Comparative Study of International Institutions of SCI Papers Based on Edible Vegetable Oil in the Era of Big Data (2011–2021)

Min Chen[1] and Jingcheng Zheng[2(✉)]

[1] Library, Wuhan Polytechnic University, Wuhan, China
[2] School of Food Science and Engineering, Wuhan Polytechnic University, Wuhan, China
`jingchengzheng@163.com`

Abstract. With the advent of the era of big data and the continuous improvement of the level of information technology, data mining and analysis has gradually become a new trend in the research and development of scientific and technological information, which is of constructive significance in the service and development of various industries. In the era of big data, scientific and technological information is gradually developing in the direction of diversification, dynamics, intelligence and competition. Starting from the innovation of scientific and technological information in the era of big data, data mining is carried out through WoS and ESI tools, the data is cleaned and filtered according to the discipline indicators of the Ministry of education and ESI discipline indicators, and the discipline situation of five international institutions in the field of edible vegetable oil is analyzed and presented in a visual form. Based on the innovative working methods of scientific and technological information based on data mining and analysis, understand the position of China's edible vegetable oil field in international institutions, and put forward suggestions for the development of edible vegetable oil related disciplines in the future through data processing.

Keywords: Vegetable Oil · Edible Oil · SCI Papers · International Institutions · Comparative Analysis

1 Introduction

With the rapid development of computer technology, science and technology information service relying on information processing and analysis is gradually becoming intelligent and systematic [6]. Scientific research pays attention to quantitative analysis and requires factual data. Therefore, based on data mining, cloud computing, semantic relationship network, artificial intelligence, neural network and other technologies, scientific demonstration and effective tools are used to conduct in-depth analysis and processing of data [3], which provides more standardized and efficient acquisition and analysis for information science.

WoS is a tool used internationally to objectively evaluate scientific journals and papers by using scientific metrology methods. SCI database [2][5] cover a wide range

of disciplines, including physics, chemistry, agriculture, industry, forestry, medicine and biology, which are suitable for the evaluation of macro objects such as countries, institutions and journals. The data collection time is November 28, 2021. The data source is selected from the subject classification system [1], which is limited to China scadc subject 97 narrows, and the research direction is limited to 0832: Food Science and engineering About 172000 pieces of data are retrospectively screened based on the papers with the title of edible oil. If multiple oil varieties are involved in the subject, there will be repeated statistics of the papers. For example, if the title includes only vegetable oil or food oil, and there is no specific oil name, which will not be included in the statistics. Through the statistical analysis of SCI papers on edible vegetable oil in China, the United Kingdom, the United States, the European Union and Japan, and comparing the relevant academic and scientific research level and development of various institutions in the field of vegetable oil over the years, we can help to understand the progress and main research direction of major institutions in the field of vegetable oil all over the world.

2 Number of the SCI Papers

Edible oil, also known as liquid non-dairy creamers, liquid creamers, etc. Edible oils are divided into two categories: animal fats and vegetable oils. The main research object of this paper is vegetable oils. Vegetable oils include soybean oil, rapeseed oil, peanut oil, cottonseed oil, sesame oil, sunflower oil, linseed (flaxseed) oil, walnut oil, corn oil, rice bran oil, etc. In recent years, China has also introduced and developed woody plants with very rich oil content, such as oil palm, Olea European L., oil-tea camellia and large-fruited hodgsonia, with oil content of 40%-81.9%, which is one of the new ways to expand oil source.

The commonly used edible vegetable oil is selected as the comparative data: soybean oil, rapeseed oil, peanut oil, palm oil, olive oil, as well as the small varieties of edible vegetable oil: walnut oil, tea oil, sesame oil, sunflower oil, corn oil, linseed (flaxseed) oil, grape seed oil, wheat germ oil, etc. Compared with the common edible vegetable oil, the market scale of the small varieties of edible vegetable oil is small, and the oil is greatly affected by regional development factors, and the price is relatively high. For example, China's sunflower seeds are generally produced in the northwest, the local sunflower oil is well developed, and corn is mainly produced in Shandong, driving the local corn oil refining industry.

2.1 Total Number and Year of Publication of SCI Related to Edible Vegetable Oil

From 2011 to 2021, the number of SCI papers on edible vegetable oils from five institutions in China, the United States, Italy, Spain and France was counted. There are many countries in the EU, among which Spain and Italy are at the forefront of the 27 countries in the EU in terms of edible oil research. We choose to compare them, as shown in Fig. 1.

According to the statistics on the issuance of SCI papers related to edible vegetable oil in 2011–2021, China surpassed the United States in 2012, and the number of relevant papers increased sharply from 2018 to 2019. See Fig. 2.
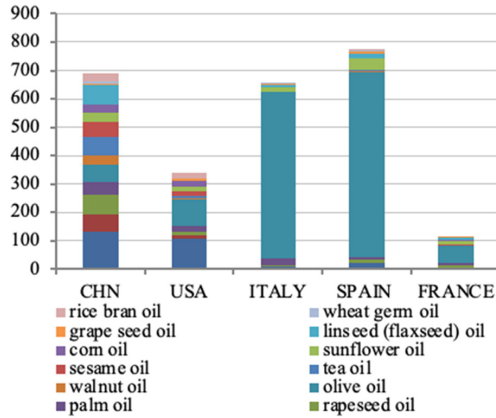
Fig. 1. Total number of SCI papers related to edible vegetable oil from 2011 to 2021.
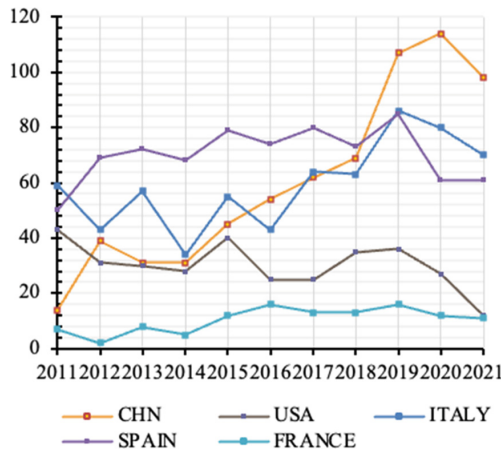

Fig. 2. Number of papers in edible vegetable oil field from 2011 to 2021.

2.2 Number of SCI Papers Related to Common Edible Vegetable Oil

The number of SCI documents issued by five institutions for commonly used edible vegetable oil from 2011 to 2021 is shown in Fig. 3.

As can be seen from Fig. 3, among the five commonly used edible vegetable oil, China has relatively more documents on rapeseed oil, soybean oil, peanut oil and palm oil, followed by the United States. The world's olive oil producing countries are concentrated in the Mediterranean coastal countries, mainly Spain, Italy, Greece, Tunisia, Turkey, Syria and Morocco. These seven countries account for 90% of the world's total olive oil production. In terms of olive oil, Spain and Italy have a large number of papers on olive oil research.
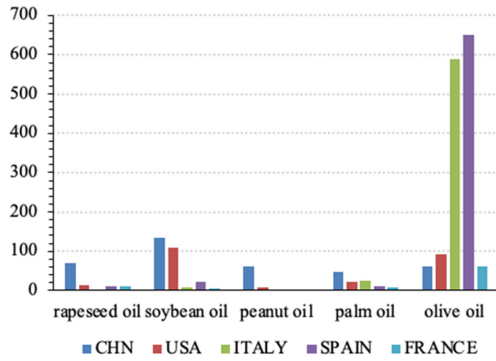
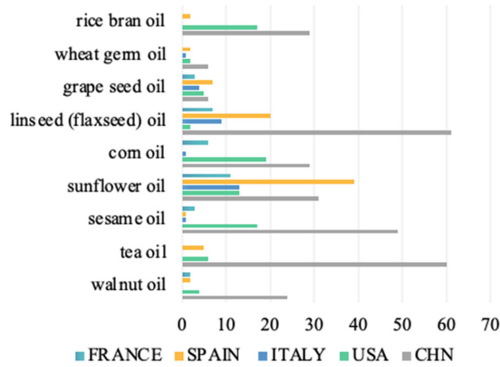**Fig. 3.** The number of SCI papers in the field of the commonly used edible vegetable oils from 2011 to 2021.

Fig. 4. number of papers on the small varieties of edible vegetable oil from 2011 to 2021.

2.3 Number of SCI Papers Related to the Small Varieties of Edible Vegetable Oil

The number of articles published by five institutions on the small varieties of edible vegetable oil from 2011 to 2021 is shown in Fig. 4.

As shown in Fig. 4, among the small varieties of edible vegetable oil, China has also published the most SCI related papers in terms of linseed (flaxseed) oil, tea oil, sesame oil, rice bran oil, corn oil, walnut oil, wheat germ oil, etc. Spain has the most papers on sunflower oil research.

3 Influence of the SCI Papers

As the journals included in SCI will change every year, we conduct statistical analysis on the relevant data of influencing factors and citation frequency based on the data collection time of 2021.

Table 1. Impact factor interval table of SCI journals related to the edible vegetable oil.

Inst.	Interval						
	<1	1.x	2.x	3.x	4.x	5.x	>6
CHN	13	100	153	100	87	79	97
USA	3	93	48	31	30	65	42
Italy	58	46	124	65	89	86	168
Spain	13	82	134	67	93	164	205
France	1	4	27	8	19	20	26

3.1 Impact Factor of SCI Journals Related to Edible Vegetable Oil Published by Institutions

Impact factor (IF) is a data in the Journal Citation Report JCR produced by Thomson Reuters, that is, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years. The higher the influence factor is, the more attention and citations the representative paper receives from the scientific community. Table 1 shows that Most of the papers published in China focus on the impact factor of 2.X interval, there are relatively few papers on 5.X. The United States papers most in 1.X interval. Italy, France and Spain are all concentrated in 4.X range above. Publications without impact factors have no data (n/a) and are not included in statistics.

3.2 Citation Frequency of SCI Papers Related to Edible Vegetable Oil

Among the five institutions, SCI papers were cited most frequently in Spain, followed by Italy and China; The data of Spain in citation frequency per article in the commonly used edible vegetable oil among the five institutions is the highest, followed by France and the United States. The highest data in citation frequency of SCI papers on edible vegetable oil among the five institutions is China, followed by the United States and Spain.

China has the highest citation frequency among the small varieties of edible vegetable oil, indicating that China has more advantages in the research of the small varieties of edible vegetable oil; However, the citation frequency per article is relatively low, indicating that the quality of the paper needs to improve (Table 2).

3.3 CNCI (Category Normalized Citation Impact) of SCI Papers in the Field of Edible Vegetable Oil

Category Normalized Citation Impact (CNCI) refers to the average ratio of the number of citations for papers of the same type in the InCites database in the past 5 years to the average number of citations for papers of the same publication year, the same discipline, and the same document type. If the CNCI is equal to 1, it indicates that the citation

Table 2. Cited frequency of SCI papers related to the edible vegetable oil.

Inst.	Citation Frequency of the Commonly Used Vegetable Oil	Citation Frequency per Article of the Commonly Used Vegetable Oil	Citation Frequency of the Small Varieties of Edible Vegetable Oil	Citation Frequency per Article of the Small Varieties of Edible Vegetable Oil
CHN	4413	11.959	3093	10.485
USA	3583	14.506	1513	17.800
Italy	8949	14.318	369	12.724
Spain	12466	17.963	1330	17.051
France	1333	16.060	417	13.900

Table 3. Comparison of CNCI in SCI papers related to the edible vegetable oil.

CNCI	Inst.				
	CHN	USA	Italy	Spain	France
>1 No.	270	114	290	355	41
Percentage (%)	40.51	35.08	45.03	46.41	39.05

performance of the group of papers is comparable to the global average; if the CNCI is less than 1, the citation performance of the papers is lower than the global average; if the CNCI is greater than 1, the citation performance of the papers is higher than the global average.

As shown in Table 3, Spain, Italy, and China have more papers with CNCI greater than 1; the United States and France have relatively few papers, and their percentages are also lower.

4   Source Journals and Subject Classification

The top ten journals in which the institution publishes SCI papers related to edible vegetable oil are concentrated in FOOD CHEMISTRY (Q1 semi-monthly published in the UK), China, Italy, France and Spain have the largest number of publications in this journal. JOURNAL OF THE AMERICAN OIL CHEMISTS SOCIETY (Q3 monthly published in Germany), the United States publishes more papers in this journal. Italy, France, and Spain publish more papers in EUROPEAN JOURNAL OF LIPID SCIENCE AND TECHNOLOGY (Q3 monthly published in Germany). JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY (Q1 Weekly published in US), Spain and France have published more papers in this journal.

FOOD CHEMISTRY, JOURNAL OF THE AMERICAN OIL CHEMISTS SOCI-
ETY, JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, EUROPEAN
JOURNAL OF LIPID SCIENCE AND TECHNOLOGY, the above 4 publications are
all in the top ten lists of the 5 institutions (Table 4).

Table 4. Ranking list of SCI journals related to the edible vegetable oil published by the
institutions.

No.	CHN	USA	Italy	Spain	France
1	Food Chemistry	Journal of the American Oil Chemists Society	Food Chemistry	Food Chemistry	Food Chemistry
2	LWT-Food Science and Technology	Journal of Agriculture and Food Chemistry	European Journal of Lipid Science and Technology	European Journal of Lipid Science and Technology	European Journal of Lipid Science and Technology
3	European Journal of Lipid Science and Technology	Food Chemistry	Foods	Journal of Agricultural and Food Chemistry	Journal of Agricultural and Food Chemistry
4	Journal of the American Oil Chemists Society	European Journal of Lipid Science and Technology	Rivista Italiana Delle Sostanze Grasse	Food Research International	Journal of Dairy Science
5	Journal of Agricultural and food Chemistry	Journal of Food Science	Food Research International	Grasas y Aceites	European Food Research and Technology
6	Journal of Food Science	Food Research International	Journal of Agricultural and food Chemistry	Journal of the Science of Food and Agriculture	Food Control
7	Journal of OLEO Science	Journal of Food Engineering	Journal of the Science of Food and Agriculture	LWT-Food Science and Technology	Journal of Food Engineering
8	Food Hydrocolloids	Molecular Nutrition & Food Research	Antioxidants	Foods	Foods
9	International Journal of Food Science and Technology	Journal of Dairy Science	LWT-Food Science and Technology	Journal of the American Oil Chemists Society	Food Analytical Methods
10	Food Analytical Methods	Journal of Medicinal Food	Food Control	Food Control	Food Research International

5   Conclusions

On the basis of diversity, openness and intelligence in the information age, through the mining and cleaning of data [4] and the presentation of various forms of visualization [7], continuously strengthen the scientization, systematization and standardization of data analysis [8]. The following conclusions can be drawn from the number of papers published by the five institutions from 2011 to 2021, the year of publication, the citation frequency of papers, the source journals, and the influence of CNCI:

China has obvious advantages in comparing the number of SCI papers published by the five international institutions' scholars. After 2019, the number of SCI papers of China ranks first in the five institutions and has been leading until now, indicating that China has enough scientific researchers to conduct research in the field of edible vegetable oil. Since 2014, the number of papers in China has steadily increased. Only by maintaining and continuing to increase investment can it be possible to maintain such a level.

China has a large number of papers in the commonly used vegetable oils: soybean oil, peanut oil and rapeseed oil, and also has a large number of papers in the small varieties of edible vegetable oil: sesame oil, tea oil, linseed (flaxseed) oil, walnut oil, rice bran oil, and wheat germ oil. Do more research with relevant advantages and increase investment to form characteristics.

From the perspective of the influence of papers, the quality of journals published by Chinese scholars is good, and CNCI is better than the United States. The citation frequency of the paper needs to be improved. The citation frequency of the commonly used edible vegetable oil is higher than that of the small varieties of edible vegetable oil.

Edible vegetable oil involves a wide range of professional fields, and there are many interdisciplinary journals. The papers published by these institutions are concentrated in FOOD CHEMISTRY, JOURNAL OF THE AMERICAN OIL CHEMISTS SOCIETY, JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, EUROPEAN JOURNAL OF LIPID SCIENCE AND TECHNOLOGY. These journals are more welcomed by experts in the field of edible vegetable oil in these institutions.

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