

# Visual Analysis of Twenty Four Solar Terms in China Based on CiteSpace

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**Abstract:** Based on the CiteSpace scientific literature analysis tool, this paper provides a comprehensive and in-depth visual analysis of the relevant literature on the twenty-four solar terms in the Chinese Knowledge Information Network (CNKI) database between 2009 and 2024, aiming to reveal the academic hot spots, knowledge evolution, and cutting-edge trends in the field. The results of the study show that since the twenty-four solar terms were inscribed on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2016, there has been a significant increase in scholarly attention and a large increase in the number of research documents. Interdisciplinary cooperation networks are gradually formed, and the research on the twenty-four festivals has a certain degree of interdisciplinarity and cooperation. Inheritance and innovation, festival culture and application, education and dissemination, cultural creation and cross-culturalization constitute the four core research themes; the research vein shows the evolution path of "origin verification → interdisciplinary expansion → innovative application", and in recent years, it has been extended to the fields of health and wellness and eco-tourism, etc. This study quantifies and presents the knowledge mapping of the twenty-four solar terms through the knowledge map. This study quantitatively presents the dynamic structure of the festival research through the knowledge map, which provides a useful reference for researchers in related fields. Meanwhile, it also provides scientific basis and data support for the inheritance and development of the twenty-four solar terms culture.

**Keywords:** Twenty-Four Solar Terms, CNKI, Citespace, Visualization Analysis

## 1. Introduction

The twenty-four solar terms, as the intellectual distillation of Chinese civilization over thousands of years, embody the temporal order perception of agricultural civilization and encompass a rich system of understanding natural laws and cultural practices<sup>[1]</sup>. After it was inscribed on the United Nations Intangible Cultural Heritage List in 2017<sup>[1]</sup>, its research in the academic community has expanded from folklore evidence to a multidisciplinary cross-cutting field<sup>[2]</sup>, covering multiple dimensions such as climatology, agronomy, sociology, and medicine. However, traditional literature review approaches struggle to systematically present the voluminous research dynamics and knowledge correlations in this domain, and there is an urgent necessity to employ scientometric tools to disclose its intrinsic evolutionary patterns.

As a visualization software based on co-citation analysis and knowledge graph, CiteSpace can effectively mine the knowledge flow and frontier trend among literature through clustering algorithms, emergence detection and region mapping technology. Compared with pure content analysis, this method can deconstruct the migration path of research hot spots from the three dimensions of time, space, and discipline intersection and identify potential knowledge faults and emerging growth points<sup>[3]</sup>. For example, in recent years, the research on festive seasons has gradually broken through the single paradigm of "cultural interpretation", and extended to the quantitative research direction of "construction of festive-season and climate models" and "verification of festive-season and health maintenance mechanisms", and such interdisciplinary shift needs to be systematically presented with evidence using visualization<sup>[4]</sup>.

This study intends to use CiteSpace to dig the solar term literature in the CNKI database in the past

15 years, and build a co-cited network, keyword time zone view, keyword co-occurrence cluster map, and keyword emergence map. By quantifying the dynamic structure of solar term research through a knowledge graph, it provides theoretical support for the modern transformation of traditional calendar culture and provides decision-making reference for interdisciplinary integration and cultural heritage protection.

## **2. Data Sources and Processing**

### **2.1 Data Acquisition**

To systematically investigate the academic dynamics of the study of the "twenty-four solar terms" in China, this study uses the China Academic Journal Network Publishing Database (CNKI) as the data source, with the theme words "twenty-four solar terms" or "festival culture" or "traditional festival", the period from January 1st, 2009 to December 31st, 2024 (PY=2009-2024), and the type of literature is limited to "academic journals" and "traditional festival". This study uses the China Academic Journal Network Publishing Database (CNKI) as the data source, with the theme word "twenty-four solar terms" or "solar culture" or "traditional solar terms", the period from January 1st, 2009 to December 31st, 2024 (PY=2009-2024), and the type of literature is limited to "academic journal", "featured journal" and "academic journal". The types of literature were limited to three categories: "academic journals", "featured journals" and "dissertations"; a total of 4,509 pieces of original literature were obtained, and duplicates were eliminated by using the built-in de-duplication function of CiteSpace 6.2.R4 (duplication rate of 12.2%); Non-academic texts such as book reviews, conference notices, character interviews, etc. were excluded by manual screening (71.4% excluded); finally, 1,287 valid documents were included, and the data collection date was March 19, 2025, respectively.

### **2.2 Data Processing**

In the field of scientometrics, it is common for researchers to use multimodal tools to parse the knowledge architecture and collaborative networks of literature data. In this study, CiteSpace 6.2.R4 is used as the core tool for deep mining and topology visualization of high-dimensional literature datasets based on bibliometric principles<sup>[5]</sup>. Based on the file architecture requirements of CiteSpace 6.2.R4, create a dual-path directory for input/output and execute format conversion (.txt→.ciw) through Python 3.10 scripts to ensure data compatibility<sup>[5]</sup>. Based on the requirements of CiteSpace 6.2.R4 file architecture, the input/output dual-path directory was created, and the format conversion (.txt→.ciw) was performed by Python 3.10 scripts to ensure data compatibility<sup>[5]</sup>. Time Slicing (Time Slicing=2 years), Pruning Threshold (Top N=50), Institution Co-occurrence Mapping (Node Type=Institution) and Keyword Co-occurrence Clustering (Node Type=Keyword) were set in CiteSpace.

A standardized corpus is constructed by Boolean logic search (SU="target subject") and manual cleaning. The node type is set to "institution" or "author" after importing the data into CiteSpace, and the Pathfinder algorithm is used to construct the co-occurrence network. After importing the data into CiteSpace, we set the node type as "organization" or "author" and use the Pathfinder algorithm to construct the co-occurrence network. The node weights were quantified by Frequency and Centrality ( $\geq 0.1$ ), reflecting the academic contribution and influence of the subject, while the Edge Weight characterizes the density of inter-institutional collaboration through Collaboration Strength (CS)<sup>[6]</sup>.

## **3. Current Status of Research on the Visualization of the "Twenty-Four Solar Terms"**

### **3.1 Analysis of Annual Volume of Publications**

According to the data statistics of CNKI from 2009 to 2024, a total of 1,287 valid literature articles have been published in the research field of "24 solar Terms", and the evolution trend of the annual publication volume can be divided into three periods. Fig .1 shows the statistics of the number of articles published in the field of "twenty-four solar terms" since 2008. According to the statistics of China Knowledge Network, the research on the twenty-four solar terms can be divided into three periods:

The first period is the preliminary exploration stage from 2009 to 2016, with a cumulative total of 87 articles, accounting for 6.8% of the total articles. Due to the lack of national cultural protection policy promotion, academic attention is low, the average annual number of articles is only 10.8, and the

research progress is relatively slow.

The second period is the sustained development phase from 2017 to 2021, with a total of 246 articles, accounting for 19.1%, and an average annual growth rate of 47.5%. The explosive growth in this phase is attributed to the successful bidding of the "24 Solar Terms" in 2016 and its inclusion in the United Nations' list of non-heritage in 2017, which pushed the research from cultural interpretation to applied practice. Research topics have expanded to include digital dissemination of non-heritage, climate-smart agriculture (e.g., combining solar terms with precision agriculture), and TCM solar terms for health and wellness<sup>[7-9]</sup>. At the policy level, the release of the Opinions on the Implementation of the Project for the Inheritance and Development of Chinese Outstanding Traditional Culture in 2017 further stimulated the enthusiasm for research in the academic community.

The third period is the high-speed growth stage from 2022 to 2024, with 954 articles, accounting for 74.1% of the total number of articles, and 276 articles in 2024, with an average annual growth rate of 32.1%. At the policy level, the "14th Five-Year Plan for Safeguarding Intangible Cultural Heritage" in 2021 and the "Overall Layout Plan for the Construction of Digital China" in 2023 provide top-level support for the study.

In terms of specific data, the average annual number of articles from 2010 to 2016 is 9.7 (standard deviation  $\pm 2.1$ ), which rises to 49.2 (standard deviation  $\pm 18.3$ ) from 2016 to 2020 and further jumps to 318 (standard deviation  $\pm 32.1$ ) from 2021 to 2024, and the number of articles reaches 228 in 2022, with a year-on-year increase of 46.2%, which symbolizes that the research has entered the "technology-culture" double-wheel drive stage. The research has entered the "technology-culture" double-wheel drive stage<sup>[13]</sup>. In the future, we need to focus on the in-depth integration of digital technologies (e.g., AI, block chain) and traditional culture, as well as on developing the "culture of culture".

The industrialized application of festival knowledge in rural revitalization and great health further releases its multi-dimensional value.

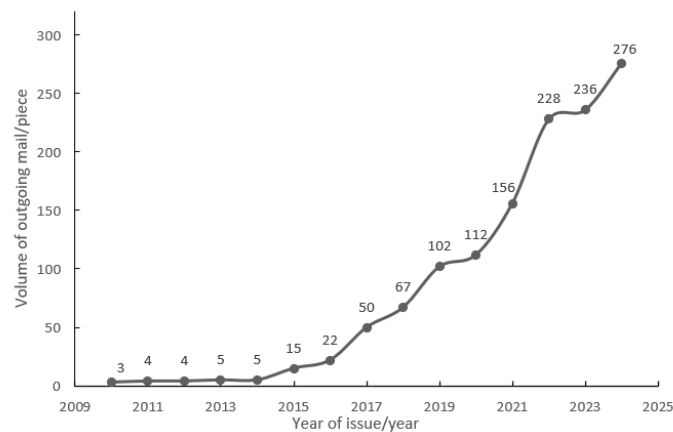


Figure 1 Number of Publications in the Field of "Twenty-Four Seasons" from 2009 to 2024

### 3.2 Analysis of Core Authors

The literature was imported into CiteSpace to obtain the top 10 authors in terms of citations (Table 1). Then, based on the retrieved literature on the twenty-four solar terms, the data on citations of journal articles were organized according to the CNKI database.

Table 1 The Top 10 Authors in Terms of Research Output on the Twenty-Four Solar Terms

| Order number | Author        | Number of documents issued | Order number | Author     | Number of documents issued |
|--------------|---------------|----------------------------|--------------|------------|----------------------------|
| 1            | Zhang Jianjun | 6                          | 6            | Hua Cao    | 4                          |
| 2            | Wei Fan       | 5                          | 7            | Xiao Mo    | 4                          |
| 3            | Zhou Hong     | 5                          | 8            | Liu Wuling | 3                          |
| 4            | Xie Yali      | 4                          | 9            | Xia Jin    | 3                          |
| 5            | Xu Yuting     | 4                          | 10           | Li Yuanbo  | 3                          |

As can be seen from Table 1, the most published article is by Prof. Zhang Jianjun, the most influential scholar in the field, whose 2020 article "Connotation, Value and Inheritance and Development of the Twenty-four Sets of Festivals" has been cited 92 times, and has been downloaded 5837 times. The latest article in 2024, "Twenty-four Sets of Seasons Empowering Rural Revitalization: the Reality Basis, Resource Endowment, and Practical Path," highlights the regional cultural characteristics of the festival resources; the correct handling of the relationship between the protection, utilization, and development of the festival resources suggests adhering to the farmers' main body status, and stimulating the intrinsic motivation of rural revitalization<sup>[10]</sup>.

### 3.3 Research Institution Distribution and Cooperative Characteristics

The organized documents were imported into CiteSpace 6.2.R4 software, the node type was set to "Institution", and the co-occurrence analysis was run to find out the top 10 issuing institutions in the research field of "twenty-four solar terms" (Table 2). The Chinese Agricultural Museum ranked first with 13 articles, followed by the Shandong Museum (10 articles) and Fujian Zhixiangfeng Kindergarten (6 articles). In terms of the types of institutions, the research subjects are diversified, covering museums (e.g., the Chinese Agricultural Museum), colleges and universities (e.g., the College of Fine Arts of Hunan Normal University), technical extension organizations (e.g., the Beijing Agricultural Technology Extension Station), and basic education units (e.g., the Maqun Kindergarten in Qixia District, Nanjing).

Institutional cooperation in the study of the 24 Solar Terms is characterized by "core leadership and local linkage", but interdisciplinary and cross-regional collaboration still needs to be strengthened. In the future, it is necessary to promote in-depth cooperation among museums, universities and grassroots units through policy guidance (e.g., setting up cross-regional research funds) and technical platforms (e.g., opening up data-sharing libraries), to promote the transformation of research from decentralized practice to systematic innovation.

Table 2 Top 10 Research Institutions for the Study of the Twenty-Four Solar Terms

| ranking | The affiliated institution                               | The year when the first document was issued | Number of documents issued |
|---------|----------------------------------------------------------|---------------------------------------------|----------------------------|
| 1       | China Agricultural Museum                                | 2015                                        | 13                         |
| 2       | Shandong Museum                                          | 2022                                        | 10                         |
| 3       | Fujian Zhi Xiangfeng Kindergarten                        | 2024                                        | 6                          |
| 4       | Maqun Kindergarten, Qixia District, Nanjing              | 2020                                        | 5                          |
| 5       | College of Fine Arts, Hunan Normal University            | 2019                                        | 5                          |
| 6       | Handan Writers Association, Hebei Province               | 2021                                        | 4                          |
| 7       | Nanjing University of Information Science and Technology | 2018                                        | 4                          |
| 8       | China Agricultural Museum 24 Solar Terms Research Center | 2020                                        | 4                          |
| 9       | Beijing Agricultural Technology Extension Station        | 2021                                        | 4                          |
| 10      | East China Normal University                             | 2018                                        | 4                          |

## 4. Analysis of Research Hotspots of the Twenty-Four Solar Terms

### 4.1 Keyword Co-occurrence Analysis

After analyzing the word frequency and co-occurrence relationship of the keywords, the top 15 keywords in terms of frequency of occurrence are listed in Table 3. The top 10 keywords in terms of frequency are "festival culture", "kindergarten", "festival", "cultural heritage", "labour education", "regional culture", "cultural and creative products", and "cultural and creative products"., "cultural heritage", "labour education", "regional culture", "cultural and creative products", "primary school language", and "culture". "Primary language", "Design", "Thematic activities". The weights in the table

indicate the importance of the nodes in the network, which can reflect the hot direction of the research field to a certain extent. Excluding name terms, "Culture of the solar terms" (0.36), "cultural inheritance" (0.07), "labour education" (0.06), "regional culture (0.04)" and "cultural and creative product (0.04)" are the five core hot areas in the research of the twenty-four solar terms.

Table 3 Co-occurrence Frequency Table for Keywords in the Research on the Twenty-Four Solar Terms

| Sequence number | Keyword                         | Co-occurrence frequency | Centrality | Sequence number | Keyword              | Co-occurrence frequency | Centrality |
|-----------------|---------------------------------|-------------------------|------------|-----------------|----------------------|-------------------------|------------|
| 1               | Culture of the solar terms      | 155                     | 0.36       | 9               | Design               | 13                      | 0.03       |
| 2               | Kindergarten                    | 55                      | 0.13       | 10              | Thematic activities  | 12                      | 0.03       |
| 3               | Solar Terms                     | 52                      | 0.12       | 11              | Rural revitalization | 9                       | 0.02       |
| 4               | Cultural heritage               | 29                      | 0.07       | 12              | Core competence      | 9                       | 0.02       |
| 5               | Labour education                | 27                      | 0.06       | 13              | Health preservation  | 8                       | 0.02       |
| 6               | Regional culture                | 16                      | 0.04       | 14              | Application          | 5                       | 0.01       |
| 7               | Cultural and creative product   | 15                      | 0.04       | 15              | English translation  | 4                       | 0.01       |
| 8               | Primary school Chinese language | 14                      | 0.03       | 16              | Development          | 4                       | 0.01       |

Keyword timeline mapping in CiteSpace is a kind of visualization mapping based on keyword co-occurrence analysis, which arranges the keywords on the horizontal axis in chronological order and demonstrates the co-occurrence relationship between the keywords and their evolution in time by connecting the lines and seasons. The keyword interval mapping (Figure 2) reveals the temporal lineage of the twenty-four solar terms research. Overall, the temporal lineage of twenty-four solar terms research has evolved from preliminary exploration in the early stage to enrichment and deepening in the middle stage and finally reached a research peak in the recent past. In this process, the research content gradually expanded from the single festival research to the combination of traditional culture, cultural heritage and other aspects, showing the continuous deepening and expansion of the research<sup>[11]</sup>.

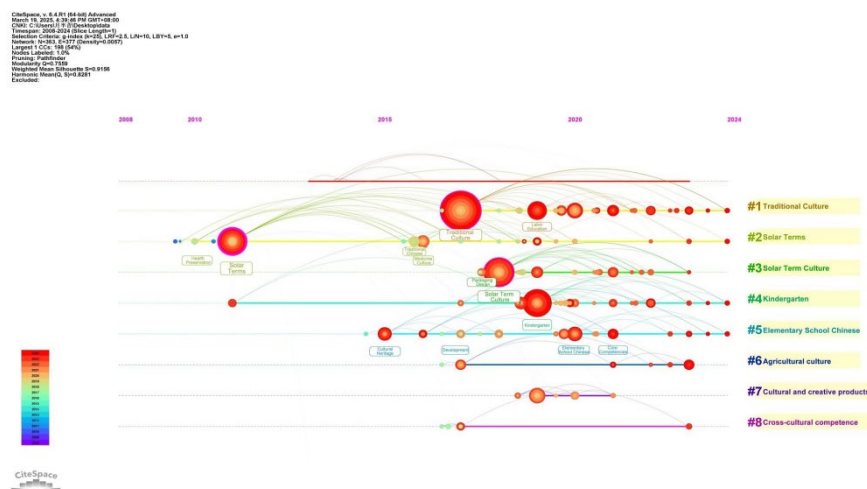


Figure 2 Timeline of "Twenty-Four Seasons"Keywords

#### 4.2 Keyword Co-clustering Analysis

In order to parse the knowledge structure of the twenty-four solar terms study, this study used the LLR (Log-Likelihood Rate) algorithm of CiteSpace 6.2.R4 to analyze the keywords by clustering, and to generate the keyword co-occurrence network atlas (Figure 3). The mapping modularity Q value = 0.7559 (>0.3) and the average profile value S = 0.9756 (>0.5) indicate a significant clustering structure and high internal consistency.

The keyword co-occurrence network contains 363 nodes (N=363) with 377 edges (E=377), and its

complex network topology (Density=0.0058) reveals semantic associations and evolutionary paths among knowledge units through the weighted connectivity strength (Edge Weight $\geq 3$ ) among nodes.

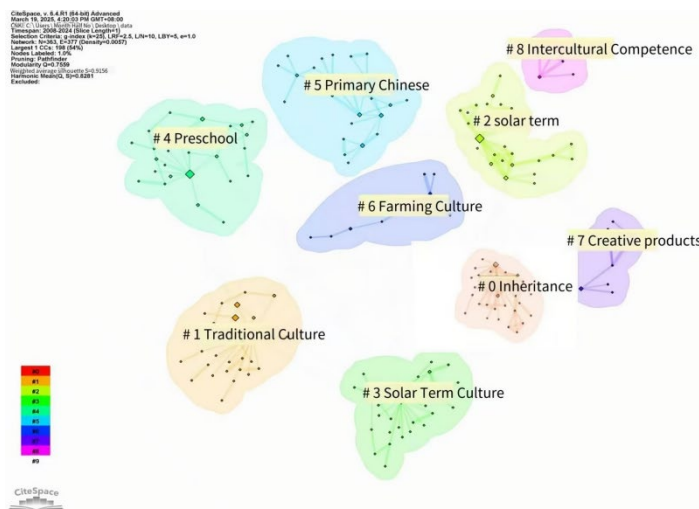


Figure 3 Clustering Map of "Twenty-Four Solar Terms"Keywords

From the cluster names in Table 4, the research keywords of "twenty-four Solar Terms" are mainly clustered into 8 clusters: #0 inheritance, #1 traditional culture, #2 solar terms, #3 solar culture, #4 kindergarten, #5 elementary school language, #6 farming culture, #7 cultural and creative products, and #8 cross-cultural competence. Four major research themes are involved: (1) Inheritance and Innovation Theme: Cluster Label: #0 Inheritance, #1 Traditional Culture. The main content consists of the inheritance of folk culture, the innovation of festival health, and the dissemination and education of traditional culture (including early childhood education and labour education). This theme emphasizes the importance of the twenty-four solar terms in cultural inheritance and innovation. (2) Theme of Festival Cultures and Applications: Cluster Tags: #2 Festival Currents, #3 Festival Cultures. The main content covers the relationship between Chinese medicine and festive seasons, cultural genes, dynamic pattern design, rural revitalization application of festive season culture, agricultural brand image, dynamic inheritance and dissemination characteristics. This theme focuses on the diversified applications of festival culture and its value in modern society. (3) Education and Communication Theme: Cluster Tags: #4 Kindergarten, #5 Primary School Language, #6 Farming Culture. The main contents include theme activities in kindergarten, food education curriculum, cultural inheritance in elementary school language, school-based curriculum, theme art, and curricular ideology and politics of farming culture. This theme highlights the application and dissemination of the twenty-four Solar Terms in education, especially the cultural inheritance in the basic education stage. (4) Cultural Creation and Intercultural Theme: Cluster Tags: #7 Cultural Creation Products, #8 Intercultural Competence. Main content: It involves the development of cultural and creative products (e.g. special products for the festive seasons such as Lidong and Winter Solstice), the construction of special towns, and the cultivation of international talents and intercultural competence. This theme demonstrates the potential of the twenty-four solar terms in the cultural and creative industries and international cultural exchanges.

Table 4 Table of Keyword Co-occurrence Clusters for "Research on the Twenty-Four Solar Terms"

| Cluster compiler | Cluster Tags.       | Cluster size | Cluster contour | Main clusters (top 6)                                                                                                                                                                 |
|------------------|---------------------|--------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #0               | Inherit             | 34           | 0.940           | Folk culture, inheritance, health preservation in accordance with the solar terms, innovation, traditional culture, integration of culture and tourism tourism                        |
| #1               | Traditional culture | 30           | 0.929           | Early childhood education, labour education, traditional culture, cultural dissemination, early childhood education, labour education                                                 |
| #2               | The solar terms     | 30           | 0.999           | Traditional Chinese medicine, cultural genes, dynamic pattern design, analytic hierarchy process, functional solar terms, intangible cultural heritage protection heritage protection |

|    |                                 |    |       |                                                                                                                                        |
|----|---------------------------------|----|-------|----------------------------------------------------------------------------------------------------------------------------------------|
| #3 | Culture of the solar terms      | 29 | 0.851 | Rural revitalisation, culture of the solar terms, agriculture, brand image, dynamic inheritance, communication characteristics         |
| #4 | Kindergarten                    | 27 | 0.840 | Toddlers, themed activities, food education courses, open courses, cultural activities, communication model                            |
| #5 | Primary school Chinese language | 24 | 0.871 | Primary school Chinese language, core literacy, cultural inheritance, school-based curriculum, thematic art, appreciation and analysis |
| #6 | Farming culture                 | 8  | 0.948 | Farming culture, farming, course ideology, course ballads, Jiangnan, instructional design                                              |
| #7 | Cultural and creative product   | 8  | 0.956 | Cultural and creative products, Beginning of Winter, Winter Solstice, Characteristic towns, Three Dog Days, Tonic soups                |
| #8 | Intercultural competence        | 5  | 0.997 | International talent, intercultural competence, construction, cultivation, twenty-four solar terms, training international talent      |

#### 4.3 Analysis of Keyword "Twenty-Four Seasons" Emergence





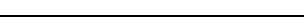
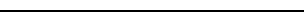

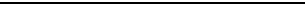
According to the data of "twenty-four solar terms" research emergence words in China Knowledge Network (CNKI) from 2009 to 2024 (Table. 5), the research hot spots can be categorized into the following three stages:











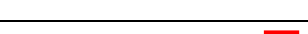
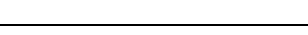
The first stage (2010-2016): Traditional health care and Chinese medicine culture. Keywords such as "health maintenance", "inheritance", and "Chinese medicine" emerged during this period, indicating that the research mainly focused on the application and value of the twenty-four solar terms in traditional health maintenance and Chinese medicine culture<sup>[12]</sup>.

The second stage (2017-2021): Cultural design and education. Keywords such as "design", "festival culture", "cultural and creative products", and "culture" emerge during this period, indicating a shift in research towards the application and promotion of the twenty-four solar terms in modern design, cultural and creative products, and cultural education. This suggests that the research shifted to applying and promoting the twenty-four solar terms in modern design, cultural and creative products, and cultural education<sup>[13]</sup>.

The third stage (2022-2024): labour education and social practice. Keywords such as "labour education", "curriculum development", and "food education curriculum" appear during this period, indicating that the research hot spot further expands to the application of the twenty-four solar terms in labour education, curriculum development and food education curriculum, emphasizing the cultivation of social practice and comprehensive literacy. And food education courses, emphasizing social practice and the cultivation of comprehensive literacy<sup>[14]</sup>.

Table 5 Frequency Chart of the Most Frequently Cited Keywords in the Research on the Twenty-Four Solar Terms

| Keywords                      | Year | Strength | Begin | End  | 2008-2024                                                                             |
|-------------------------------|------|----------|-------|------|---------------------------------------------------------------------------------------|
| Health preservation           | 2010 | 2.2      | 2010  | 2019 |  |
| Inherit                       | 2014 | 2.59     | 2014  | 2017 |  |
| Traditional Chinese medicine  | 2016 | 3.56     | 2016  | 2019 |  |
| Design                        | 2018 | 2.16     | 2018  | 2021 |  |
| culture of Solar Terms        | 2018 | 1.87     | 2018  | 2018 |  |
| Cultural and creative product | 2019 | 2.72     | 2019  | 2021 |  |
| Culture                       | 2016 | 1.95     | 2019  | 2022 |  |
| Solar Terms                   | 2011 | 1.88     | 2019  | 2019 |  |
| Agriculture                   | 2109 | 1.87     | 2019  | 2019 |  |

|                           |      |      |      |      |                                                                                     |
|---------------------------|------|------|------|------|-------------------------------------------------------------------------------------|
| Early childhood education | 2020 | 4.19 | 2020 | 2021 |  |
| Course                    | 2020 | 1.9  | 2020 | 2020 |  |
| Lunisolar calenda         | 2020 | 1.75 | 2020 | 2021 |  |
| Illustration design       | 2021 | 1.86 | 2021 | 2024 |  |
| Packaging design          | 2018 | 1.83 | 2021 | 2022 |  |
| Labor education           | 2019 | 3.75 | 2022 | 2024 |  |
| Converged media           | 2022 | 2.21 | 2220 | 2022 |  |
| Curriculum development    | 2022 | 1.93 | 2022 | 2022 |  |
| Food education course     | 2022 | 1.93 | 2022 | 2022 |  |
| Cultural confidence       | 2023 | 2.52 | 2023 | 2024 |  |
| Action research           | 2011 | 1.84 | 2023 | 2024 |  |
| Cultural transmission     | 2021 | 1.82 | 2023 | 2024 |  |

## 5. Conclusion and Outlook

Based on the bibliometric method, this paper conducted an in-depth visual knowledge mapping and research trend analysis of 1,287 documents in twenty-four solar terms research using CiteSpace software and came up with a series of valuable conclusions. First, since 1999, the number of publications in the research field related to the twenty-four solar terms has been increasing yearly, especially climbing rapidly after 2017. This trend reflects society's increasing attention to the festival culture, especially after its inscription on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity, which has stimulated extensive attention and in-depth research on the festival culture by academics and the public<sup>[15]</sup>. This growth is reflected not only in the increase in the number but also in the breadth and diversity of research content, covering climatology, agronomy, sociology, medicine, and other dimensions. The research vein shows the evolution path of "origin verification → interdisciplinary expansion → innovative application", and in recent years, it has been extended to the fields of health and wellness, eco-tourism, etc. This shows that the twenty-four solar terms are a major part of the Chinese calendar. This shows that the twenty-four Solar Terms, as an interdisciplinary research field, have broad research prospects and far-reaching social significance<sup>[16]</sup>. However, in terms of the sources of research results, although museums, universities, technology promotion organizations and basic education units have all made important contributions, there is still a need to promote in-depth cooperation among these organizations through policy guidance and technology platforms in the future. Measures such as establishing a cross-regional research fund and the opening of a data-sharing repository will help to break down barriers between geographies and institutions and promote the sharing and integration of research resources, thus realizing the transition from decentralized practice to systematic innovation<sup>[17]</sup>. In terms of the current state of research on the twenty-four solar terms, this paper summarizes four major thematic categories: inheritance and innovation, festival culture and application, education and dissemination, and cultural creation and interculturalism. These four themes not only reflect the history and current situation of the study of the 24 solar terms but also reveal the process of its inheritance and innovation. It is worth noting that these topics are not isolated from each other but are intertwined and influence each other. For example, inheritance and innovation are the internal driving forces for the development of solar term culture, and the diversified application of solar term culture is an important way for its inheritance and innovation in modern society. Meanwhile, education and dissemination are the basis for the inheritance of the festival culture, while cultural creation and cross-culture are the important bridges for the festival culture to go international and influence the world<sup>[18]</sup>. To summarize, the research on the twenty-four solar terms has gone through the process from preliminary exploration to enrichment and deepening and then to the peak period of research. During this process, the research content has been continuously expanded and deepened, showing the academia's continuous concern and deep excavation of the festival culture. However, we should also see that as research deepens and expands, new challenges and problems continue to emerge. For example, how to maintain the originality and vitality of the festival culture in the process of modernization? How to better integrate the festival culture into the modern education system? How to show the unique charm of the festival culture in international cultural exchanges?



These are the problems that need to be paid attention to and solved in future research. Looking ahead, the study of the twenty-four solar terms can be explored in depth in the following aspects: (1) Interdisciplinary research: to further strengthen the cross-fertilization between climatology, agronomy, sociology, medicine and other disciplines to form a more systematic and comprehensive research system on the solar terms culture. (2) Practical application research: to deeply explore the application value of the festival culture in modern society, such as combining the festival with health and wellness, the festival with agricultural production, and the festival with urban planning. (3) Research on educational inheritance: Strengthen research on the educational inheritance of the festival culture in the basic education stage and explore more effective and interesting educational methods and modes. (4) Research on international exchanges: Strengthen cultural exchanges and cooperation with the international community, promote the festival culture to the world stage, and show the unique charm of Chinese culture<sup>[19]</sup>. To this end, the government and related organizations should increase policy support and financial investment in research on the twenty-four solar terms and provide researchers with better research environments and conditions. In addition, cooperation and exchanges among museums, colleges and universities, technology promotion organizations and basic education units should be encouraged, to form a favorable atmosphere for collaborative innovation. It is also necessary to strengthen exchanges and cooperation with the international academic community, and to promote the international dissemination and exchange of the festival culture through the organization of international academic conferences, seminars and other activities<sup>[20]</sup>.

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