



**AUTHORSHIP PATTERNS AND DEGREE OF COLLABORATIONS OF AGRONOMY
JOURNAL ARTICLES 2000-2020: A BIBLIOMETRIC ANALYSIS**

By

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Abstract

This study conducts a bibliometric analysis of authorship patterns and degree of collaboration in agronomy journal articles published between 2000 and 2020, with the aim of identifying patterns that can inform strategies to improve access to agronomy research in Nigeria. A total of 705 peer-reviewed articles sourced from the JSTOR, AGORA, and ProQuest databases were retrieved and analysed using descriptive bibliometric methods. Findings revealed a marked upward trend in publication output over the period: early years (2000–2010) showed low and comparatively stable production (averaging around 15 articles annually), followed by moderate increases from 2011–2017 (roughly 30 articles/year), and a sharp rise post-2017, peaking at 162 articles in 2019. AGORA and ProQuest accounted for the largest share of this later growth. Authorship patterns indicated strong collaboration, with multi-authored publications comprising 72.06% of the total and a Degree of Collaboration of 0.72. Large teams (more than five authors) were especially prominent in the highest-output years. The study recommends sustained investment in database access platforms, promotion of international research partnerships, capacity-building for scholarly publishing, and stronger open-access advocacy.

Keywords: Agronomy, Authorship, Bibliometric, Collaboration, Database, Journal

1.0 INTRODUCTION

1.1 Background to the Study

The word “bibliometrics” constitutes one of the most important research areas in the field of library and information science. Use quantitative and statistical analyses to describe patterns of publications within a particular field or body of literature. Pritchard (1969) cited in Salinas-Ríos (2022), defined bibliometrics as “the application of mathematical and statistical methods to books and other media”. It involves analysing a series of publications characterized by bibliographic variables such as the author(s), the place of publication, keywords associated with the subject and citations. Bibliometric analysis is a popular method for determining the keywords, the connections between them, and the number of citations produced by publications published over a specific period of time when examining the state of the art in a particular field of knowledge (Rocchi, Boggia, & Paolotti, 2020).

According to Garg, Lamba, and Singh (2020), journals are a vital source of information and are considered the most significant medium for disseminating research findings, novel concepts in a subject, and an indicator of the expansion of literature in any field of study. Online databases are collections of electronic information sources that have been specifically or general, they are organised to meet the information needs of researchers from a variety of fields. Azubuike and Orsu (2021) defined electronic database as a group of electronic information sources from publishers in different fields of study. Electronic databases are regularly updated to reflect current literature trends in research that serve as a catalyst for research, development, education, study and learning as well as to the overall enhancement of academic excellence. Electronic databases organize digital collections of references used to publish a variety of materials, including journal articles, newspaper articles, conference proceedings, reports, legal publications, theses, and eBooks, among others.

Agronomy is a branch of agricultural science that focuses on the science and practice of growing crops for food, fibre, fuel and other essential resources. Agronomy encompasses a wide range of practices and disciplines including plant genetics, soil science, Crop physiology, pest management and agricultural technology. Access to agronomy research in Nigeria from 2000 to 2020 faced significant challenges, such as limited research output, poor distribution methods, and a lack of international collaboration (Aliyu & Babayi, 2024). Nigerian academic institutions frequently face limited access to crucial research databases due to high subscription costs, inadequate government

funding, and restricted institutional budgets for library resources (Suelzer & Jackson, 2022). Also, Nigerian researchers have significant obstacles in accessing agronomy research due to institutional deficiencies in academic institutions, inadequate library resources, and limited research networks (Adewojo, Olubiyi, Hamzat, & Ajani, 2023).

Consequently, academic faculties, particularly in agriculture, face constraints that hinder their access to contemporary agronomy literature. This divide impedes research and restricts the ability of Nigerian researchers to participate meaningfully in international agronomy research discussions, thereby exacerbating Nigeria's position within the global scientific community (James *et al.*, 2025).

Despite this growing body of work on access barriers, comparatively little of it examines how agronomy research actually gets produced once access is secured, specifically, whether the field's authorship is shifting toward the kind of large, collaborative teams seen in other rapidly internationalising disciplines (Wang & Xu, 2023), or whether it remains dominated by smaller, more individual efforts. Most existing Nigeria-focused bibliometric studies (Aliyu & Babayi, 2024; Sani & Olugbade, 2018) describe local output in isolation, without tracking how collaboration norms and publication volume have evolved over time within the same international databases Nigerian researchers and libraries actually use. This study addresses that gap directly: it tracks year-wise growth and authorship/collaboration patterns in agronomy literature indexed in JSTOR, AGORA, and ProQuest between 2000 and 2020, treating these trends as a proxy for how the field's scholarly practices have changed over two decades.

This study aims to conduct a bibliometrics analysis of agronomy literature in Nigeria from 2000 to 2020 using JSTOR, AGORA and ProQuest databases.

1.2 Research Objectives

The general objective of this research is bibliometric analysis of authorship patterns and degree of collaborations of agronomy journal articles 2000-2020. The specific objectives are:

1. To analyse the year- wise growth of agronomy journal articles between 2000 – 2020 in the JSTOR, AGORA, and ProQuest databases.
2. To identify the authorship patterns and degree of collaborations of agronomy journal articles between 2000-2020 in the databases.

1.3 Research Questions

1. What is the year- wise growth of agronomy literature between 2000 – 2020 as exhibited by JSTOR, AGORA, and ProQuest databases?
2. What are the authorship patterns and degree of collaborations of agronomy journal articles between 2000-2020 in the databases?

1.4 Significance of the Study

This investigation carries practical value for several groups, for researchers, understanding how collaboration norms and team sizes have shifted over the study period offers a useful benchmark for deciding how to structure their own co-authorship strategies. For policymakers in agriculture and education, the year-wise growth trend provides descriptive evidence of how visibility of agronomy literature accessible through these databases has changed over time, evidence that can inform, without overstating, discussions of research funding and institutional support. For universities and research institutions, the study offers a concrete basis for reviewing how collaborative research is supported and incentivised internally.

1.5 Scope and Limitations of the Study

A bibliometric examination of agronomy literature published between 2000 and 2020 is carried out in this work. The scope is restricted to peer-reviewed journal articles that are indexed in three significant electronic databases: ProQuest, Journal Storage (JSTOR), and Access to Global Online Research in Agriculture (AGORA).

2.0 REVIEW OF RELATED LITERATURE

2.1 Concept and Significance of Bibliometrics

Bibliometric analysis is often used to identify important research subjects, analyse research trends, and evaluate the influence of academics or institutions (Leydesdorff & Milojević, 2019). In order to visualise connections between academics and institutions and provide insights into academic collaboration, the approach has evolved to include network analysis (Yu & Li, 2020). Bibliometric analysis is widely used to identify important research subjects, analyse research trends, and evaluate the influence of scholars or institutions (Leydesdorff & Milojević, 2019). By analysing citation data, bibliometrics is a crucial tool for evaluating the impact of publications. In order to create a framework for more efficient academic and policy decision-making, bibliometrics allows

scholars to trace the development of a subject, assess the impact of research, and track changes in academic emphasis over time (De Sousa et al., 2024).

According to MacRoberts & MacRoberts (2021), bibliometrics can reveal gaps in funding for research, enabling targeted investments in fields with room for growth. Additionally, bibliometrics can be used to identify institutional and scholarly collaboration trends. Bibliometric study reveals interdisciplinary and transnational collaborations, which are essential for fostering innovation and accelerating scientific growth, as Wang and Xu (2023) show.

By concentrating on citation analysis, keyword networks, and co-citation patterns, bibliometric analysis helps comprehend the intellectual structure of disciplines in addition to assessing the body of current literature (De Sousa et al., 2024). As demonstrated in domains such as financial literacy (Echchakoui et al., 2023) and concept mapping in education (Küçükaydın, 2023), these techniques allow researchers to understand how ideas and theories evolve and interact. Bibliometrics is an evidence-based method for assessing research productivity that helps funding agencies and governments make resource allocation decisions. Bibliometric studies can identify areas that might need more funding for research or assistance in building infrastructure by monitoring the contributions of various organisations or nations. Bibliometric insights are also essential for creating evidence-based policies that tackle global issues. Bibliometric data, for example, can direct policy interventions in the context of agronomy and climate change by highlighting high-impact research trends and collaboration requirements in food security, climate resilience, and sustainable agriculture.

2.2 Year- wise Growth of Literature

The increase of publications, research outputs, or scholarly works in a specific topic throughout time, measured year by year, is referred to as the "year-wise growth of literature." To find trends, patterns, and shifts in research productivity, this growth can be examined. Lyu et al. (2023) conducted one of the most thorough evaluations of literature growth in Library and Information Science (LIS), looking at 138,658 records over 122 years. According to Price's model, which holds that scientific areas frequently follow an exponential trajectory throughout growth periods, our study discovered that LIS literature demonstrates an exponential growth pattern (Price, 1963). Lyu et al. (2023) claim that LIS is presently experiencing continuous exponential expansion, which reflects the rising need for information management solutions in a time of data proliferation and

digital transformation. The importance of LIS as a field addressing changing information difficulties in academia, business, and society is highlighted by its ongoing expansion.

Saher et al. (2024) conducted a bibliometric analysis of the literature on inclusive growth, a concept that includes economic policies and practices intended to guarantee that the benefits of growth are dispersed fairly throughout society. The study shows a notable concentration of publications from the United States, India, and Great Britain using data from Scopus and Web of Science covering the years 1995 to 2022, highlighting areas where inclusive growth has attracted major scholarly and policy interest. This analysis highlights the relevance of bibliometrics in detecting institutional and geographical contributions within developing areas and offers a cross-sectional snapshot of the global conversation on inclusive growth. The work by Saher et al. is especially pertinent to policy-oriented research since equity, sustainable growth, and economic development are all directly impacted by inclusive growth, which propels research in both developed and emerging economies.

2.3 Authorship Pattern and Degree of Collaboration in Research

Authorship trend and collaborative research are important facets of bibliometric studies. The authorship pattern, as one of the prime aspects of bibliometric analysis mainly deals with the kind of authors, nature and degree of collaboration among them and collaborative trend of authors.

2.3.1 Authorship Pattern

The authorship pattern refers to how authorship is allocated in scholarly publications, regardless of whether research is conducted and published by a single author or by a group of writers. It sheds light on the disciplinary norms, collaborative character, and research culture of academic fields. A crucial component of bibliometric study, which focuses on the cooperative dynamics between academics, is the investigation of authorship patterns. According to Adegbaye et al. (2017), analysing academic output requires a knowledge of the degree to which individuals participate in collaborative research.

Collaborative research and authorship trends are essential elements of bibliometrics. According to Kirtania (2023), the authorship pattern takes into account a number of factors, such as the kinds of writers participating, the nature of their collaboration, and general co-authorship tendencies.

Understanding how knowledge is created and shared within academic communities depends on these elements. The authorship pattern in research articles is influenced by a number of factors, according to Kirtania (2023). A greater number of collaborators is frequently correlated with a higher number of publications. Furthermore, a researcher's collaboration efforts are greatly impacted by how long they have been actively involved in their field (Pushpa and Shantadevi, 2023). As experienced scientists frequently recruit co-authors due to their reputation and skill, researchers with a lot of experience and recognition typically attract more collaborators (Pandey & Sahoo, 2020). This phenomenon emphasises how crucial visibility and acknowledgement are to promoting cooperative research.

International collaboration among authors has expanded as a result of the globalisation of research. More academics from other institutions and nations are co-authoring articles, which improves the calibre and scope of the research. This pattern is indicative of the interconnectedness of modern science, where cooperation is frequently necessary to tackle difficult global issues (Bemke-ěwitiłnik et al. 2020). According to research, papers with several authors typically obtain more citations than those written by a single person since the co-authors' varied expertise adds depth to the project and expands the networks used during collaboration (Ifeanyi-obi & Asuquo, 2023). The relevance of teamwork in scholarly endeavours is reinforced by the growing perception of collaborative research as a route to increased visibility and recognition within the academic community.

2.3.2 Co-authorship

Co-authoring refers to the collaborative authorship of a single research article by several individuals. An article with multiple writers is referred to as co-authorship. While citing older publications (defined by the date of publication) of other academics, authors frequently self-cite their most recent work (BJaksic et al. 2023). This approach, which reflects the growing complexity of research problems requiring a variety of expertise, has come to define contemporary scholarship. Compared to single-author articles, co-authored publications frequently contain more self-citations, indicating a unique cognitive and social function for self-citations. The number of authors has a substantial correlation with collective self-citation rates, as shown by Jaksic et al. (2023), however this effect is less noticeable in citations by outside scholars. These trends draw attention to the complex dynamics of influence and credit in co-authored works.

As a stand-in for both the exchange of research opportunities and the dissemination of knowledge, co-authorship networks offer trustworthy measures of scientific collaboration (Siddique et al., 2021). By highlighting the fact that co-authorship represents an interconnected process of intellectual exchange rather than just collaboration, these networks also provide insights into the social structure of scientific communities. Notably, because they leverage the varied networks and knowledge of all participants, co-authored publications typically acquire more citations than single-author studies (Amjad et al., 2019). International co-authorship, which is now a defining characteristic of cutting-edge scientific investigation, has been further enhanced by the globalisation of research. According to Amjad et al. (2019) and Jaksic et al. (2023), this kind of cooperation makes it easier to obtain cutting-edge techniques, resources, and financing possibilities, which results in more significant research findings.

2.3.3 Degree of Collaboration

Collaboration involves multiple facets, such as communication, coordination, and collective decision-making. The extent of collaboration can be evaluated using various indicators: The frequency and quality of interactions, characterized by regular and meaningful exchanges among team members, often indicate a high level of collaboration; shared goals and objectives pertain to clearly defined collective goals signify a collaborative environment; interdependence pertains to the degree of reliance among team members on each other's expertise and contributions, reflecting the depth of collaboration; and collective problem-solving, which involves participation in joint decision-making and problem-solving activities, exemplifies collaborative engagement.

Collaborative learning environments enhance students' critical thinking and problem-solving abilities. Saher, et al. (2024) conducted a systematic review emphasizing the significance of peer cooperation in higher education, indicating that such collaboration enhances the development of abilities like problem-solving, creativity, and critical thinking. In professional environments, elevated collaboration levels correlate with heightened productivity and innovation. Research conducted by Tunga (2022) demonstrated that collaborative tools, including robots, can foster collaborative abilities, hence improving team performance. The utilization of digital tools in training programs has been linked to the enhancement of collaborative skills. A comprehensive review by the demonstrates that digital tools can improve collaboration skills, however the results differ according on the tools and methodologies employed.

The degree of collaboration varies significantly across disciplines, influenced by factors such as the nature of the research problem, the organizational research environment, and demographic variables. For instance, fields like physics and medical sciences tend to exhibit higher levels of collaboration due to the resources and expertise required (Debnath, 2021). Collaboration correlates positively with research productivity and access to financial support (Bemke-Świtilnik et al., 2020). Bibliometric methods, such as co-authorship analysis, provide robust, non-reactive tools for evaluating collaborative trends (Carchiolo, Grassia, Malgeri & Mangioni, 2022). These methods measure the degree of collaboration by calculating the ratio of collaborative research outputs to total research outputs within a specific field or time frame (Pushpa & Shantadevi, 2023). This approach allows researchers to quantify collaboration and understand its dynamics across various academic disciplines.

The nature and magnitude of collaboration vary across different disciplines, influenced by factors such as the research problem's nature, the research environment, and demographic variables (Isfandyari-Moghaddam et al. 2021). Studies have shown a high degree of correlation between collaboration and research productivity, as well as between collaboration and financial support for research (Beck et al., 2020). Traditional methods like surveys and observations are often insufficient to determine the extent of collaboration accurately. Bibliometric methods provide a non-reactive and convenient tool for studying collaboration in research (Carchiolo et al., 2022). The degree of collaboration is typically defined as the ratio of the number of collaborative research papers to the total number of research papers in a given discipline over a specific period (Debnath, 2021).

However, most existing studies examining collaboration degrees are situated in fields like education, information science, and engineering, leaving agricultural disciplines comparatively underexplored.

2.4 Theoretical Framework

The theoretical framework for this study rests on Subramanyam's (1983) measure of the Degree of Collaboration, which quantifies the proportion of a literature's output that is co-authored rather than produced by single authors. Subramanyam's formula — $C = N_m / (N_m + N_s)$, where N_m is the number of multi-authored papers and N_s the number of single-authored papers. This provides a straightforward, widely used way of tracking how collaborative a field's research practice is over

time, and is the specific analytical tool this study applies. The Subramanyam's Law measures degree of research collaboration of scholars and scientists. It has been widely used in many of the bibliometrics research.

3.0 METHODOLOGY

3.1 Research Approach

This study adopts a bibliometric analysis approach, a quantitative research methodology widely recognized for its ability to analyse and quantify key aspects of scientific literature.

3.2 Research Design

This research employed a descriptive bibliometric approach research design. To make a map of the structure and growth of a certain research field, descriptive bibliometric research design involves collecting and analyzing quantitative data from scholarly publications in a planned way (Van Leeuwen, 2014). This approach focuses on identifying publication patterns, authorship trends, and collaborative networks without assessing the quality or impact of the research outputs (Weingart, 2015).

3.3 Research Setting

The research drew on bibliographic data from three databases: JSTOR, AGORA, and ProQuest. Searches were conducted in July, 2025. The three databases were chosen for complementary reasons rather than for uniform coverage: JSTOR was included for its strong archival coverage of longer-established agricultural and social-science journals; AGORA was included specifically because of its role, through the Research4Life initiative, in providing subsidised or free access to agricultural research for researchers in developing countries including Nigeria, making it directly relevant to this study's access-focused motivation; and ProQuest was included for its broad multidisciplinary full-text coverage, which captures more recent and trade-oriented agronomy publishing that the other two platforms cover less comprehensively. Together, the three databases were judged to offer a more representative cross-section of agronomy publishing accessible to a Nigerian researcher than any single database would on its own.

3.4 Population of the Study

The population of the study comprise journal articles of Agronomy literature from 2000-2020. The population of the study would include all articles from AGORA (451,677), JSTOR (42,708) and

ProQuest (4,656) databases relating to agronomy. In selecting the sampled journal articles, the researcher searched the databases for agronomy literature and filtered the results to include only journal articles published between 2000 and 2020.

3.5 Sampling Technique and Sample Size

A three-stage filtering process was applied using the advanced search functions of JSTOR, AGORA, and ProQuest, with the single search term "Agronomy" used consistently across all three databases. Inclusion criteria were: (i) publication type restricted to journal articles; (ii) publication date between 2000 and 2020 inclusive; and (iii) the term "Agronomy" appearing explicitly in the article title. Exclusion criteria were: all non-journal-article formats (books, theses, conference proceedings, reports); publications outside the 2000–2020 window; and any article whose title did not contain the word "Agronomy". Records retrieved from more than one database were checked against title, author, and publication year to identify and remove duplicates before the final count was fixed.

The unfiltered search returned 494,385 records across the three databases combined. Applying the 2000–2020 date filter reduced this to 291,900 records; restricting to journal articles specifically brought the total to 378,515; and the final title-keyword filter requiring "Agronomy" to appear in the title, narrowed this to the 705-article sample used in the analysis (341 from AGORA, 24 from JSTOR, 340 from ProQuest). The title-based approach was adopted for consistency and reproducibility across three databases with different subject-indexing conventions, rather than as a judgment about topical relevance; no secondary screening or abstract-level review was carried out.

3.6 Instrument for Data Collection

In conducting this study, the researcher employed data collection tools to analyze research output, impact, and accessibility. The researcher used a Checklist for data collection. In the context of this work, a checklist ensures a systematic and consistent approach to identifying, extracting, and recording bibliometric data across all agronomy research outputs between 2000 and 2020.

3.7 Method of Data Collection and Analysis

Data were collected from the JSTOR, AGORA, and ProQuest databases through a systematic search for agronomy journal articles, limited to the 2000–2020 period, with metadata, publication year, authors, and article titles extracted for each record. Two specific analyses were then applied. First, year-wise growth was calculated as the raw count and percentage share of total articles published in each year of the study period, allowing growth phases to be identified descriptively. Second, authorship and collaboration were assessed using Subramanyam's (1983) Degree of Collaboration formula, $C = N_m / (N_m + N_s)$, where N_m is the number of multi-authored articles and N_s the number of single-authored articles; the Average Authors Per Paper (AAPP) was also calculated as a secondary indicator of team size. Data were organised and analysed descriptively in Microsoft Excel, and results were presented in tabular form.

4.0 ANALYSIS AND DISCUSSION

4.1: Year-Wise Growth of Agronomy Journal Articles

Year	Agora	Jstor	Proquest	Total	% of Total
2000	6			6	0.85%
2001	22			22	3.12%
2002	15	1		16	2.27%
2003	8			8	1.13%
2004	8			8	1.13%
2005	17	1		18	2.55%
2006	7	3	5	15	2.13%
2007	15		2	17	2.41%
2008	19		3	22	3.12%
2009	11		8	19	2.70%
2010	13	1	14	28	3.97%
2011	24		21	45	6.38%
2012	16	1	6	23	3.26%
2013	13	2	18	33	4.68%
2014	17		8	25	3.55%
2015	9	1	19	29	4.11%
2016	7	2	13	22	3.12%
2017	15	2	17	34	4.82%
2018	22	3	86	111	15.74%
2019	40	4	118	162	22.98%
2020	37	3	2	42	5.96%
Grand Total	341	24	340	705	100%

Source: Compiled by the Researcher

The results show a clear upward trajectory in agronomy publications over the two decades. Between 2011 and 2017, growth was steady, averaging 29.9 articles annually (209 articles total), with notable peaks in 2011 (45 articles) and 2013 (33 articles). The most pronounced expansion occurred between 2018 and 2020: output rose from 111 articles in 2018 to 162 in 2019, before settling at 42 in 2020. This pattern coincides with broader trends of expanding global attention to food security, climate change, and sustainable intensification in agricultural research more generally (Aryal et al., 2019; Awhari et al., 2024; Bertoglio et al., 2021; Bhagat et al., 2022). The timing also coincides with the period in which AGORA and ProQuest contributed an increasing share of records, which is consistent with a role for improved database access in the observed growth; this descriptive dataset cannot separate the effect of access-platform expansion from other concurrent factors such as general growth in global agricultural research funding.

4.2: Authorship Patterns and Degree of Collaboration

Year	Single Authored		Multi Authored		Total	% of records
	Papers	%	Papers	%		
2000	1	0.51%	5	0.98%	6	0.85%
2001	4	2.03%	18	3.54%	22	3.12%
2002	5	2.54%	11	2.17%	16	2.27%
2003	4	2.03%	4	0.79%	8	1.13%
2004	5	2.54%	3	0.59%	8	1.13%
2005	5	2.54%	13	2.56%	18	2.55%
2006	6	3.05%	9	1.77%	15	2.13%
2007	11	5.58%	6	1.18%	17	2.41%
2008	9	4.57%	13	2.56%	22	3.12%
2009	10	5.08%	9	1.77%	19	2.70%
2010	9	4.57%	19	3.74%	28	3.97%
2011	16	8.12%	29	5.71%	45	6.38%
2012	7	3.55%	16	3.15%	23	3.26%
2013	12	6.09%	21	4.13%	33	4.68%
2014	8	4.06%	17	3.35%	25	3.55%
2015	4	2.03%	25	4.92%	29	4.11%
2016	6	3.05%	16	3.15%	22	3.12%
2017	11	5.58%	23	4.53%	34	4.82%
2018	12	6.09%	99	19.49%	111	15.74%
2019	31	15.74%	131	25.79%	162	22.98%
2020	21	10.66%	21	4.13%	42	5.96%
Total	197	100.00%	508	100.00%	705	100.00%

Source: Compiled by the Researcher

Using Subramanyam's (1983) collaboration index formula $C = \frac{Nm}{Nm+Ns}$, where Nm denotes multi-authored papers and Ns single-authored papers, the degree of collaboration is:

$$C = \frac{508}{508 + 197} = \frac{508}{705} \approx 0.72$$

Authorship patterns showed single-authored works at 27.94% (197 articles), while multi-authorship dominated (72.06%, 508 articles). Year-wise trends indicated a shift from single authorship dominance in 2000–2010 to strong multi-authorship in high-output years (e.g., 89% joint in 2018). This supports the argument that agricultural research has become increasingly collaborative and interdisciplinary (Wang & Xu, 2023). Similar patterns are reported in sustainable agriculture and agroecology studies, where complex problems demand diverse expertise (Barrios et al., 2020; Rocchi et al., 2020).

The calculated degree of collaboration (72%) suggests a strong shift toward team science. Such trends echo findings in bibliometric studies across science domains where co-authorship networks expand over time (Isfandyari-Moghaddam et al., 2021; Carchiolo et al., 2022). Wang and Xu (2023) note increasing international collaboration in agriculture over recent decades, while Bemke-Świtilnik et al. (2020) highlight similar patterns in sustainable mining-related fields. The average authors per paper (AAPP = 3.74) and declining individual productivity in peak years supports Abramo and D'Angelo (2014), who discuss how productivity metrics evolve with collaboration scale.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The study documents a marked increase in the volume of accessible agronomy literature over the two-decade period, particularly after 2017, alongside a clear shift toward larger, multi-authored research teams. Whether this growth reflects the influence of access initiatives such as AGORA and ProQuest, broader shifts in global agricultural research funding and priorities, or some combination of both cannot be established from a descriptive bibliometric design of this kind; what the data support is the pattern of growth and rising collaboration, not a causal account of what produced it. The elevated Degree of Collaboration (0.72) and growing team sizes do, however, indicate that agronomy research has become markedly more collaborative over the study period.

5.2 Recommendations

Given the observed shift toward larger co-authored teams, Nigerian research institutions and funding bodies might consider structuring grant and incentive schemes to specifically support multi-author, collaborative agronomy projects, since the data suggest this is the direction the field's productive output is already moving.

Given that AGORA and ProQuest accounted for a growing share of the later-year output, continued institutional support for maintaining and expanding access to these platforms is important. Therefore, the Federal Ministry of Agriculture and Rural Development, in collaboration with the Nigerian Universities Commission (NUC) and Tertiary Education Trust Fund (TETFund), should institutionalize sustained funding for these platforms at national and institutional levels.

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