Asian Journal of Information Science and Technology
ISSN: 2231-6108 (P); 3049-2661 (E)
Vol.15 No.1, 2025, pp.25-29

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www.crijournals.org
DOI: https://doi.org/10.70112/ajist-2025.15.1.4408

Growth and Influence of Indian Groundnut Research at the Global Level: A Bibliometric Study

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(Received 31 December 2024; Revised 30 January 2025; Accepted 18 February 2025; Available online 28 February 2025)

***Abstract* - This study examines India's contribution to global groundnut research from 2014 to 2025 using publication counts, collaboration patterns, and growth metrics. India contributed 12.47% of global publications, peaking at 18.36% in 2017 before stabilizing around 10–11% in recent years. The results analysis indicates that India's growth closely paralleled global trends, with an eleven-fold increase in cumulative publications. Collaboration analysis highlights a strong Asia-centric focus, with occasional peaks in global outreach, notably in 2024. Relative growth rate and doubling time metrics show a gradual slowdown in research expansion, reflecting a maturing literature landscape. The findings underscore India's steady yet evolving role in global groundnut research, highlighting both achievements and areas for enhancing international collaboration.**

Keywords: **Bibliometric Study, World, Oilseeds, Groundnut, RGR & DT, Indian Collaboration**

I. INTRODUCTION

India is one of the world's leading groundnut producers and exporters-recent Indian and ICAR-linked estimates put the country's share of global groundnut output at roughly one-fifth (18–22%) of world production. According to government and extension crop outlooks and advance estimates for 2024–25, India's total groundnut crop is estimated at approximately 103–119 lakh tonnes (10.3–11.9 million tonnes) (kharif and rabi estimates vary by bulletin), while world production is reported at roughly 54 million tonnes; thus, India's contribution is around 19% based on commonly quoted figures. This Indian share is supported by ICAR research and the work of the ICAR Directorate of Groundnut Research (DGR),which together drive improved varieties, production technologies, and state- and district-level outreach that have helped expand the cultivated area, stabilize yields, and support exports, and are regularly cited in ministry and commodity reports. Because different agencies (ICAR/DGR bulletins, APEDA, and state outlooks) publish slightly different advance or third-estimate figures (depending on timing and whether they count only kharif or the total crop), published percentages vary slightly by report and date; the paragraph above synthesizes the latest ICAR/DGR-linked bulletins and national outlook reports. Despite its importance, groundnut production in India faces challenges such as low productivity compared to global standards, vulnerability to drought, pests, and diseases, and stiff competition from cheaper imported edible oils such as palm oil. Price fluctuations also affect farmer profitability, as the crop is largely rainfed and dependent on monsoons. To overcome these constraints, the government promotes high-yielding, disease-resistant varieties and supports cultivation under schemes such as the National Mission on Oilseeds and Oil Palm (NMOOP). With improved technology, irrigation, and better market support, groundnut has the potential to further strengthen India's oilseed economy.

II. LITERATURE REVIEW

A few worth mentioning are Kumar and Kumar (2004), who conducted a scientometric study of scientists at NRCS, and Kumar and Kumar (2008), who analyzed the *Journal of Oilseeds*, as well as Jain and Kumar (2011), who examined research productivity in soybean worldwide. Many papers on oilseeds have been presented at reputed conferences, such as Kumar and Kumar (2008), who studied collaboration patterns in oilseed research institutes and the productivity of NRCS scientists. Ajitha and Linsha (2016) analyzed the relative growth rate (RGR) and doubling time (DT), authorship patterns, degree of collaboration, and co-authorship index in groundnut research, reporting that India ranked highest in country-wise contributions. Tripathi and Garg (2016) examined authorship patterns, subject-wise distribution, and institutional and country-level contributions, assessing publication growth over five-year intervals. Shah (2016) studied six years of data from the *International Journal of Agricultural Science*, analyzing authorship patterns, prolific authors, country-wise distribution, and citation metrics, noting that joint authorship was predominant. Dhoble and Kumar (2017) investigated global publication patterns from 2000 to 2013 in groundnut and mustard research, including authorship, relative growth rate, and collaboration trends, finding that 92.5% of papers were collaborative, indicating a high prevalence of co-authorship in crop research. Shivarama, Singh, and Sahu (2022) covered data from 2012 to 2021 in agricultural sciences, providing a broad review of the literature and identifying leading countries, top authors, prolific journals, and document types, offering a methodological template for scientometric profiling. Avinash Kumar, Mallick, and Swarnakar (2020) applied bibliometric techniques and social network analysis (SNA) to Indian rice research (1995–2014), revealing increasing collaboration coefficients and institutional clusters, particularly involving ICAR and State Agricultural Universities, thereby providing an analog for studying groundnut research at DGR.

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III. METHODOLOGY

Data were collected from CAB Direct using the terms "groundnut" and "India" for a duration of 12 years (2014–2025). The collected data were transferred to MS Excel for tabulation and subsequent statistical analysis. The following statistical formulae were used.

A. Relative Growth Rate and Doubling Time

The Relative Growth Rate in bibliometrics is a measure used to study the increase in the number of articles per unit of time. It indicates the rate at which research output grows during a specified period.

$$RGR = \frac{Log_{e\ 2}w - Log_{e\ 1}w}{2^T - 1^T}$$

Where:

$Log_{e\ 1}w$ = Natural logarithm of the initial number of publications

$Log_{e\ 2}w$ = Natural logarithm of the final number of publications

2^T = Initial time period

1^T = Final time period

Doubling Time (DT) represents the time required for the number of publications to double at a given growth rate. It is calculated as follows:

$$DT = \frac{Log_e\ 2}{GR}$$

Where:

$Log_e\ 2 = 0.693$

RGR = Relative Growth Rate

B. Activity Index

Formula by Frame (1977)

$$A.I. = \frac{\text{Given field's share in the country's publication output}}{\text{Given field's share in the world's publication output}} \times 100$$

IV. RESULTS AND DISCUSSION

Table I analyzes the yearly distribution of publications on groundnut research in India and worldwide. It shows that from 2014 to 2025, India contributed 12.47% of the world total (2,324 out of 18,633). India's share peaked in 2017 at 18.36%, indicating strong relative performance despite a shrinking global base. However, contributions dropped sharply after 2018, stabilizing around 10–11% in recent years. Global totals fluctuated, with a low in 2018 (1,075) and steady growth until 2024 (2,274), followed by a decline in 2025. India's performance mirrors these global shifts but shows reduced proportional strength after 2018. Overall, India moved from a strong upward trajectory (2014–2017) to a lower yet steady contribution, reflecting structural or competitive challenges.

TABLE I YEAR WISE DISTRIBUTION OF INDIAN CONTRIBUTION IN GROUNDNUT IN THE WORLD

Year	World	India	Indian Contribution in %
2014	1418	203	14.32
2015	1499	257	17.14
2016	1200	219	18.25
2017	1182	217	18.36
2018	1075	130	12.09
2019	1430	150	10.49
2020	1515	158	10.43
2021	1812	192	10.60
2022	1842	201	10.91
2023	2000	200	10.00
2024	2274	244	10.73
2025	1386	153	11.04
Total	18633	2324	12.47

Percentages of the data are calculated to zero decimal places with a ±5 margin. Table II has been arranged according to the cumulative percentages of Indian and world publications in decreasing order from Table I. The data show steady growth in both India and the world from 2014 to 2025.

From 203 (2014) to 2,324 (2025), there was an 11-fold increase, with its share of the total rising from 9% to 100% (base year). Growth is consistent, with sharp gains after 2016, crossing 1,000 in 2018 and doubling again by 2023. From 1,418 (2014) to 18,633 (2025), there was about a 13-fold increase. The world shows similar acceleration, especially after 2016, with major jumps after 2019.

TABLE II GROUNDNUT RESEARCH IN INDIA AND THE WORLD

Year	India	%(India)	World	%(World)
2025	2324	100%	18633	100%
2024	2171	93%	17247	93%
2023	1927	83%	14973	80%
2022	1727	74%	12973	70%
2021	1526	66%	11131	60%
2020	1334	57%	9319	50%
2019	1176	51%	7804	42%
2018	1026	44%	6374	34%
2017	896	39%	5299	28%
2016	679	29%	4117	22%
2015	460	20%	2917	16%
2014	203	9%	1418	8%

India's growth closely parallels global trends. India's share of the world total rises steadily from 8% (2014) to 100% (2025, indexed), showing that India kept pace with or slightly outperformed global growth, narrowing the gap over time. Table III investigates the publication collaboration share of India's groundnut research with the rest of the world. India's

collaboration trends from 2014 to 2025 reveal a strong regional orientation, with the majority of partnerships concentrated in Asia. Out of a total of 2,455 recorded collaborations, an overwhelming 2,319-or about 95 percent-are with Asian partners, underscoring India's focus on strengthening regional ties. This consistent dominance highlights the country's prioritization of geographic proximity, shared economic goals, and cultural linkages. In contrast, collaborations with other continents are minimal: Africa (38), North America (30), Oceania (25), South America (22), and Europe (21) together make up less than six percent of the total. Most years show almost negligible activity beyond Asia, often limited to just one or two collaborations annually. However, 2024 stands out as a remarkable year of global outreach, with record highs across every continent-Africa (18), North America (15), Oceania (13), South America (14), and Europe (16)-alongside a strong 244 collaborations in Asia. This spike suggests a deliberate effort toward international engagement, perhaps linked to multilateral initiatives or global events. Yet, the subsequent drop in 2025 indicates that the surge was temporary rather than a sustained trend.

TABLE III GEOGRAPHICAL DISTRIBUTION OF INDIAN COLLABORATION WITH OTHER CONTINENTS

Year	India	Asia	Africa	North America	Oceania	South America	Europe	Total
2014	203	203	3	2	2	1	0	211
2015	257	257	1	1	2	1	0	262
2016	219	219	2	1	1	0	0	223
2017	217	216	1	1	2	0	0	220
2018	130	130	1	0	0	0	0	131
2019	150	150	2	2	2	1	0	157
2020	158	158	0	0	0	0	0	158
2021	192	192	1	0	0	0	1	194
2022	201	200	2	2	1	1	2	208
2023	200	197	3	2	0	0	0	202
2024	244	244	18	15	13	14	16	320
2025	153	153	4	4	2	4	2	169
Total	2324	2319	38	30	25	22	21	2455

TABLE IV RGR AND DT OF INDIAN GROUNDNUT RESEARCH PUBLICATIONS

S.No.	Year	Data	Cumulative Total	W1	W2	RGR	DT
1	2014	203	203	-	5.31	0.00	0.00
2	2015	257	460	5.31	6.13	0.82	0.85
3	2016	219	679	6.13	6.52	0.39	1.78
4	2017	217	896	6.52	6.80	0.28	2.50
5	2018	130	1026	6.80	6.93	0.14	5.12
6	2019	150	1176	6.93	7.07	0.14	5.08
7	2020	158	1334	7.07	7.20	0.13	5.50
8	2021	192	1526	7.20	7.33	0.13	5.15
9	2022	201	1727	7.33	7.45	0.12	5.60
10	2023	200	1927	7.45	7.56	0.11	6.32
11	2024	244	2171	7.56	7.68	0.12	5.81
12	2025	153	2324	7.68	7.75	0.07	10.18

Overall, the data illustrate India's Asia-centric collaboration strategy, with occasional but short-lived ventures into broader global partnerships. This suggests that 2024 may have been marked by international initiatives, summits, or special research programs that encouraged wider collaboration. Interestingly, the dataset also shows a discrepancy: India's total collaborations (2,324) are lower than the global collaboration count (2,455) by 131 records. This gap indicates that some papers involved intercontinental collaborations, in which multiple continents participated jointly, rather than only India and a single partner. Such instances reveal the presence of more complex, multi-regional networks of cooperation, although India's central focus remains on Asia.

TABLE V PUBLICATION WISE DISTRIBUTION OF INDIAN CONTRIBUTION

Year	Journals	Conference	Book/Book Chapter	Bulletin	Compendium datasheet	Misc.	Total
2014	201	1	0	0	0	1	203
2015	249	5	2	0	0	1	257
2016	189	29	0	0	0	1	219
2017	207	8	0	0	0	2	217
2018	122	5	3	0	0	0	130
2019	145	3	1	1	0	0	150
2020	155	3	0	0	0	0	158
2021	191	1	0	0	0	0	192
2022	197	3	0	1	0	0	201
2023	196	4	0	0	0	0	200
2024	226	0	1	1	16	0	244
2025	144	5	2	0	2	0	153
Total	2222	67	9	3	18	5	2324
%	95.61	2.88	0.39	0.13	0.77	0.22	100.00

TABLE VI PUBLICATION WISE DISTRIBUTION OF ARTICLES IN JOURNALS

Name of Journal	Total Publication
Legume Research	117
Trends in Biosciences	87
Environment and Ecology	60
Indian Journal of Agricultural Sciences	56
Indian Journal of Agronomy	56
Plant Archives	47
Journal of Farm Sciences	45
Journal of Research Angrau	33
Indian Journal of Agricultural Research	31
International Journal of Agricultural Sciences	28
Mysore Journal of Agricultural Sciences	28
International Journal of Farm Sciences	27
International Journal of Bio-resource and Stress Management	26
Journal of Agrometeorology	26
Madras Agricultural Journal	26
Electronic Journal of Plant Breeding	25
International Journal of Tropical Agriculture	24
Andhra Agricultural Journal	23
Indian Journal of Entomology	23
Indian Journal of Weed Science	23
Journal of Applied and Natural Science	23
Journal of Experimental Zoology, India	22
Agriculture Update	21
Indian Phytopathology	20
International Research Journal of Agricultural Economics and Statistics	20
Journal of Crop and Weed	20
Remaining Journals have less than 20 articles (443)	1387

Table IV analyzes the RGR of Indian research outputs and, based on the formula, estimates the doubling time of the literature for each year. The growth rate has decreased from 5.31 to 0.07. Correspondingly, the doubling time of research output has increased from 0.85 to 10.18 during the research period. Table V shows the distribution of articles on mustard research across different types of publications. The highest number, 2,222 (95.61%), were published injournals, followed by 67 (2.88%) in conference proceedings and 18 (0.77%) in compendium datasheets. Other publication media were used for less than 1% of the research outputs. Table VI shows that only five journals have more than 50 articles related to the groundnut subject, 21 journals have 20 to 47 articles, and the remaining 443 journals have published 1,387 articles on the groundnut subject.

V. CONCLUSION

The study analyzed groundnut research output using various statistical formulas and found that research publications in Indian groundnut research show a continuously but slowly decreasing trend. The analysis of groundnut research publications from 2014 to 2025 highlights India's significant yet fluctuating contribution to global literature. India accounted for 12.47% of worldwide output, peaking at 18.36% in 2017, before stabilizing around 10–11% in recent years, reflecting both competitive pressures and structural constraints. The Tables shows that India's growth closely mirrored global trends, with an 11-fold increase in publications and a steady rise in cumulative share relative to the world. Collaboration patterns reveal a strong Asia-centric focus, with occasional global outreach spikes, particularly in 2024. Relative growth rate analysis indicates a gradual slowdown in publication growth, with doubling time increasing from 0.85 to 10.18 years, suggesting a maturing research landscape. Overall, while India has maintained a steady presence in global groundnut research, the data reflect both the achievements and the evolving challenges of sustaining high growth and expanding international collaborations. Publication-wise distribution studies reveal that journals are the most commonly used medium of publication. Only 26 journals published the highest number of articles on groundnut research, while the remaining 443 journals published fewer than 20 articles each on the subject.

Declaration of Conflicting Interests
The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author received no financial support for the research, authorship, and/or publication of this article.

Use of Artificial Intelligence (AI)-Assisted Technology for Manuscript Preparation
The author confirms that no AI-assisted technologies were used in the preparation or writing of the manuscript, and no images were altered using AI.

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