Dissertation Topics of Agricultural Master's Degree over the Past Seven Years Based on CiteSpace

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Abstract: A total of 378 papers were obtained an university's master's dissertations in the field of agriculture from 2019 to 2025 by CNKI (China National Knowledge Infrastructure) and visually analyzed by CiteSpace software. It was found that most of the dissertations were based on such keywords as local highland barley, native pigs, yield and Shergyla Mountains. The three stages of the temporal evolution of research topics were "basic exploration – rapid expansion – frontier deepening". The focus of "research hotspots" gradually moved towards the three aspects: molecular breeding, ecological restoration in typical areas, germplasm innovation. Interestingly, the emergence of the most explosive research theme in the field was that of highland barley. It can be seen that the dissertation topics have increasingly tended toward systematization, precision, and the exploration of new frontiers, which can be used as reference points for future research in related fields.

Keywords: CiteSpace; Bibliometrics; Knowledge Mapping; Dissertations

1. Introduction

Graduate education is the highest stage of the talent cultivation system of higher education, and dissertations are the embodiment of students' research ability, innovation and academic literacy. Dissertation topics are considered to be the logical beginning of the academic research, which directly affects the value of the research, the pathway of its implementation and the quality of its final results [1]. As an important discipline supporting regional agriculture development, ecological security and rural revitalization, agriculture reflects the discipline positioning, research characteristics, and service capacity of universities in terms of the quality of their graduate training and the topic of dissertations. Xizang Agriculture and Animal Husbandry University is the only university covering agriculture and animal husbandry in Xizang, which assumes an important duty for training highland agricultural and animal husbandry talents, developing scientific research and providing services to society. The university has its own regional characteristics and advantages, including the research on improvement of the yield of highland barley, Xizang pig industry development, the research on ancient trees, grassland restoration and tea plant cultivation, etc., based on the unique natural geographical environment of the Qinghai-Xizang Plateau and the needs of agricultural and pastoral development. With the gradual development of higher education in border and ethnic areas, the major increase of national support for higher education, the steady expansion of graduate education scale, the continuous improvement of discipline development, the output of agricultural master's dissertations has drastically increased in recent years. It is of great significance to systematically review and analyze the characteristics, research hotspots and developmental trend of these dissertations in this period to optimize the training system of graduates, improve the research innovation ability of the talent team, and precisely serve the high-quality development of plateau modern agriculture.

In recent years, bibliometrics and scientific knowledge mapping have become indispensable tools for exploring the disciplinary development trends, evolution of research hotspots and academic resource allocation. Of these, CiteSpace software, which has the advantages of visualization, quantification and dynamic analysis, has been widely used in assessing the development of disciplines, exploring research frontiers and searching for themes in literature. It offers technical assistance to the systematic and

scientific analysis of the dissertation topics [2]. Chinese scholars have conducted extensive research on the dissertation topics of graduate students in different universities [3,4] and disciplines [5,6], with results mainly focusing on hotspot mining, problem diagnosis, and strategy optimization [7-9]. However, most current research focuses on inland major universities or comprehensive universities. The studies on the dissertation themes of the local universities focusing on highland agriculture and animal husbandry in the border and ethnic areas of the Qinghai-Xizang Plateau are relatively few.

As a result, the agricultural master's dissertations included by Xizang Agriculture and Animal Husbandry University (2019-2025) in CNKI database are the objects of this study. Using CiteSpace 6.4.R1 software, we built knowledge maps and systematically analyzed research hotspots, thematic structure, stage characteristics, and frontier dynamics over the last 7 years using modules like high-frequency keywords co-occurrence networks, keyword clustering, timeline evolution, and keyword bursts. This study identifies the current core research areas, weaknesses and developmental trends in the field and serves as references for scholars to determine research fields, objectives, and directions.

2. Data Sources and Research Methods

The data source for this study was CNKI, and the retrieval time was from January 1, 2019 to December 31, 2025. Literature research was conducted at Xizang Agriculture and Animal Husbandry University (formerly Xizang Agriculture and Animal Husbandry College and Xizang University Agriculture and Animal Husbandry College). To guarantee the accuracy of the data, the non-agricultural master's theses were manually verified and screened out, and finally 378 master's theses retrieved from CNKI were selected, including preventive veterinary medicine, crop science, forestry, forest cultivation, soil and water conservation, desertification control, landscape plants and ornamental horticulture. The retrieval date was January 25, 2026. Data were exported from CNKI in RefWorks format and the sample data were then converted and organized with the CiteSpace 6.4.R1 software.

3. Results and Analysis

3.1 High-Frequency Keyword Co-Occurrence Network Analysis

Table 1. Keywords with Frequency ≥ 5 in Retrieved Literature

Rank	Frequency	Centrality	First Appearance	Keywords
1	27	0.56	2019	Xizang
2	25	0.12	2021	Xizang pigs
3	24	0.23	2022	Highland barley
4	18	0.06	2020	Yield
5	13	0.05	2022	Shergyla Mountains
6	12	0.14	2020	Physiological characteristics
7	12	0.07	2023	Yak
8	11	0.13	2019	Drought stress
9	10	0	2021	Photosynthetic characteristics
10	9	0.13	2021	Isolation and identification
11	8	0.07	2021	Low-temperature stress
12	7	0.14	2022	Southeastern Xizang
13	7	0.06	2022	Maize
14	6	0.19	2019	Juniper
15	5	0.07	2021	Diversity
16	5	0.06	2024	Agronomic Traits
17	5	0.03	2022	Elevation Gradient
18	5	0.01	2022	Growth Performance
19	5	0.01	2019	Biomass

Keywords reflect the research content of dissertations, and high-frequency keywords represent the research themes and research hotspots of a specific field. Using a co-occurrence network of keywords can help identify the primary research areas in a research field [1]. Using CiteSpace 6.4.R1, a keyword co-occurrence network (Figure 1) was created

for the agricultural master's dissertations of Xizang Agriculture and Animal Husbandry University in the period 2019-2025. 209 important keywords were identified. Figure 1 clearly shows that the main keywords that the dissertations mainly focus on were highland barley, Xizang pigs, yield and Shergyla Mountains. Academic significance of the keywords was measured by centrality, a measure of the bridging role of a keyword between different hubs. If the centrality value is more than 0.1, it means the keyword has important academic significance [10]. Based on centrality, the top 11 keywords are listed in Table 1: Xizang (0.56), highland barley (0.23), juniper (0.19), Southeastern Xizang and physiological characteristics (0.14), isolation and identification and drought stress (0.13), Xizang pig (0.12), yak, low-temperature stress, and diversity (0.07). Among them, the centrality values of the top eight keywords are greater than 0.1.

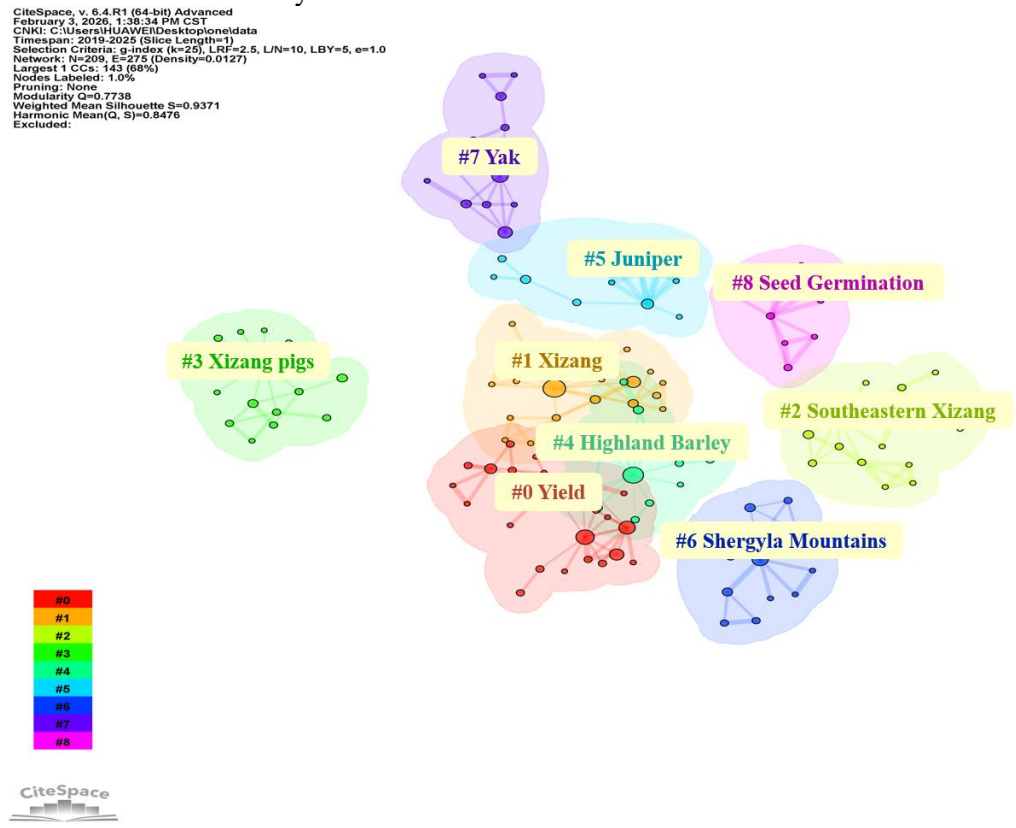

Figure 1. Keyword Clustering Graph

3.2 Keyword Cluster Analysis

The co-occurrence relationships of keywords in literature are used as the basis of grouping keywords that are similar to each other into a single cluster, which is called keyword cluster analysis. In each cluster, researchers can consider a cluster as a relatively independent research theme group, and can use it to determine the research categories from a large number of keywords [11]. The structural significance and scientific validity of the clustering graph are fully demonstrated when, as shown in Figure 1, the Q value is above the threshold of 0.3, i.e., Q = 0.7738. The S value is 0.9371, which is greater than 0.5, which means the clustering results are reasonable.

The first 9 clusters (in terms of size) in this keyword clustering graph are the following in the last 7 years of agricultural master's dissertations: "#0 Yield", "#1 Xizang", "#2 Southeastern Xizang", "#3 Xizang pigs", "#4 Highland Barley", "#5 Juniper", "#6 Shergyla Mountains", "#7 Yak", and "#8 Seed Germination". The leading keywords of each cluster to a certain degree represent the main research content. The results of the clustering are presented in Table 2. Based on the size of the clusters, "#0 Yield" (23 nodes) and "#1 Xizang" (22 nodes) are two main research clusters, corresponding to the two research themes about master's dissertations on agriculture: "exploring the physiological characteristics and growth performance of crops and livestock to enhance yield" and "conducting studies on drought stress adaptation, climate change responses, and

species diversity in extreme highland environments". Notably, the omics technologies including whole genome sequencing and metabolomics have been combined with traditional agricultural research, and have already become a well-defined research frontier, as exemplified by research on yak drug resistance and Xizang pig gut microbiota, providing new technical pathways for the conservation and utilization of biological resources at high altitude.

Table 2. Keyword Cluster Analysis

Cluster Name	Number of Nodes	Silhouette Value	Main Keywords
#0 Yield	23	0.907	Yield, physiological characteristics, photosynthetic characteristics, agronomic traits, nutrient absorption
#1 Xizang	22	0.977	Xizang, drought stress, diversity, endogenous hormones, adaptability
#2 Southeastern Xizang	18	0.924	Southeastern Xizang, soil respiration, nitrogen deposition, topography, single-tree competition
#3 Xizang pigs	17	0.986	Xizang pigs, growth performance, Wenchang chicken, gut microbiota, metabolomics
#4 Highland Barley	15	0.827	Highland barley, growth-promoting characteristics, endophytes, physiological indicators, microbial inoculants
#5 Juniper	14	0.932	Juniper, tree habitat index, branch pruning, climate, root pruning
#6 Shergyla Mountains	13	0.915	Shergyla Mountains, radial growth, alpine meadow, elevation gradient, climate change
#7 Yak	12	1.000	Yak, drug resistance, whole genome, tight junctions, epidemiology
#8 Seed Germination	9	0.990	Seed germination, population decline, cutting, plant communities, enclosure protection

3.3 Timeline Analysis of Keywords

Keyword clustering analysis can be performed over a period of time, showing the evolution of certain fields or themes over time, which can help the researchers to identify the trends of research and research turning points. From the data obtained, the agricultural master's research at Xizang Agriculture and Animal Husbandry University from 2019 to 2025 has certain temporal evolution characteristics and the division of research phases. 2019–2020 (Exploration Phase): This is the first phase of research and keywords involve fundamental ecological and environmental issues: Xizang, juniper, drought stress and diversity. The research was mostly undertaken at the macro level, in the form of resource surveys and background analyses of the environment, a necessary, exploratory stage of the fieldwork. 2021–2022 (Rapid Expansion Phase): In this stage, the keywords highland barley, yield, physiological characteristics, Southeastern Xizang, seed germination and yak were highlighted. Research shifted to the physiology of crops, yield formation, regional ecology, and basic traits of livestock and poultry and breeding methods. The relationship between keywords significantly strengthened, and the multi-theme parallel development pattern emerged, which was the main explosive period of research in this field. 2023–2025 (Frontier Deepening Phase): During this stage, keywords like Xizang pigs, Shergyla Mountains, metabolomics and agronomic traits continued to emerge. The research gradually focused on innovative livestock and poultry germplasm, ecological responses in typical mountainous areas, and analysis of molecular physiological mechanisms. The network of links between nodes became denser, and the thematic associations were increased. In general, the research shifted from macro-level foundation ecology research to applied foundation ecology research on crops and livestock, from the observation of conventional traits to analyzing the molecular and metabolic mechanisms, and from general studies to exact studies in typical areas like Southeastern Xizang and Shergyla Mountains. This development trend is indicative of the growing depth, sophisticated technical approaches, and improved targeting, marking the evolution of agricultural master's dissertations toward systematization, precision, and exploration of frontiers.

3.4 Keyword Burst Analysis

Analysis of the burst intensity and temporal

evolution of keywords from Master's dissertations in the field of agriculture from 2019 to 2025 detected 17 keywords with high burst intensity (Figure 2).

Figure 2. Keyword Burst Graph

The results reveal a positive relationship between burst intensity and the sudden jump in the popularity of the research field, as well as a distinct pattern of a phased replacement. 2019–2020 (Early Burst Phase): In this stage, a burst of keywords emerged—immune response, adjuvant, juniper—which all converged towards fundamental directions of pathogen immunity and forest resource conservation. These are the early hotspot research areas in this field. 2020–2021 (Application-Oriented Phase): The focus for the research shifted to application-oriented topics with keywords such as nutrient absorption, quality, and soil respiration. Of those, yield had the highest burst intensity (2.74) in this phase, indicating a transition towards crop production and ecological monitoring. 2021–2022 (Explosive Growth Phase): During this stage, the keywords Xizang pigs, diversity, endophytes, growth-promoting characteristics appeared. The research covered multiple directions such as characteristic livestock and poultry, biodiversity, microbial growth promotion etc. 2022 (Peak Burst): The keyword with the highest burst intensity (4.0) was "highland barley", which was the highest of all the keywords and, thus, the most prominent theme throughout the research period. At the same time, keywords about alpine grasslands and Shergyla Mountains started to have burst trends. 2023–2025 (Focused Frontier Phase): Burst intensity of the keywords Zayü County, enclosure protection, whole genome and Shergyla Mountains remained high and continued to be prominent in the current period. The research hotspots slowly shifted towards ecological management in typical areas, molecular study of germplasm resources, and ecological restoration technologies. In sum, the burst keywords evolve gradually from basic immunity and forest protection through crop productivity and physiology and on to characteristic livestock, regional ecology and molecular breeding. This evolution is the clear manifestation of the deepening, focusing, and frontier development of the research hotspots in this field over the years.

4. Conclusions

This study employed visual analysis to analyze agricultural master's dissertations from Xizang Agriculture and Animal Husbandry University over the past seven years (2019–2025) by using CiteSpace software. The research objectively illustrated the status, hotspots and developmental trends of agricultural master's dissertations by using high-frequency keyword co-occurrence network, keyword clustering, evolutionary trends of keywords through time and keyword bursts. It was concluded that:

First, in terms of the research hotspot, the keyword knowledge map and frequency table show that the research topics of agricultural master's theses mainly focus on"highland barley", "Xizang pigs", "yield" and "Shergyla Mountains". The subjects constitute stable and regionally characteristic central research groups, which are closely related to the development of agriculture and animal husbandry in Xizang. It is a full reflection of the university's educational philosophy of "rooted in the plateau, oriented towards Xizang, and serving agriculture, rural areas and farmers".

Secondly, regarding research trends, the timeline analysis divides the research into three stages, each with its own hotspot keywords. The keywords are used here to indicate the time dimension of the agricultural master's dissertation research in various stages, which are characterized by the systematization, precision and exploration of frontiers. Moreover, the keyword burst mapping indicates that the keyword "highland barley" has reached the highest burst intensity of 4.0, which is the

highest of all the keywords, and it is the most prominent theme during the research period.

5. Research Implications

On Topic Innovation: Dedicated efforts should be made to speed up alignment with the modern frontiers of agriculture, increase the number of agricultural master's and doctoral students who are trained and exposed to new areas of agriculture, like Smart Agriculture, Gene Editing, Microbiomics, and Agricultural Carbon Sequestration. The integration of traditional agriculture-related research with information technology, biotechnology, ecological economics, etc. will break the boundaries of traditional research and enhance the foresight and originality of writing dissertation topics. Also, it should be improved in topic planning to minimize the repetition of research, and to increase the ratio of applied research and the fundamental research, and guide students to focus on scientific questions and mechanism analysis. This will enhance the academic depth and theoretical value of dissertations. Dissertation topics should be closely related to the major national strategies including food security, ecological protection and revitalization of the rural area, based on the evolution of research hotspots. Disciplinary layouts should be dynamically adjusted to avoid disconnection from research directions and industrial development. This way, disciplinary construction is in harmony with the local economy and society.

In the training and management area: The guidance and topic selection mechanism should be improved, and a dynamic monitoring mechanism and hotspot warning system for dissertation topics should be built. These tools, such as CiteSpace, should be used on a regular basis for field frontier analysis and giving topic references for faculty and students. It is important to strengthen the development of the advisor team, so that advisors can better understand the frontiers of the discipline and market needs. Advisors should involve students in their own research projects and integrate major regional issues into both research and teaching. Inter-institutional collaboration among the university, local government, and enterprises should be strengthened, and students should be encouraged to carry out field investigations in production environment to enhance their problem-solving ability. Academic exchange platforms should be set up, introducing high-quality academic resources, to build interdisciplinary and inter-institutional cooperation, and expand research fields.

Furthermore, it is necessary to build a layered and categorized topic guidance system, and differentiate the cultivation strategies for different research directions. Training on research methodology and academic ethics should be emphasized to comprehensively improve the ability of graduate students in research and innovation. The systematic optimization of the topic ecosystem enables Xizang Agriculture and Animal Husbandry University to better adapt to the national food security, rural revitalization and plateau ecological protection strategies, and cultivate high-quality and well-rounded talents of agricultural science and technology in Xizang.

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