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Literature Analysis of Bryophytes in China during 2005 – 2015

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Abstract In order to study China's bryophyte, this paper uses bibliometrics for statistical analysis of literature about China's bryophyte during 2005–2015. The results show that in terms of published article distribution of different journals, there are 13 kinds of journals with more than 5 papers about bryophyte, accounting for 32.5%; in terms of the number of papers published in different years, it was smallest in 2005, only 16, while it reached the largest number of 33 in 2008; in terms of the number of papers published for different first authors, there are most authors publishing less than 9 papers, accounting for 87.5%, there is only one author publishing 9 papers, and there are 5 people publishing more than 9 papers; in terms of author unit distribution, in the 278 articles collected, there are 12 units publishing papers of less than 6, accounting for 30%, the unit publishing the most papers (36) is Guizhou Normal University, 5 units publish 6 papers, accounting for 12.5%, and the units publishing papers of less than 6 account for 57.5%; in terms of literature research level, there are most papers about basic and applied basic research (natural science), accounting for 91.2%, the papers about engineering and technology (natural science) account for 5.5%, and other papers account for 3.3%.

Key words Bryophyte, Bibliometrics, Literature analysis, Classification statistics

1 Introduction

Bryophytes are an informal group consisting of three divisions of non-vascular land plants, the liverworts, hornworts and mosses. They are characteristically limited in size and prefer moist habitats although they can survive in drier environments. There are more than 21000 kinds of bryophytes having been reported in the world, and the bryophytes recorded in China involve 125 families, 572 genera and 3460 species^[1]. As one of the pioneers of the plant kingdom, the bryophytes have a close relationship with other biological communities, thus promoting and protecting biodiversity^[2]. With the economic development, people have an increasing demand for natural resources. In some areas, some environmental issues continue to emerge, including deforestation, overgrazing, salinization and desertification, wetland loss, depletion of water resources, environmental pollution and global warming, posing a serious threat to the survival and development of bryophytes. Therefore, the protection of bryophyte diversity has become a focus of attention^[3–4]. In 1958, Chen Bangjie divided the bryophyte distribution area into 7 zones on the basis of preliminary investigation of bryophytes in Chinese provinces and autonomous regions^[5–7]. Based on China's bryophyte distribution status, Hu Renliang also confirmed the division into the above 7 zones^[8–11]. In 2006, Wu Pengcheng re-divided China's bryophyte distribution area into 10 zones based on summarization of relevant research data about China's bryophytes. The distribution type of Chinese bry-

ophytes and possible distribution route were also discussed, and three distribution routes of Chinese bryophytes were pointed out: the first one was from the Himalayas to the southeastern part of China via northwestern Yunnan and western Sichuan along the Yangtze River; the second one was between the Himalayas, the Hengduan mountains and Taiwan; the third one was from the Himalayas to the Changbai mountain area via the Qinling mountains^[12]. The representative families, genera and species of bryophytes in each geographical area as well as their distribution type were also expounded. However, there are no reports about the author, author unit distribution and research content concerning the bryophyte ecology in China. In this paper, based on the data from CNKI, we make a statistical analysis on bryophyte study papers published in domestic journals during 2005–2015, in order to provide a reference for the study of bryophyte ecology.

2 Data sources and methods

2.1 Data sources Based on the CNKI data, in "Advanced Search", with "bryophyte" as key word, a total of 278 papers about bryophyte published in domestic core journals during 2005–2015 are searched (including literature review, academic papers, proceedings, etc.) (retrieval time: October 25, 2015).

2.2 Research methods In order to analyze the number of papers published, literature authors, authors' units and research content, the bibliometrics in science of statistics is employed for statistical analysis.

2.3 Data analysis In the process of analyzing literature, Excel and originlab originpro 8.5 are used for assisted analysis.

3 Results and analysis

3.1 Number of papers published

3.1.1 Number of papers published in different years. From Fig. 1, it is found that the number of the papers published increased

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during 2005–2008, but slowly decreased during 2009–2014; the number continued to increase in 2015 and the number was smallest in 2005 (16), accounting for 5.76% of total papers published. In 2008, the number of the papers published reached a maximum of 33, accounting for 11.87%. The number declined during 2005–2015, but it can be seen that China has made great progress in the study of bryophytes.

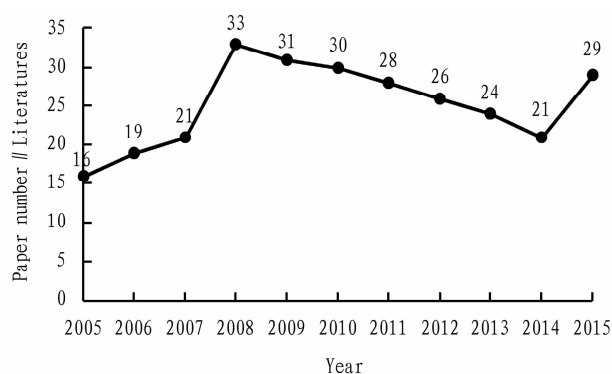


Fig. 1 The number of the papers published about bryophytes in China during 2005–2015

3.1.2 Number of papers published for different authors. By the first author retrieval, it is found that three authors publishing the greatest number of papers: Zhang Zhaohui (27), Cao Tong (12), Xiong Yuanxin (12), accounting for 7.5%. There are 8 authors publishing 7–11 papers, accounting for 20%; there are 9 authors publishing 5–6 papers, accounting for 22.5%; other authors publishing less than 5 papers, accounting for 5%. This indicates that Chinese authors studying bryophyte are particularly scattered.

3.2 Distribution of papers published in different journals

The journals publishing the papers (≥ 10) about bryophytes include *Anhui Agricultural Sciences*, *Guizhou Agricultural Sciences*, *Guihaia*, *Chinese Journal of Ecology*, *Acta Botanica Boreali-Occidentalia Sinica*, *Hubei Agricultural Sciences*, *Bulletin of Botanical Research*, *Plant Science Journal*, accounting for 20% of all published journals, and it is published frequently in the agricultural resource journals. This indicates that China's bryophyte papers are unevenly distributed in the journals. *Anhui Agricultural Sciences* publishes the most papers (18), accounting for 6.47%, 6 times the number of *Ecology and Environment* (Fig. 2).

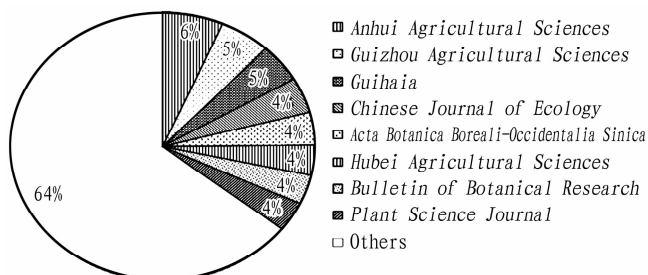


Fig. 2 Distribution of papers published in different journals

3.3 Distribution of authors' units From Fig. 3, it is found that as for the 278 papers retrieved, there are 12 units publishing papers > 6 , a total of 163, accounting for 58.63%. Guizhou Nor-

mal University publishes the most papers, reaching 39, accounting for 14.03%, followed by Shanghai Normal University (17), accounting for 6.12%, and Guizhou University and East China Normal University (32), accounting for 11.51%. This indicates that the distribution of domestic bryophyte research units is very uneven and the normal universities are leading alone. It is necessary to train all kinds of talents who study bryophyte and bridge the gap between institutions, so that the bryophyte study is conducted simultaneously in different regions and institutions.

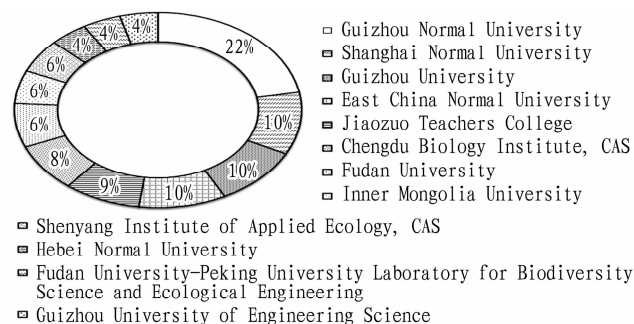


Fig. 3 Distribution of authors' units

3.4 Literature research level and object

3.4.1 Research level. In the 278 papers retrieved, the research level involves three areas basic and applied basic research (natural science), engineering and technology (natural science), professional and practical technology (natural science). There are 15 papers published about engineering and technology (natural science), accounting for 5.5%; there are 9 papers published about professional and practical technology (natural science), accounting for 3.3%; there are 248 papers published about basic and applied basic research (natural science), accounting for 91.2%. These papers account for more than half of total papers published, indicating that Chinese bryophyte studies are still at the basic level and the studies focus on the basic level (Fig. 4).

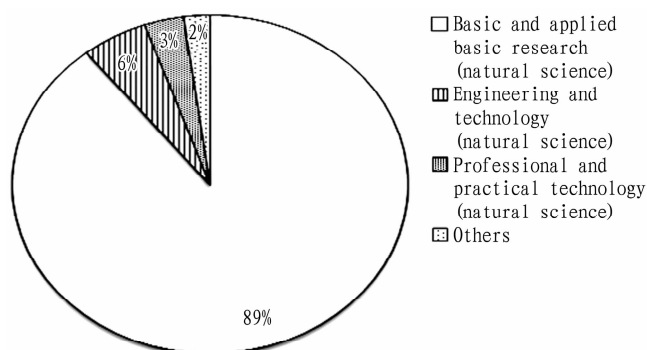


Fig. 4 Research level of Chinese bryophyte literature during 2005–2015

3.4.2 Research Object. Chinese bryophyte research object is shown in Fig. 5. Most objects are about biology, accounting for 66%, followed by agronomy and agriculture (10%) and environmental science and resources utilization (8%). The results show that the scope of Chinese bryophyte studies needs to be expanded and it is necessary to balance the bryophyte research in China.

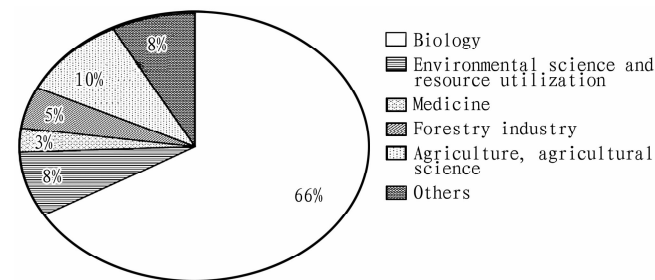


Fig. 5 Research object of bryophytes in China

4 Conclusions

The results show that the Chinese bryophyte studies mainly focus on biology, agronomy and agricultural science. The research level mainly stays in basic and applied basic research. From different research units, different journals and different authors, it is found that the regional distribution of research units is not balanced, the researchers are more scattered, and the research cycle is short. Most scholars' bryophyte studies are not very deep, the distribution of bryophyte literature is extremely unbalanced in the journals, and the researchers are particularly scattered. These problems have restricted the current bryophyte research and it is necessary to focus on other aspects and basic theoretical part. The study of bryophytes in Tibet has been the focus of attention of many experts and scholars.

References

- [1] CAO T, GUO SL, GAO Q. Ordination analysis on relationship between bryophyte distribution and climatic factors [J]. Chinese Journal of Ap-

(From page 58)

- [27] CHEN P, YU SY, CHEN HY, *et al.* Effects of Se on growth and some physiological characteristics of rice seedling under Cd stress[J]. Guihaia, 2002, 22(3): 277–282. (in Chinese).
- [28] LIN L, ZHOU W, DAI H, *et al.* Selenium reduces cadmium uptake and mitigates cadmium toxicity in rice[J]. Journal of Hazardous Materials, 2012, 235: 343–351.
- [29] Turakainen M, Hartikainen H, Sepp "a" nen MM. Effects of selenium treatments on potato (*Solanum tuberosum* L.) growth and concentrations of soluble sugars and starch [J]. Journal of Agricultural and Food Chemistry, 2004, 52(17): 5378–5382.
- [30] LIANG C, LIN KF, ZHANG W, *et al.* Effects of sulfur and selenium treatment on plant growth and some physiological characteristics of rice under cadmium stress[J]. Journal of Agro-Environment Science, 2012, 31(5): 857–866. (in Chinese).
- [31] LIU Y, JIANG GX. Effects of Se on some physiological characteristics of *Brassica napus* under Cd stress[J]. Journal of Henan Agricultural Sciences, 2008, 165(3): 47–50. (in Chinese).
- [32] CHEN YX, *et al.* On heavy metals pollution chemistry in soil-plant system[M]. Beijing: Science Press, 2008. (in Chinese).
- [33] HE PP, LV XZ, WANG GY. Effects of Se and Zn supplementation on the antagonism against Pb and Cd in vegetables[J]. Environment International, 2004, 30(2): 167–172.
- [34] PENG SQ, YU H, LIU SJ. Effects of sodium selenite and selenomethionine on cadmium-induced lipid peroxidation and the ability of cadmium to induce metallothionein in rats[J]. Journal of Health Toxicology, 2003, 17(3): 155–158. (in Chinese).
- [35] DIAO SY, ZHANG YZ. Progress in the toxicity mechanism of cadmium [J]. Progress in Veterinary Medicine, 2005, 26(5): 49–51. (in Chinese).

- plied Ecology, 2001, 11 (5): 680–686. (in Chinese).
- [2] WANG Q, HE SA, WU PC. Study on the diversity of bryophytes [J]. Biodiversity Science, 1999, 7(4): 332–339. (in Chinese).
- [3] CAO T, ZHAO Q, YU J, *et al.* Biodiversity and distribution pattern of the bryophytes of the main parks in Shanghai [C]. The Collected Papers of Biodiversity Protection and Regional Sustainable Development, 2004: 202–217. (in Chinese).
- [4] CAO T, ZHU RL, GUO SL. A brief report of the first red list of endangered bryophytes in China [J]. Bulletin of Botanical Research, 2006, 26 (6): 757–762. (in Chinese).
- [5] CHEN BJ. The records of Chinese moss genus [M]. Beijing: Science Press, 1978. (in Chinese).
- [6] CHEN BJ. The records of Chinese moss genus [M]. Beijing: Science Press, 1963. (in Chinese).
- [7] CHEN BJ. Preliminary report of the cenological and geographical study of Chinese mossflora [J]. Acta Phytotaxonomica Sinica, 1958, 7(4): 271–293. (in Chinese).
- [8] HU RL. Distribution of bryophytes in China [J]. Tropical Bryology, 1990 (2): 133–137.
- [9] HU RL, WANG YF. Bryoflora of China [M]. Beijing: Science Press, 2005. (in Chinese).
- [10] HU RL, WANG YF. Investigation on bryophytes in West Tianmu Mountain of Zhejiang Province [J]. Journal of East China Normal University (Natural Science), 1981(1): 85–104. (in Chinese).
- [11] HU RL. A preliminary investigation report on mossy plant in Dongting, Taihu Lake [J]. Journal of East China Normal University (Natural Science), 1958(1): 85–104. (in Chinese).
- [12] WU PC. The regionalization and distribution types of the bryophytes in China [J]. Journal of Plant Resources and Environment, 2006, 15(1): 1–8. (in Chinese).
- [36] ZEMBALA M, FILEKM, WALAS S, *et al.* Effect of selenium on macro- and microelement distribution and physiological parameters of rape and wheat seedlings exposed to cadmium stress[J]. Plant and Soil, 2010, 329(1–2): 457–468.
- [37] FENG R, WEI C, TU S. The roles of selenium in protecting plants against abiotic stresses[J]. Environmental and Experimental Botany, 2013(87): 58–68.
- [38] CHEN M, LIU GL. Higher plant selenium nutrition and role in the food chain[J]. Chinese Journal of Soil Science, 1996, 27(2): 88–89. (in Chinese).
- [39] TANG HT, LI WD, SUN YT, *et al.* Controlling effects of different foliar fertilizers on heavy metal accumulation in rice plant in mild heavy metal polluted paddy field[J]. Hunan Agricultural Sciences, 2013(1): 40–44. (in Chinese).
- [40] FANG Y. Study on exogenous microorganism and chemical forms of selenium in rice grain [D]. Nanning: Nanjing Agricultural University, 2010. (in Chinese).
- [41] WANG X, LIU YG, ZENG GM, *et al.* Subcellular distribution and chemical forms of cadmium in *Beckermia nivea* L. Gaud[J]. Environmental and Experimental Botany, 2008, 62: 389–395.
- [42] SHANKER K, MISHRA S, SRIVASTAVA S, *et al.* Effect of selenite and selenate on plant uptake and translocation of mercury by tomato (*Lycopersicon esculentum*) [J]. Plant and Soil, 1996, 183(2): 233–238.
- [44] ZEMBALA M, FILEK M, WALAS S, *et al.* Effect of selenium on macro- and microelement distribution and physiological parameters of rape and wheat seedlings exposed to cadmium stress[J]. Plant and Soil, 2010, 329(1–2): 457–468.
- [45] FENG R, WEI C, TU S. The roles of selenium in protecting plants against abiotic stresses[J]. Environmental and Experimental Botany, 2013(87): 58–68.