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A Citation Analysis of Scientists' Publications from Selected Agricultural Institutions in Ibadan, Nigeria

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Abstract

This paper investigated the citation patterns in the published works of scientists from the Institute of Agricultural Research and Training, Federal College of Agriculture, and Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria. The study employed bibliometric research methods to analyze 12,903 citations from 1,202 articles authored by 43 scientists in 14 agricultural and related fields. The results showed that journal articles were the most cited resource, accounting for 6,967 citations (54.00%), followed by monographs with 2,425 citations (18.79%), while archival materials were cited only 3 times (0.02%). This analysis highlights a strong preference for periodical materials among the various information sources referenced in the scientists' publications over the past 50 years (1970 – 2020). The consistent reliance on journals was evident across most disciplines, with notable exceptions in Biometrics, Seed Technology, and Information Science, where deviations were observed. The age distribution of cited materials underscores the importance for agricultural libraries to offer a wide range of resources, including both contemporary and foundational research materials, and to tailor their collection development strategies to meet the specific needs of their users. The Chi-Square Test showed a significant variation ($p < 0.001$) in the average age of cited materials across disciplines, confirming the significant variations in citation frequencies among different age categories. Using targeted strategies such as subject-specific acquisitions is essential to enhance the relevance of resources. This approach should prioritize the acquisition of recent and frequently used materials while ensuring that the average age of the collection remains 16 years or less to support scientific research and development in institutional libraries.

Introduction

The importance of collaboration between the public and private sectors to tackle funding shortfalls in the agricultural sector, particularly in West Africa, including agricultural libraries, has been highlighted by Dan and Bassolet (2021). Many countries in this region are experiencing significant financial constraints that hinder the growth of library collections and the research capabilities of agricultural institutions (Ehirim, 2024). According to the FAO (2015), the funding issues confronting agricultural libraries have far-reaching effects on agricultural research and development. Insufficient financial resources limit their ability to build extensive library collections and acquire essential materials. Consequently, these challenges delay the publication of research findings that are essential for promoting agricultural development.

Hefeker and Cooper (2022) discussed the broad economic impact of currency devaluation in developing countries, highlighting how these economic adjustments can disrupt local markets and increase prices of essential goods, such as books. The rising book prices are a consequence of the devaluation of the monetary system in developing countries. This trend is particularly exacerbated by

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the depreciation of local currencies against foreign currencies, severely impacting the ability of libraries

One of the most heavily affected are agricultural libraries, which are tasked with providing interdisciplinary resources and meeting the information needs of researchers in various fields of study to support research, teaching, and learning (Lawal and Maharazu, 2022). Agricultural libraries were initially established to support research scientists by providing resources for fieldwork, technology dissemination, innovation adoption, laboratory training, seminars, workshops, conferences, and scholarly activities. However, these libraries have often been inadequately equipped due to the lack of appropriate selection tools. For a library to be viable, it must be stocked with relevant, subject-specific collections that meet the unique information needs of scientists.

The acquisition librarians in most agricultural libraries are now to prudently and judiciously utilize the limited funds available in the acquisition of the most relevant resources to satisfy the information needs of its users. Information is dynamic, and the volume of information explosion globally has not only increased exponentially but the growth rates also differ from one field of study to another. Most libraries are now in the quest to find a reliable mechanism that will help to ascertain the most needful information-bearing materials to be subscribed. This quest has called for librarians to have a professional and clear understanding of information needs and information resources used by researchers. One way to do this is by analyzing the citation analysis in the published works of scientists in agricultural institutions to discover what materials are cited in their research activities and breakthroughs. The knowledge of this will guide libraries to provide materials that are needed to complement teaching, learning, research, and scholarly publications. The results of the analysis will help libraries base their acquisition of materials on facts not on opinions.

Library collection development and selection tool

The library exists to serve its patrons and the only way that objective of meeting its user's needs is through the quality of collection it acquires. According to Uwandu and Okere (2022), the main objective of establishing a library is to satisfy the needs of its clientele by providing materials relevant to their needs. Thus, the collection and development to acquire both print and non-print resources (Arslanalp *et al*., 2022).

of information resources constitute the basic instrument of service delivery to the users (Nwosu and Udo-Anyanwu, 2015**).** Collection development in libraries will always be a continuous activity, as the library is as good as its collections. The effective usage of library resources is a product of the appropriateness of the selection criteria deployed in the acquisition of relevant information materials. The collection development process is therefore seen as a vital and critical process in selecting, ordering and acquiring information materials into the library by a team of library professionals putting into consideration the budget available to the library, the parent institution, and external researchers. Eze and Eze (2006) defined collection development policy as a written statement that guides the library's collection procedures or a document that contains lists of guidelines as to what is suitable for acquisition in a particular library.

Azubuike (2001) states that collection development is the process the library adopts to assemble different types of materials that the users may need. It is also a systematic and organized process of acquiring and improving both the quality and quantity of a library's information resources in continuing order to maximize their use or enhance their exploitation (Oduagwu, 2002). Collection development is therefore a means of acquiring various information resources in the library and ensuring that they meet the information needs of its users as the library interfaces the staff, clientele, and holdings (Vandana, 2020). Often times, acquiring relevant library collections is a product of good and painstaking selection. Therefore, the use of selection tools in library acquisition is key for the development of a viable holding in which the acquisition librarian or the team responsible for the collection development has to be well guided, this can only be possible using up-to-date selection tools to satisfy users' information needs. The application of citation analysis is a potent tool for collection development more credible and effective than other traditional means of materials acquisition in the library (Engar, 2009; Yelena, 2007).

The library is a growing organism and its continuous existence depends on the information resources it has in its holdings, thus Eze and Eze (2006) see collection development as a universal

phenomenon that involves professional tasks in deciding which information materials to be acquired based on the selection process anchored on quantitative usage of information resources. According to Uwandu and Okere (2022), while billions of works are published every day, collection development managers must ensure that selecting materials should be based on some criteria. These include; depth of coverage, number of users, accuracy of facts contained in the book, relevance, currency, general organization of the work, style of presentation, quality of paper, authoritativeness, and price of the books.

Citation analysis

Every research or study builds on previous work, as knowledge is continuously evolving and dynamic. Therefore, a citation is very essential and a sine qua non in carrying out a study to examine bibliographic data from multiple volumes of journal articles, monographs, published bibliographies, theses and electronic indexes to understand researchers' specific information based on past, present and future needs (Fagbola and Adejoro, 2012). Citation is an analytical tool for examining reference citations in bibliometric studies (Tunon and Brydes, 2005), to determine the position of authors and can help to identify useful journals (Salami and Olatokun, 2017). Citation analysis, therefore, is also a branch of information science in which the researcher studies the way articles in scholarly fields are accessed and referenced (Meho, 2007). A citation analysis of current and retrospective agricultural literature plays an important role in ensuring that agricultural scientists at all levels have access to the most relevant library collection to maintain high standards of research productivity, teaching output, training, and consultancy services.

For balanced library holdings through a reasonable collection of both print and non-print materials, librarians must know the characteristics of literature cited by library clientele most especially in agricultural institutions which are multi-disciplined. The changing trends in research areas and the information-seeking behaviour of research scientists are factors that agricultural libraries need to study to provide collections and services that fulfill their information needs. One of such methods to examine the actual usage of information resources is in the analysis of citations listed at the end of published works of scholars.

Thus, this study aimed to carry out a quantitative content analysis of literatures cited in the published works of research scientists in the Institute of Agricultural Research and Training, Federal College of Agricultural, and Federal College of Animal Health and Production Technology, Ibadan, Nigeria; to understand the actual literature requirements of the scientists, and identify specific information needs as indicator for library collection development and as catalyst in the selection of relevant resources for effective agricultural information acquisition and dissemination.

Materials and Methods

The adopted research method consists of the technique of gathering data by extraction and direct analysis of citations in the published works of scientists submitted to the Main Library of the three (3) selected Agricultural Institutions: Institute of Agricultural Research and Training (IAR&T), Federal College of Agriculture (FCA), and Federal College of Animal Health and Production Technology (FCAH&PT), Moor Plantation, Ibadan, Nigeria). Seventy-one (71) Published works of scientists stocked in the reserve section of the main Library were retrieved from the shelves, representing 100% of the total published works of the scientists in the library holding. A Purposeful Sampling method was thereafter used to select sixty (60) publications to have the sampled size from the rank of Senior Research Fellow/Senior Lecturer above out of the entire population size of seventy-one (71) Published works of scientists in the three (3) Agricultural Institutions' main library holding. The entire 12,903 citations generated from 1,202 scholarly articles across fourteen (14) disciplines were all analyzed to have accurate representation. This study covers a period of 50 years from 1970-2020. Thirteen (13) different types of library resources cited were analyzed while the current year and obsolescence of cited literature were established by subtracting the year of each cited literature from the year of each 1,202 published articles. A Chi-Square test was used to compare the frequency of citations across different age categories of materials. The test statistic was used to determine if there is a significant difference in how often the materials of different ages are cited. The test statistic was calculated to check if the observed citation frequencies differ from what we would expect if there were no differences based on the age of the

materials. This analysis focuses on identifying disciplines that predominantly use the most current literature (below 5 years) and those that rely on obsolescent materials (above 31 years).

$$D = \frac{CA \leq 5\ years}{TFC} x\ 100$$

Discipline=Citation Age below 5 years divided by Total Frequency of Citation multiplied by 100.

$$D = \frac{CA \geq 31\ years}{TFC} x\ 100$$

Discipline=Citation Age above 31 years divided by Total Frequency of Citation multiplied by 100

Average Age of materials Cited

$Average\ Age\ (AA) = Total\frac{Sum}{D} = 220.\frac{4933}{14} =$ 15.74952357 (Approximately 16 years)

Sum of Total: 220.4933

Total Number of Entries Discipline (D): 14

Results and Discussion

Frequency of articles and subject distribution of literature cited

Table 1 revealed that Agricultural Extension, Animal Sciences, Plant Science and Food Science are the most prolific in terms of frequency of articles published and the subject distribution of literature cited across Agricultural and the related fields. Highest frequency of articles published, appeared under Agricultural Extension 215 representing (17.89%) followed by Animal Science 190 (15.81%), Plant Science 180 (14.98%), Food Science 161 (13.39 %), Soil Sciences 113 (9.40 %), Agronomy 91 (7.57 %), Entomology 81 (6.74 %) and the least frequency of articles published was Biometrics less value 7 (0.58 %) of 1202 total articles published. Table also indicates that out of 12,903 literature cited, Plant Science has the highest distribution of literature cited with 2,646 (20.51 %), followed by Food Science 2,266 (17.56 %), 2,187 (16.95 %) in Animal Science and 1,674 (12.97 %) in Agricultural Extension. The data reveals that disciplines like Agricultural Extension, Animal Science, and Plant Sciences not only exhibit a high frequency of publications but also attract a substantial number of literature citations. These result mirror high-impact areas where agricultural libraries should prioritize the acquisition of resources in Agricultural Extension, Animal Sciences, Plant Sciences and Food Sciences. Result have shown a high level of research activity and output in these fields, which should guide the formulation of templates for collection development. The high frequency of published articles and citations in these areas are critical focal points for collection development in agricultural libraries to support research and academic activities.

In contrast, fields such as Biometrics have significantly fewer publications, indicating a potential area for growth. This suggests a need for targeted collection development to support emerging research and resource allocation in less represented fields.

Table 1: Frequency of articles and subject distribution of literature cited

Disciplines	Published Articles	% of Published Articles	Citation Count	% of Citation Count
Agricultural. Economics	53	4.41	652	5.05
Agricultural Engineering	13	1.08	219	1.70
Agricultural Extension	215	17.89	1674	12.97
Agronomy	91	7.57	637	4.94
Anim. Science	190	15.81	2187	16.95
Biometrics	7	0.58	71	0.55
Crop Science.	12	1.00	312	2.42
Entomology	81	6.74	768	5.95
Food Science	161	13.39	2266	17.56
Information Science	23	1.91	65	0.50
Plant Science	180	14.98	2646	20.51
Seed Technology	39	3.24	49	0.38
Soil Science	113	9.40	982	7.61
Swine & Genetics	24	2.00	375	2.91
Total	1,202	100.00%	12,903	100.00%

Table 2 indicates a predominant reliance on journals as the most cited literature across the 14 disciplines which accounts for 6,967 **(**54.00%) of the total 12,903 citations, Books are the second most cited source, with 2,425 citations (19.00%) followed by Conference proceedings with 819 citations (6.30%), while Archival materials 3 (0.02%) are the least cited information sources. Specific-discipline Journal usage revealed Plant Science had the highest journals usage with 1,562 citations, Food Science followed with 1,427, Animal Science 1,241 out of the total 6,967 journal citations.

Findings in this table has revealed clear implications for collection development prioritizing journal subscriptions. Agricultural libraries should prioritize the acquisition and subscription to key journals in Plant Science, Food Science, and Animal Science, as these disciplines showed the highest usage. The overwhelming preference for journals, which constitute 54.00% of the citations, underscores the critical role periodical acquisitions play in agricultural research. Ensuring access to a wide range of current and relevant agricultural journals will significantly support researchers' needs and enhance the quality and timeliness of their work (Aina, 1983). With books being the second most cited source, comprising 2,425 (19.00%) of the citations, expanding book collections is suggested for Agricultural institutional libraries to maintain a robust collection of up-to-date books. The citation of conference proceedings, although lower at 819 (6.30%), indicates their value in providing cutting-edge research and latest findings presented by experts. Agricultural libraries should include relevant conference proceedings in their collections to offer researchers access to innovative and contemporary studies. Given that archival materials are the least cited, indicated that reliance on Archival materials should be minimizing while libraries should focus on enhancing more frequently used resources.

Analysis of disciplines using the most current literatures below 5 years and obsolescence materials above 31 years

Table 3 provides data on the age distribution of cited information materials across various disciplines within the agricultural sciences.

Disciplines Using the Most Current Literature below 5 years:

Utilization of recent materials was predominant in five disciplines out of fourteen disciplines sampled. Agricultural Extension has the highest value 481 (21.95 %) of 2,191 total citation below 5 years, followed by Food Science 384 (17.52%), Plant Science 358 (16.33%), Animal Science 296 (13.50%), Agricultural Economics 119 (5.43%) and Seed Technology 106 (4.83%). Therefore, Agricultural Extension, Food Science, Plant Science, Animal Science, Agricultural Economics and Seed Technology exhibited a significant reliance on recent literature below 5 years. This trend indicated that these fields are rapidly evolving and depend heavily on the latest research findings, technological advancements, and contemporary methodologies. The implications of these findings are for agricultural libraries to prioritize acquiring the most recent publications, journals, monographs and conference proceedings in these fields to support the immediate research needs of research scientists and other library clienteles.

Disciplines Using Obsolescence Materials above 31 years:

Usage of obsolescent materials or older literature was noticeable in fields like Agronomy, Seed Technology, Crop Science, Plant Science and Biometrics. In which Agronomy had the highest number of obsolete materials in 31-50 years 126 (53.38 %) of 236 total citation metric; Seed Technology 46 (19.49 %), Crop Science 33 (13.98 %), Plant Science 26 (11.01 %) and Biometrics 5 (2.10 %). These findings corroborate those of Walters (2011), whose study found that older research articles are valuable and frequently cited, indicating their lasting relevance in scholarly work. These findings revealed that historical research and foundational studies of many decades still play an essential role in referencing agriculture and related disciplines information materials. The results have shown older research as a vital resource to present the breadth and depth of research in specific subjects. Hence, agricultural libraries should maintain comprehensive archives of older, seminal works and historical studies.

Diverse Age of Materials Usage.

Table 3 also revealed a balanced use of both recent and older literature in fields such as Agricultural Extension, Animal Science, Food Science, Plant Science and Seed Technology. While materials less than 5 years old were frequently utilized, there was also significant usage of older materials, ranging from

Table 2: Types of literature cited across disciplines

Disciplines	*Jour	Bk	Conf. Proc.	Inst. Pub.	Rep.	Thesis & Dissert.	Ref. Mat.	Elect Media	Occ. Pub.	Abst & Index	News-letter	Govt-Pub.	Arch	Total
Agricultural Economics	193	108	77	74	35	21	71	39	14	13	1	5	1	652
Agric. Engineering	103	11	13	2	13	5	45	6	7	8		6		219
Agricultural Extension	360	199	187	119	181	143	199	42	72	45	14	111	2	1,674
Agronomy	466	103	12	24	10	15	3				2	2		637
Animal Science	1241	260	171	207	12	62	18	31	120	40	1	24		2,187
Biometrics	13	44	4		3	2	1	2	1	1				71
Crop Sci.	243	28	9	4	6	8		10		1	1	2		312
Entomology	466	135	41	23	52	15				1	3	32		768
Food Science	1427	630	48	59	32	14	3	5			46	2		2,266
Information Science	64				1									65
Plant Science	1562	593	152	60	45	62	7	94	23	8	29	11		2,646
Seed Technology	45	2	2											49
Soil Science	550	255	83	13	14	15	20		4	6	21	1		982
Swine & Genetics	234	57	20		3	10		48			3			375
Total	6,967	2,425	819	585	406	372	367	277	241	123	122	196	3	12,903
(%)	(54 %)	(18.79 %)	(6.35 %)	(4.53 %)	(3.15 %)	(2.88 %)	(2.84 %)	(2.15 %)	(1.87 %)	(0.95 %)	(0.95 %)	(1.51 %)	(0.02 %)	(100 %)

*Jour: Journal, Bks: Books, Conf. Proc: Conference Proceedings, Inst. Pub.: Institutes' Publications, Rep.: Report, Dissert. Dissertation, Ref. Mat: Reference materials, Elect. Media: Electronic Media, Occ. Pub: Occasional. Publication, Abst. Abstract, Govt. Pub.: Government Publication, Arch: Archival

Table 3: Age distribution of information materials cited

Discipline	<5	5 – 10	11 – 20	21 – 30	31 – 40	41-50	Total sum >31	%>31	% <5	Total	Average age
	Years										
Agric.Econs	119	204	192	82	0	0	0	0	5.43	597	11.5486
Agric. Eng.	64	82	57	16	0	0	0	0	2.92	219	9.43607
Agric. Ext	481	524	561	371	0	0	0	0	21.95	1937	12.023
Agronomy	67	164	210	179	78	48	126	53.38	3.05	746	18.9946
Animal Sci.	296	443	635	578	0	0	0	0	13.50	1952	14.6742
Biometrics	8	13	25	15	4	1	5	2.11	0.36	66	16.2879
Crop Sci	64	88	118	59	24	9	33	13.98	2.92	362	14.9586
Entomology	61	41	63	41	0	0	0	0	2.78	206	12.0485
Food Sci.	384	490	752	504	0	0	0	0	17.52	2130	13.6822
Info. Sci.	21	31	8	7	0	0	0	0	0.95	67	8.76866
Plant Sci.	358	470	656	397	26	0	26	11.01	16.33	1907	43.7735
Seed Tech	106	261	368	501	46	0	46	19.49	4.83	1282	17.422
Soil Sci.	76	86	136	158	0	0	0	0	3.46	456	15.2895
Swine Gen.	86	126	93	67	0	0	0	0	3.92	372	11.586
Total	2,191	3,023	3,874	2,975	178	58	236	100	100	12,299	15.74952

11 to 30 years, indicating the continued relevance of historical research in these areas. The balanced citation pattern indicates that researchers in these fields value both cutting-edge advancement and established knowledge. Research scientists value both contemporary studies for their latest advancements and historical literature for foundational knowledge and long-term insights. Collins and Fauser (2005), support these findings with the notion that a solid grasp of existing knowledge is essential for designing new research, enabling researchers to build on a robust foundation while advancing the frontiers of current scientific understanding. They argued for a balance between new and old literature, noting that understanding the current state of knowledge, generated by basic science, is fundamental for future scientific practice. In Agricultural Extension, the integration of current literature ensures that practitioners are informed about the latest techniques and technologies which are crucial for effective extension services. Simultaneously, older literature provides essential background, historical trends, and proven methodologies that have stood the test of time. This combination supports a comprehensive understanding and facilitates the development of more robust and effective extension programmes. Similarly, in Animal Science, current research contributes to advancements in genetics, nutrition, health management, and animal welfare. In Plant Science, current literature is essential for understanding recent developments in plant genetics, breeding techniques, biotechnology, and sustainable agricultural practices. Meanwhile, older literature provides critical insights into traditional practices, long-term agricultural trends, and historical data on plant growth and development. This balance ensures that research scientists can innovate while maintaining an appreciation for the evolutionary progress in plant sciences. In Seed Technology, the use of up-to-date research is vital for advancements in seed treatment, storage, and genetic modification, which directly impact crop yield and quality. Historical literature, on the other hand, offers fundamental principles, past experimental data, and established techniques that continue to inform and guide modern practices. The integration of both current and older literature in seed technology allows for continuous improvement and innovation while respecting the proven methods of the past. Result has therefore highlighted the importance of including a mix of new and older materials to support comprehensive research needs in agricultural disciplines. The balanced use of both current and older literature across these fields highlights the importance of building on established knowledge while staying at the forefront of new developments. Alex Verstak *et al.* (2014) corroborated this mixed citation patterns and emphasized the need for a balanced approach in library collection development.

Table 3 underscores the importance of tailoring collection development strategies to the specific needs of each discipline. This is revealed in the significant variation in the average age of materials across disciplines. For instance, Plant Science showed the highest average age of 43.77 years, indicating a need for substantial updating. Conversely, disciplines like Information Science, Agricultural Engineering, Agricultural Economics, Swine Genetics, Agricultural Extension and Entomology had lower average ages that range from 8.77 and 12.05 years, suggesting relatively current collections. Data from the table therefore reveals how the age of the collection informs library collection development strategies. This result has appropriated an average age of 15.75 approximately less than 16 years as the crucial metric for assessing the relevance and currency of library collections. Adhering to the recommended average age of 16 years or less helps maintain a collection that is both current and valuable. By prioritizing recent publications, maintaining essential older works, and aiming for an average collection age of 16 years or less, libraries can better support the research activities of their patrons. This approach ensures that collections remain relevant, comprehensive, and valuable, thereby enhancing the overall quality and impact of scientific research. In agricultural libraries, where scientific advancement and new research are continually emerging, maintaining an up-to-date collection is essential. The recommended average age of 16 years or less therefore, provides a useful benchmark for accurate collection development that will improve the quality of the library's resources to enhance scholarly activities.

Chi-Square test provide insight into whether there is a significant difference in referencing the age of newer materials over older ones or if there is a balanced approach to citing sources of various ages (Table 4). The Chi-Square value is 2366.5 with 13 degrees of freedom, and the p-value is 0.001. The p-

Table 4: Results of chi-square test on age of cited materials

S/N	Chi Square Test	
1	Chi Square Statistics	2366.5
2	Degree of Freedom	13
3	P- Value	0.001

$P < 0.05$= significant difference < 5 to >31 years

value of 0.001 is significantly lower than the conventional alpha level of 0.05, indicating that the observed differences in citation frequencies across age categories are statistically significant. This low p-value suggests a strong rejection of the null hypothesis, providing substantial evidence that the age of materials significantly influences citation practices.

The substantial Chi-Square statistic and the highly significant p-value imply that there is a notable difference in the citation frequencies of materials based on their age. This result indicates that researchers do not cite materials uniformly across different age categories. Instead, there is a discernible pattern or preference that emerges in the citation behaviour. The significant difference in citation patterns shows that researchers might have a preference for citing materials from specific time periods. This reflected in their bias towards newer materials in less than 5 years, indicating a trend towards utilizing the most recent research findings. Conversely, it also revealed a reliance on older, foundational works of more than 31 years. This result provided a clear understanding of the citation trends for agricultural libraries to better manage collections and resources for effective usage. The Chi-Square test revealed a significant difference in the age of cited materials, suggesting that citation practices are influenced by the age of the resources. Understanding these patterns can aid in better supporting the informational needs of researchers and ensuring that valuable materials, regardless of age, are accessible and utilized effectively.

Conclusion and Recommendations

The study revealed that research scientists across various disciplines predominantly utilize published literature in journals, with a marked preference for recent information materials. This trend is consistent across most fields except in Biometrics, Seed Technology and Information Science. The findings underscore the importance of a strategic approach to collection development for agricultural libraries. The data indicated that incorporating both contemporary and essential historical research materials is crucial for research scientists to have access to a comprehensive range of resources that support both their current and foundational research needs. This was established through a notable preference for newer materials (less than five years old) and foundational works (over thirty-one years old), indicating a trend towards using the most recent research alongside critical older studies to support comprehensive research needs in agricultural disciplines. The substantial Chi-Square statistic and the highly significant p-value implied that researchers do not cite materials uniformly across different age categories. To better manage collections and resources, libraries should consider maintaining a balanced collection that includes both the latest research to support current studies and older foundational works that provide essential background information. This approach will ensure that the informational needs of researchers are adequately met and that valuable materials, regardless of age, remain accessible and utilized effectively. To enhance the overall effectiveness and accessibility of library collections that cater for the diverse informational requirements of the agricultural research community, libraries should consider maintaining a balanced collection that includes both the latest research to support current studies and older, foundational works that provide essential background information across disciplines in agricultural institutions. The study therefore recommends subject-specific acquisition, prioritization of recency and usage proximity, and maintaining an average collection age of 16 years or less. By focusing on the average age of materials, libraries can develop targeted strategies for collection development, ensuring that their collections remain relevant and useful for their users. This article thus provides a valuable framework and a clear roadmap for agricultural libraries to assess and enhance their collections to effectively meet users' needs with specific metrics.

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