020**, *10*, 1957. [CrossRef]

39. Food and Agricultural Organization of the United Nations. *El sistema Alimentario en México—Oportunidades Para el Campo Mexicano en la Agenda 2030 de Desarrollo Sostenible*; FAO: Ciudad de México, Mexico, 2019. Available online: http://www.fao.org/3/CA2910ES/ca2910es.pdf (accessed on 5 February 2021).

40. Food, Agricultural and Fisheries Information Service. *2019 Food & Agriculture Overview*; SIAP: Mexico City, Mexico, 2019. Available online: https://nube.siap.gob.mx/gobmx_publicaciones_siap/pag/2019/Agricultural-Atlas-2019 (accessed on 5 February 2021).

41. World Trade Organization. *World Trade Statistical Review 2019*; World Trade Organization: Geneva, Switzerland, 2019. Available online: https://www.wto.org/english/res_e/statis_e/wts2019_e/wts19_toc_e.htm (accessed on 5 February 2021).

42. Sosa-Baldivia, A.; Ruíz-Ibarra, G. Food availability in Mexico: An analysis of agricultural production over the last 35 years and its projection for 2050. *Pap. Poblac.* **2017**, *23*, 207–230. Available online: https://rppoblacion.uaemex.mx/article/view/9111 (accessed on 25 October 2017).

43. The World Bank. Available online: https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?end=2019&locations=MX&start=1991 (accessed on 5 February 2021).

44. Carrasco-Quintero, M.R.; Ortiz-Hernández, L.; Roldán-Amaro, J.A.; Chávez-Villasana, A. Malnutrition and cognitive development if infants in rural marginalized areas in Mexico. *Gac. Sanit.* **2016**, *30*, 304–307. [CrossRef]

45. Solovieva, Y.; Quintanar, R.; Lázaro, G. Efectos socioculturales sobre el desarrollo psicológico y neurológico en niños preescolares. *Cuad. Hispanoam. Psicol. México* **2006**, *6*, 9–20.

46. Gómez-Merino, F.C.; Hernández-Anguiano, A.M. El Contexto del Sector Agroalimentario en México. In *Líneas Prioritarias de Investigación. Informe de Gestión 2009–2011*; Hernández-Anguiano, A.M., Gómez-Merino, F.C., Pérez-Hernández, L.M., Villanueva-Jiménez, J.A., Eds.; Colegio de Postgraduados: Estado de México, México, 2013; ISBN 978-607-715-135-7.

47. Delgado-Carranza, C.; Bautista, F.; Ihl, T.J.; Palma-López, D. Duración del periodo de lluvias y aptitud de tierras para la agricultura de temporal. *Ecosistemas Recur. Agropecu.* **2017**, *4*, 485. [CrossRef]

48. Secretaria de Medio Ambiente y Recursos Naturales (Semarnat, 2019). *Programa Nacional Hídrico 2019–2014*; Comisión Nacional del Agua (Conagua): Copilco el Bajo, Mexico, 2019. Available online: http://187.191.71.192/portales/resumen/48732 (accessed on 2 February 2021).

49. Comisión Nacional del Agua (Conagua, 2018). *Estadisticas del Agua en México, 2018ed*; Conagua: Ciudad de México, México, 2018. Available online: http://sina.conagua.gob.mx/publicaciones/EAM_2018.pdf (accessed on 2 February 2021).

50. Arce-Romero, A.; Monterroso-Rivas, A.I.; Gómez-Díaz, J.D.; Palacios-Mendoza, M.A.; Navarro-Salas, E.N.; López-Blanco, J.; Conde-Álvarez, A.C. Crop yield simulations in Mexican agriculture for climate change adaptation. *Atmósfera* **2020**, *33*, 215–231. [CrossRef]

51. Durieux, V.; Gevenois, P.A. Bibliometric Indicators: Quality Measurements of Scientific Publication. *Radiology* **2010**, *255*, 342. [CrossRef]

52. Mongeon, P.; Paul-Hus, A. The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics* **2016**, *106*, 213–228. [CrossRef]

53. Govaerts, B.; Sayre, K.D.; Goudeseune, B.; De Corte, P.; Lichter, K.; Dendooven, L.; Deckers, J. Conservation agriculture as a sustainable option for the central Mexican highlands. *Soil Tillage Res.* **2009**, *103*, 222–230. [CrossRef]

54. Riojas, C. La naturaleza de las articulaciones regionales en México a través del tiempo. *Amerika* **2011**, *4*. [CrossRef]

55. Rocchi, L.; Boggia, A.; Paolotti, L. Sustainable agricultural systems: A bibliometrics analysis of ecological modernization approach. *Sustainability* **2020**, *12*, 9635. [CrossRef]

56. El Chami, D.; Daccache, A.; El Moujabber, M. How can sustainable agriculture increase climate resilience? A systematic review. *Sustainability* **2020**, *12*, 3119. [CrossRef]

57. Wezel, A.; Soldat, V. A quantitative and qualitative historical analysis of the scientific discipline of agroecology. *Int. J. Agric. Sustain.* **2009**, *7*, 3–18. [CrossRef]

58. Aznar-Sánchez, J.A.; Belmonte-Ureña, L.J.; Velasco-Muñoz, J.F.; Manzano-Agugliaro, F. Economic analysis of sustainable water use: A review of worldwide research. *J. Clean. Prod.* **2018**, *198*, 1120–1132. [CrossRef]

59. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; Belmonte-Ureña, L.J.; Manzano-Agugliaro, F. Innovation and technology for sustainable mining activity: A worldwide research assessment. *J. Clean. Prod.* **2019**, *221*, 38–54. [CrossRef]

60. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; Belmonte-Ureña, L.J.; Manzano-Agugliaro, F. The worldwide research trends on water ecosystem services. *Ecol. Indic.* **2019**, *99*, 310–323. [CrossRef]

61. Cossarini, D.M.; MacDonald, B.H.; Wells, P.G. Communicating marine environmental information to decision makers: Enablers and barriers to use of publications (grey literature) of the Gulf of Maine Council on the Marine Environment. *Ocean. Coast. Manag.* **2014**, *96*, 163–172. [CrossRef]

62. Garrigós-Simón, F.; Sanz-Blas, S.; Narangajavana, Y.; Buzova, D. The Nexus between Big Data and Sustainability: An Analysis of Current Trends and Developments. *Sustainability* **2021**, *13*, 6632. [CrossRef]

63. Hernández-Diaz, P.M.; Polanco, J.A.; Escobar-Sierra, M.; Filho, W.L. Holistic integration of sustainability at universities: Evidences from Colombia. *J. Clean. Prod.* **2021**, *305*, 127145. [CrossRef]

64. Abad-Segura, E.; Batlles-delaFuente, A.; González-Zamar, M.D.; Belmonte-Ureña, L.J. Implications for Sustainability of the Joint Application of Bioeconomy and Circular Economy: A Worldwide Trend Study. *Sustainability* **2021**, *13*, 7182. [CrossRef]

65. Velasco-Muñoz, J.F.; Aznar-Sánchez, J.A.; Belmonte-Ureña, L.J.; Román-Sánchez, I.M. Sustainable Water Use in Agriculture: A Review of Worldwide Research. *Sustainability* **2018**, *10*, 1084. [CrossRef]

66. Cogato, A.; Meggio, F.; Migliorati, M.; Marinello, F. Extreme Weather Events in Agriculture: A Systematic Review. *Sustainability* **2019**, *11*, 2547. [CrossRef]

67. Ngwenya, S.; Boshoff, N. Participation of 'international national organisations' in Africa's research: A bibliometric study of agriculture and health in Zimbabwe. *Scientometrics* **2020**, *124*, 533–553. [CrossRef]

68. Kumar, A.; Mallick, S.; Swarnakar, P. Mapping Scientific Collaboration: A Bibliometric Study of Rice Crop Research in India. *J. Sci. Res.* **2020**, *9*, 29–39. [CrossRef]

69. Ubiergo-Corvalán, P.A.; Rodríguez-Galván, M.G.; Zaragoza-Martínez, M.L.; Ponce-Díaz, P.; Casas, A.; Mariaca-Méndez, R. Agrobiodiversity of edible vegetable in the indigenous territory maya-ch'ol Chiapas, Mexico. *Trop. Subtrop. Agroecosyst.* **2020**, *23*, 46. Available online: http://www.revista.ccba.uady.mx/urn:ISSN:1870--0462-tsaes.v23i2.3192 (accessed on 27 February 2021).

70. Castro-Sánchez, E.I.; Moreno-Calles, A.I.; Meneses-Eternod, S.; Farfán-Heredia, B.; Blancas, J.; Casas, A. Management of wild edible fungi in the meseta Purépecha Region, Michoacán, México. *Sustainability* **2019**, *11*, 3779. [CrossRef]

71. Moreno-Calles, A.I.; Casas, A.; Rivero-Romero, A.D.; Romero-Bautista, Y.A.; Rangel-Landa, S.; Fisher-Ortíz, R.A.; Alvarado-Ramos, F.; Vallejo-Ramos, M.; Santos-Fita, D. Ethnoagroforestry: Integration of biocultural diversity for food sovereignty in Mexico. *J. Ethnobiol. Ethnomed.* **2016**, *12*, 54. [CrossRef] [PubMed]

72. Prospero-Bernal, F.; López-González, F.; Martínez-García, C.G.; Arriaga-Jordán, C.M. Assessment of the sustainability between 2010 and 2015 of small-scale dairy systems in the highlands of central Mexico. *ITEA* **2020**, *116*, 41–56. [CrossRef]

73. Espinoza-Guzmán, M.A.; Velásquez, L.R.S.; López, M.R.P.; Sánchez, F.J.S.; Borrego, D.A.; García, Z.F.R. Dynamics of changes in the agroecosystem of a shade-grown coffee plantation in the upper la antigua river basin, Veracruz. *Madera Bosques* **2020**, *26*, e2621974. [CrossRef]

74. Albarrán-Portillo, B.; García-Martínez, A.; Ortiz-Rodea, A.; Rojo-Rubio, R.; Vázquez-Armijo, J.F.; Arriaga-Jordán, C.M. Socioeconomic and productive characteristics of dual purpose farms based on agrosilvopastoral systems in subtropical highlands of central Mexico. *Agrofor. Syst.* **2019**, *93*, 1939–1947. [CrossRef]

75. García-Pérez, J.A.; Barois, I.; Alarcón-Gutiérrez, E. Growth and survival of the Mayan palm Chamaedorea hooperiana in two villages of Los Tuxtlas Biosphere Reserve, Veracruz, Mexico: A comparison between primary and secondary forests. *Agrofor. Syst.* **2018**, *92*, 1237–1252. [CrossRef]

76. Ferguson, B.G.; Diemont, S.A.W.; Alfaro-Arguello, R.; Martin, J.F.; Nahed-Toral, J.; Álvarez-Solís, D.; Pinto-Ruíz, R. Sustainability of holistic and conventional cattle ranching in the seasonally dry tropics of Chiapas, Mexico. *Agric. Syst.* **2013**, *120*, 38–48. [CrossRef]

77. Molina-Guerrero, C.E.; Sanchez, A.; Vázquez-Núñez, E. Energy potential of agricultural residues generated in Mexico and their use for butanol and electricity production under a biorefinery configuration. *Environ. Sci. Pollut. Res.* **2020**, *27*, 28607–28622. [CrossRef]

78. Di Bitonto, L.; Reynel-Avila, H.E.; Mendoza-Castillo, D.I.; Pastore, C.; Bonilla-Petriciolet, A. Mexican biomass wastes: Valorization for potential application in bioenergy. *Bulg. Chem. Commun.* **2019**, *51*, 99–102. [CrossRef]

79. Medina-Santana, A.A.; Flores-Tlacuahuac, A.; Cárdenas-Barrón, L.E.; Fuentes-Cortés, L.F. Optimal design of the water-energy-food nexus for rural communities. *Comput. Chem. Eng.* **2020**, *143*, 107120. [CrossRef]

80. Reyes-González, A.; Reta-Sánchez, D.G.; Sánchez-Duarte, J.I.; Ochoa-Martínez, E.; Rodríguez-Hernández, K.; Preciado-Rangel, P. Estimation of evapotranspiration of forage corn supported with remote sensing and in situ measurements. *Terra Latinoam.* **2019**, *37*, 279–290. [CrossRef]

81. López-Hernández, M.; Arteaga-Ramírez, R.; Ruiz-García, A.; Vázquez-Peña, M.A.; López-Resano, J.I. Productividad del agua normalizada para el cultivo de maíz (Zea mays) en Chapingo, México. *Agrociencia* **2019**, *53*, 811–820.
82. Vanderplank, S.; Ezcurra, E.; Delgadillo, J.; Felger, R.; McDade, L.A. Conservation challenges in a threatened hotspot: Agriculture and plant biodiversity losses in Baja California, Mexico. *Biodivers. Conserv.* **2014**, *23*, 2173–2182. [CrossRef]
83. Marín-Celestino, A.E.; Ramos-Leal, J.A.; Martínez-Cruz, D.A.; Tuxpan-Vargas, J.; De Lara-Bashulto, J.; Morán-Ramírez, J. Identification of the Hydrogeochemical Processes and Assessment of Groundwater Quality, Using Multivariate Statistical Approaches and Water Quality Index in a Wastewater Irrigated Region. *Water* **2019**, *11*, 1702. [CrossRef]
84. González-Bravo, R.; Nápoles-Rivera, F.; Ponce-Ortega, J.M.; El-Halwagi, M.M. Involving integrated seawater desalination-power plants in the optimal design of water distribution networks. *Resour. Conserv. Recycl.* **2015**, *104*, 181–193. [CrossRef]
85. Fernández, K.G.; Moreno-Calles, A.I.; Casas, A.; Blancas, J. Contributions of urban collective gardens to local sustainability in Mexico City. *Sustainability* **2020**, *12*, 7562. [CrossRef]
86. Fonteyne, S.; Gamiño, M.M.; Tejeda, A.S.; Verhulst, N. Conservation Agriculture Improves Long-term Yield and Soil Quality in Irrigated Maize-oats Rotation. *Agronomy* **2019**, *9*, 845. [CrossRef]
87. Santillano-Cázares, J.; Núñez-Ramírez, F.; Ruíz-Alvarado, C.; Cárdenas-Castañeda, M.E.; Ortiz-Monasterio, I. Assessment of Fertilizer Management Strategies Aiming to Increase Nitrogen Use Efficiency of Wheat Grown Under Conservation Agriculture. *Agronomy* **2018**, *8*, 304. [CrossRef]
88. Fuentes, M.; Hidalgo, C.; Etchevers, J.; León, F.; Guerrero, A.; Dendooven, L.; Verhulst, N.; Govaerts, B. Conservation agriculture, increased organic carbon in the top-soil macro-aggregates and reduced soil CO emissions. *Plant. Soil* **2012**, *355*, 183–197. [CrossRef]
89. Rivers, A.; Barbercheck, M.; Govaerts, B.; Verhulst, N. Conservation agriculture affects arthropod community composition in a rainfed maize-wheat system in central Mexico. *Appl. Soil Ecol.* **2016**, *100*, 81–90. [CrossRef]
90. Hernández-Bedolla, J.; Solera, A.; Paredes-Arquiola, J.; Pedro-Monzonís, M.; Andreu, J.; Sánchez-Quispe, S.T. The Assessment of Sustainability Indexes and Climate Change Impacts on Integrated Water Resource Management. *Water* **2017**, *9*, 213. [CrossRef]
91. Molina-Navarro, E.; Hallack-Alegría, M.; Martínez-Pérez, S.; Ramírez-Hernández, J.; Mungaray-Moctezuma, A.; Sastre-Merlín, A. Hydrological modeling and climate change impacts in an agricultural semiarid region. Case study: Guadalupe River basin, Mexico. *Agric. Water Manag.* **2016**, *175*, 29–42. [CrossRef]
92. Díaz-Garza, A.M.; Fierro-Rivera, J.I.; Pacheco, A.; Schüßler, A.; Gradilla-Hernández, M.S.; Senés-Guerrero, C. Temporal Dynamics of Rhizobacteria Found in Pequin Pepper, Soybean, and Orange Trees Growing in a Semi-arid Ecosystem. *Front. Sustain. Food Syst.* **2020**, *4*, 602283. [CrossRef]
93. Baez-González, A.D.; Fajardo-Díaz, R.; Padilla-Ramírez, J.S.; Osuna-Ceja, E.S.; Kiniry, J.R.; Meki, M.N.; Acosta-Díaz, E. Yield performance and response to high plant densities of dry bean (*Phaseolus vulgaris* L.) cultivars under semi-arid conditions. *Agronomy* **2020**, *10*, 1684. [CrossRef]
94. Orduño-Torres, M.A.; Kallas, Z.; Ornelas-Herrera, S.I. Farmers' environmental perceptions and preferences regarding climate change adaptation and mitigation actions; towards a sustainable agricultural system in México. *Land Use Pol.* **2020**, *99*, 105031. [CrossRef]
95. Shinbrot, X.A.; Jones, K.W.; Rivera-Castañeda, A.; López-Báez, W.; Ojima, D.S. Smallholder Farmer Adoption of Climate-Related Adaptation Strategies: The Importance of Vulnerability Context, Livelihood Assets, and Climate Perceptions. *Environ. Manag.* **2019**, *63*, 583–595. [CrossRef] [PubMed]