



Global Trend in *Syzygium cumini* Research: A Scientometric Study

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Abstract:

The present study analyzed 2073 global publications on *Syzygium cumini* published between 1966 and 2024 (58 years). Data from Scopus were exported to a CSV (. csv) file format. This file served as the data source for the Biblioshiny application. After data analysis, it was found that the highest contribution in *Syzygium cumini* research took the form of journal articles. India was the most productive country in *Syzygium cumini* research. Elsevier's publication has published more articles than any other source among the top ten prolific sources. The most relevant journal is the Journal of Ethnopharmacology, published by Elsevier. Professor Ameeta Ravi Kumar of Savitribai Phule Pune University, India, was the most prolific author. This study reported *Syzygium cumini*, article, nonhuman, *Syzygium cumini* extract, etc. as the significant author's keywords in the publication.

Keywords: *Syzygium cumini*, R statistical package, Biblioshiny, Research output, Scientometrics.

Introduction and Background:

Blackberry, also referred to as jamun or jambul in Hindi and known as black plum or Indian blackberry in English, is an evergreen tree scientifically named *Syzygium cumini*. This species originates from India and is found across the upper Gangetic plains, Bihar, and Odisha. *Syzygium cumini* is part of the Myrtaceae family (Pepato et al., 2001). The bark of the jambul tree is known for its carminative and digestive benefits. The tree's fruits and seeds are utilized in diabetes management, while its leaves are antibacterial and widely used for treating diabetes (Srivastava & Chandra, 2013). Additionally, it is beneficial for anti-diabetic, neuropsychopharmacological, anti-microbial, anti-diarrheal, antifertility, anti-ulcerogenic, gastroprotective, anti-inflammatory, and radio-protective purposes (Ramteke et al., 2015).

The International Diabetes Federation has recently disclosed that 540 million individuals globally are affected by diabetes. Following COVID-19, diabetes ranks as a major contributor to chronic kidney disease (CKD) and kidney failure in adults. Kidney damage can occur due to high blood sugar levels or other related conditions like high blood pressure, polyneuropathic bladder dysfunction, and infections. Until not long ago, estimates of the global population living with type 1 diabetes were limited to children and adolescents under 20 years old, primarily due to a lack of data for adults. In 2022 and 2023, we conducted a more thorough examination of the effects of type 2 diabetes on indigenous populations, type 1 diabetes across all age groups, the impact of COVID-19 on individuals with diabetes, complications related to diabetic foot, and the relationship between diabetes and kidney disease. Africa is

projected to experience the highest increase in diabetes cases, with a 134% rise by 2045, followed by the Middle East, North Africa with an 87% increase, and Southeast Asia with a 68% increase by 2045. These figures are expected to continue rising steadily (<https://idf.org>).

In humans, cancer is the second most rapidly increasing disease. In 2022, India recorded an estimated 14,61,427 new cancer cases, with a crude rate of 100.4 per 100,000 individuals. Lung cancer was the most common type among males, while breast cancer was prevalent among females. For children aged 0-14 years, lymphoid leukemia was the most frequent, affecting 29.2% of boys and 24.2% of girls (Sathishkumar et al., 2022).

The prevalence of diabetes and cancer is escalating at a concerning pace. *Syzygium cumini*, recognized for its potent medicinal properties, offers promising treatment possibilities for these ailments. Flavonoids, particularly quercetin, have been identified for their anticancer capabilities against numerous cancer cell types (Yadav et al., 2011). In my study, I have demonstrated how scientometric data can pinpoint which countries are actively researching *Syzygium cumini* and which ones should focus more on safeguarding their citizens' health. The exploration of *Syzygium cumini* is on the rise, and it is increasingly being integrated into everyday diets to promote health and longevity.

Literature Review:

Fadeyi et al. (2024) conducted a bibliometric study on medicinal plants for their antifertility activities using a Scopus data set and visualised it through the biblioshiny and Vosviewer interface. According to the study results, 614 research articles were used for analyses, and the “contraception” journal is the

most productive. Results show that India is the most productive country with high publications. The institution of the University of Rajasthan from India is the top for most articles. Finally, studies suggest that antifertility properties determined in preclinical and clinical studies isolate compounds present in the plants.

Sari et al. (2023) used VOSviewer to perform a bibliometric analysis of the antibacterial activity of *Centella asiatica*. In the analysis, 89 research papers retrieved from the Scopus database between 1997 and 2022 found that Ubon Ratchthani University from Thailand was the most productive affiliation and the Journal of Ethnopharmacology was the most productive. The result was explored in adopting phytomedicine as a therapeutic option for preclinical and clinical trials.

Hairani et al. (2023) analyse the research output in anti-diabetic properties of traditional herbal concoctions containing *Eleutherine palmifolia*, *Merr*, *Momordica charantia* L., and *Syzygium polyanthum* using the VOSviewer interface. The study found that no existing studies combine the extracts of *E. palmifoli*, *M. charantia*, and *S. polyanthum* into a single formulation to treat diabetes.

To assess the productivity of *Azardiercta indica* research, Gupta and Mueen Ahmed (2018) used scientometric indicators. Scopus was used as a data source, and data was collected over 20 years (1997 to 2016). 4900 research outputs retrieved for analyses, the study revealed that India has the highest number of publications, Banaras Hindu University Varanasi leads in publications, and the Journal of Ethnopharmacology contributed the largest publications. Finally, he suggests that developing countries, particularly India, must prioritise plant-based research and collaboration, increasing the international level.

Objective:

1. To know the Scientometric profile of the publications on *Syzygium cumini*.
2. To know the communication channels.
3. To identify the national and international collaboration of research.
4. To analyse the top 10 articles with the highest local citation score.
5. To find out the prolific authors.
6. To know the prominent sources.
7. To identify the most frequent author keywords.

Methodology:

A scientometric method was used for the present study. The years between 1966 and 2024 publications were considered for analysis. Document type: Only journal articles, reviews, conference papers, book chapters and books are considered in the dataset. Data for this study were recovered from the Scopus database. To retrieve the dataset for conducting the present study following search strategy was used: TITLE-ABS-KEY (*Syzygium AND cumini**) AND PUBYEAR 1966 TO 2024 AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”) OR LIMIT-TO (DOCTYPE, “cp”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO (DOCTYPE, “bk”) AND (LIMIT-TO (LANGUAGE, “English”))). As of 24 December 2024, 2075 records in (.csv) file format were retrieved from the Scopus database. The actual 2073 records analysed 2 duplicate records that were removed from the dataset. Limited to only English language

records. Scopus database health Science research is not indexed, which is one of the study's limitations. This file was uploaded into the biblioshiny interface. The Biblioshiny app from the R statistical package (<https://bibliometrix.org/Biblioshiny.html>) was used for comprehensive science mapping analysis. Microsoft Excel was also used to design graphs and pie charts. Finally, as per the study's objectives, Excel files were downloaded and used for further analysis.

Data Analysis:**Primary Information and Publication Trends:**

The R-based tool Biblioshiny, utilizing data from Scopus CSV in file format, has facilitated a comprehensive global research effort from 1966 to 2024. Our search has identified 2073 *Syzygium cumini* (Sc) publications from 915 sources. The result revealed that the Document's Average Age was 8.38, while the research's impact is underscored by the high average number of citations per document, which stands at an impressive 26.13. Similarly, 90724 references were cited in the 2073 documents. It also found that these documents were written by 7186 authors, including 55 single-authored and the remaining multi-authored documents. During this study period, research on *Syzygium cumini* published 4.67 co-authors per document. The strong collaborations across countries and regions were highlighted in 16.55% of the total publications involving international co-authorship.

Table 1: Key Details from the Included Publications

Sr. No.	Description	Results
Main Information		
1.	Timespan	1966:2024
2.	Sources (Journals, Books, Etc)	915
3.	Documents	2073
4.	Annual Growth Rate %	7.85
5.	Document Average Age	8.38
6.	Average Citations Per Doc	26.13
7.	References	90724
Document Contents		
8.	Keywords Plus (ID)	17678
9.	Author's Keywords (DE)	5390
Authors		
10.	Authors	7186
11.	Authors Of Single-Authored Docs	55
Authors Collaboration		
12.	Single-Authored Docs	57
13.	Co-Authors Per Doc	4.67
14.	International Co-Authorships %	16.55

Communication Channels:

The researchers produced a scholarly communication regarding *Syzygium cumini* research. A total of 2,073 documents were identified, the majority of which are journal articles, accounting for 1,783 (86%) of the total. This is followed by review articles at 195 (9%), conference papers at 50 (3%), and book chapters at 43 (2%). There are 2 documents classified as books (0%).

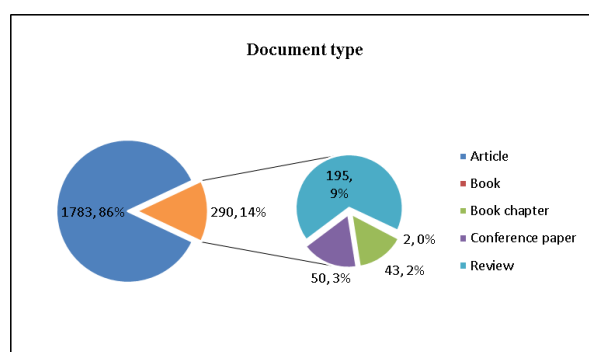
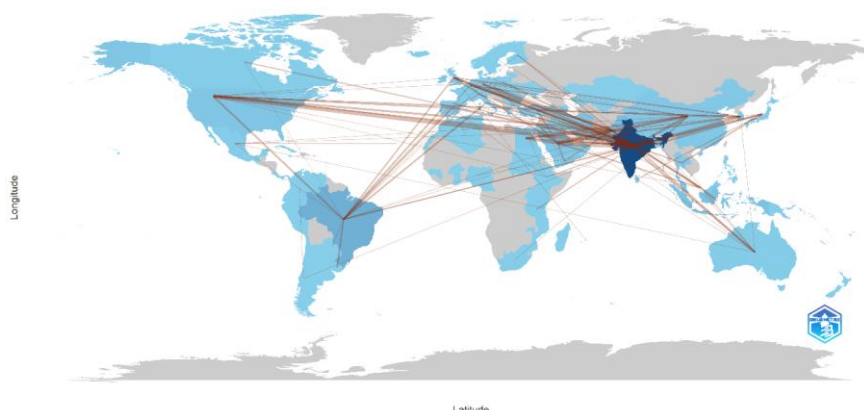


Figure 1: Communication Channels

National and International Collaboration:

Research on *Syzygium cumini* has attracted participation from 64 countries. The table shows the top 10 countries actively engaged in this field. *S. cumini* is a potential therapeutic plant and is appreciated for its medicinal properties in traditional healthcare systems like Siddha, Ayurveda, Unani, and the Chinese medicine system (Ramya et al., 2012). In India *Jamun* cultivation is huge and the country ranks second in the production of *S. cumini* with a contribution of nearly 15.4% to the world's total annual output of 13.5 million tons (Hameed et al., 2020). In India, Maharashtra leads the production of *Jamun* while its cultivation has also been reported in the regions of Gujarat, Uttar Pradesh, Tamil Nadu, and Assam (Indian Institute of Food Processing Technology, 2020).

Country Collaboration Map



India, a leading country, has made a significant mark with 959 publications and 26046 citations, contributing to 46.3% of the research output. Brazil follows with 201

publications, and Pakistan with 103. Despite a lower publication count, the USA stands out with higher citations (1615), ranking fourth in total citations.

Table 2: Top 10 Countries With The Most Publication

Rank	Country	Publications %	Total Citation	MCP/SCP
1	INDIA	959 (46.3 %)	26046	0.107
2	BRAZIL	201 (9.7%)	7945	0.148
3	PAKISTAN	103 (5%)	2143	0.492
4	INDONESIA	84 (4.1%)	548	0.12
5	BANGLADESH	54 (2.6%)	695	0.421
6	CHINA	31 (1.5%)	602	0.722
7	USA	24 (1.2%)	1615	1
8	EGYPT	23 (1.1%)	826	0.437
9	IRAN	23 (1.1%)	365	0.21
10	THAILAND	21 (1%)	337	0.4

MCP Multiple Country Publications, SCP Single Country Publications

The geographical distribution of corresponding authors was analyzed by distinguishing between Single Country Publications (SCP) and Multiple Country Publications (MCP). Further research focused on individual countries and international collaborations. The United Kingdom showed the highest level of collaboration, followed by Malaysia and Germany.

Most Cited Documents with a High Local Citation:

The researcher references the data and identifies the most relevant papers from

the comprehensive lists. The local citation score (LCS) also measures the number of citations a document receives within a specific dataset. The table outlines the top 10 most locally cited documents. Assistant professor Dr Muniappan Ayyanar in the postgraduate and research department of botany and microbiology, A. Veeriya Vandayar Memorial Sri Pushpam College, Poondi, Thanjavur District, Tamil Nadu, India, has authored four of the most influential articles, including one published in 2012. In India, Maharashtra leads the production of *Jamun* while its cultivation has

also been reported in the regions of Gujarat, Uttar Pradesh, Tamil Nadu, and Assam. Production is high, which is the reason

researchers focus on this medicinal fruit in these regions.

Table 3: Top 10 Articles with the Highest Local Citation Score

Rank	Title	Journal	Author (Year)	LCS	GCS	LC/GC Ratio (%)
1	Syzygium cumini (L.) Skeels: A review of its phytochemical constituents and traditional uses	Asian Pacific Journal of Tropical Biomedicine	Ayyanar M (2012)	203	366	55.46
2	In vitro study of antioxidant activity of Syzygium cumini fruit	Food Chemistry	Banerjee A (2005)	82	376	21.81
3	Chemical composition and in vitro antioxidant studies on Syzygium cumini fruit	Journal of the Science of Food and Agriculture	Benherlal PS (2007)	78	121	64.46
4	Phytochemistry, traditional uses and pharmacology of Eugenia jambolana Lam. (black plum): A review	Food Research International	Baliga MS (2011)	70	137	51.09
5	Identification of bioactive compounds from jambolão (Syzygium cumini) and antioxidant capacity evaluation in different pH conditions	Food Chemistry	Faria AF (2011)	68	141	48.23
6	Chemical nature, stability and bioefficacies of anthocyanins from fruit peel of syzygium cumini Skeels	Food Chemistry	Veigas JM (2007)	68	133	51.13
7	Pharmacological potentials of Syzygium cumini: A review	Journal of the Science of Food and Agriculture	Srivastava S (2013)	65	102	63.73
8	Hypoglycaemic and hypolipidemic effect of ethanolic extract of seeds of Eugenia jambolana in alloxan-induced diabetic rabbits	Journal of Ethnopharmacology	Sharma SB (2003)	64	315	20.32
9	Antihyperglycemic effect of the fruit-pulp of Eugenia jambolana in experimental diabetes mellitus	Journal of Ethnopharmacology	Sharma SB (2006)	60	154	38.96
10	Anti-hyperglycemic effect of Eugenia jambolana and Tinospora cordifolia in experimental diabetes and their effects on key metabolic enzymes involved in carbohydrate metabolism	Journal of Ethnopharmacology	Grover JK (2000)	55	363	15.15

Dr. Ayyanar M. publication in the Asian Pacific Journal of Tropical Biomedicine, titled "Syzygium cumini (L.) Skeels: A Review of Its Phytochemical Constituents and Traditional Uses," received the highest number of local and global citations. The ratio of local citations to global citations (LCS/GCS) for the article "Chemical Composition and In Vitro Antioxidant Studies on Syzygium cumini Fruit," authored by Benherlal P. S. in 2007 and published in the Journal of the Science of Food and Agriculture, is 64. From 2000 to 2013, articles generally received more local than global citations.

Prolific Authors Based On Publications with Article Fractionalization:

The research on Syzygium cumini identifies the top 10 prolific authors based on their published articles and fractionalization, as detailed in Table 4. Kumar A. leads with 34 articles and a fractionalization rate of 7.34%. Following him is S. Sharma, who published 24 articles with a fractionalization rate of 5.65%. S. Singh authored 22 articles, while S. Kumar and A. Singh published 21 articles each, with A. Singh achieved a fractionalization rate of 4.57%, the fourth highest among these authors.

Table 4: Ranking Of Prolific Authors

Rank	Authors	Articles	Articles Fractionalized	Area of Interest
1	Kumar, A.	34	7.34	Epoxide Hydrolase
2	Sharma, S.	24	5.65	Maturity Onset Diabetes of the Young
3	Singh, S.	22	5.23	Dietary Supplement
4	Kumar, S.	21	5.33	Antioxidant
5	Singh, A.	21	4.57	Natural Resource
6	Kumar, R.	20	4.53	Antioxidant
7	Ghosh, D.	18	4.53	Diabetes Mellitus
8	Sharma, A.	16	3.57	Antioxidant activity
9	Kumar, V.	15	3.99	Lipid
10	Sharma, P.	14	2.79	Gamma-Aminobutyric Acid

Only one author published more than 30 articles, while five published more than 20 articles each. Additionally, only four authors had fractionalized articles with more than 5. Most authors focused on antioxidant activity as their area of interest. Antioxidant properties linked to high concentrations of flavonoids, such as quercetin, have been shown to have anticancer properties against various cancer cells.

Top fifteen relevant sources with respect to h-index:

A total of 825 journals published 2,073 articles. Table 5 highlights the 15 most preferred journals, detailing their publication number (NP), h-index scores, and total citations (TC). The "Journal of Ethnopharmacology" leads with the highest h-index of 58, underscoring its importance in the field published by Elsevier.

Table 5: Top 15 Relevant Journals With Respect To The H-Index

Rank	Source	h-index	Number of Publication	Total Citation	PY-start
1	Journal Of Ethnopharmacology	39	58	5617	1997
2	Food Chemistry	15	19	3016	2005
3	Pharmaceutical Biology	14	20	550	2001
4	Journal Of Food Science and Technology	13	19	629	2004
5	Phytotherapy Research	13	17	1039	1990
6	Asian Pacific Journal of Tropical Biomedicine	12	12	1253	2011
7	Evidence-Based Complementary and Alternative Medicine	11	12	789	2011
8	International Journal of Pharmacy and Pharmaceutical Sciences	11	20	219	2011
9	International Journal of Biological Macromolecules	9	14	669	2012
10	Lwt	9	11	402	2009
11	International Journal of Pharma and Bio Sciences	8	23	152	2010
12	Journal Of Herbal Medicine	8	9	149	2017
13	Asian Journal of Pharmaceutical and Clinical Research	7	29	233	2012
14	Bmc Complementary and Alternative Medicine	7	7	899	2006
15	Food Research International	7	8	404	2011

An analysis of prominent journals reveals that the Journal of Ethnopharmacology holds the top position with 5,617 citations, followed by Food Chemistry with 3,016 citations and the Asian Pacific Journal of Tropical Biomedicine, which has 1,253 citations. Only three international journals account for 57 publications within the top 15, highlighting their considerable influence.

The Keyword with the Highest Frequency:

The top 20 most frequently occurring author keywords ($N \geq 252$) and their corresponding frequencies are illustrated in Figure 2. One advantage of selecting author keywords is that they offer valuable insights into the primary topics and research trends within publications. The total frequency of these 20 keywords amounts to 7,519. The study identified significant keywords such as *Syzygium cumini* (1,113), article (902), nonhuman (843), *Syzygium cumini* extract (595), controlled study (542), and plant extract (526), among others, as highlighted in Figure 2.



Figure 2: Tree Map of Significant Author Keywords

Conclusion:

This study highlights a dynamic array of papers on *Syzygium cumini*, analysing 2,073 research outputs. Among these, 1,783 were journal articles, constituting a substantial majority and highlighting a wide range of academic contributions. International co-authorship reached an impressive 16.42%, with India leading 959 publications, emphasising its pivotal role, while the UK showed strong collaborative efforts. India is dominant because of its biodiversity in the Sahyadri Range and traditional medicinal practices. The Government of India's Ministry of AYUSH funded 237 medicinal plant research projects. Author Ayyanar M. is notably cited 203 times for his work, and prolific contributors include Kumar A. and Sharma S., with 34 and 24 articles, respectively. The Journal of Ethnopharmacology stands out, with 58 published articles and an h-index of 39, making it the leading journal. The term "*Syzygium cumini*" frequently appeared in abstracts and keywords, underscoring its relevance. This study indicates a crucial need

for further research on *Syzygium cumini* extracts, especially regarding their application in diabetes mellitus in Ayurveda, highlighting potential health benefits.

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