Review Article

Common Carp: A Bibliometric Analysis of Scopus-Indexed Journal Articles for Iraqi Authors

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Abstract | This bibliometric review analyzes 346 articles published in Scopus-indexed journals, characterizing research conducted by Iraqi authors on common carp from 1988 to November 2025. It is noteworthy that while two papers were published in 1988, no further outputs appeared until 2009, after which annual publication counts increased, reaching 60 articles by 2023. The analysis shows that the University of Basrah has led other local institutions in this field, with its researchers also attracting collaborators from universities where they had initially begun their academic careers. The most prolific author in the dataset was Al-Niaeem, Khalidah S. This study highlights the need for stronger international collaboration, particularly with leading academic institutions, to enhance the global visibility and impact of Iraqi carp research. Despite its limitations, the review provides a useful baseline for future investigations and offers a roadmap for a more nuanced understanding of the relatively limited global influence of Iraqi authors' contributions in this area.

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Introduction

Aquaculture plays an important part in international trade, sustains the livelihoods of millions of people worldwide, makes a substantial contribution to global food production, and presents potential answers to issues related to food security. However, in order to minimize environmental effects and guarantee its long-term survival, its rapid expansion calls for a thorough analysis of sustainable development principles. To reduce the long-term hazards associated with the industry, sustainable aquaculture combines economic viability, social concerns, environmental responsibility, and production efficiency. This strategy entails putting into practice methods that lessen the influence on the environment, like reducing water pollution, protecting biodiversity, and making the best use of available resources (Subasing *et al.*, 2009; Costa-Pearce, 2010).

Freshwater fish account for 83% of aquaculture production, followed by freshwater fish at 79%. These high percentages indicate the success of applying aquaculture technologies in these two sectors (FAO, 2024).

Generally, since 2010, the Food and Agriculture Organization has collected data on the main species produced in global aquaculture, specifically in three categories: Finfish, crustaceans, and mollusks (FAO, 2011). Previously, the world's major species production was divided into six groups, including freshwater fish, diadromous fish, marine fish, crustaceans, mollusks, and other aquatic animals not categorized elsewhere (FAO, 2011). Aquatic algae were excluded from the list of aquatic species because they were considered non-animal items. These lists are managed by The State of World Fisheries and Aquaculture (SOFIA) (FAO, 2021), which aims to provide comprehensive, objective, and global insights on fisheries and aquaculture data for policymakers, civil society, and those whose livelihoods depend on aquatic resources.

In several Asian and some European nations, common carp (*Cyprinus carpio*) is a crucial aquaculture species (Sodhi *et al*., 2022). It is among the fish species that are farmed the most extensively worldwide. Out of the 80 million tons of aquaculture produced worldwide in 2018, 4,189,524 tons of carp were produced. Carp rated third among carp species, fourth among fish species, and fifth among farmed aquaculture products globally with this output volume (FAO, 2020). In the aquaculture sector, common carp are a crucial species (Öz and Üstüner, 2021). Carps are farmed in 123 countries or regions worldwide; however, they are mostly raised in Asian nations. Asian nations are the top seven producers of farmed carp, accounting for over 96.3% of the world's production in 2018 (Miao and Wang, 2020). This species is considered a preferred species in aquaculture due to its favorable traits such as its high tolerance, as it can tolerate oxygen levels up to 7% saturation, high levels of turbidity, 14% salinity, a wide range of temperatures (2-40°C) and high levels of toxic substances (Koehn, 2004), in addition to its rapid growth, market demand, and omnivorous nature, which accepts a variety of feeds, including manufactured feeds (Patil *et al*., 2019; Jafari *et al*., 2022; Sayed-Lafi *et al*., 2022).

The foundation of innovation in aquaculture product creation is research, which propels developments that guarantee the sector's continued competitiveness, sustainability, and resilience. In order to meet the need for food worldwide, it is maintaining sustainability and boosting output. Improving fish health and productivity through disease control and breeding, developing more sustainable practices by creating effective feeds and optimizing resource use, improving product quality for consumers, and supplying data to support improved policies and management are all important areas (Cerda Dubó, 2024; Dadlani, 2025).

The scientific study of aquaculture in controlled conditions, such as fish, shellfish, and aquatic plants, is known as aquaculture research. Research-based aquaculture is intended to address issues regarding fish health, environmental change, sustainable production, and ecosystem dynamics, in contrast to commercial fish farming, which concentrates on creating food for human consumption (Dadlani, 2025).

Therefore, universities, institutes, and places of learning stand out in this regard. It is generally accepted that universities and public research institutions are vital sources of innovation because they provide both technical personnel and cutting-edge scientific knowledge (Whittington *et al*., 2009). Particularly, universities are important sources for star scientists and technical staff (Murray, 2002; Sayed-Lafi, 2024). Moreover, the investigated information and technologies from universities and public research institutes are more available than those from other organizations, as they function primarily under the principles of open science (Smith and Powell, 2004).

The amount of research generated globally has increased significantly over the last 20 to 30 years, especially in the fields of aquaculture and fisheries science (Natalie *et al*., 2012). The advancement of fisheries technologies contributes to food sustainability by ensuring a steady supply of fish and fisheries products. In light of this, the purpose of this study is to provide insight into the reality of research on common carp (*C. carpio*) fish published by Iraqi universities and scientific institutes and stored in journals within Scopus until November 2025.

Materials and Methods

The objective of the current evaluation is to determine the features of carp studies carried out by Iraqi experts. Bibliometric techniques were used to accomplish this. Additionally, bibliometric analysis entails monitoring research on a particular subject and disclosing the results by evaluating these studies based on a variety of criteria (Marti-Parineau *et al*., 2016). To get high-quality articles, the study considered pertinent publications that were indexed in the Scopus database.

In the July 17, 2021 survey, keywords were looked for in the abstract, title, or by choosing Topic.

The terms common carp and *Cyprinus carpio* were used as keywords and related phrases. The Scopus database was used to access online learning journals in this research, given its intelligent tools for visualizing, analyzing, and tracking research outputs in various fields, such as the humanities, technology, and sciences (Sayed-Lafi and Sultan, 2024). However, it is recognized for publishing high-caliber research publications and is said to cover over 7000 publishers and over 84 million records from 240 disciplines. In addition, to ensure the relative importance of the analyzed publications for online learning readiness, we performed a manual check to exclude irrelevant publications, and in this way, 346 publications remain.

This strategy was designed to capture publications that explicitly focused on common carp, ensuring that the results were highly relevant to the research. Bibliometric data, including titles, abstracts, keywords, and references, were extracted from the selected publications. The Biblioshiny tool, available as an R package at https://www.bibliometrix.org/home, was used to further analyze and interpret the data. A collection of tools for quantitative research approaches in scientometrics and bibliometrics is provided by the bibliometrics software, which is written in the R language for scientific computation. These tools include a large presence, effective statistical algorithms, integrated data visualization tools, and access to high-quality digital routine analytics (Aria and Cuccurullo, 2017).

Results and Discussion

Publication-related metrics

The information about the collection of articles used in the field of common carp in Iraq is summarized in Table 1. The 346 publications (296 articles (85.5%), 47 conference papers (13.6%), and one (0.3%) review, correction, and retraction, respectively) from 87 respectable scientific journals between 1988 and 2025 make up these articles, which were sourced from Scopus databases. In 1989, there was only one article published; by 2023, there were sixty. There are 3.89 citations on average per document. 1,218 author-submitted keywords and 906 redundant keywords were found through data analysis. One author wrote 26 of these papers, out of a total of 620 authors who contributed to the value chain research. Each document has an average of 3.5 co-authors. 11.56% is the rate of international collaboration, which is determined by dividing the total number of publications by the number of publications with authors from other nations.

Table 1: *Summary of results after completion of Scopus data audit.*

Description	Results
Main information about the data	
Timespan (years)	1988:2025
Sources (journals)	87
Documents	346
Annual Growth Rate of publications (%)	8.65 %
Average citations per document	3.89
References	0
Document contents	
Keywords Plus (ID)	1218
Author's Keywords (DE)	906
Authors	
Authors	620
Authors of single-authored docs	26
Authors collaboration	
Average co-authors per document	3.05
Single-authored document	32
International co-authorships (%)	11.56%
Document types	
article	296
conference paper	47
erratum	1
retracted	1
review	1

The annual number of Scopus articles on common carp is shown in Figure 1. The number of publications increased from 2009 to 2024, except in 2015 (n=0). Phase I covers 1988-1989; Phase II covers 1990-2008; and Phase III spans 2009 to the present. These three phases represent the study period. Interestingly, in 1988, there were two publications (first phase); the first two articles appeared in the Journal of Environmental Science and Health, Part A: Environmental Science and Engineering by Mangalo and Akbar (1988). The following year, only one was published, and in 1989 (n=1), Ali and Munir (1989) published in the same journal. The second phase was marked by a lack of publications, due to the Second Gulf War and Iraq's isolation on all levels. Over three decades, no Iraqi

authors were able to publish in journals indexed in Scopus due to the collapse of infrastructure, brain drain, and a severely hostile environment for academics. The war led to a drastic decline in research output, marked by a sharp drop in engineering publications after the 1990 peak. This trend continued due to the country's insecurity, resulting in the flight or murder of scientists and a general depletion of intellectual capital (Hunter and Salama, 2006). However, in 2009 (n = 1), Al-Zubaidy et al. (2009) began publishing in the Journal of King Abdulaziz University, Marine Science. The number of articles published continued to grow, reaching its peak in 2023 (n=60). Aside from 2015, when there were no publications (n=0), the annual growth rate is 8.65%.

The increase in publications after 2009 comes for several reasons, including (1) the Ministry of Higher Education and Scientific Research has focused on supporting scientific journals and improving their presence on international indexing platforms. (2) The emphasis on international scientific partnerships has also been a key driver for this growth. (3) The progress aligns with a strategic vision from the Ministries, e.g, Higher Education and Scientific Research, Education, Sciences and technology, and others, to enhance the quality and visibility of Iraqi journals.

Citation-related metrix

The top citations, 60 in 2023, followed by 2024 (56) (Figure 2). Looking back, from 2009 to 1988, there was a decline in citations, reaching a low of two citations. Based on how frequently their relevant peers mention their scholarly publications, important writers with high citation numbers are thought to have a major effect on the academic research area, and have a higher impact value and intensity of knowledge flow from their publication (Docampo and Cram, 2019; Wang *et al.*, 2019). These days, as professional researchers, authors, especially in aquaculture sciences, carry out their scientific work in a complex way that involves registering and commercializing their patents, copyrights, inventions, and innovations, as well as contacting different research sponsors, collaborators, publishers, institutions, industries, and other colleagues (Perkmann et al., 2013; Joffre *et al.*, 2017; Kosmützky et al., 2021; Neema and Chandrashekar, 2021). It appears that the publications on common carp presented by Iraqi authors have not risen to the level of global impact. They appear to be a replication and recycling of prior information that has not matched global academic progress.

The three top journals published for common carp are IOP conference series: earth and environmental science (Cite-Score 1.3), ranked highest among journals with 41, followed by Egyptian journal of aquatic biology and fisheries (Cite-Score 1.3) with 39 publications, and Iraqi journal of agricultural sciences (Cite-Score 3.2) with 30 publications (Figure 3).

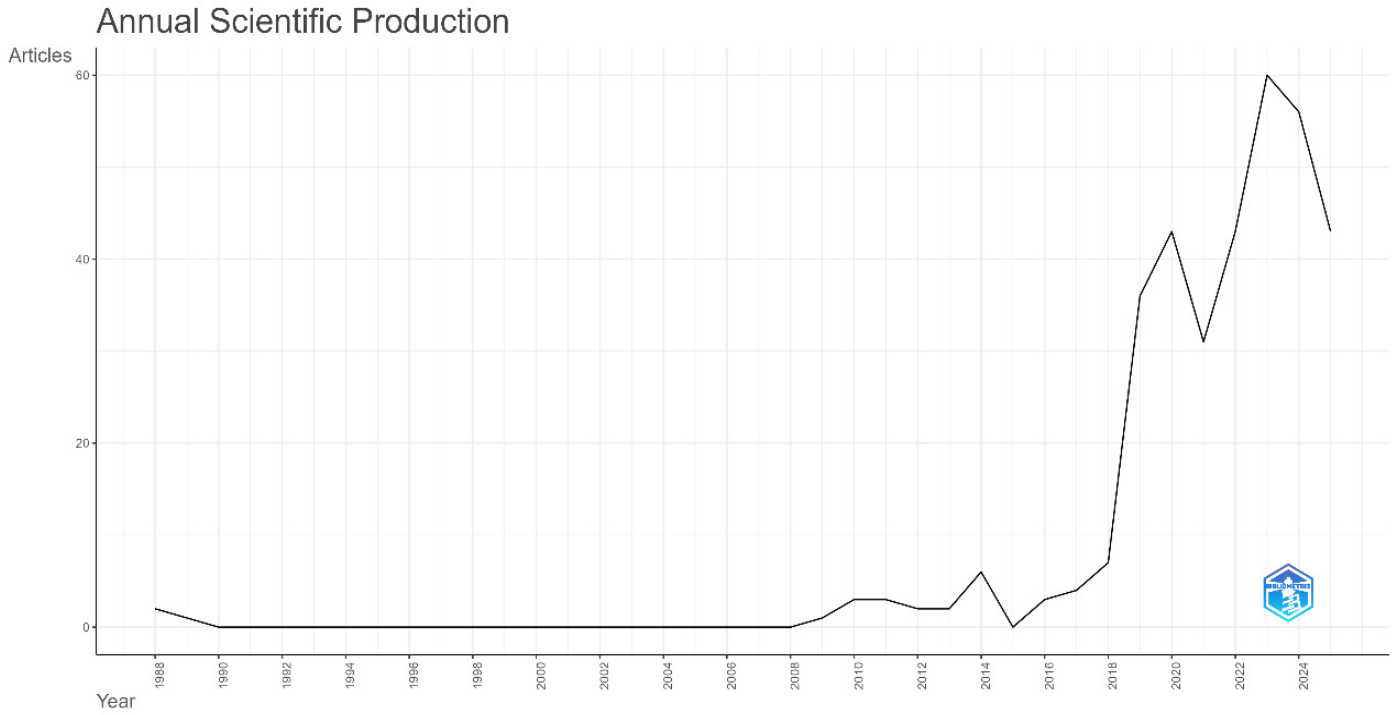

Figure 1: *The number of related scientific papers published on common carp from 1988 to the present.*

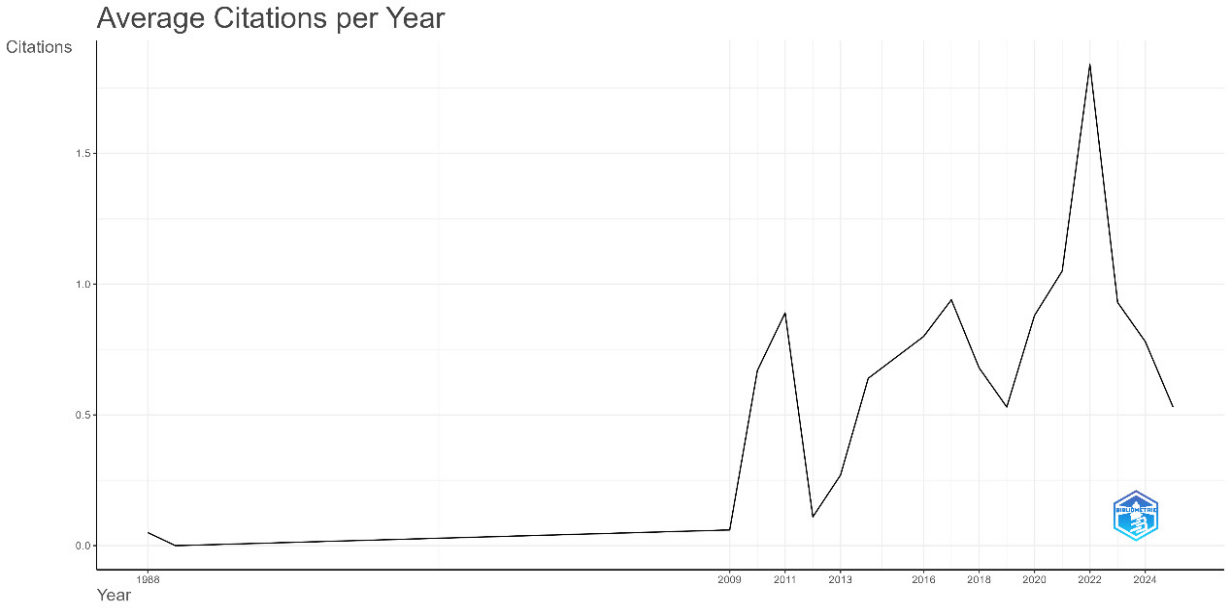

Figure 2: *Timeline of citations for Iraqi authors from 1988 to 2025.*

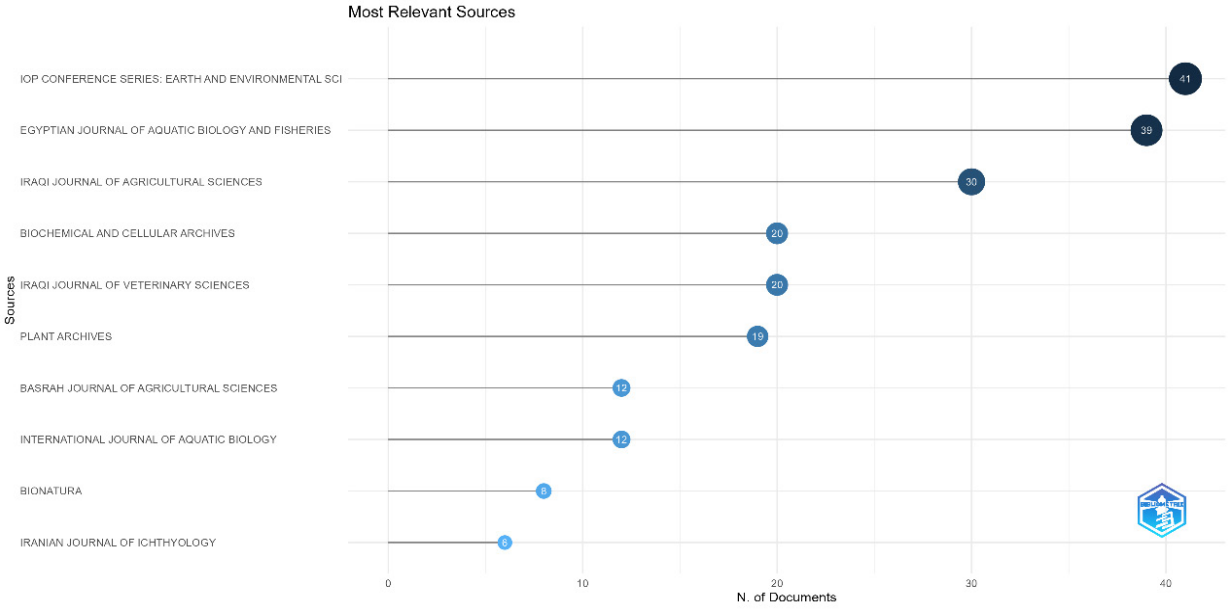

Figure 3: *The journal most relevant to the largest number of citations for Iraqi authors.*

Table 2: *Hirsch Index ranking of the top ten most influential writers. NP stands for number of publications.*

Author	Affiliation	NP	NPF	TC	TC/NP	FPY	h-index
Al-Niaeem, Khalidah S.	University of Basrah	35	21	182	4.91	2011	5
Abdulrahman, Nasreen M.	University of Sulaimani	22	16	115	5.22	2013	6
Mustafa, Sanaa A.	University of Baghdad	27	12	843	31.2	2010	13
Salman, Ali H.	University of Al-Muthanna	13	12	4	0.30	2019	1
Al-Tameemi, Riyadh A.	University of Basrah	11	16	48	4.36	2010	3
Mohammad, Mahmoud A.	University of Mosul	16	11	59	3.68	2020	5
Najim, Salah M.	University of Basrah	16	11	31	1.93	2019	3
Al-Khshali, Mohammed S. H.	University of Baghdad	21	10	93	4.42	2017	6
Abedalhammed, H. S.	University of Anbar	14	9	55	3.92	2017	4
Al-Gharawi, Jassim K. M.	University of Al-Muthanna	65	9	104	1.6	2016	5

NPF for number of publications (fractional); TC stands for total citations. FPY: First year of publication; TC/NP: Total citations per publication.

The top ten most influential authors according to the h-index are shown in Table 2 and Figure 4. Al-Niaeem, Khalidah S., from the University of Basrah (h-index= 5), Abdulrahman, Nasreen M., from the University of Sulaimani (h-index= 6), Mustafa, Sanaa Abdulaziz, from the University of Baghdad (h-index= 13), Salman, Ali Hussain, from the University of Al-Muthanna (h-index= 1), Al-Tameemi, Riyadh A., from the University of Mosul (h-index= 5). It's interesting to note that two of the top writers are from the University of Basrah.

Figure 5 shows that the academic institution with the highest number of publications on common carp is the University of Basrah (n= 205), followed by the University of Baghdad (n= 139). The remaining institutions have fewer than 100 publications. This also applies to the relevant authors, who are affiliated with the University of Basrah. It is noteworthy that some of the authors are graduates of the Department of Fisheries and Marine Resources, such as Abdul Rahman, Al-Khashali, and others.

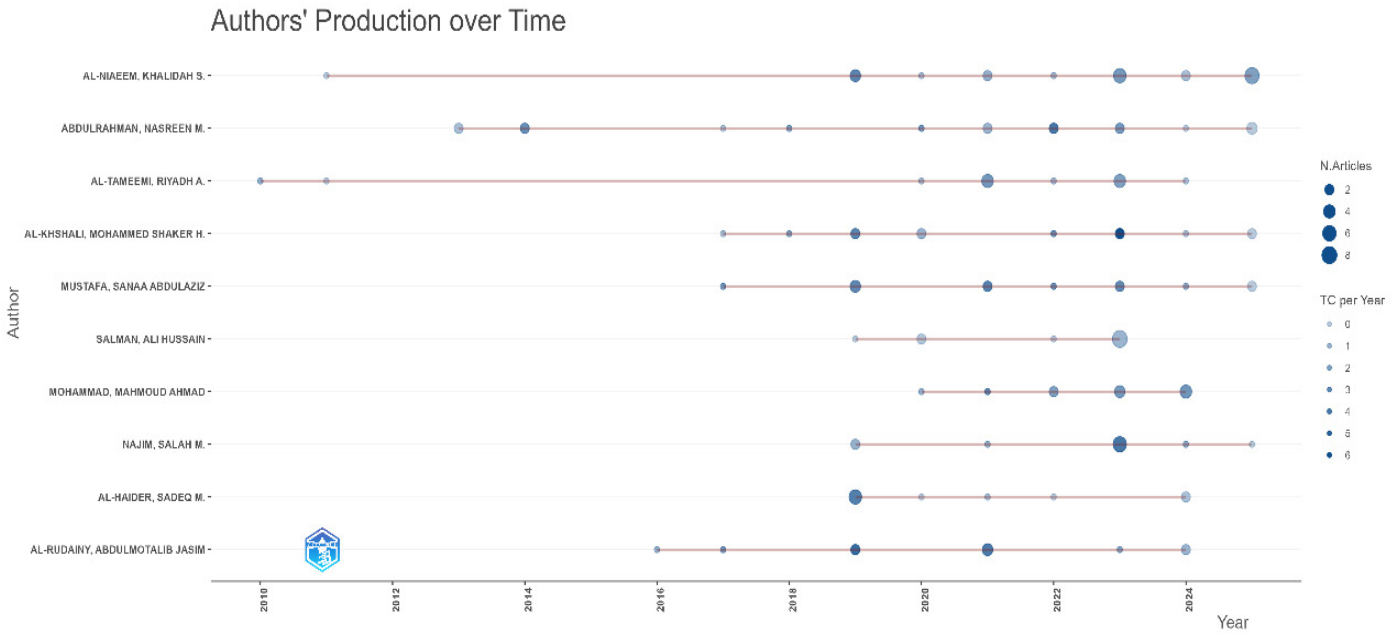

Figure 4: *Iraqi authors' production of publications on common carp over time.*

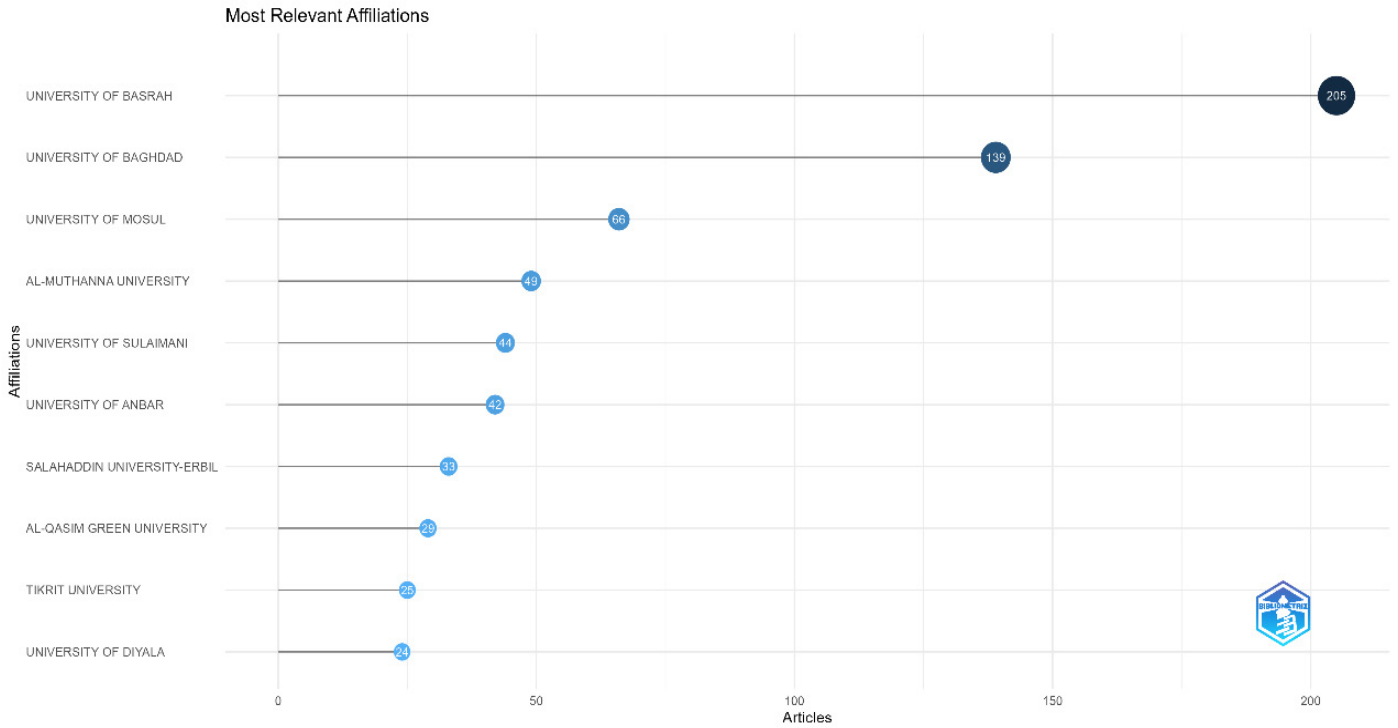

Figure 5: *The most relevant affiliations of Iraqi authors.*

Table 3: *The top ten journals based on the number of publications about the common carp.*

Journal title	h-index	TC	NP	PY	Publisher
Iraqi journal of agricultural sciences	20 (Q1)	208	35	2016	University of Baghdad, College of Agriculture
Iraqi journal of veterinary sciences	20 (Q2)	223	32	2010	University of Mosul - College of Veterinary Medicine
Egyptian journal of aquatic biology and fisheries	22 (Q3)	97	47	2020	Egyptian Society for the Development of Fisheries and Human Health
Basrah journal of agricultural sciences	9 (Q3)	50	13	2019	University of Basrah, College of Agriculture
biochemical and cellular archives*	19	61	21	2019	Prof (Dr.) P.R. Yadav
Plant archives**	27	-	-	-	Plant Archives
AIP conference proceedings •	90	16	8	2017	American Institute of Physics
Annals of Animal Science	41	31	4	2022	Walter de Gruyter GmbH
Aquaculture research	112 (Q2)	56	3	2021	John Wiley and Sons Ltd
IOP conference series: earth and environmental science •	58	49	54	2019	Institute of Physics

**Scopus covered years (2011-2021); • Not yet assigned quartile ** Scopus covered years (2011-2020) TC= Total Citation; NP= Number of Publications; PY= Publications of Year.*

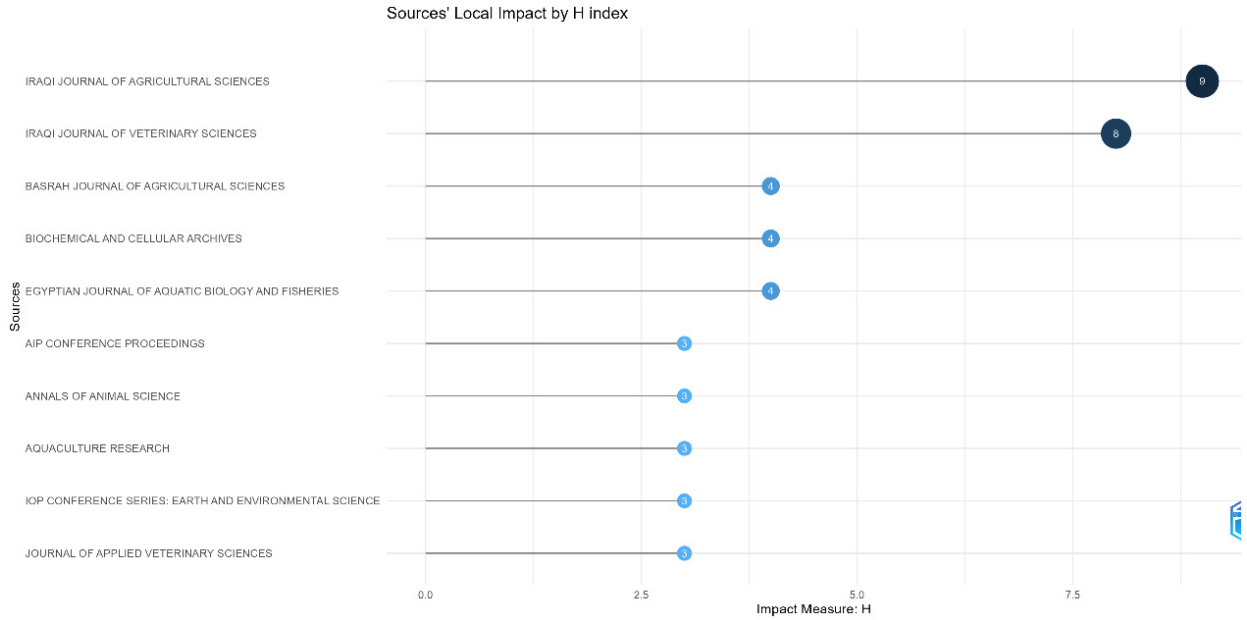

Figure 6: *Sources' local by H-index.*

Overall, The University of Basrah has a strong focus on marine research, Because the province of Basrah and the southern region of Iraq have large bodies of water, such as the Shatt Al-Arab River and marsh areas, the Department of Fish and Marine Resources was established in 1971 as one of the main departments in the College of Agriculture. This was followed in 1977 by the Marine Science Center, which eventually became the College of Marine Sciences. Basrah stands out due to its location with a view of the Arabian Gulf. As a result, the department's scientific goals and research avenues have focused on investigating the biological elements and environmental features of these surfaces, identifying the qualitative makeup of fish communities, and conducting innovative projects in the fields of aquaculture and fish farming in particular (UOB, 2025).

Journals local impact

The results of the current study revealed the top ten scientific journals that published articles by Iraqi researchers on common carp (Table 3 and Figure 4. The three journals with the most publications on common carp were the Iraqi Journal of Agricultural Sciences (n= 9), the Iraqi Journal of Veterinary Sciences (n= 8), and the Basrah Journal of Agricultural Sciences (n= 4), respectively. These journals are affiliated with prestigious universities: Baghdad, Mosul, and Basrah. These universities were established at the beginning of modern Iraq.

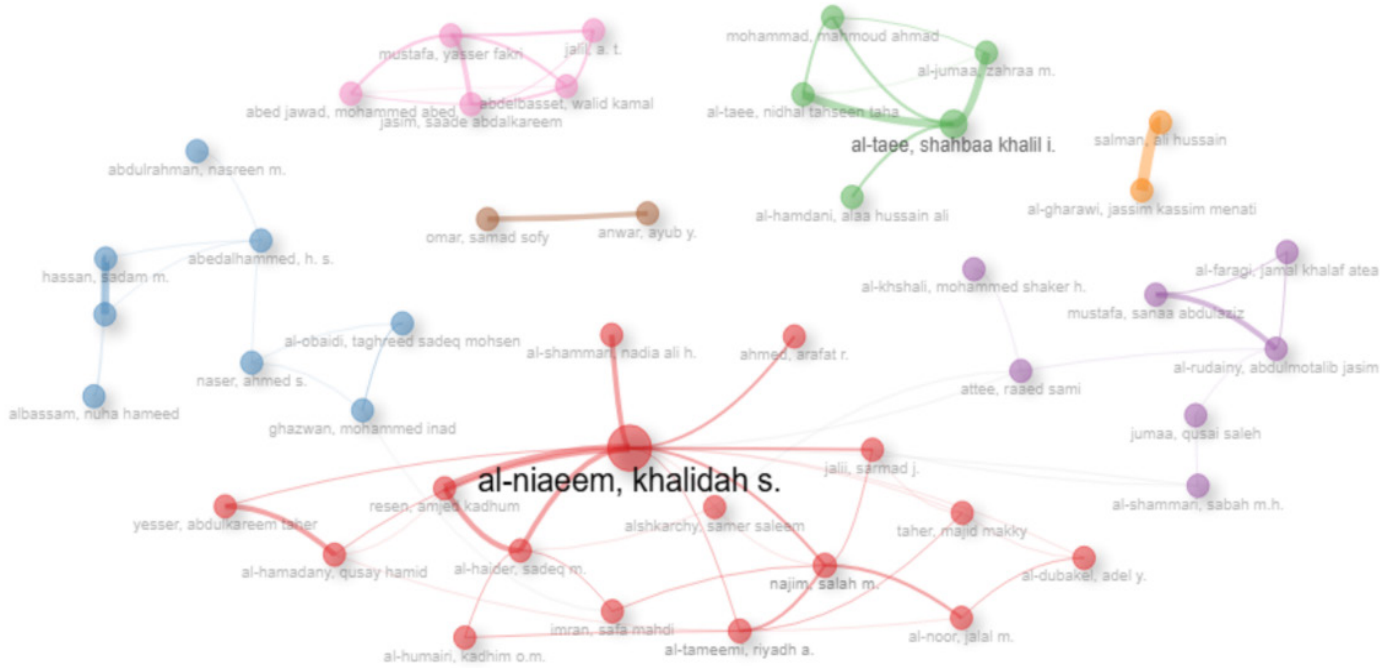

Figure 7: *Collaboration networks between Iraqi authors on common carp publications.*

Collaboration networks

Figure 7 shows a network map of Iraqis who have collaborated or co-authored research on common carp. Several useful findings can be interpreted from the observed graph, such as the fact that Al-Naim, Khalida S., in Group 2, Al-Ta'i, Shahba Khalil I., in Group 6, and both Hassan, Saddam M. and Madloul, Najla Salah A., in Group 1, with page rankings of 0.089 and 0.039, respectively, and the remainder of 0.39 for all, are considered among the top three most influential authors in this scientific field. In the co-authoring collaboration network, these authors have the highest node size, which is indicative of their substantial contributions, high citation counts, and wide-ranging connections to other authors in the area. According to Joffre *et al.* (2016) and Prabakusuma *et al.* (2023), authors, as professional researchers, particularly in aquaculture science, currently carry out their scientific work in a complex dimension that includes contacting various research sponsors, collaborators, publishers, institutions, industries, and other colleagues, as well as registering and marketing patents, copyrights, inventions, and innovations.

In addition, collaboration has become the norm in scientific research. Research collaboration has long been an essential part of academic work in the natural and exact sciences, medical sciences, and technology and engineering, because most research in these fields revolves around the social environment of the laboratory, where senior and junior researchers and students engage in group projects. Collaboration is also essential in these fields to enable researchers to access instruments and equipment that are only available to a few research groups (Lauteau and Valentin, 2013).

In the evolution of academic research, influential authors play a crucial role in shaping and defining the network of interaction, shifting the scientific perspective, and the global flow of intellectual information (Cansino *et al.*, 2017, 2020). In addition to networking with different research sponsors, collaborators, publishers, institutions, sectors, and other colleagues, authors today, as professional researchers, especially in aquaculture science, carry out their scientific work in a complex dimension that includes registering, securing copyrights, and commercializing inventions and innovations (Prabakosuma *et al.*, 2023).

Conclusion

The purpose of this review is to summarize common carp research conducted by Iraqi academics, with a particular focus on studies indexed in the Scopus database. The analysis highlights the leading role of the University of Basrah in this field, both in terms of output and in nurturing researchers who later contributed from other institutions. Al-Niaeem, Khalidah S., emerged as the most productive author, showing a clear growth in both publication volume

and collaborative networks. Although the number of Scopus-indexed publications has increased in recent years, a substantial body of carp research still appears in journals that are not indexed in Scopus.

Looking ahead, if current capacities and research efforts are strategically developed, Iraqi authors can make stronger contributions to a more comprehensive and robust knowledge base on aquaculture. Such progress is not purely academic; it is closely tied to the pressing need to equip practitioners and policymakers to use scientific evidence effectively. To keep pace with global advances, Iraqi researchers will need to broaden their research agenda, adopt modern analytical and technological tools, and move beyond the narrow, repetitive experimental designs that have characterized much of the existing literature.

Acknowledgement

The authors thank the Department of National University of Sciences and Technology, Thi-Qar , Iraq, for their logistical support in completing this work.

Novelty Statement

This study revealed that Iraqi authors have increased their output in publications related to common carp, addressing all aspects of the subject. However, they have not introduced any new, innovative ideas that would capture the attention of the aquaculture sector.

Generative AI and AI assisted technology statement

The author states that the Grammarly tool was used to improve the vocabulary of the manuscript, and that inspiration was drawn from COMET generators to enhance the presentation of insights related to the subject.

Conflict of interest

The authors have declared no conflict of interest.

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