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VISUALIZATION ANALYSIS OF CLIMATE SMART AGRICULTURE RESEARCH IN ASIA BASED ON WOS AND CITESPACE

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ABSTRACT

Purpose: This study conducts a quantitative analysis of relevant research literature in the field of Climate Smart Agriculture in Asian countries and regions included in the "Web of Science Core Collection" to clarify the current development status of Climate Smart Agriculture in Asia.

Methodology: Based on bibliometric methods, this article searched the relevant research 617 literature in the field of Climate Smart Agriculture in Asian countries and regions included in WoS from 2014 to 2023. Analyzed from the perspectives of annual publication volume, publishing institution, author, country, keyword.

Findings: The number of published papers from 2014 to 2023 showed an overall upward trend, and the largest number of papers was published in 2022, with 166 papers. India, China, and Pakistan rank within the top 3 countries in Asia based on the volume of publications they have produced. The most published author is Jat, ML (17 articles). The keywords with the highest frequency are Climate Change, Climate Smart Agriculture, Impacts, Management, Food Security, etc. Most of the literatures research hotspots in the field of Climate Smart Agriculture in Asia focus on climate change, food security, and agricultural management and attach importance to the study of agriculture's adaptability to climate change.

Value: This paper provides a comprehensive analysis of the WoS Core Collection of literature, which can point out the direction for researchers in the area of Climate Smart Agriculture to engage in related research, provide data reference and help predict the future development trend of the industry.

Keywords: climate smart agriculture, visual analytics, citespace.

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ANÁLISE DE VISUALIZAÇÃO DA PESQUISA AGRÍCOLA INTELIGENTE DO CLIMA NA ÁSIA COM BASE EM WOS E CITESPACE

RESUMO

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Objetivo: Este estudo realiza uma análise quantitativa de literatura de pesquisa relevante no campo da Agricultura Inteligente Climática em países e regiões asiáticas incluídas na "Web of Science Core Collection" para esclarecer o atual estado de desenvolvimento da Agricultura Inteligente Climática na Ásia.

Metodologia: Com base em métodos bibliométricos, este artigo pesquisou a literatura 617 de pesquisa relevante no campo da Agricultura Inteligente do Clima em países e regiões asiáticas incluídos na OMS de 2014 a 2023. Analisado a partir das perspectivas do volume anual de publicação, instituição editorial, autor, país, palavra-chave.

Constatações: O número de artigos publicados de 2014 a 2023 mostrou uma tendência ascendente geral, e o maior número de artigos foi publicado em 2022, com 166 artigos. A Índia, a China e o Paquistão estão entre os 3 principais países da Ásia, com base no volume de publicações que produziram. O autor mais publicado é Jat, ML (17 artigos). As palavras-chave com maior frequência são Mudança Climática, Agricultura Inteligente Climática, Impactos, Gestão, Segurança Alimentar, etc. A maioria dos pontos críticos de pesquisa de literatura no campo da Agricultura Climate Smart na Ásia se concentram nas mudanças climáticas, segurança alimentar e gestão agrícola e atribuem importância ao estudo da adaptabilidade da agricultura às mudanças climáticas.

Valor: Este artigo fornece uma análise abrangente da coleção de literatura de base da WoS, que pode apontar a direção para os pesquisadores na área de Agricultura Inteligente Climática para se envolver em pesquisas relacionadas, fornecer referência de dados e ajudar a prever a tendência de desenvolvimento futuro da indústria.

Palavras-chave: agricultura inteligente climática, análise visual, citespace.

ANÁLISIS DE VISUALIZACIÓN DE LA INVESTIGACIÓN SOBRE AGRICULTURA CLIMÁTICAMENTE INTELIGENTE EN ASIA BASADA EN WOS Y CITESPACE

RESUMEN

Propósito: Este estudio realiza un análisis cuantitativo de la literatura de investigación relevante en el campo de la agricultura climáticamente inteligente en los países y regiones asiáticos incluidos en la "Web of Science Core Collection" para aclarar el estado actual de desarrollo de la agricultura climáticamente inteligente en Asia.

Metodología: Basado en métodos bibliométricos, este artículo buscó la literatura 617 de investigación relevante en el campo de la Agricultura Climáticamente Inteligente en países y regiones asiáticas incluidas en la OMS de 2014 a 2023. Analizado desde las perspectivas del volumen de publicación anual, institución editorial, autor, país, palabra clave.

Resultados: El número de artículos publicados de 2014 a 2023 mostró una tendencia general al alza, y el mayor número de artículos se publicó en 2022, con 166 artículos. India, China y Pakistán se ubican entre los 3 países más importantes de Asia según el volumen de publicaciones que han producido. El autor más publicado es Jat, ML (17 artículos). Las palabras clave con mayor frecuencia son Cambio Climático, Agricultura Climáticamente Inteligente, Impactos, Gestión, Seguridad Alimentaria, etc. La mayoría de las literaturas que investigan puntos críticos en el campo de la agricultura climáticamente inteligente en Asia se centran en el cambio climático, la seguridad alimentaria y la gestión agrícola y otorgan importancia al estudio de la adaptabilidad de la agricultura al cambio climático.

Valor: Este artículo proporciona un análisis exhaustivo de la colección principal de literatura de la OMS, que puede señalar la dirección para que los investigadores en el área de Agricultura Climáticamente Inteligente participen en investigaciones relacionadas, proporcionen datos de referencia y ayuden a predecir la tendencia futura de desarrollo de la industria.

Palabras clave: agricultura climáticamente inteligente, visual analytics, citespace.

1 INTRODUCTION

Today's global society is faced with two major focal issues, namely ensuring human food security and mitigating the effects of climate change (Guan et al., 2017). Asia accounts for 7 out of 14 countries with a population of over 100 million globally or 50 per cent, and in the first half of 2023, India has overtaken China to become the world's most populous country (He, 2023). Most of the world's underfed population is concentrated in South Asia, East Asia and Sub-Saharan Africa (Guo, 2015).

Climate Smart Agriculture is a model of agricultural production and development that sustainably improves agricultural efficiency, enhances resilience, and reduces greenhouse gas (GHG) emissions, aiming to achieve food security goals at a higher level (Guan et al., 2017). A report released by the Food and Agriculture Organization (FAO) on 28th October 2010 states that developing countries need to promote the development of Climate Smart Agriculture to adapt to a warming global climate and to meet the needs of a growing population (Lin, 2022), therefore, the development of Climate Smart Agriculture sector in the Asian region is of great significance for guaranteeing food security.

Bibliometric takes the literature system and its measurement characteristics as the research object, adopts mathematical and statistical methods to analyse, evaluate and predict the current situation and development trend of science and technology, which is one of the important methods to quantitatively measure the basic scientific activities, disciplinary layout and development dynamics, and it has been widely used in various fields of scientific research (Xu et al., 2019). CiteSpace is able to present the evolutionary history of the ins and outs of a knowledge CiteSpace is able to show the evolution of the ins and outs of a knowledge field on a citation network map (Chen et al., 2015). Therefore, in this paper, we measured and analysed the literature related to the field of Climate Smart Agriculture in Asia from 2014 to 2023 by using CiteSpace 6.2.R4(64-bit) Advanced and Web of Science Core Collection, to discuss the trend of the literature characteristics and the content of the study, to clarify the research lineage and the knowledge structure of the field, and to summarise the content of the study, so as to clearly and accurately

demonstrate the research dynamics and trend of the field of Climate Smart Agriculture in Asia, and to provide references for the subsequent in-depth study of the field.

2 RESEARCH METHODOLOGY AND DATA ANALYSIS

2.1 RESEARCH METHODOLOGY

WPS is a commonly used office software developed by Beijing Kingsoft Office Software, Inc, which has the functions of text, table, display and so on. In this study, WPS is used to describe the statistics on the time distribution of the number of articles issued in qualified literature, etc., which can present information such as the number of articles issued in a clear graphical way.

CiteSpace is an information visualisation software developed by Professor Chen Chaomei's team using Java language, which is mainly based on the Co-citation Analysis Theory and Path-finding Network Algorithm to analyse the literature collection of a specific field quantitatively, explore the key paths and knowledge inflexion points of the discipline's field evolution, and then draw a series of visual maps to analyse the potential dynamics of the discipline's evolution, which can serve as the main basis for sorting out the basic knowledge and detecting the trend of the discipline (Chen etal., 2015). CiteSpace has a high analytical efficiency for identifying the overall trends of seminal literature, key literature and mainstream issues in the field (Chen, 2006).

Based on this, this study analyses the results of research on Climate Smart Agriculture in Asian countries and identifies the current status and future trends of research in this area.

2.2 DATA SOURCES

All sample data in this study are from Web of Science (hereinafter referred to as WoS) Core Collection, and a total of 2126 results were retrieved with the Topic of "Climate Smart Agriculture" or "Climate Smart Agriculture" or "Climate-Smart-Agriculture". The Country/Regions selected "India", "People's Republic of China", "Pakistan", "Bangladesh", "Saudi Arabia", "Vietnam", "Philippines", "Malaysia", "Iran", "Japan", "South Korea" and other Asian countries, select "Article" as the Document Type,

the Publication Year is 2014-2023. A total of 617 literature information were obtained after screening and removing duplicates, and the search time was March 9, 2024. Export the Full Record and Cited References in Plain text file and import them into CiteSpace6.2.R4(64-bit) Advanced software.

2.3 DATA PROCESSING

This study used Knowledge Graph Analysis and Cluster Analysis to quantitatively analyze the literature. First, rename the downloaded txt file with the beginning of "download_" and import the data into CiteSpace 6.2.R4(64-bit) Advanced. Time Slicing sets the time interval from January 2014 to December 2023, and the Years Per Slice is 1 year. Node Types: Author, Institution, Country, and Keyword for node types. Selection Criteria extracts the top 50 default thresholds and analyzes the top 50 documents in each Time Slicing. Pruning chose “Pathfinder” and “Pruning sliced networks” (He et al., 2023). The keyword cluster graph is drawn using the Log-likelihood Ratio (LLR) algorithm to extract keywords. $Q > 0.3$ means that the divided community structure is significant. When the S value is 0.7, the clustering efficiency is convincing, and if it is above 0.5, the clustering is generally considered reasonable (Chen et al., 2015).

3 RESEARCH STATUS ANALYSIS

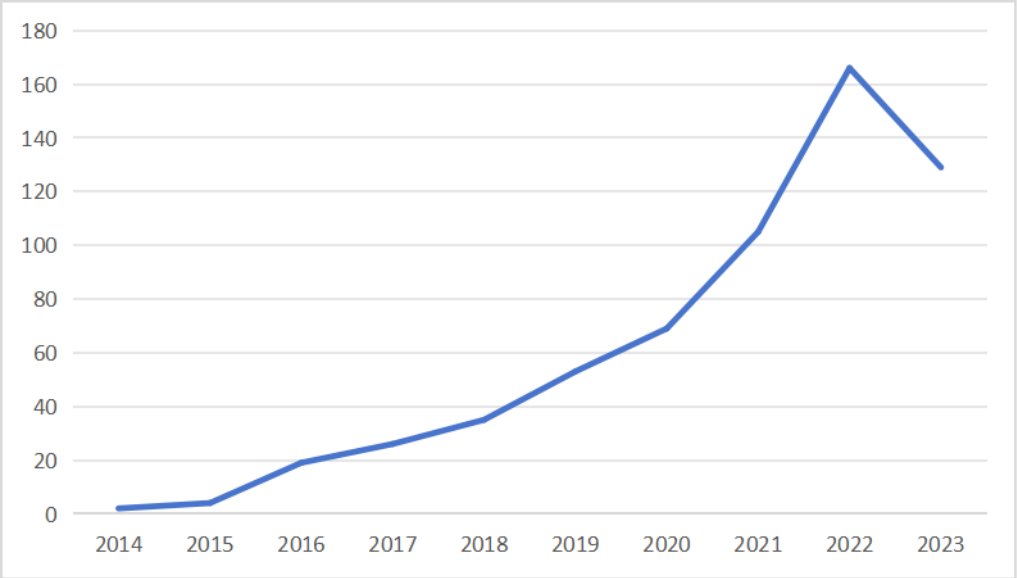
3.1 ANNUAL PUBLICATION COUNT ANALYSIS

The annual change in the number of publications is an essential indicator of academic research in a certain field (Xu et al., 2019). The number of publications can reflect the dynamics of the knowledge stock of a discipline, and analysing the annual publication volume is helpful in clarifying the current development of a field (Zhao et al., 2024). In this paper, we collect the articles on Climate Smart Agriculture research in Asian countries or regions from 2014~2023 from the Web of Science (WOS) Core Collection and get Figure 1. As shown in the figure, the number of papers published in 2014~2015 is very small. It has grown rapidly since 2016, peaked at 166 articles in 2022, and declined in 2023.

According to the trend of publications, it can be seen that scholars in Asian countries and regions have lacked attention to research on Climate Smart Agriculture, and the number of annual publications was not less than 20 before 2016, and then the number of publications showed an overall upward trend, indicating that the research on Climate Smart Agriculture has begun to be taken seriously and the research prospect are good.

Figure 1

Annual Publication Trend Graph



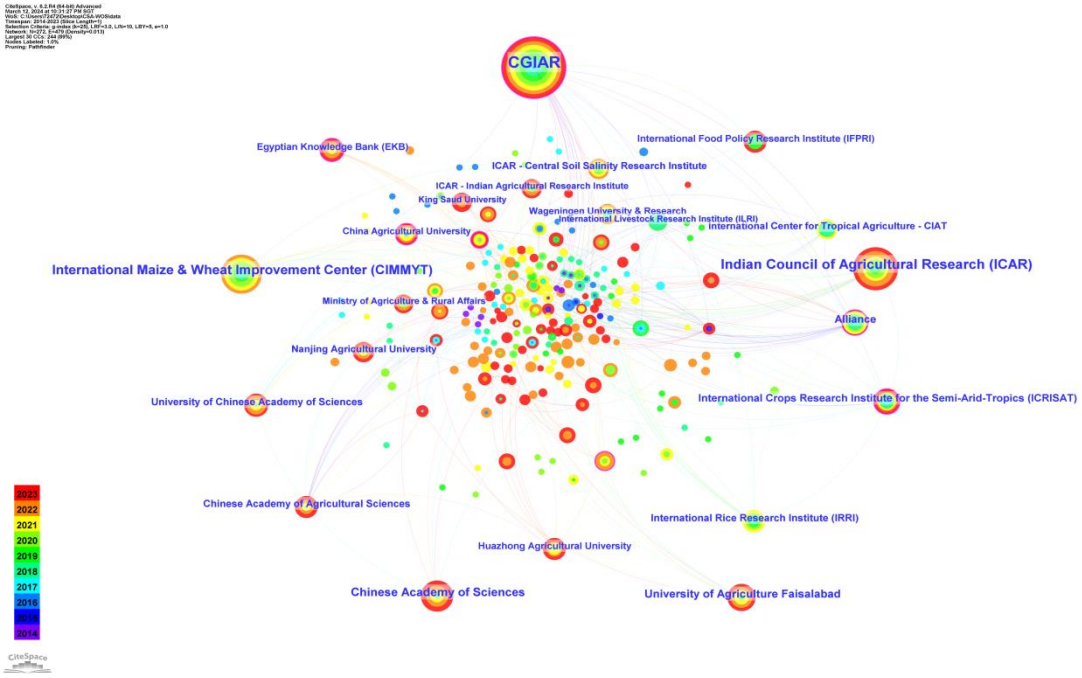
Data Source: Web of Science

3.2 PUBLISHING INSTITUTIONS ANALYSIS

The number of papers published by research institutions and the cooperation between institutions can reflect the academic influence of the field (Guo et al., 2023). CiteSpace software was used to analyse the number of papers published by institutions in 617 documents. In the software, the Node Type was selected as Institution, the Time Slicing was selected as 1, the Pruning was selected as “Pathfinder”and “Pruning sliced networks”, and the rest were defaulted. After running, we got Figure 2 Institutions Cooperate Analysis Graph.

Figure 2

Institutions Cooperate Analysis Graph



Data Source: Web of Science

The node represents the issuing institution; the larger the node indicates that the institution publishes more academic papers, and vice versa, the fewer papers are published; when the node is displayed in the form of a yearly wheel, the width of the wheel of a certain year represents the number of papers published by the institution in a certain year, and the more papers are published, the wider is the wheel of the year. The lines between the nodes represent the strength of cooperation between authors; the more lines indicate the stronger the cooperation between scholars, and vice versa, the weaker the cooperation (Chen, 2006).

As can be seen from Fig. 2, N=272, E=479, the Density is 0.013, which indicates that there are 272 research institutions,479 connecting lines with nodes are generated, the network density value is 0.013, which indicates that many research institutions in this field have generated corresponding cooperative relationships, which have received wide attention from the academic community, but the inter-institutional academic exchanges need to be strengthened.

The top 5 institutions in terms of the number of publications are CGIAR, the Indian Council of Agricultural Research (ICAR), the International Maize & Wheat

Improvement Centre (CIMMYT), the Chinese Academy of Sciences, University of Agriculture Faisalabad.

Table 1

Top 5 Institutions by Publication Count

Count	Centrality	Year	Institutions
101	0.3	2014	CGIAR
51	0.1	2016	Indian Council of Agricultural Research (ICAR)
43	0.03	2016	International Maize & Wheat Improvement Center (CIMMYT)
26	0.11	2017	Chinese Academy of Sciences
22	0.11	2018	University of Agriculture Faisalabad

Data Source: Web of Science

As can be seen from Figure 1, the number of papers published by the top five institutions is 243, accounting for 39.38% of the total number of papers, of which CGIAR ranks first with 101 papers, which shows that the research results of the researchers of the institutions have played a leading role in the research in this field. In addition to CGIAR and the International Maize & Wheat Improvement Center (CIMMYT), which are international organizations, the Indian Council of Agricultural Research (ICAR), Chinese Academy of Sciences, and University of Agriculture are the top five institutions in terms of publications Faisalabad, located in India, China and Pakistan, all of which are agriculturally large countries or countries with threatened food security, are more concerned about the impact of climate change on agriculture.

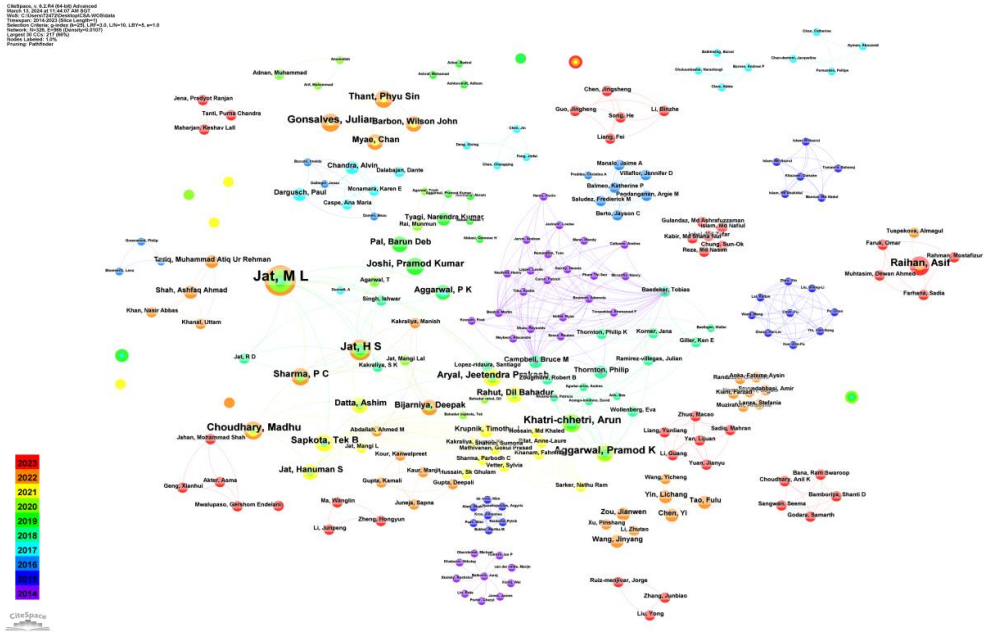
3.3 AUTHOR ANALYSIS

By analysing the authors of the literature, we can understand the output and contribution of each researcher (Guo et al., 2023). The documents in the WoS Core Collection were imported into CiteSpace, and the Node Type was selected as Author, Time Slicing was selected as 1, Pruning was selected as "Pathfinder" and "Pruning sliced

networks", and the rest were defaulted. After running, we got Authors Cooperate Analysis Graph in Figure 3.

Figure 3

Authors Cooperate Analysis Graph



Data Source: Web of Science

As can be seen from Figure 3, N=326, E=566, and the Density is 0.0107, which indicates that there are 326 authors and 566 connections with nodes, and the communication between authors needs to be strengthened.

Table 2

Authors With ≥5 Publications

Count	Year	Authors
17	2018	Jat, M L
8	2018	Jat, H S
6	2018	Aggarwal, Pramod K
6	2022	Raihan, Asif
6	2021	Gonsalves, Julian
6	2018	Khatri-chhetri, Arun
6	2020	Choudhary, Madhu
5	2018	Sapkota, Tek B
5	2019	Joshi, Pramod Kumar
5	2021	Thant, Phyu Sin
5	2020	Sharma, P C
5	2018	Aryal, Jeetendra Prakash

Data Source: Web of Science

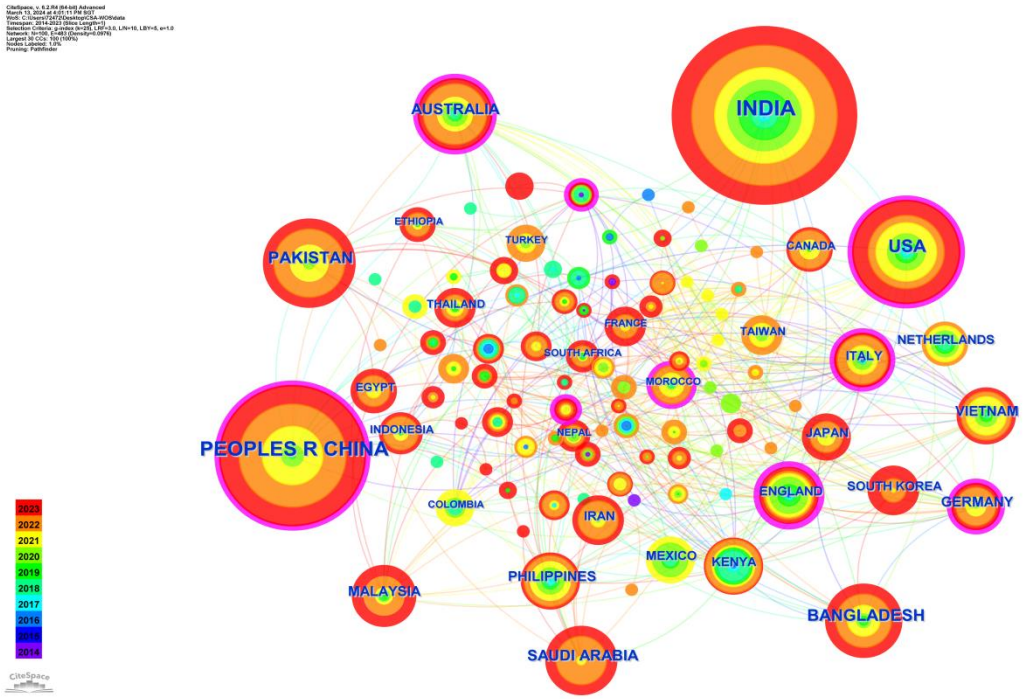
As can be seen from Table 2, in the field of Climate Smart Agriculture in Asia, Jat, M L has the highest number of papers (17), and the number of papers published by the rest of the researchers is in single digits, indicating that compared with other popular fields, relevant scholars have not paid enough attention to Climate Smart Agriculture.

3.4 PUBLISHING COUNTRIES ANALYSIS

The analysis of the publication of papers in a specific field in different countries can reflect the research trend of this field in that country and the importance of scholars in this field in that country. In the CiteSpace software, select the Node Type as Country, select 1 for Time Slicing, select "Pathfinder" and "Pruning sliced networks" for Pruning, and leave the rest as default. After running, we got the Publishing Countries Analysis Graph, as shown in Figure 4.

Figure 4

Publishing Countries Analysis Graph



Data Source: Web of Science

The development of disciplines often has a specific regional nature, and scholars from the same country or region have frequent exchanges and large information flows (Li et al., 2021). The higher the analytical centrality of the country, the greater the country's important position and contribution to this professional field (Wang et al., 2024). As can be seen from Figure 4, N=100, E=483, and the Density is 0.0976, indicating that the research cooperation between countries is relatively close. The presence of non-Asian countries, such as the United States in Figure 4, may be due to cross-border cooperation or citation relationships.

Table 3

Top 10 Countries by Number of Publications

Count	Centrality	Year	Countries
223	0.09	2016	INDIA
153	0.14	2014	PEOPLES R CHINA
62	0.1	2015	PAKISTAN
47	0.05	2015	BANGLADESH
36	0.09	2019	SAUDI ARABIA
32	0.07	2014	VIETNAM
31	0.08	2016	PHILIPPINES
25	0.07	2019	MALAYSIA
19	0	2017	IRAN
19	0.02	2015	JAPAN

Data Source: Web of Science

As can be seen from Table 3, India is the country with the highest number of publications in the field of Climate Smart Agriculture in Asia, however, China and Pakistan are more centred, with all three countries having a significant impact in this field. Most of the top ten countries with the highest number of publications are countries in South and Southeast Asia that face high food security risks, reflecting that these countries are more concerned about the impact of climate change on food security.

4 RESEARCH CONTENT ANALYSIS

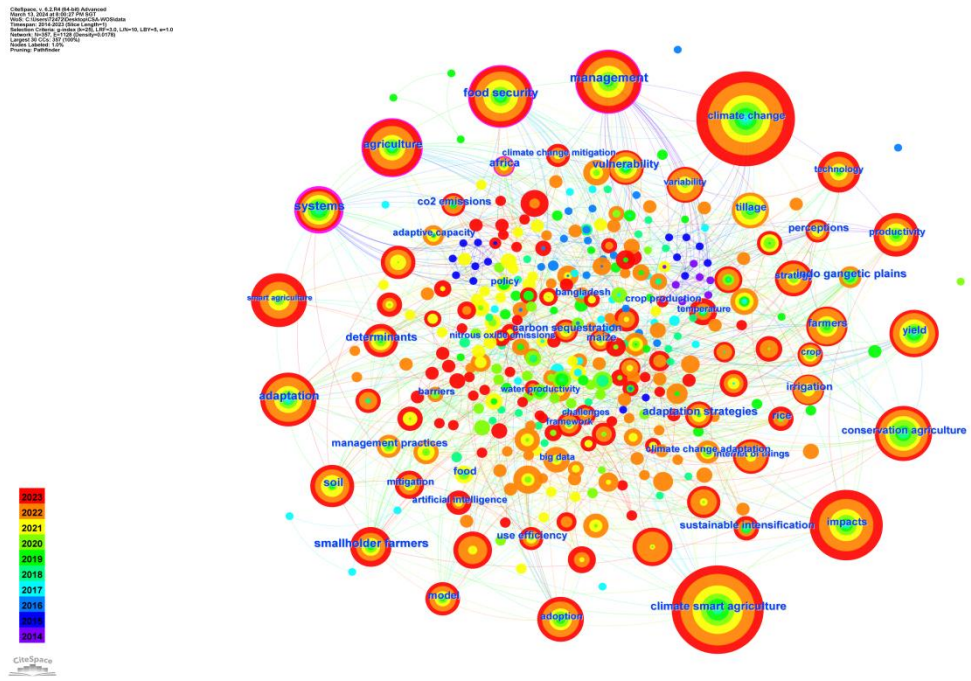
4.1 KEYWORD CO-OCCURRENCE ANALYSIS

Keywords are a high degree of condensation of the topic of the literature, and the research hotspots and important issues in the subject area can be examined on the basis of high-frequency keywords (Wang et al., 2024). Keywords represent the direction of the

article to a large extent, and if a keyword has a high frequency of occurrence in a number of documents, it means that this keyword is a similar research hotspot in the literature (Li et al., 2021). Statistical analysis of keywords in the literature can summarise the research hotspots in the field (Zheng et al., 2018). The literature data downloaded from the WoS Core Collection were imported into CiteSpace 6.2.R4 software, the Node Type was selected as Keyword, the Time Slicing was set to 1, the Threshold was set to T50, and the Pruning was selected as "Pathfinder" and "Pruning sliced networks", the rest is default. Run to get Figure 5.

Figure 5

Keyword Co-occurrence Graph



Data Source: Web of Science

As shown in Figure 5, the Keyword Co-occurrence Graph has N=357, E=1128, and Density of 0.0178, indicating that there are 357 keywords and there are 1128 connecting lines between keywords, which is a relatively close connection. The size of the nodes in the graph is proportional to the frequency of keyword occurrences, and the number of lines is proportional to the closeness between keywords (Guo et al., 2023). The figure shows that the largest node is Climate Change, indicating that Climate Change is the keyword with the highest frequency of occurrence in the research area.

Table 4

Top 10 Keywords With Frequency of Occurrence

Count	Centrality	Year	Keywords
166	0.06	2015	climate change
152	0.08	2015	climate smart agriculture
96	0.07	2014	impacts
75	0.15	2014	management
73	0.11	2016	food security
65	0.1	2015	agriculture
62	0.06	2016	conservation agriculture
62	0.09	2015	adaptation
55	0.04	2018	smart agriculture
47	0.07	2016	yield

Data Source: Web of Science

Table 4 shows that Climate Change, Climate Smart Agriculture, Impacts, Management, Food Security, Agriculture, Conservation Agriculture, Adaptation, Smart Agriculture and Yield are the keywords that appear in the top 10 frequency. From these high-frequency keywords, it can be seen that in the past ten years, research in the field of Climate Smart Agriculture in Asia has focused on climate change, food security, agricultural management, and the study of the adaptive capacity of agriculture to climate change.

4.2 KEYWORD CLUSTER ANALYSIS

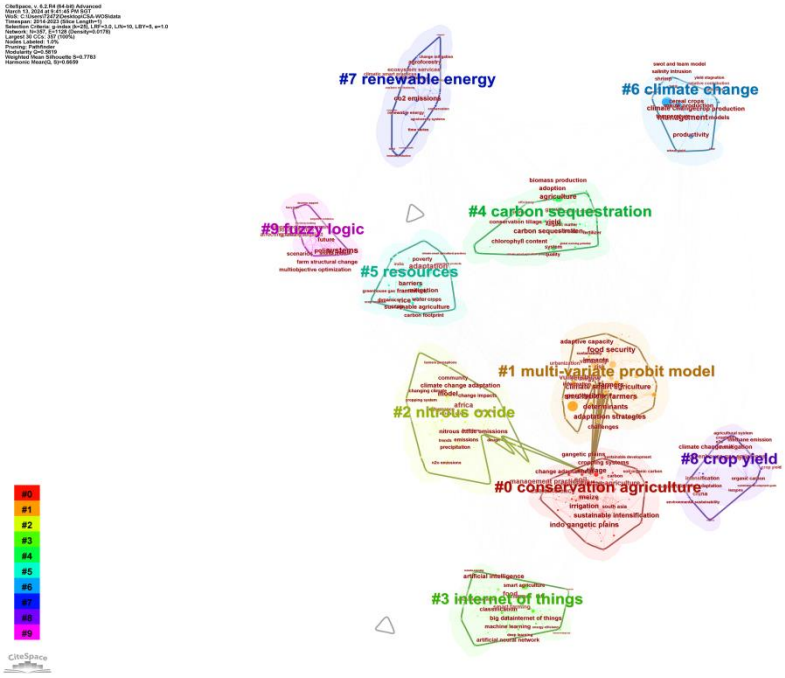
The level of keyword clustering can reflect the research hotspots in a specific field (He et al., 2023). On the basis of the keyword co-occurrence map, the cluster tags of the keywords of Climate Smart Agriculture research can be extracted, and the structural characteristics of Climate Smart Agriculture research in Asia can be judged by combining the clustering label words. The Log-likelihood Rate (LLR) test algorithm of CiteSpace software was used to study the samples, and the Keyword Clustering Graph of Climate Smart Agriculture research was drawn, as shown in Figure 6.

In the keyword clustering graph, the node's size represents the keyword's frequency, and the larger the node, the higher the frequency of the keyword, the more it can reflect the popularity of the research direction represented by these keywords. Centrality represents the importance of the data, the greater the centrality indicates the higher the importance of the keyword in the research direction it represents, when the centrality is greater than 0.1, it indicates that the keyword is more important, and when it is less than 0.1, the importance is lower (Chen, 2006). The smaller the number, the larger the cluster size (Wang et al., 2024).

The Clustering Module Value Q and the Average Contour Value S are important indexes for evaluating the clustering effect's significance and reasonableness, and the clustering association structure is significant if the Q value is greater than 0.3, and the larger the value indicates the greater the connection relationship within the association, and the greater the value indicates the greater the connection relationship within the association. If the Q value is greater than 0.3, the clustered association structure is significant, and its value indicates that there are more connection relations within the association and the clustering effect is better; if the S value is greater than 0.5, the clustering is reasonable, and if the S value is greater than 0.7, it indicates that the clustering result has higher credibility (Zhang et al., 2023).

Figure 6

Keyword Clustering Graph



Data Source: Web of Science

As can be seen from Fig. 6, the Q value is 0.5819, and the S value is 0.7783, indicating that the resulting clustering structure is more reasonable. The S values of all clusters in Table 5 are not only greater than 0.5, but also most of them are close to 1, which indicates that the modularity of clusters is good and concentrated. The clustering results are credible, indicating a high level of credibility to carry out further analyses.

Figure 6 shows 10 clusters of #0 conservation agriculture, #1 multi-variate probit model, #2 nitrous oxide, #3 internet of things, #4 carbon sequestration, #5 resources, #6 climate change, #7 renewable energy, #8 crop yield, #9 fuzzy logic.

Table 5

Clustering of Climate Smart Agriculture Research Hotspot

ClusterID	Size	Silhouette	mean (Year)	Label (LLR)
0	61	0.69	2019	conservation agriculture; water productivity ; cropping systems; soil organic carbon ; tillage
1	55	0.734	2018	multi-variate probit model; agricultural extension ; climate smart agriculture ; internet of things; adaptation strategies
2	43	0.754	2019	nitrous oxide; methane; climate change adaptation ; soil acidification; nitrogen management
3	40	0.83	2020	internet of things; climate smart agriculture ; smart agriculture; machine learning; smart farming
4	35	0.847	2018	carbon sequestration; adaptation; stress tolerance; soil health; zero-tillage
5	31	0.791	2019	resources; mitigation; climate-smart agricultural practices; climate; greenhouse gas
6	22	0.928	2015	climate change; developing countries; environmental services; internet of things; sustainability
7	21	0.831	2019	renewable energy; co_2 emissions; sustainability; environment; emission reduction
8	20	0.867	2021	crop yield; agricultural system; greenhouse gas emissions; environmental sustainability; climate change mitigation
9	15	0.959	2017	fuzzy logic; decision support; system of rice intensification; inorganic fertilizer; spatially explicit

Data Source: Web of Science

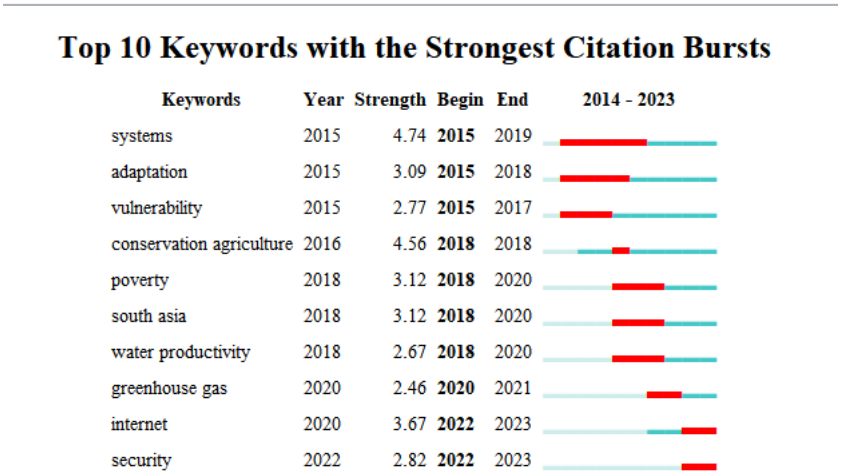
The 10 hotspot clusters presented in Table 5 form a multifaceted research network, which can reflect that the research on Climate Smart Agriculture in Asia from 2014 to 2023 is "Diversity-advancement". Based on the main keywords contained in the labels of each cluster, the research can be summarised into three aspects: Reducing Emissions, Adapting to Climate, and Improving Yields.

4.3 KEYWORD EMERGENCE ANALYSIS

The analysis of emergent keywords can identify hotspots and frontiers in the research field, reflecting that a certain topic has received special attention from scholars over a period of time (Xu et al., 2020). The analysis of emergent keywords can identify the time periods and dynamic changes of keyword emergence with higher intensity to reflect the frontiers and development trends within the research field (Wang et al., 2024).

Figure 7

Keyword Emergence Graph



Data Source: Web of Science

Based on the emergent analysis of keywords with a minimum duration of one year from 2014 to 2023, the top 10 emergent words were selected and then sorted according to the early and late start time of emergence, and the top 10 Climate Smart Agriculture keywords from 2014 to 2023 were obtained as shown in Figure 7. The red bolded area indicates the time period when the frequency of occurrence changes or has the greatest impact. Analysed by the chronological order of the start of the emergence, it can be seen that Systems received the longest continuous attention from 2015 to 2019, followed by Adaptation and Vulnerability; Conservation Agriculture received brief attention in 2018. Poverty, South Asia, Water Productivity meanwhile received attention in 2018-2020. In the next few years, Greenhouse Gas, Internet, and Security become the theme words that Asian scholars focus on. This is corroborated by the time distribution chart of the previous article, which shows that there are more hotspots and results in Climate Smart Agriculture research in Asia since 2018; Internet, and Security have become keywords in the last two years, which also indicates that scholars pay more attention to the application of the Internet in climate change adaptation in agriculture, and food security is more concerned.

5 CONCLUSION

At present, as far as research power is concerned, in order to promote the development of the field of Climate Smart Agriculture, research institutions, researchers,

and academic exchanges between countries in this field need to be strengthened. Compared with other popular fields, the research on Climate Smart Agriculture still lacks attention. In future research, relevant scholars should enhance the foresight of the research on Climate Smart Agriculture, broaden the ideas and methods of the research on Climate Smart Agriculture, and provide theoretical support and practical basis for the research on Climate Smart Agriculture.

In summary, this study has sorted out the development of Climate Smart Agriculture in Asia, analysed the future development trend of climate-smart research, and provided development trends and data references for researchers to conduct subsequent research in the field.

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