Open Access Initiatives in Agricultural Research: a comparative study of China, USA, Brazil, India and Russia

Riya Chakraborty

Junior Library Assistant, Presidency University, Kolkata

Alankrita Dutta*

Librarian, Brahmo Balika Shikshalaya, Kolkata
(* Corresponding Author)

Laxmi Subba

Assistant Librarian, Deshbandhu District Library, Darjeeling

Abstract

This comparative study evaluates OA practices across five agricultural powerhouses: China, the United States, Brazil, India, and Russia. Through a comprehensive literature review and analysis of policy frameworks, enforcement mechanisms, and impact, this research identifies commonalities, unique characteristics, and areas for improvement in OA initiatives. Findings reveal significant government support and institutional involvement in promoting OA, with each country showcasing distinct objectives and strategies. China emphasises global dissemination, Brazil focuses on collaboration, India prioritises inclusive development, while Russia emphasises agricultural modernisation. Despite these differences, all countries exhibit a commitment to transparency and accessibility in research. Challenges include the standardisation of practices, enhanced monitoring, ensuring financial sustainability, and global alignment with OA standards. Recommendations include standardising policies and infrastructure, improved monitoring mechanisms, exploring alternative funding models, and greater alignment with global OA initiatives. Overall, this study contributes valuable insights for policymakers and stakeholders to enhance OA practices, foster collaboration, and drive global agricultural research innovation, paving the way for a more equitable and sustainable future in agriculture.

Keywords: Agricultural research, Global collaboration, Institutional repositories, Open access initiatives, Policy frameworks, Research dissemination, Sustainable development

1. Introduction

In the realm of agricultural research, Open Access (OA) initiatives have emerged as a pivotal force in reshaping how knowledge is disseminated and utilised, offering a pathway to democratise information and foster global collaboration (Biswas, Brar, & Bhabal, 2022). This comparative study delves into the landscape of OA initiatives across five key agricultural powerhouses-China, the United States, Brazil, India, and Russia-each playing a significant role in shaping agricultural practices and policies on a global scale. By examining the unique approaches, challenges, and opportunities these nations encounter in promoting OA in agricultural research, this research aims to uncover valuable insights that can inform strategies for

advancing open and collaborative research practices worldwide. From the rapid economic growth driving OA advocacy in China to the longstanding commitment to transparency in the United States, from Brazil's emphasis on fostering collaboration to India's focus on inclusive development, and from Russia's pursuit of agricultural modernisation to its engagement in global research collaboration, this study offers a comprehensive exploration of the multifaceted dynamics of OA initiatives in agricultural research, illuminating pathways toward a more equitable and sustainable future for agriculture.

2. Literature review

This section reviews key literature exploring OA initiatives in the agricultural sectors of China, the United States, Brazil, India, and Russia, shedding light on the diverse approaches, challenges, and impacts associated with these initiatives.

China

China's rapid economic growth and expanding research infrastructure have driven the proliferation of OA initiatives in agricultural research. Studies by Li et al. (2018) and Liu et al. (2020) underscore the increasing focus on OA to boost scientific innovation and dissemination in China's agricultural research community. Government policies, like the National Plan for Open Access to Scientific Information (Li et al., 2018), support these initiatives by promoting OA publication and data sharing across scientific disciplines, including agriculture.

United States

In the United States, OA initiatives in agricultural research result from federal funding policies and institutional practices. Research by Morrison (2017) and Johnson et al. (2019) highlights the significance of federal mandates, like the NIH Public Access Policy and USDA's Ag Data Commons, in promoting OA publication and data sharing. Additionally, academic institutions and scholarly societies, as shown by Smith (2016), play a pivotal role in advocating OA principles and fostering openness in the US agricultural research community.

Brazil

Brazil, renowned for its agricultural biodiversity and scientific prowess, has become a key player in the global OA arena. Studies by Souza et al. (2019) and Guimarães et al. (2021) emphasise the role of collaborative OA platforms like EMBRAPA's OA Repository in fostering knowledge exchange and innovation within Brazil's agricultural research community. Moreover, government initiatives like the Brazilian Open Government Partnership (OGP) Action Plan (Souza et al., 2019) aim to bolster transparency and public engagement in scientific research through OA promotion.

India

In India, OA initiatives in agricultural research have been driven by a commitment to inclusive development and knowledge sharing. Research by Biswas (2023) underscores the role of the Indian Council of Agricultural Research's OA policy in promoting OA publication highlighting journal articles (Biswas & Das Biswas, 2023) and data accessibility within the Indian agricultural research community. Additionally, the emergence of collaborative OA platforms, such as the Indian Agricultural Research Institute's KrishiKosh repository (Biswas, 2023), reflects growing efforts to leverage OA as a catalyst for innovation and technology transfer in Indian agriculture.

Russia

In Russia, OA initiatives in agricultural research reflect its scientific legacy and

modernisation goals. Research by Ovchinnikov et al. (2019) and Gontareva et al. (2021) emphasises government policies like the Russian Science Foundation's OA mandate and national OA repositories in fostering OA publication and knowledge dissemination. Collaborations with global partners, highlighted by Komleva and Saifitdinova (2018), underscore Russia's commitment to advancing open science and research collaboration.

This literature review highlights the research gap in terms of a comparative analysis that systematically examines the effectiveness and sustainability of OA practices, considering factors such as policy frameworks, enforcement mechanisms, funding sustainability, and international collaboration across these agricultural powerhouses. Such a comparative analysis could offer valuable insights for policymakers and stakeholders to enhance OA initiatives on a global scale.

3. Objectives

The objectives are:

i. To evaluate the existing policy frameworks and mandates related to OA initiatives in agricultural research within China, the USA, Brazil, India, and Russia

ii. To conduct a comparative analysis of OA infrastructures, platforms, and practices across the five selected countries

iii. Toidentify the key challenges and opportunities encountered by agricultural researchers, institutions, and policymakers in promoting and implementing OA initiatives

iv. To generate evidence-based insights and policy recommendations to enhance the effectiveness and sustainability of OA initiatives in agricultural research at both national and international levels.

4. Methodology

The methodology for this comparative study involves a multifaceted approach. Firstly, a comprehensive review of existing literature on OA initiatives in agricultural research across China, the United States, Brazil, India, and Russia was conducted to identify key themes, challenges, and opportunities. Secondly, data were gathered from primary and secondary sources and respective websites of agricultural research councils of concerned countries, including government policies, institutional mandates, and scholarly publications, to assess the policy frameworks, infrastructure, and practices related to OA in each country. Thirdly, qualitative and quantitative analysis techniques were employed to compare OA infrastructures, platforms, funding mechanisms, compliance monitoring strategies, licensing and copyright policies, international collaborations, and impact assessment methodologies across the selected countries. Finally, the findings were synthesised and discussed to identify common patterns, unique characteristics, and potential areas for improvement in OA initiatives in agricultural research, aiming to generate evidence-based insights and policy recommendations for enhancing the effectiveness and sustainability of OA practices at both national and international levels.

5. Findings and analysis

Table 1: Open access policies of top five countries' agricultural research council

Sl. No.	Country	Agricultural Research Council	Specific Open Access Mandate
1	China	Chinese Academy of Agricultural Sciences (CAAS) https://www.caas.cn/en/index.htm	x
2	USA	United States Department of Agriculture (USDA) https://www.usda.gov/	✓ https://www.usda.gov/directives/dr-1020-006
3	Brazil	Brazilian Agricultural Research Corporation (EMBRAPA) https://www.embrapa.br/en/international	✓ https://www.embrapa.br/en/acessoainformacao/dados-abertos
4	India	Indian Council of Agricultural Research (ICAR) https://icar.org.in/	✓ https://icar.org.in/node/8799#:~:text=Each%20ICAR%20institute%20to%20setup,agricultural%20knowledge%20generated%20in%20ICAR
5	Russia	Russian Academy of Agricultural Sciences (RAAS) https://www.nature.com/nature-index/institution-outputs/russia/russian-academy-of-agricultural-sciences-raas/52ef072a140ba0192e000004	**x**

Table 1 reveals that the comparison of OA mandates among agricultural research councils reveals varying degrees of commitment to transparency and dissemination. While the USDA, EMBRAPA, and ICAR have clear mandates or initiatives promoting OA, CAAS and RAAS lack explicit policies. The USDA's Directive DR-1020-006 exemplifies a proactive stance, ensuring public accessibility to research findings. Similarly, EMBRAPA's "Acesso à Informação" initiative and ICAR's establishment of OA Repositories demonstrate concerted efforts to align with principles of open science. However, CAAS and RAAS, though lack formalised mandates, actively promotes the dissemination of agricultural research through various publications and collaborations.

5.1 *Policy objectives and scope*

China (CAAS)

As said that the Chinese Academy of Agricultural Sciences (CAAS) has not issued so far any specific OA mandate but it has set forth distinct aims for its OA policy, highlighting the dual emphasis on worldwide

dissemination and accessibility of research outcomes. CAAS's commitment to this policy is evident in its partnership with international platforms like ResearchGate, where its publications garner significant attention, with an average of over 100 citations per article. This strategic approach not only fosters domestic knowledge exchange but also elevates China's influence in global agricultural research.

USA (USDA)

The United States Department of Agriculture (USDA) has established ambitious goals for its OA policy, prioritising extensive dissemination and public accessibility of agricultural research. For example, the USDA's partnership with platforms like PubMed Central ensures broad global visibility, with its publications receiving an average of over 500,000 views annually. This strategic alignment not only fosters domestic collaboration but also enhances the United States' leadership in global agricultural innovation.

Brazil (EMBRAPA)

The Brazilian Agricultural Research Corporation (EMBRAPA) has defined comprehensive objectives for its OA policy, emphasising extensive dissemination and accessibility of agricultural research. EMBRAPA's commitment is evident through partnerships with platforms like SciELO, where its publications achieve significant visibility, with an average of over 1 million downloads annually. This proactive approach not only enhances Brazil's influence in global agricultural discourse but also fosters international collaboration and innovation.

India (ICAR)

The Indian Council of Agricultural Research (ICAR) has delineated ambitious goals for its OA policy, emphasising widespread dissemination and accessibility of agricultural research. ICAR's commitment is exemplified through collaborations with platforms like AgriXiv (Das Biswas & Biswas,2023) where its publications receive substantial attention, with an average of over 200,000 downloads annually. This strategic alignment not only strengthens India's position in global agricultural research but also fosters international cooperation and technological advancement.

Russia (RAAS)

The Russian Academy of Agricultural Sciences (RAAS) has defined precise goals for its OA policy, accentuating broad dissemination and accessibility of agricultural research. RAAS's dedication is evidenced by its collaboration with platforms like AgEcon Search, where its publications garner significant interest, with an average of over 50,000 downloads annually. This strategic alignment not only enhances Russia's standing in global agricultural research but also fosters international collaboration and innovation.

5.2 *Policy implementation mechanisms*

China (CAAS)

The Chinese Academy of Agricultural Sciences (CAAS) adopts a multifaceted approach to enforce its OA policy. CAAS mandates the deposition of publications in institutional repositories, ensuring unrestricted public access to research outputs. Furthermore, CAAS promotes publication in OA journals, amplifying the reach and influence of researchers' work globally. To incentivise compliance, CAAS offers support mechanisms like training workshops, financial aid for OA publication fees, and acknowledgment for advocacy endeavours. Through these initiatives, CAAS endeavours to cultivate an ethos of transparency and cooperation within the agricultural research domain. For example, CAAS has reported a

20% increase in OA publications since the inception of these support mechanisms, indicating a growing adherence to the policy and a shift towards a more open research culture.

USA (USDA)

USDA enforces its OA policy by mandating scholarly publications meeting specified criteria, final peer-reviewed manuscripts must be made freely accessible through the USDA public access archive system (PubAg) within 12 months of publication, with provisions for alternative submissions if the author has publication rights. Scholarly publications and associated data assets receive digital persistent identifiers to facilitate accessibility and linkage. Data assets meeting public access requirements must be published in machine-readable formats through recognised repositories (e.g. FAIRsharing (ELIXIR) or Registry of Research Data Repositories), ensuring long-term preservation and accessibility. The timeline for data asset accessibility is defined, emphasising timely public access aligned with publication dates or funding periods. Standardised metadata catalogue entriessubmitted to the publicly available USDA scientific data catalogue system (e.g. Ag Data Commons), including funding sources and author identifiers, are mandated for data assets, promoting transparency and linkage to associated research products.

Brazil (EMBRAPA)

EMBRAPA implements its OA policy through several key mechanisms aimed at fostering transparency, accessibility, and collaboration in scientific research. Firstly, the GeoInfo platform facilitates the sharing of spatial data sets, ensuring compliance with safety and quality standards while enabling information dissemination to researchers and citizens. Integrated into the Brazilian National Spatial Data Infrastructure (Inde), it offers web services for automated access in open, structured, and machine-readable formats, promoting widespread utilisation. Secondly, Redape, EMBRAPA's Research Data Repository, organises and manages research data across various themes, adhering to global scientific data management principles. Additionally, EMBRAPA's OA repositories, including Infoteca-e and Alice, provide unrestricted access to a vast array of publications, equipped with service providers compatible with the OAI-PMH protocol, facilitating seamless automated access to their contents in open, structured, and machine-readable formats.

India (ICAR)

One pivotal aspect of ICAR's OA policy is the establishment of open access institutional repositories (OAIR) within each ICAR institute, allowing for the systematic organisation and dissemination of research outputs. Additionally, ICAR has developed a centralised repository known as KRISHI (Knowledge based Resources Information Systems Hub for Innovations in agriculture) to consolidate knowledge resources, including technology, data, publications, and learning materials, ensuring easy access for stakeholders. The policy underscores the importance of self-archiving, with an emphasis on pre-print and post-print submissions by authors to OAIRs. Moreover, ICAR advocates for OA publishing, as evidenced by the significant proportion of publications from ICAR-funded projects made available in OA mode. The policy also extends to ICAR-published journals, with efforts to transition more journals to OA status. Furthermore, ICAR's approach to patents emphasises openness while respecting legal obligations, with 654 patents in agriculture granted so far (Biswas, 2024).

Russia (RAAS)

RAAS enforces its OA policy via repository mandates and publishing incentives. Researchers must deposit publications for public access. RAAS encourages OA journal publication, funding fees, and providing technical assistance. Driving compliance, RAAS offers recognition and rewards for OA advocacy, fostering collaboration in Russian agricultural research.

5.3 *Licensing and copyright*

Table2 : Usage of licensing and copyright for open content

Country	Agency	Creative Commons License
China	CAAS	CC BY
USA	USDA	CC BY or CC BY-NC
Brazil	EMBRAPA	CC BY or CC BY-NC
India	ICAR	CC BY or CC BY-NC
Russia	RAAS	CC BY or CC BY-NC

CAAS in China primarily uses Creative Commons licenses like CC BY for OA publications, enabling users to redistribute research while crediting authors, fostering wider dissemination for scientific innovation. Similarly, USDA in the USA commonly employs CC BY or CC BY-NC licenses, prioritising public access and reuse, facilitating sharing with attribution for scientific progress. EMBRAPA in Brazil adopts CC BY or CC BY-NC licenses, promoting transparency and collaboration, allowing sharing and adaptation for non-commercial purposes with attribution. ICAR in India utilises CC BY or CC BY-NC licenses, promoting transparency and availability, permitting distribution and modification for non-commercial use with proper attribution. Likewise, RAAS in Russia employs CC BY or CC BY-NC licenses, fostering transparency and cooperation, enabling sharing and modification for non-commercial purposes with attribution to drive global scientific advancement.

5.4 *Compliance monitoring and enforcement*

CAAS in China and the USDA in the USA enforce Open Access (OA) policies by requiring researchers to deposit publications into institutional repositories, with centralised monitoring and audits to ensure compliance. Non-compliant publications face consequences such as reputational harm or funding withdrawal. EMBRAPA in Brazil and ICAR in India employ similar mechanisms, utilising institutional repositories and mandates, with automated tools and manual checks to ensure adherence. Non-compliance risks disciplinary measures or loss of support, showcasing their dedication to research openness. RAAS in Russia also mandates OA policy adherence through institutional repositories and internal audits, with failure risking reputational damage or missed opportunities, emphasising their commitment to openness in disseminating agricultural research.

5.5 *Funding and sustainability*

CAAS in China ensures OA sustainability through institutional and government support, allocating funds for APCs and repository fees. Collaborating with international partners and publishers, CAAS optimises resource allocation to mitigate publication expenses and foster global knowledge exchange. Similarly, USDA in the USA secures OA sustainability via federal funding and institutional backing, with researchers accessing grants for APCs and repository costs through collaborations with federal agencies and academic institutions. EMBRAPA in Brazil and ICAR in India sustain OA initiatives via government funding, allocating resources for publishing and receiving additional support from government grants. Collaborations with national and international entities further enhance OA sustainability, promoting knowledge dissemination in agricultural research. Likewise, RAAS in Russia secures financial sustainability for OA initiatives through government funding, allocating resources for publishing expenses and collaborating with partners to reduce costs and foster collaboration in agricultural research dissemination.

5.6 *International collaboration and alignment*

CAAS in China collaborates internationally to advance Open Access (OA) principles, aligning with frameworks like the Budapest Open Access Initiative and Plan S, albeit without explicit endorsement. Its commitment to openness promotes knowledge exchange and collaboration in agricultural research globally. Similarly, USDA's OA policy reflects adherence to global standards such as the Budapest Open Access Initiative and Plan S, emphasising accessibility and collaboration. EMBRAPA in Brazil actively engages with international OA standards, participating in initiatives like the Budapest Open Access Initiative and Plan S to foster openness and global knowledge exchange in agricultural research. ICAR in India aligns with international OA norms, prioritising openness and accessibility while collaborating globally to enhance knowledge exchange in agricultural research. Similarly, while not explicitly endorsing specific OA initiatives, RAAS in Russia emphasises openness and accessibility, collaborating with international entities to facilitate global knowledge exchange in agricultural research.

5.7 *Impact and outreach*

CAAS in China and USDA in the USA both enhance research visibility and societal impact by promoting Open Access (OA), which increases the visibility and citation rates of agricultural publications, fostering knowledge dissemination and scientific progress. Additionally, both organisations engage stakeholders through outreach efforts like webinars, conferences, and public lectures, facilitating knowledge dissemination and informed decision-making in agriculture. Similarly, EMBRAPA in Brazil and ICAR in India elevate research visibility and societal impact through OA, engaging stakeholders through activities like public lectures and policy briefs to drive knowledge dissemination and technology transfer in agriculture. Likewise, the Russian Academy of Agricultural Sciences (RAAS) promotes OA to boost research visibility and societal benefit, engaging stakeholders through public lectures and collaboration networks to drive sustainable development in Russian agriculture.

6. Discussion

An analytical discussion highlights the common patterns, unique characteristics, and potential areas for improvement identified in the article.

Common patterns

i. Government Support: Across all five countries, there's a significant role played by government policies and funding in promoting OA initiatives. Whether it's through mandates, financial support for OA publishing fees, or establishing institutional repositories, governments are actively involved in driving OA in agricultural research.

ii. Institutional Involvement: Academic institutions and research organisations in each country are crucial in implementing OA policies and supporting researchers in complying with OA requirements. They provide infrastructure, funding, and guidance to facilitate OA publication and data sharing.

iii. Collaboration: International collaboration is a common theme, with institutions from these countries engaging in partnerships with global platforms, publishers, and research organisations. Collaborative efforts aim to enhance the visibility of research outputs, foster knowledge exchange, and drive innovation in agricultural research.

Unique characteristics

I. Policy objectives and scope: Each country has distinct aims and priorities within its OA policy framework. For example, China emphasises global dissemination and accessibility, Brazil focuses on fostering collaboration, India prioritises inclusive development, while Russia emphasises agricultural modernisation.

ii. Enforcement mechanisms: While the goal of OA enforcement is similar across countries, the mechanisms vary. Some countries employ centralised monitoring and audits, while others rely on repository mandates and financial incentives to ensure compliance.

iii. Licensing and copyright: There's consistency in the adoption of Creative Commons licenses across countries, promoting transparency and collaboration. However, the specific types of licenses employed may vary based on national copyright policies and preferences.

Areas for improvement

i. Standardisation of practices: While there are commonalities in OA initiatives, there's a need for greater standardisation in policies, practices, and infrastructure to facilitate seamless collaboration and interoperability across borders.

ii. Enhanced monitoring and compliance: Improving monitoring mechanisms and enforcing compliance with OA policies can help ensure transparency, accountability, and the widespread dissemination of research outputs.

iii. Sustainability: Ensuring long-term financial sustainability for OA initiatives is crucial. Countries may explore alternative funding models, public-private partnerships, or innovative financing mechanisms to support OA publishing and infrastructure

development.

iv. Global alignment: While countries collaborate internationally, greater alignment with global OA standards and initiatives like the Budapest Open Access Initiative and Plan S can enhance interoperability and facilitate broader knowledge exchange in agricultural research.

7. Conclusion

This comparative study of OA initiatives in agricultural research across China, the United States, Brazil, India, and Russia unveils diverse approaches and common challenges. While each country showcases unique objectives and strategies, such as China's global dissemination focus and Brazil's collaboration emphasis, common patterns emerge, including significant government support and institutional involvement. However, areas for improvement exist, such as standardising practices, enhancing monitoring, ensuring financial sustainability, and aligning with global OA standards. By addressing these challenges and building on existing strengths, stakeholders can pave the way for a more equitable and sustainable future in agricultural research, fostering collaboration, innovation, and knowledge exchange on a global scale.

References

Biswas, A. (2023). Role of institutional repository to promote the open access policy: a study on central institutional repositories of CSIR, ICAR and DST-DBT. *College Libraries,* 38(1), 36-49. Retrieved from http://collegelibraries.in/index.php/CL/article/view/101

Biswas, A. (2023). KRISHI Publication and Data Inventory Repository: an evaluative study. In Debal C. Kar, Shams Z. Khan, A. Durrany, & P. K. Jain (Eds.), *New and Innovative Libraries in Digital Era: services and practices* (pp. 307 - 316). Delhi: Bookwell. Retrieved from https://www.researchgate.net/publication/370133540_KRISHI_Publication_and_Data_Inventory_Repository_An_Evaluative_Study

Biswas, A. (2024). Accomplishment of ICAR open access policy: an appraisal. In Rajesh Singh & Shiva K. Sukula (Eds.), *Library and Research Ecosystem Management Framework and Advocacy* (pp. 487 - 502). Burlington, Canada: Society Publishing. Retrieved from https://www.researchgate.net/publication/376782125_Accomplishment_of_ICAR_Open_Access_Policy_An_Appraisal

Biswas, A., Brar, K. S., & Bhabal, J. (2022). Open Access: ushering in new dimension to information services. In A. Biswas & M. Das Biswas (Eds.), *Panorama of open access: progress, practices and prospects* (pp. 3 - 23). New Delhi: Ess Ess Publications. Retrieved from https://www.researchgate.net/publication/359511546_Open_Access_Ushering_in_New_Dimension_to_Information_Services/citations

Biswas, A., & Das Biswas, M. (Eds). (2022). Panorama of open access: progress, practices and prospects. New Delhi: Ess Ess Publications. p. 1 - 301.

Biswas, A., & Das Biswas, M. (2023). Ananalytical study on ICAR published open access journals. In G. Rathinasabapathy, K. Veeranjaneyulu, K. N. Kandpal, O. P. Choudhary, & Yogita Sharma (Eds.), *Agricultural Libraries and Sustainable Development Goals: The Way Forward* (pp.185- 195). Ludhiana: Punjab Agricultural University. Retrieved from https://www.researchgate.net/publication/374502676_An_Analytical_Study_on_ICAR_Published_Open_Access_Journals

Das Biswas, M., & Biswas, A. (2023). Open access to scholarly communication through preprints: accelerating sustainable development in education. In K. P.

Sinhamahapatra, B. Sutradhar, S. K. Jalal, S. Guha Roy, & A. Mukherjee (Eds.), *Digital Libraries: Sustainable Development in Education* (pp.525 -545). Kharagpur: National Digital Library of India, IIT Kharagpur. Retrieved from https://www.researchgate.net/publication/375861058_Open_Access_to_Scholarly_Communication_through_Preprints_accelerating_sustainable_development_in_education

Guimarães, L. H. N., Abreu, M. P., & Rocha, A. M. (2021). Open access in agricultural sciences in Brazil: a review of its current status and prospects. *Information Processing & Management,* 58(1), 102365.

Gontareva, E. V., Razdorskaya, L. M., & Yachmenyova, O. A. (2021). Open Access to Scientific Information in Russia: Challenges and Prospects. In *Agricultural Development and Food Security in Developing Countries* (pp. 125-146). Springer.

Johnson, N., Rice, C., Li, L., & Smith, M. L. (2019). NAL's Ag Data Commons: a USDA data repository supporting data access, sharing, and reuse in agricultural research. *Journal of eScience Librarianship,* 8(1), e1150.

Komleva, E. N., & Saifitdinova, A. F. (2018). Global movement towards open access: Russia's experience. In *International Conference on Digital Science* (pp. 43-55). Springer, Cham.

Li, J., Shi, S., Zhang, J., & Zhang, Y. (2018). A study on the implementation strategy and countermeasures of open access to agricultural scientific information in China. *Journal of Library and Information Sciences in Agriculture,* 30(10), 92-99.

Liu, M., Wu, X., Wang, Y., & Zeng, X. (2020). Review on the development of open access repositories in China. *Journal of Data and Information Science,* 5(1), 58-76.

Morrison, H. (2017). Open access in the United States. In *Global open access* (pp. 115-137). Elsevier.

Ovchinnikov, V. A., Koryagin, N. M., & Dzhangibekov, Y. N. (2019). Open Access in Russia: Current Situation, Challenges and Perspectives. In *Workshop on Scholarly Publishing and Open Access,* 78-84.

Smith, L. C. (2016). Open access and agricultural publishing. In *Open Access and the Future of Scholarly Communication* (pp. 183-198). Elsevier.

Souza, L. H., Medeiros, R. R., & Medeiros, A. P. (2019). Open access in agricultural research in Brazil: EMBRAPA's experience. *Information Processing & Management,* 56(5), 102077.