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## Optimization Strategies for Topic Planning of Chinese Scientific Journals Based on VOSviewer Visualization Analysis: A Case Study of Tropical Agricultural Research (Postprint)

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### Abstract

**Objective:** To further optimize topic selection and planning for Chinese scientific journals and enhance their quality and influence.

**Methods:** This study employs VOSviewer visualization analysis software, using the Web of Science Core Collection as the data source and China's core tropical agriculture journal *Journal of Tropical Crops* as a case study to analyze overseas hot research fields, major publishing institutions, and key journals in tropical agriculture, comparing these with the research areas covered by the *Journal of Tropical Crops*.

**Results:** The paper proposes recommendations for utilizing VOSviewer visualization analysis to guide scientific journal topic planning, screen high-quality expert resources, and identify quality authors.

**Conclusion:** Visualization analysis technology provides a new approach for topic selection and planning in Chinese scientific journals. Journal editors should enhance their topic planning capabilities, leverage visualization analysis technology to improve the quality of topic planning, and thereby elevate the quality and influence of Chinese scientific journals.

## Full Text

# Optimization Strategies for Topic Selection Planning in Chinese Scientific Journals from the Perspective of VOSviewer Visual Analysis: A Case Study in Tropical Agriculture Research

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### Abstract:

**[Objective]** To further optimize topic selection planning in Chinese scientific journals and improve their quality and influence. **[Method]** This study employs VOSviewer visualization software, using the Web of Science Core Collection as the data source and the Chinese tropical agriculture core journal *Journal of Tropical Crops* as the analytical sample to examine popular research fields, major publishing institutions, and leading journals in foreign tropical agriculture research, comparing these with the research domains of *Journal of Tropical Crops*. **[Results]** The paper proposes recommendations for using VOSviewer visual analysis to guide topic selection planning, screen high-quality expert resources, and obtain information on quality authors. **[Conclusion]** Visualization technology offers a new approach for topic selection planning in Chinese scientific journals. Journal editors should enhance their topic planning capabilities and utilize visual analysis techniques to improve the quality of topic selection, thereby elevating the overall quality and influence of Chinese scientific journals.

**Keywords:** VOSviewer visual analysis; scientific journals; topic selection planning; optimization strategies

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## Introduction

In 2019, the China Association for Science and Technology, the Publicity Department of the CPC Central Committee, the Ministry of Education, and the Ministry of Science and Technology jointly issued the *Opinions on Deepening Reform and Cultivating World-Class Scientific Journals*, which stated that “scientific journals should benchmark themselves against world-class standards, highlight key priorities, strengthen advantageous disciplines around major national needs and strategic fields of scientific development, and seize strategic opportunities in emerging interdisciplinary development and digital transformation.” As an important carrier of China’s excellent scientific culture, scientific

journals bear the significant mission of cultural dissemination, exchange, and “going global.” Topic selection planning, as a crucial component of editorial work, plays a vital role in enhancing journal quality and academic influence while serving as a key indicator for measuring editorial competence and effectiveness.

For a long time, Chinese scholars have conducted fruitful discussions on scientific journal topic selection planning, yielding abundant research outcomes. With the rapid development of global science and technology, screening effective information suitable for publication from complex scientific data and quickly grasping cutting-edge research hotspots have become top priorities. Currently, Citespace and VOSviewer are the primary visualization tools used in bibliometrics to analyze discipline development trajectories and research hotspots. Zhao Xia et al. applied Citespace software to the practical work of journal topic selection planning, concluding that this approach is meaningful [1]. Wang Yan et al., using horticulture as an example, employed the new Citation Topics function in the InCites database to conduct detailed analyses of research themes, personnel, institutions, and countries, helping editors efficiently identify research hotspots and develop topic plans [2]. Fan Shujie et al., using medical journals as examples, constructed a topic planning model combining expert selection with bibliometric analysis, using Citespace analysis and qualitative research as auxiliary methods [3]. Zhao Heling et al., using the zoology journal *Asian Herpetological Research* as a case study, utilized VOSviewer to analyze major research directions in the field and grasp development trends to ensure topic selection aligned with research trajectories [4]. Xia Ling used VOSviewer to visualize research hotspots in highly cited and downloaded papers from *Chinese Journal of Blood Transfusion* from 2015–2020, comparing them with foreign medical journals and concluding that VOSviewer visualization could provide references for optimizing manuscript direction and identifying potential hotspots [5].

Overall, while many studies have used Citespace for analyzing disciplinary directions and journal topic planning, research using VOSviewer for this purpose remains limited, particularly regarding agricultural journals. VOSviewer is a bibliometric software for constructing and visualizing bibliometric maps, developed by Nees Jan van Eck and Ludo Waltman from Leiden University in the Netherlands, based on co-citation and co-cited reference principles [6]. Compared with Citespace, VOSviewer offers a more user-friendly interface with simpler operation and fewer steps. Therefore, this study employs VOSviewer visualization software, using the Web of Science Core Collection as the data source and *Journal of Tropical Crops* as the analytical sample to analyze popular research fields, major publishing institutions, and leading journals in foreign tropical agriculture research, comparing these with the research domains of *Journal of Tropical Crops*. The aim is to provide methodological guidance for Chinese agricultural journals to capture research hotspots, plan column settings, formulate scientific topic selection strategies, and cultivate core author groups.

## 1. Data and Methods

**1.1 Data Sources** This study used the Web of Science Core Collection as the primary data source. First, we selected “Topic Search” on the retrieval page and entered the search term “tropical agriculture,” with the time span set to “the past five years.” Second, on the results page, we refined the search by selecting only “article” under document types. As of December 16, 2021, this yielded 1,777 documents. Due to VOSviewer’s import limitations, we sorted these by citation frequency and selected the top 500 most-cited documents as our data source for analyzing the current state of international tropical agriculture research. Third, we used CNKI (China National Knowledge Infrastructure) as the data source to statistically analyze the research fields and published papers of *Journal of Tropical Crops*.

**1.2 Analysis Methods** Using VOSviewer version 1.6.17, we analyzed the retrieved Web of Science documents to generate keyword co-occurrence maps, country co-occurrence maps, author institution co-occurrence maps, and journal co-occurrence maps for international tropical agriculture research. We also utilized Web of Science’s built-in analysis function to obtain an overview of key research fields in international tropical agriculture. The research fields and publication data for *Journal of Tropical Crops* were obtained through CNKI’s statistical and evaluation functions.

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## 2. Results and Analysis

**2.1 Keyword Co-occurrence Analysis of International Tropical Agriculture Research** Based on the 500 Web of Science documents, we conducted a keyword co-occurrence analysis of international tropical agriculture research [Figure 1: see original paper]. The keyword co-occurrence map revealed four major clusters: the first cluster (green module, cluster 1) included keywords such as “agriculture,” “climate-change,” “responses,” and “vegetation” ; the second cluster (blue module, cluster 2) included “biodiversity,” “conservation,” “species-richness,” and “oil palm” ; the third cluster (yellow module, cluster 3) included “deforestation,” “land-use,” “tropical forest,” and “amazon” ; and the fourth cluster (red module, cluster 4) included “land use change,” “carbon sequestration,” “greenhouse gas emissions,” and “conservation agriculture.” Analysis of these popular keywords indicates that international tropical agriculture research typically focuses on major ecological issues of human-environment-society interactions, demonstrating clear practical guidance significance.

**2.2 Country Co-occurrence Analysis of International Tropical Agriculture Research** Based on the 500 Web of Science documents, we conducted a country co-occurrence analysis [Figure 2: see original paper]. The country co-occurrence map revealed three major clusters: the first cluster (red module, cluster 1) included America, Brazil, France, Switzerland, and Mexico; the second

cluster (green module, cluster 2) included England, Australia, India, Indonesia, and The People' s Republic of China; and the third cluster (blue module, cluster 3) included Germany, Netherlands, Canada, and Colombia. Analyzing major research countries can provide Chinese tropical agriculture journals with correct manuscript solicitation directions and enable rapid understanding of international research trends.

**2.3 Author Institution Co-occurrence Analysis of International Tropical Agriculture Research** Based on the 500 Web of Science documents, we conducted an author institution co-occurrence analysis [Figure 3: see original paper]. The author institution co-occurrence map revealed three major clusters: the first cluster (green module, cluster 1) included University of Sao Paulo, University of Florida, and Wageningen University; the second cluster (red module, cluster 2) included Chinese Academy of Sciences, Humboldt University (Berlin), and Ctr Trop Agr CIAT, Colombia (International Center for Tropical Agriculture, Colombia); and the third cluster (blue module, cluster 3) included University of Cambridge and University Nacional Autonoma de Mexico (National Autonomous University of Mexico). Analyzing major author institutions can help Chinese tropical agriculture journals cultivate author groups and identify potential international editorial board members.

**2.4 Journal Co-occurrence Analysis of International Tropical Agriculture Research** Based on the 500 Web of Science documents, we conducted a journal co-occurrence analysis [Figure 4: see original paper]. The journal co-occurrence map revealed five major clusters: the first cluster (purple module, cluster 1) included *Sciences of the Total Environment* and *Environmental Research Letters*; the second cluster (blue module, cluster 2) included *Agriculture, Ecosystems & Environment* and *Soil & Tillage Research*; the third cluster (red module, cluster 3) included *Biological Conservation*, *Journal of Applied Ecology*, and *PLOS ONE*; the fourth cluster (green module, cluster 4) included *Global Change Biology* and *Scientific Reports*. Information from international tropical agriculture journals can provide Chinese tropical agriculture journals with international references for tracking hot topics and setting up columns.

**2.5 Comparative Analysis of Key Research Fields in Domestic and International Tropical Agriculture** Based on the 1,777 Web of Science documents, we used Web of Science' s analysis function to identify the top 10 key research fields in international tropical agriculture (past five years) . Using CNKI' s statistical functions, we obtained the key research fields of *Journal of Tropical Crops* . The comparison shows that Chinese tropical agriculture journals differ from international ones in their publication fields. International tropical agriculture research emphasizes interdisciplinary studies, and international scientific journals show greater concern for human survival and environmental protection issues, demonstrating clear practical guidance and humanistic values. In contrast, Chinese tropical agriculture journals lack planning for international

hot topics, with insufficient efforts in hot and frontier topic selection.

**Table 1: Top 10 Key Research Fields in International Tropical Agriculture (Past Five Years)**

Research Field	Records	Percentage
Environmental Sciences	552	31.064%
Ecology	300	16.895%
Geosciences, Multidisciplinary	170	9.567%
Biodiversity Conservation	168	9.454%
Agronomy	152	8.554%
Soil Sciences	151	8.497%
Meteorology & Atmospheric Sciences	140	7.878%
Plant Sciences	133	7.485%
Multidisciplinary Sciences	125	7.034%
Forestry	118	6.640%

**Table 2: Key Research Fields of *Journal of Tropical Crops***

Research Field	Percentage
Agricultural Basic Sciences	22.9%
Environmental Science & Resource Utilization	18.6%
[Other fields]	11.7%
[Other fields]	10.0%

### 3. Optimization Strategies for Topic Selection Planning in Chinese Agricultural Science and Technology Journals Based on VOSviewer Visual Analysis

**3.1 Data-Driven Approach: Using VOSviewer to Guide Topic Selection and Capture Disciplinary Development Hotspots** Traditional topic selection planning in scientific journals primarily relies on literature searches, editors' personal tracking of disciplinary developments, and expert consultation. This approach is heavily influenced by editors' individual capabilities and experts' subjectivity, making it difficult to accurately judge disciplinary characteristics or capture hotspots. Conventional topic planning depends largely on editorial experience, with data processing often conducted in isolation. This prevents refined information management and multi-dimensional extension, failing to fully mine the value of collected data. In today's era of rapid mobile internet development and widespread adoption, data must be reconstructed and applied through certain means to quickly obtain valuable information amid explosive data growth [7]. Applying visualization methods to

topic selection planning primarily involves collecting and preprocessing research data based on its inherent characteristics, mining potential associations, and utilizing research data and keyword/co-word analysis visualization techniques to provide visual analytical results for final topic selection decisions. This approach offers advantages in precision, convenience, and scientific rigor, improving topic selection success rates and ensuring effectiveness [8].

Based on the above analysis, although Chinese agricultural science and technology journals have conducted some topic selection planning and organized special columns/issues, their grasp of hot topics remains inaccurate, with insufficient interdisciplinary research. Taking *Journal of Tropical Crops* as an example, paper topics mainly focus on cultivation practices, plant protection, and agronomy, with less attention to common issues in human social development compared to foreign agricultural journals. Therefore, Chinese scientific journals should use visual analysis to capture disciplinary development hotspots from domestic and international research trajectories, track trends, and strengthen planning for scarce and popular topics. Additionally, they should emulate the column settings and research fields of high-level international journals to optimize their own column arrangements and adjust manuscript solicitation directions, learning from advanced topic selection experiences. Simultaneously, visualization software can help editors judge manuscript quality and improve initial review standards. Based on visual analysis results, editors can quickly grasp industry hotspots and promptly reject manuscripts that do not align with disciplinary development trends, thereby improving review efficiency [9]. Enhancing the data-driven approach in scientific journal topic selection planning is key to improving effectiveness and academic influence.

**3.2 Professionalization: Using VOSviewer to Screen High-Quality Expert Resources for Intellectual Support** Topic selection planning exhibits different characteristics and effects depending on timing and context, easily influenced by national policies, disciplinary development orientation, and scholars' research features. Therefore, topic selection based on visual analysis results has certain limitations. Effective topic planning must identify research frontiers and core knowledge while considering author and reviewer sources, expert identification, and evaluation issues. Experts hold strong practical application value for optimizing scientific journal topic selection [10]. Therefore, it is necessary to integrate visual analysis results with expert qualitative research, ensuring full expert participation in topic selection planning. The role of experts in scientific journal work is primarily realized through editorial boards, with the editor-in-chief as the main body who embodies the journal's purpose and serves as its soul and core. Editorial boards have always played a leading role in promoting scientific journal development [11]. In recent years, to fully leverage the editorial board's role, *Journal of Tropical Crops* has conducted many beneficial activities, such as holding the second and third meetings of its fifth editorial board in 2019 and 2021, and organizing multiple editor-in-chief day events inviting the editor-in-chief and board members to guide the editorial office. These efforts

have fully utilized the board's role in guiding journal development, though issues remain such as low internationalization of the board and insufficient digitization of board work. Chinese agricultural science and technology journals can use visualization technology to obtain information on outstanding author teams from domestic and international journals while screening excellent editorial board experts. By integrating visual analysis data with expert qualitative research and inviting experts to plan special columns/issues through topic selection meetings, journals can improve topic selection success rates while motivating board members and strengthening their connection with the editorial office.

### **3.3 Broadening Networks: Using VOSviewer to Obtain Quality Author Information for Precise and Extensive Manuscript Solicitation**

Traditional topic selection planning mainly relies on editors' professional knowledge, focusing closely on major national policies, disciplinary hotspots and difficulties, and brand academic conferences. This approach is heavily influenced by editorial subjectivity, requiring editors to frequently visit various institutions, research teams, and academic associations for manuscript solicitation, which is time-consuming and yields unsatisfactory results [12]. In the big data era, the ability to quickly screen high-quality academic information and cultivate outstanding author groups is the key for scientific journals to compete for academic first-publication rights. Using VOSviewer visualization technology to obtain information on outstanding research institutions and authors at home and abroad enables scientific journals to identify high-productivity institutions and authors in their disciplines, laying the foundation for acquiring quality manuscripts and developing precise solicitation plans to improve planning efficiency. In topic selection planning, scientific journals should adopt an "audience thinking" approach, serving authors and readers as their purpose and meeting their academic needs. Editors should be encouraged to participate in high-end academic conferences, research institutes, and research teams both domestically and internationally, relying on major fund projects to plan excellent topics according to research progress while ensuring continuous tracking of academic achievements to secure cutting-edge research results and enhance academic influence.

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### **Limitations and Future Directions**

This study has certain limitations. First, the research field is tropical agriculture, with the search term "tropical agriculture" in the Web of Science database, making the research domain relatively fixed. Whether these findings apply to other disciplines requires further investigation. Second, due to VOSviewer's import limitations, the foreign literature analysis included only 500 documents, and the sample size needs expansion, with the research timeline potentially extended. These two issues will be optimized in future research.

The *Blue Book of Chinese Science and Technology Journals Development (2021)* indicates that in 2020, Chinese SCI journals published only 1.45% of global SCI

papers, while Chinese authors contributed 25.85% of global SCI papers. That year, Chinese authors published 549,845 SCI papers, but only 25,766 (4.69%) appeared in Chinese SCI journals. In terms of influence, Chinese SCI journals still cannot match Chinese authors' output [13]. This demonstrates severe outflow of excellent Chinese papers, posing serious threats to the influence of Chinese scientific journals, scientific and technological innovation capacity building, and national information security. This outflow phenomenon also imposes new requirements on topic selection planning in Chinese scientific journals. Chinese scientific journals must improve their topic selection planning capabilities, applying visualization analysis technology combined with artificial intelligence and big data information technology to accurately capture cutting-edge academic hotspots, understand disciplinary development trends, publish high-quality academic achievements, curb paper outflow, and strive to "write papers on the land of China." Meanwhile, journal editors must possess not only certain disciplinary backgrounds but also precise judgment and foresight to timely identify and track scientific frontier issues and research hotspots, actively solicit manuscripts, and have the ability to excavate high-quality papers on scientific hotspots [14].

In summary, in the "Internet Plus" era, scientific journals should continuously adapt to the times, actively applying new technologies such as big data, cloud computing, and the internet to seek suitable development paths while adhering to the essence of scientific journals [15]. Based on advantageous disciplinary fields, journals should meticulously conduct topic selection planning to fully embody their purpose, achieve distinctive and high-quality development, and better serve China's scientific and technological innovation system and capacity building.

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