Information Research Communications, 2024; 1(3):261-275.
https://inforescom.org

Research Article

Mapping Global Research Trends in Medicinal Plants: A Scientometric Analysis of Highly Cited Publications

Chaman Sab M[1], Mueen Ahmed KK[2,*], Vitthal Bagalkoti[3]

[1]A.R.G. College of Arts and Commerce, Davanagere, Karnataka, INDIA.
[2]Manuscript Technomedia, No. 9, St. Thomas Town, Bengaluru, Karnataka, INDIA.
[3]CMR University, Bengaluru, Karnataka, INDIA.

ABSTRACT

Objectives: This study aims to explore global research trends in medicinal plants by performing a scientometric analysis of highly cited publications. **Methodology:** By analysing articles indexed in databases such as Web of Science, this research identifies influential authors, journals, countries, institutions, and thematic focus areas. **Results:** The analysis offers insights into publication growth, collaboration patterns, citation impact, and emerging hotspots in medicinal plant research. offers a comprehensive overview of scholarly publications spanning from 1991 to 2022. A total of 200 documents were published across 115 sources, including journals, books, and other scholarly outlets. Despite the modest document count, the average citations per document are exceptionally high at 742.8. The top-cited papers, led by Bakkali *et al*., (5305 citations) and Cowan (4833 citations), predominantly focus on essential oils, antimicrobial agents, antioxidants, flavonoids, and natural products. Dominating the list is the Journal of Ethnopharmacology, with 21 publications, accounting for 10.5% of the top 200 papers. The United States (USA) stands out as the leading contributor, producing 40 records (20% of the top 200 papers) and receiving the highest total citations (35,376) with an Average Citation per Paper (ACP) of 884.4 and an h-index of 4, highlighting the widespread influence of its research output India. **Conclusion:** Findings will help researchers, policymakers, and funding bodies understand this interdisciplinary domain's evolution and future direction.

Keywords: Medicinal plants, Scientometrics, Highly cited papers, Global research trends, Bibliometric analysis, Herbal medicine, Natural products.

Correspondence:
Dr. Mueen Ahmed KK
Manuscript Technomedia, No.9, St. Thomas town, Bangalore, Karnataka, INDIA.
Email: mueen.ahmed@gmail.com

Received: 24-12-2024;
Revised: 09-02-2025;
Accepted: 14-05-2025.

INTRODUCTION

Medicinal plants have played a pivotal role in healthcare systems worldwide for thousands of years (Trivedi *et al*., 2022). Rooted in traditional knowledge systems and ethnobotanical practices, these plants continue to serve as an essential source of therapeutic agents in modern pharmacology. In recent decades, scientific interest in medicinal plants has surged due to their vast potential in treating various diseases, including cancer, diabetes, cardiovascular disorders, and infectious diseases (Senthamilselvi *et al*., 2021a). The World Health Organization (WHO) estimates that nearly 80% of the world's population relies on herbal medicine for some aspect of primary health care, especially in developing countries.

With the growing concerns over antibiotic resistance, adverse drug reactions, and the escalating cost of synthetic drugs, researchers and pharmaceutical companies are increasingly turning towards natural products as safer and cost-effective alternatives (Alarcon-Ruiz *et al*., 2023; Gupta, Mueen Ahmed, and Gupta 2018; Rahaman *et al*., 2021).

The biodiversity of medicinal plants offers an untapped reservoir of bioactive compounds with diverse pharmacological properties. As a result, research in this domain has evolved into an interdisciplinary field, drawing attention from botanists, pharmacologists, chemists, microbiologists, and healthcare professionals alike (Hani *et al*., 2022; Vaishya *et al*., 2025).

Over the past two decades, there has been an exponential rise in the number of publications on medicinal plants, as indexed in major scientific databases (Gupta and Ahmed 2020). These studies range from ethnobotanical surveys and phytochemical analyses to clinical trials and molecular investigations of bioactive compounds (Funada *et al*., 2023; Gupta, Mueen Ahmed, Dhawan, *et al*., 2018; Gupta and Mueen Ahmed 2018; Islam *et al*., 2020; Salmerón-Manzano, Garrido-Cardenas, and Manzano-Agugliaro 2020). However, not all Gupta research contributions have equal visibility or impact. Highly cited publications, in particular,

DOI: 10.5530/irc.1.3.27

Publishing Partner : ScienScript Digital. [www.scienscript.com.sg]

serve as benchmarks of scientific influence and often indicate breakthrough findings or widely adopted methodologies.

Scientometric analysis provides a quantitative and objective method to evaluate the structure, dynamics, and trends of scientific literature. By focusing on highly cited publications, this study aims to map the global landscape of medicinal plant research and uncover key contributors, influential journals, active institutions, collaborative networks, and emerging themes. Such an approach not only highlights the historical evolution of the field but also identifies research gaps and future directions (Hu *et al*., 2024; Kumar 2023; Miraldi and Baini 2019; Rosa Paraguison, Tandang, and Duran Alejandro 2021; Senthamilselvi *et al*., 2021b; Surulinathi *et al*., 2021).

Although several bibliometric studies have examined medicinal plant research in general, few have concentrated specifically on the most influential works (Hani *et al*., 2023).

Analyzing highly cited literature allows for a deeper understanding of the thematic areas that have shaped the field and have had a lasting impact on subsequent studies. It also helps in recognizing centers of excellence, interdisciplinary collaborations, and the translational value of research findings.

In this context, the present study adopts a scientometric approach to explore and analyze the global research output on medicinal plants by focusing on highly cited publications indexed in reputed scientific databases. The findings are expected to offer valuable insights to researchers, policymakers, academic institutions, and funding agencies involved in herbal medicine, drug discovery, and related disciplines.

METHODOLOGY

This research analysed highly cited papers in the medicinal plants published during 1991-2022. Data collection was carried out through several stages. First, bibliometric techniques were applied in this study to gather highly cited papers. Second, the highly cited papers in the Topic of medicinal plants were examined. An advanced search was conducted on 10. April 2025 in the Clarivate Analytics Web of Science Core Collection (Gholampour, Gholampour, and Noruzi 2022) Science Citation Index Expanded (SCI-EXPANDED). In the "Topics" of "TS" in "All languages" for highly cited papers, as follows:

- TS "Medicinal Plants"
- Timespan:1991-2022
- Indexes: SCI-EXPANDED
- The search strategy retrieved 74,857
- Filter results by: Highly cited papers
- Documents: 200 documents
- Citations: 5,304 to 392 citations

The data was used to manage the extracted data and perform statistical analysis, and develop bibliometric indicators. The 200 records were exported as a "plain text' file and imported by Microsoft Excel, Biblioshiny, R-Studio, (Ringle and Sarstedt n.d.) and VOSviewer (Chaman Sab, Kappi, and Mueen Ahmed 2022) software, which provides a network visualization of the publications, including bibliometric coupling, co-authorship, co-citation, and co-occurrence analysis of publications, countries, organisations, authors, journals, and keywords. Labels represent items in the network visualization using circles. The weight of an item determines the size of the label and the circle around it. The label of some items may not be visible to prevent possible overlapping labels. An item's color is determined by the cluster to which it belongs. The lines between items represent a link. TS= (medicinal plants).

OBJECTIVES

* To identify the most highly cited publications on medicinal plants.

* To analyze the growth pattern of publications over time.

* To determine the most productive authors, journals, institutions, and countries.

* To study co-authorship and collaboration networks.

* To identify core themes and emerging research areas using the keyword co-occurrence.

RESULTS AND DISCUSSION

Main information of the study

The bibliometric data presented in Table 1 offers a comprehensive overview of scholarly publications spanning from 1991 to 2022. A total of 200 documents were published across 115 sources, including journals, books, and other scholarly outlets. Despite the modest document count, the average citations per document are exceptionally high at 742.8, suggesting significant academic impact and high relevance within the field. However, the annual growth rate of publications shows a negative trend at -2.21%, indicating a decline in publication output over time. The average age of the documents is 16.8 years, which implies that much of the literature remains influential over a long period.

In terms of content, 1172 Keywords Plus (ID) and 688 Author's Keywords (DE) were used, reflecting a diverse thematic range and research focus areas. The author base is substantial, with 924 contributors, yet only 29 authored single-authored documents, highlighting a strong collaborative research culture. This is further supported by the fact that there are 30 single-authored documents and an average of 4.89 co-authors per document. International collaboration is also notable, accounting for 30% of the publications.

Regarding document types, reviews dominate with 117 entries, followed by articles (74), and a small number of article-proceedings papers (6), review-book chapters (2), and editorial materials (1). The prominence of review articles suggests a strong inclination toward synthesizing existing knowledge rather than generating new empirical findings. Overall, the dataset illustrates a high-impact but declining field with considerable international and collaborative research activity, primarily focused on review literature.

Year-wise distribution of publications

Figure 1 shows that the annual growth of highly cited papers on global medicinal plants, based on a scientometric study, reveals several key trends from 1991 to 2022. The early 1990s witnessed modest publication activity with relatively high citation impact, particularly in 1991 and 1992, which recorded exceptionally high citation-per-paper values of 1,471 and 870, respectively. This suggests that foundational or landmark studies were published during this time, laying the groundwork for future research. From the mid to late 1990s, there was a gradual increase in the number of highly cited publications, with 1998 and 1999 marking significant peaks in both total citations (8,834 and 9,682, respectively) and citations per paper, especially in 1999 with the highest recorded value of 1,613.67. The early 2000s saw a consistent rise in publication volume, with 2003 reaching the highest record count of 15 papers (7.5% of the top 200), although the citation-per-paper metric began to stabilize. Notably, 2008 and 2009 maintained high total citation figures, with 2008 peaking at 14,254 citations and a strong citation impact of 890.88 per paper. During the 2010s, the annual publication of highly cited papers remained steady, averaging around 8-9 records per year. However, the average citation per paper started to decline slightly, indicating a broadening of research output with possibly more diversified but less individually impactful studies. The years 2013 and 2015 still stood out with solid citation metrics (926.43 and 807, respectively), showing that high-impact contributions continued to emerge. From 2016 onward, there was a noticeable dip in both the number of highly cited papers and their citation influence, likely due to the recency of these publications, which haven't had enough time to accumulate citations. By 2022, only one highly cited paper was recorded, with 467 citations, reflecting a continuing trend of lower immediate citation impact in recent years. This could be attributed to the natural lag in citation accrual or a shift in research priorities. the field of medicinal plant research experienced substantial growth in terms of high-impact publications between the late 1990s and early 2010s, followed by a stabilization and slight decline in citation metrics in the most recent years.

Most productive and impactful journals

Table 2, Dissemination of influential research in the field of medicinal plants is concentrated in a few key scholarly journals. Dominating the list is the Journal of Ethnopharmacology, with 21 publications, accounting for 10.5% of the top 200 papers. It has accumulated a substantial 12,790 citations, an average of 609.05 citations per paper, and an H-index of 21, establishing it as the foremost platform for impactful research in this domain. Following it, five journals each contributed six highly cited papers, namely Food Chemistry, International Journal of Molecular Sciences, Life Sciences, and Molecules. Among these, Life Sciences leads in average citations per paper with 960.17, while Food Chemistry also performs impressively with an average of 802.33 citations per article, reflecting both quality and reach.

Among journals contributing five papers each, Food and Chemical Toxicology and Phytochemistry stand out with particularly high average citation scores-1,530.2 and 1,356 respectively-indicating their publications' exceptional influence despite a slightly lower record count. Notably, the Journal of Agricultural and Food Chemistry, with just four articles, has the highest average citation per paper at 1,921.75, demonstrating its significant impact per publication. Other journals with four papers include Frontiers in Microbiology, International Journal of Food Microbiology, and Planta Medica, with average citation counts ranging from 431 to 695.5, reflecting moderate yet noteworthy influence.

Table 1: Main information of the study.

Main Information About Data	
Timespan	1991:2022
Sources (Journals, Books, etc.,)	115
Documents	200
Annual Growth Rate %	-2.21
Document Average Age	16.8
Average citations per doc	742.8
References	22763
Document Contents	
Keywords Plus (ID)	1172
Author's Keywords (DE)	688
Authors	
Authors	924
Authors of single-authored docs	29
Authors Collaboration	
Single-authored docs	30
Co-Authors per Doc	4.89
International co-authorships %	30
Document Types	
article	74
article; proceedings paper	6
editorial material	1
review	117
review; book chapter	2

Further contributions come from journals with three or fewer publications but still substantial citation metrics. Economic Botany, Industrial Crops and Products, and Natural Product Reports each published three papers, with average citations between 436.67 and 496.67. While their record counts are lower, they remain important sources for niche or specialized studies. Journals like the African Journal of Biotechnology, African Journal of Traditional Complementary and Alternative Medicines, Biomedicine Pharmacotherapy, and Bioorganic Medicinal Chemistry represent regional or interdisciplinary outlets, each contributing two highly cited papers, with average citation values generally between 450 and 750, indicating their growing relevance in the field.

Overall, this analysis illustrates that while a few journals dominate in quantity, others demonstrate higher citation efficiency, underscoring the dual importance of both publication volume and citation impact in evaluating the scholarly influence of research on medicinal plants. It also highlights the interdisciplinary nature of the field, which spans pharmacology, food science, microbiology, botany, and biochemistry.

Most Productive and Impactful Authors

Table 3 indicates the scientometric assessment of the most influential authors in medicinal plant research reveals a cohort of scholars who have significantly shaped the field through highly cited publications. Cai Yi-Zhong from the University of Hong Kong leads the list with 5 records, contributing 2.5% of the top 200 publications and amassing 3,617 total citations, with an impressive Average Citation per Paper (ACP) of 904.25 and an h-index of 4, reflecting both productivity and sustained influence. Equally prolific is Harold Corke of Shanghai Jiao Tong University, who also recorded 4 highly cited papers with the same total citations and ACP as Cai, suggesting a strong collaboration or overlap in impactful research. Li Huabin of Fudan University follows with 4 papers, accumulating 2,599 citations and an ACP of 649.75, also holding an h-index of 4, indicating his strong standing in the research community.

Another key contributor, Sun Mei, also from the University of Hong Kong, is noteworthy for achieving the highest ACP of 1,026.67, despite having 3 publications, demonstrating exceptional citation impact and relevance. Authors such as Zhang Wenli (KAUST) and Chen SL (University of California, Davis) contributed with 3 and 2 papers respectively, each with a perfect 775 ACP, indicating high citation density per paper. Other authors, including Anwar F and Ashraf M, both affiliated with institutions in Malaysia and Pakistan respectively, share identical statistics-2 papers, 1,746 citations, and an ACP of 873, reflecting their impactful regional contributions to medicinal plant literature.

The University of Vienna appears frequently in the list with multiple authors: Atanasov, Dirsch, and Heiss, each credited with 2 publications and 2,244 total citations, translating to a very high ACP of 1,122, reflecting concentrated academic influence. Similarly, Bauer R from Universität Graz shares this citation metric, suggesting strong inter-institutional collaborations in Austria. Authors like Ahmad Iqbal (Aligarh Muslim University), Grover Jitendra (Gajara Raja Medical College), and Houghton Peter J. (King's College London) also stand out with high citation counts, ranging from 1,133 to 1,564, with ACPs above 560, indicating substantial academic impact from relatively fewer papers.

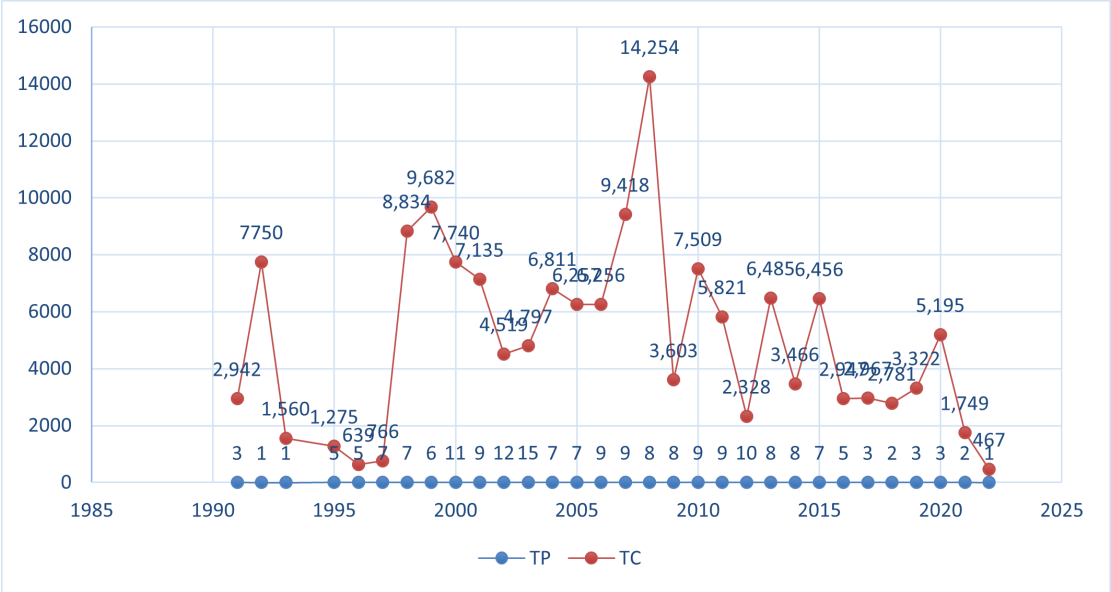

Figure 1: Year-wise publication and citation trends.

Table 2: Most productive and impactful journals.

Sl. No.	Publication Titles	TP	% of 200	TC	ACP	H Index
1	Journal of Ethnopharmacology	21	10.5	12,790	609.05	21
2	Food Chemistry	6	3	4,814	802.33	6
3	International Journal of Molecular Sciences	6	3	4,245	707.5	6
4	Life Sciences	6	3	5,761	960.17	6
5	Molecules	6	3	4,024	670.67	6
6	Food And Chemical Toxicology	5	2.5	7,651	1,530.20	5
7	Phytochemistry	5	2.5	6,780	1,356	5
8	Frontiers In Microbiology	4	2	1,724	431	4
9	International Journal of Food Microbiology	4	2	1,812	453	4
10	Journal of Agricultural and Food Chemistry	4	2	7,687	1,921.75	4
11	Planta Medica	4	2	2,782	695.5	4
12	Economic Botany	3	1.5	1,310	436.67	3
13	Industrial Crops and Products	3	1.5	1,490	496.67	3
14	Natural Product Reports	3	1.5	1,490	496.67	3
15	African Journal of Biotechnology	2	1	1,499	749.5	2
16	African Journal of Traditional Complementary And Alternative Medicines	2	1	1,282	641	2
17	Aquaculture	2	1	917	458.5	2
18	Biochemical Pharmacology	2	1	916	458	2
19	Biomedicine Pharmacotherapy	2	1	1,061	530.5	2
20	Bioorganic Medicinal Chemistry	2	1	901	450.5	2

Moreover, authors such as Elewa Yaser (Hokkaido University) and Beshbishy Amany Magdy have contributed impactful work, although their ACPs (439) are moderate in comparison. Overall, this data illustrates a globally diverse pool of scholars spanning Asia, Europe, and the Americas-who have been central in advancing highly cited research in medicinal plants. The high average citations per paper for many authors signal the field's growing scientific credibility and the increasing application of medicinal plant research in pharmacological, biotechnological, and therapeutic domains.

Most Productive and Impactful Countries

Table 4 shows that the top 20 most productive countries in medicinal plant research reveal a diverse global contribution, with dominance by developed nations and significant input from developing countries. The United States (USA) stands out as the leading contributor, producing 40 records (20% of the top 200 papers) and receiving the highest total citations (35,376) with an Average Citation per Paper (ACP) of 884.4 and an h-index of 4, highlighting the widespread influence of its research output. India, the second most prolific country with 34 records (17%), amassed 19,512 citations and an h-index of 34, the highest in the list, showcasing both the volume and quality of its scholarly contributions in this field. Closely following is China, contributing 32 papers (16%), with the second-highest total citations at 21,710 and a strong *h*-index of 32, indicating its significant academic footprint in medicinal plant studies.

England, with 16 records (8%), shows remarkable impact, having 13,166 citations and an impressive ACP of 822.88, suggesting high-quality research output. Germany, with only 12 records, achieves the highest ACP of 942.5, reflecting a very efficient citation performance. Other European nations like France and Portugal also perform strongly in terms of citation impact; notably, France, despite just 4 papers, has an outstanding ACP of 2,152, the highest among all countries listed, indicating exceptional influence per publication. Canada also exhibits a strong performance with an ACP of 980.4, despite a lower record count of 5, revealing high-impact contributions.

Among emerging economies, Brazil (11 records, 6,515 citations), South Korea (10 records, 5,918 citations), Saudi Arabia (8 records, 5,404 citations), and Pakistan (7 records, 4,507 citations) show growing involvement and rising impact in medicinal plant research. Countries such as Australia and Spain, with only 6 and 7 publications respectively, achieve ACPs above 640, indicating valuable contributions. Iran, Malaysia, and Nigeria also appear in the list with 4 publications each, showing robust regional efforts in advancing this research domain. Malaysia stands out with an

ACP of 862.5, reflecting substantial citation impact relative to its output.

Collectively, this data demonstrates the global nature of medicinal plant research, with strong contributions from Asia, Europe, and the Americas. While developed nations dominate in terms of citation averages and research influence, countries like India, China, and Brazil are rapidly gaining ground, not only in quantity but also in the quality and impact of their scientific output. This suggests an increasingly collaborative and international effort in exploring the therapeutic potential of medicinal plants, driven by global health and sustainability priorities.

Collaboration Network

Table 5 shows that the scientometric analysis of the top 20 contributing institutions reveals significant global engagement in highly cited medicinal plant research. The University of Hong Kong emerges as the most productive institution, contributing 9 out of the 200 highly cited publications (4.5%) and achieving the highest total citations at 8,083. This also results in a notable average of 898.11 citations per paper and an h-index of 9, indicating a consistent and influential output. Following closely, the Council of Scientific and Industrial Research (CSIR), India holds the second position with 6 publications (3%), accumulating 3,600 citations and a strong average of 600 citations per paper, reinforcing India's pivotal role in herbal and traditional medicine research. The Chinese Academy of Sciences and the University of California System each contributed five publications (2.5%), showcasing the significant research contributions from China and the United States. The University of California System, in particular, recorded a high average of 750.6 citations per paper, reflecting the high impact of its research outputs.

European institutions also feature prominently, with Universidade do Porto (Portugal), King's College London, University of London, and the Royal Botanic Gardens, Kew making notable contributions. Among these, the Royal Botanic Gardens, Kew stands out with an impressive average of 1,036.33 citations per paper, despite contributing only three publications, demonstrating the high influence and quality of its research. Similarly, the United States Department of Agriculture (USDA) reported a remarkable average citation of 1,049.67 per paper, suggesting groundbreaking work in plant-based therapeutics and bioresources. Interestingly, the University of Reading surpasses all other institutions in terms of citation impact, achieving the

Table 3: Top 20 Contributing Authors in Highly Cited Global Medicinal Plant Research.

Sl. No.	Authors	Affiliation	TP	% of 200	TC	ACP	h Index
1	Cai, Yi-Zhong	University of Hong Kong	5	2.5	3,617	904.25	4
2	Corke, Harold	Shanghai Jiao Tong University	4	2	3,617	904.25	4
3	Li, Huabin	Fudan University	4	2	2,599	649.75	4
4	Sun, Mei	University of Hong Kong	3	1.5	3,080	1,026.67	3
5	Zhang, Wenli	King Abdullah University of Science and Technology (KAUST)	3	1.5	775	775	1
6	Abd El-Hack, Mohamed E	Zagazig University	2	1	433	433	1
7	Ahmad, Iqbal	Aligarh Muslim University	2	1	1,133	566.5	2
8	Anwar F	Universiti Putra Malaysia	2	1	1,746	873	2
9	Ashraf M	The University of Lahore, Lahore Pakistan	2	1	1,746	873	2
10	Atanasov, Atanas G.	University of Vienna	2	1	2,244	1,122	2
11	Bauer R	Universität Graz	2	1	2,244	1,122	2
12	Beshbishy, Amany Magdy	(Beshbishy, Amany Magdy)	2	1	878	439	2
13	Chen SL	University of California, Davis	2	1	775	775	1
14	Dirsch, Verena M	University of Vienna	2	1	2,244	1,122	2
15	Elewa, Yaser H. A	Hokkaido University	2	1	878	439	2
16	Gan, Ren-You	Hong Kong Polytechnic University	2	1	1,356	678	2
17	Gentry AH	Missouri Botanical Gardens	2	1	694	347	2
18	Grover, Jitendra	Gajara Raja Med Coll	2	1	1,564	782	2
19	Heiss, Elke H	University of Vienna	2	1	2,244	1,122	2
20	Houghton, Peter J.	ing's College London	2	1	1,133	566.5	2

Table 4: Most productive and impactful countries.

Sl. No.	Countries/Regions	TP	% of 200	TC	ACP	h index
1	USA	40	20	35,376	884.4	4
2	India	34	17	19,512	573.88	34
3	Peoples R China	32	16	21,710	678.44	32
4	England	16	8	13,166	822.88	16
5	Germany	12	6	11,310	942.5	12
6	Brazil	11	5.5	6,515	592.27	11
7	Italy	10	5	5,398	539.8	10
8	South Korea	10	5	5,918	591.8	10
9	Saudi Arabia	8	4	5,404	675.5	8
10	Japan	7	3.5	3,416	488	7
11	Pakistan	7	3.5	4,507	643.86	7
12	Spain	7	3.5	4,543	649	7
13	Australia	6	3	4,093	682.17	6
14	Canada	5	2.5	4,902	980.4	5
15	Egypt	5	2.5	2,138	427.6	5
16	France	4	2	8,608	2,152	4
17	Iran	4	2	2,690	672.5	4
18	Malaysia	4	2	3,450	862.5	4
19	Nigeria	4	2	2,666	666.5	4
20	Portugal	4	2	3,174	793.5	4

highest average citation per paper at 1,276.67, highlighting the profound reach and relevance of its research in the field.

While most institutions recorded an h-index of 3 to 5, the University of London exhibited an outlier h-index of 34, indicating a historically rich and widely cited contribution to medicinal plant research, possibly extending beyond the current dataset. Several Asian institutions also demonstrate strong performance, notably the Chinese Academy of Medical Sciences, Sun Yat-sen University, Hong Kong Baptist University, and the University of Delhi, all maintaining high average citations per publication. This reflects the growing research excellence and global engagement of Asia in traditional medicine and phytopharmacology. Collectively, the table illustrates a geographically diverse and interdisciplinary landscape of institutions leading the way in highly cited medicinal plant research, with many achieving exceptional citation impact through a relatively small number of influential publications.

Frequent Keyword Analysis and Thematic Analysis

Figure 2 shows the Frequent keyword occurrence analysis VOSviewer map. Blue Cluster: Antimicrobial and Essential Oil Research: This cluster centres around terms like "medicinal plants," "antibacterial activity," "essential oil," "antimicrobial," and "inhibition." It reflects a strong focus on the bioactive and antimicrobial properties of plant-derived substances, particularly essential oils. Keywords like "growth" and "antimicrobial activity" indicate studies investigating plant-based alternatives to synthetic antibiotics. This area is especially relevant in the context of antibiotic resistance and highlights the importance of natural compounds for microbial inhibition.

Green Cluster: Antioxidants and Disease-Related Studies: Dominated by terms such as "in-vitro," "oxidative stress," "cancer," "nf-kappa-b," "antioxidants," and "curcumin," this cluster reflects a biomedical approach to medicinal plant research. It explores molecular pathways involved in diseases, particularly focusing on anti-inflammatory and antioxidant mechanisms. The presence of "nitric-oxide synthase" and "NF-kappa-B" suggests investigations into cell signaling and inflammation. This cluster showcases how phytochemicals like curcumin and polyphenols are being studied for their role in disease prevention and treatment, especially through oxidative stress modulation.

Yellow Cluster: Flavonoids, Polyphenols, and Phenolics: This cluster is heavily focused on "flavonoids," "polyphenols," "phenolics," "tannins," and "antioxidant activity." It underlines the chemical profiling and evaluation of phytoconstituents responsible for antioxidant potential. Keywords like "extracts," "capacity," and "performance liquid-chromatography" imply methodological approaches for identifying and quantifying these compounds. This area aligns with nutritional science and functional food research, where bioactive phytochemicals from plants are evaluated for health-promoting properties.

Red Cluster: Natural Products and Species Identification: Here, terms such as "medicinal plants," "natural products," "identification," "fungi," "antibiotics," and "performance liquid-chromatography" suggest research focused on plant taxonomy, compound isolation, and the standardization and authentication of medicinal plant species. The keyword "DNA barcoding" is indirectly suggested through the theme of "identification," showing how molecular tools are integrated to ensure reliable species classification, crucial in herbal medicine and pharmacognosy. The red cluster also touches upon the intersection with fungal pathogens and antibiotic discovery from natural sources.

Cross-Cluster Connectivity: The central node, "medicinal plants," acts as a bridge among all clusters, signifying its foundational role across diverse research dimensions. The dense interlinking of nodes reflects interdisciplinary collaborations between phytochemistry, molecular biology, pharmacology, and bioinformatics.

This VOSviewer map visually articulates how medicinal plant research is a multidimensional field, spanning bioactivity screening, molecular mechanism exploration, compound identification, and therapeutic applications. The prominent clusters highlight trends in antioxidant research, anti-inflammatory mechanisms, natural antimicrobial discovery, and plant compound profiling, providing a holistic view of the field's evolution and research hotspots.

Figure 3 shows that the word cloud visualizes key research themes in highly cited literature on global medicinal plants. Prominent terms such as "in-vitro," "medicinal-plants," "antibacterial activity," and "antimicrobial activity" indicate a strong focus on experimental validation and therapeutic potential. Keywords like "antioxidant activity," "nf-kappa-b," "oxidative stress," and "lipid-peroxidation" highlight the biochemical and molecular mechanisms explored. The presence of "natural-products," "essential oils," "flavonoids," and "phenolic-compounds" suggests that phytochemical analysis is central. Additionally, terms such as "identification," "performance liquid-chromatography," and "mass-spectrometry" reflect the methodological approaches used in compound profiling. Overall, the map reveals an interdisciplinary focus blending pharmacology, biochemistry, and analytical science.

Thematic Trend Analysis

Figure 4 indicates the trend topic map illustrates the evolution of research themes over time, showcasing the emergence, duration, and frequency of specific scientific terms. In the early years (1999-2005), research primarily focused on biochemical and metabolic topics such as "low-density-lipoprotein," "capacity," "inhibition," "lipid-peroxidation," and "hypoglycemic activity." These terms appeared early and were foundational in understanding physiological and therapeutic mechanisms. Moving into the mid-2000s, terms like "essential

Table 5: Top 20 Contributing Affiliations in Highly Cited Global Medicinal Plant Research.

Sl. No.	Affiliations	TP	% of 200	TC	ACP	H Index
1	University of Hong Kong	9	4.5	8,083	898.11	9
2	Council Of Scientific and Industrial Research CSIR India	6	3	3,600	600	6
3	Chinese Academy of Sciences	5	2.5	2,549	509.8	5
4	University of California System	5	2.5	3,753	750.6	5
5	Egyptian Knowledge Bank EKB	4	2	1,705	426.25	4
6	Universidade Do Porto	4	2	3,170	792.5	4
7	Chinese Academy of Medical Sciences Peking Union Medical College	3	1.5	2,588	862.67	3
8	Hong Kong Baptist University	3	1.5	1,335	445	3
9	King S College London	3	1.5	1,962	654	3
10	Royal Botanic Gardens Kew	3	1.5	3,109	1,036.33	3
11	State University System of Florida	3	1.5	2,182	727.33	3
12	Sun Yat Sen University	3	1.5	2,098	699.33	3
13	United States Department of Agriculture USDA	3	1.5	3,149	1,049.67	3
14	University of Agriculture Faisalabad	3	1.5	2,157	719	3
15	University of California Davis	3	1.5	2,167	722.33	3
16	University of Delhi	3	1.5	2,126	708.67	3
17	University of Georgia	3	1.5	2,716	905.33	3
18	University of London	3	1.5	1,962	654	34
19	University of Reading	3	1.5	3,830	1,276.67	3
20	University of Wisconsin Madison	3	1.5	2,357	785.67	3

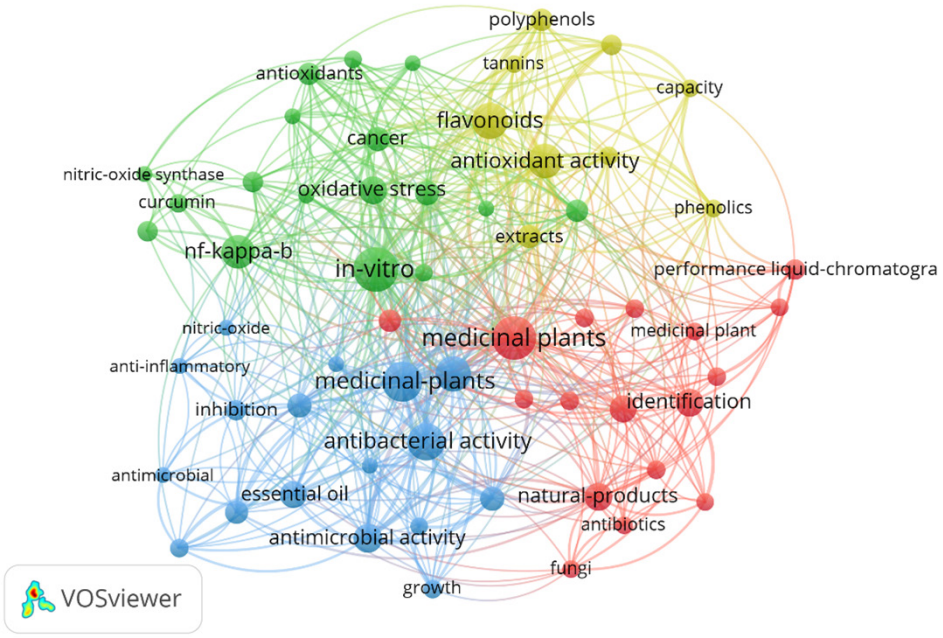

Figure 2: Network co-occurrence visualisation of significant keywords.

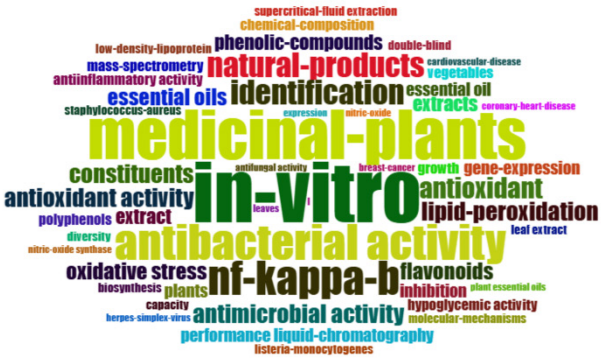

Figure 3: Network co-occurrence visualisation of significant keywords.

oils," "polyphenols," "flavonoids," "antimicrobial activity," and "constituents" gained momentum, reflecting a growing interest in natural products and their pharmacological potential. From 2007 to 2010, there was a notable shift toward more targeted biological activities and plant-based research, with high frequencies for terms like "antioxidant activity," "natural-products," "medicinal-plants," and "phenolic-compounds." This period marked the peak of interest in phytochemical studies. Post-2010, the focus transitioned to molecular and clinical themes, including "identification," "nf-kappa-b," "anti-inflammatory activity," "oxidative stress," and "chemical-composition," indicating a maturation of earlier findings into deeper mechanistic investigations. In recent years (2015 onward), emerging topics such as "listeria monocytogenes," "*in vitro*," "double-blind," "antioxidant," and "molecular-mechanisms" signal a trend toward more experimental, clinically-oriented, and mechanistic research approaches. The increasing frequency and sustained activity of these terms suggest ongoing innovation and a shift toward translational science in the biomedical field.

Three filed polit study

In Figure 5, three-field plot visually maps the relationships between Cited References (CR), Authors (AU), and Keywords/ Descriptors (DE), offering insight into influential works, leading researchers, and central research themes within the domain. On the left, the CR column highlights seminal works, such as Ríos

JL (2005) on ethnopharmacology and Bakkali F (2008) on food chemistry and toxicology. These papers serve as foundational literature, frequently cited across studies. Moving to the center, the AU column showcases prominent contributors like Cai YZ, Corke H, and Sun M, who appear to be key connectors, frequently referencing the aforementioned works and producing research that bridges these core ideas.

On the right, the DE column reveals major themes in the field, prominently featuring "antioxidant activity," "plants," "flavonoids," "medicinal plants," and "natural products." These keywords reflect a strong emphasis on plant-based bioactive compounds and their pharmacological properties. The dense linkage between authors and descriptors suggests that these researchers are central to advancing studies in phytochemistry, natural therapeutics, and functional foods. Additionally, topics like "antibacterial activity" and "phenolics" highlight a growing concern with antimicrobial resistance and the role of plant-derived compounds in addressing it.

Most Productive Research areas

Table 6 indicate that the field of medicinal plant research is inherently interdisciplinary, spanning diverse scientific domains. Pharmacology and Pharmacy is the most dominant research area, contributing 67 of the top 200 papers (33.5%), with a significant total of 42,038 citations and an average of 627.43 citations per paper, highlighting its centrality in medicinal plant applications and therapeutics. Following closely is Plant Sciences, which accounts for 45 publications (22.5%) and has garnered 31,431 citations with a higher average of 698.47, reflecting the botanical foundations of medicinal plant studies.

Biochemistry and Molecular Biology and Chemistry rank third and fourth, with 38 and 36 papers, and average citations per paper of 747.37 and 795.31 respectively. These areas underscore the role of molecular-level analysis in identifying bioactive compounds. Integrative and Complementary Medicine, although slightly less cited on average (611.77), is notable with 30 publications (15%), showing the growing recognition of traditional and alternative systems of healing. In contrast, Food Science and Technology, with 28 records, leads in citation influence with a remarkable 1,021.14 average citations per paper, underlining the nutritional and functional food relevance of medicinal plants.

Microbiology and Biotechnology & Applied Microbiology also contribute significantly, with 15 and 14 papers, and average citations of 792.87 and 751.5 respectively. These areas are vital for exploring microbial interactions and the production of plant-derived compounds. Nutrition and Dietetics (12 records) and Research in Experimental Medicine (11 records) also feature prominently, reflecting clinical and dietary research intersections with medicinal plants.

Interestingly, fields like Agriculture and Toxicology, despite fewer papers (9 and 8 respectively), have the highest average citations per paper, 1,178.67 and 1,311.25. This indicates that while less frequent, studies in these domains have strong scholarly impact—perhaps due to the real-world implications of plant toxicity and agronomic application. Similarly, Engineering (5 papers, 1,272.60 avg citations) and Environmental Sciences/ Ecology (5 papers, 951.2 avg citations) show emerging roles, especially in sustainable utilization and environmental interactions.

Lower in publication volume but still impactful are areas like Cell Biology, Fisheries, Genetics and Heredity, and Neurosciences, each contributing 3 papers (1.5%). Among them, Genetics and

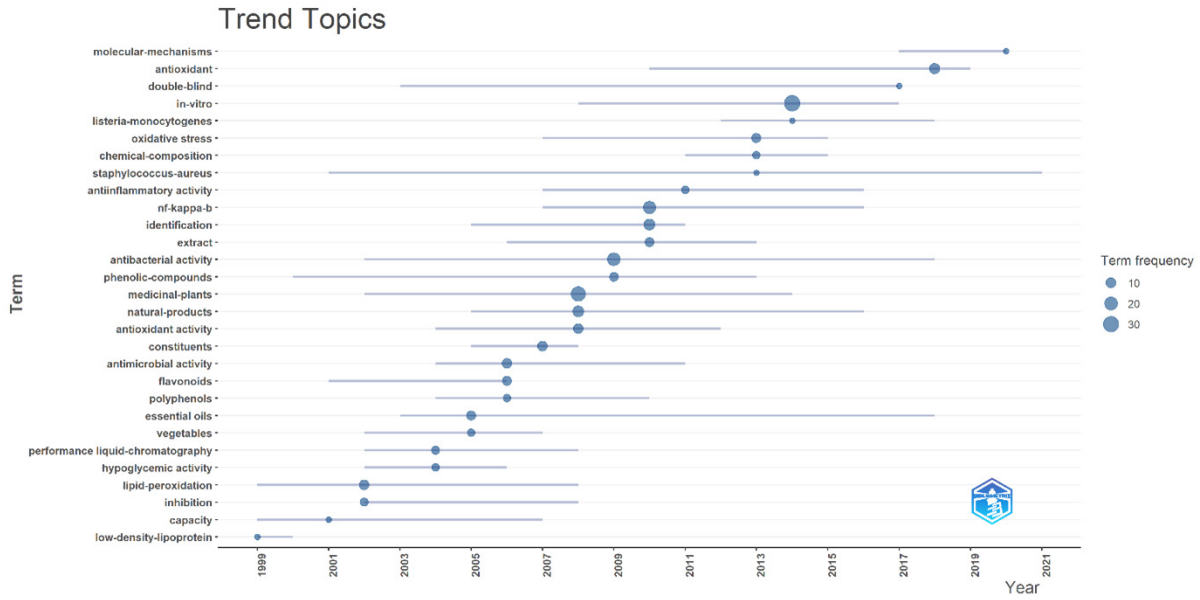

Figure 4: Thematic trend topics.

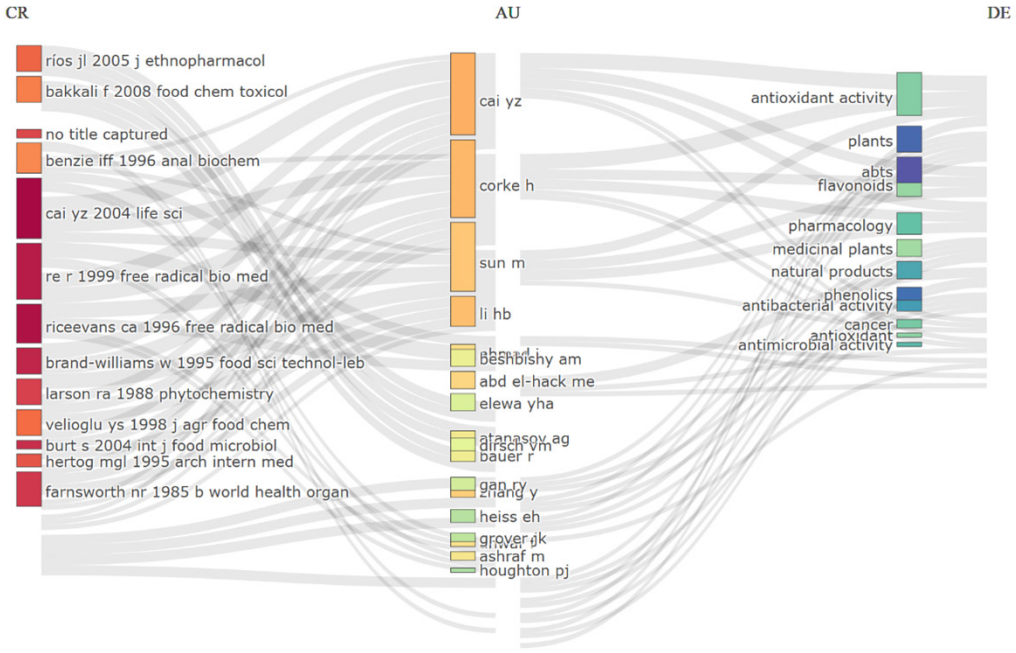

Figure 5: Three filed polit map.

Heredity records the highest citation average (760), likely tied to genetic insights into phytochemical pathways. Meanwhile, Life Sciences/Biomedicine (Other Topics) and Neurosciences reflect interdisciplinary extensions, integrating neurological and biomedical research with plant-derived compounds.

In summary, while traditional areas like Pharmacology and Plant Sciences dominate in volume, emerging and niche fields such as Toxicology, Agriculture, and Engineering demonstrate exceptional influence per publication, emphasizing the broad and evolving scientific landscape surrounding medicinal plant research.

Citation Analysis

Highly cited papers

Table 7 shows that the highly cited papers in global medicinal plant research reveal key themes and landmark contributions across phytochemistry, pharmacology, and biotechnology. Leading the list is Bakkali et al.'s comprehensive review on the biological effects of essential oils, published in Food and Chemical Toxicology, with a remarkable 5305 citations, reflecting the central role of essential oils in therapeutic and toxicological research.

Following closely, Cowan's pivotal article on plant products as antimicrobial agents in Clinical Microbiology Reviews has amassed 4833 citations, underlining the immense scientific interest in plant-derived antimicrobial compounds, especially in the context of antibiotic resistance. Harborne and Williams's classic on flavonoid research (2963 citations) in Phytochemistry showcases the enduring relevance of flavonoids in plant-based pharmacology.

The study by Ternes on pharmaceutical pollutants in water systems (2770 citations) published in Water Research highlights environmental dimensions of medicinal plant and pharmaceutical research. Velioglu *et al.,* (2669 citations) and Kähkönen *et al.,* (2572 citations) have both published landmark papers in the Journal of Agricultural and Food Chemistry, focusing on antioxidant activities and phenolic compounds, thereby establishing nutritional and functional food aspects of medicinal plants as a major domain.

Cai *et al.*'s work on traditional Chinese medicinal plants (1985 citations) in Life Sciences, and Cragg & Newman's widely-cited study on natural products as drug leads (1982 citations) in Biochimica et Biophysica Acta, represent the bridge between ethnobotany and modern drug discovery. Similarly, Zheng & Wang (1804 citations) further strengthen the field's antioxidant thread with a study on selected herbs.

The hormone Salicylic Acid, discussed in Vlot *et al.*'s (1770 citations) article in Annual Review of Phytopathology, highlights plant immune responses and their cross-disciplinary interest. Atanasov et al.'s review on plant-derived pharmacologically active compounds (1761

Table 6: Most productive research areas.

Sl. No.	Research Areas	TP	% of 200	TC	ACP
1	Pharmacology Pharmacy	67	33.5	42038	627.43
2	Plant Sciences	45	22.5	31431	698.47
3	Biochemistry Molecular Biology	38	19	28400	747.37
4	Chemistry	36	18	28,631	795.31
5	Integrative Complementary Medicine	30	15	18,353	611.77
6	Food Science Technology	28	14	28,592	1,021.14
7	Microbiology	15	7.5	11,893	792.87
8	Biotechnology Applied Microbiology	14	7	10,521	751.5
9	Nutrition Dietetics	12	6	8,679	723.25
10	Research Experimental Medicine	11	5.5	8,345	758.64
11	Agriculture	9	4.5	10,608	1,178.67
12	Science Technology Other Topics	9	4.5	6,088	676.44
13	Toxicology	8	4	10,490	1,311.25
14	Engineering	5	2.5	6,363	1,272.60
15	Environmental Sciences Ecology	5	2.5	4,756	951.2
16	Cell Biology	3	1.5	1,285	428.33
17	Fisheries	3	1.5	1,415	471.67
18	Genetics Heredity	3	1.5	2,280	760
19	Life Sciences Biomedicine Other Topics	3	1.5	1,680	560
20	Neurosciences Neurology	3	1.5	1,668	556

citations) in Biotechnology Advances reflects contemporary interest in sustainable bioprospecting and drug development.

Extraction methodologies are detailed in Azmir *et al.*'s work (1587 citations), serving as a practical guide for researchers in the field, while Scalbert's foundational paper on tannins' antimicrobial properties (1520 citations) continues to be widely referenced. The pharmacological exploration of Curcuma longa by Ammon & Wahl (1422 citations) in Planta Medica anchors turmeric's role in medicinal plant science.

Miliauskas *et al.,* (1384 citations) and Surh *et al.,* (1365 citations) contribute significantly to antioxidant and anti-inflammatory research, the latter addressing molecular mechanisms like COX-2 and NF-?B suppression, foundational in understanding phytochemical modulation of inflammation.

From a genomic perspective, Chen & Yao's article on ITS2 DNA barcoding for species identification (1284 citations) in PLOS ONE marks a shift toward molecular authentication in herbal medicine. Liu's work on oleanolic and ursolic acids (1275 citations) in Journal of Ethnopharmacology and Chung *et al.*'s (1190 citations) review on tannins and human health in Critical Reviews in Food Science and Nutrition emphasize specific bioactive compounds' therapeutic roles.

Finally, Li *et al.,* address oxidative stress and antioxidants in liver diseases (1182 citations) in the International Journal of Molecular Sciences, showcasing a disease-focused approach to phytotherapy.

DISCUSSION

The present study offers a comprehensive scientometric and bibliometric analysis of the top 20 highly cited research papers in the field of global medicinal plant research, complemented by an insightful keyword co-occurrence map using VOSviewer. The findings reveal significant trends and research hotspots that have shaped this interdisciplinary domain, encompassing pharmacology, phytochemistry, biotechnology, and clinical science.

The top-cited papers, led by Bakkali *et al.,* (5305 citations) and Cowan (4833 citations), predominantly focus on essential oils, antimicrobial agents, antioxidants, flavonoids, and natural products. These papers have served as cornerstones for subsequent research, highlighting the therapeutic potential of bioactive compounds derived from plants. Notably, several studies such as those by Harborne & Williams and Cragg & Newman delve into the chemical characterization and pharmacological promise of plant secondary metabolites, particularly flavonoids, tannins, and polyphenols. Other prominent contributions include the exploration of antioxidant activity (Velioglu *et al.*, Kähkönen *et*

Table 7:Top 20 most highly cited papers.

Sl. No.	Author	Titles	Sources	TC
1	Bakkali, F; Averbeck, S *et al.*	Biological effects of essential oils - A review	Food and Chemical Toxicology	5305
2	Cowan, MM	Plant products as antimicrobial agents	Clinical Microbiology Reviews	4833
3	Harborne, JB and Williams, CA	Advances in flavonoid research since 1992	Phytochemistry	2963
4	Ternes, TA	Occurrence of drugs in German sewage treatment plants and rivers	Water Research	2770
5	Velioglu, YS; Mazza, G; *et al.*	Antioxidant activity and total phenolics in selected fruits, vegetables, and grain products	Journal of Agricultural and Food Chemistry	2669
6	Kähkönen, MP; Hopia, A *et al.*	Antioxidant activity of plant extracts containing phenolic compounds	Journal of Agricultural and Food Chemistry	2572
7	Cai, YZ; Luo, Q; *et al.*,	Antioxidant activity and phenolic compounds of 112 traditional Chinese medicinal plants associated with anticancer	Life Sciences	1985
8	Cragg, GM and Newman, DJ	Natural products: A continuing source of novel drug leads	Biochimica Et Biophysica Acta-General Subjects	1982
9	Zheng, W and Wang, SY	Antioxidant activity and phenolic compounds in selected herbs	Journal of Agricultural and Food Chemistryarrow_Drop_Up	1804
10	Vlot, AC; Dempsey, DA and Klessig, DF	Salicylic Acid, a Multifaceted Hormone to Combat Disease	Annual Review of Phytopathologyarrow_Drop_Up	1770
11	Atanasov, AG; Waltenberger, B *et al.*	Discovery and resupply of pharmacologically active plant-derived natural products: A review	Biotechnology Advances	1761
12	Azmir, J; Zaidul, ISM *et al.*	Techniques for extraction of bioactive compounds from plant materials: A review	Journal of Food Engineering	1587
13	Scalbert, A	Antimicrobial Properties of Tannins	Phytochemistry	1520
14	Ammon, HPT and Wahl, MA	Pharmacology of Curcuma-Longa	Planta Medica	1422
15	Miliauskas, G; Venskutonis, PR and van Beek, TA	Screening of radical scavenging activity of some medicinal and aromatic plant extracts	Food Chemistryarrow_Drop_Up	1384
16	Surh, YJ; Chun, KS *et al.*	Molecular mechanisms underlying the chemopreventive activities of anti-inflammatory phytochemicals:	Mutation Research-Fundamental and Molecular	1365
		down-regulation of COX-2 and iNOS through suppression of NF-κB activation	Mechanisms of Mutagenesis	
17	Chen, SL; Yao, H	Validation of the ITS2 Region as a Novel DNA Barcode for Identifying Medicinal Plant Species	Plos One	1284
18	Liu, J	Pharmacology of oleanolic acid and ursolic acid	Journal of Ethnopharmacologyarrow_Drop_Up	1275
19	Chung, KT; Wong, TY *et al.*	Tannins and human health: A review	Critical Reviews in Food Science and Nutrition	1190
20	Li, S; Tan, HY *et al.*	The Role of Oxidative Stress and Antioxidants in Liver Diseases	International Journal of Molecular Sciencesarrow_	1182
			Drop_Down	

al.,) and molecular mechanisms underlying anti-inflammatory and anticancer effects (Surh *et al.*, Cai *et al.*, and Ammon & Wahl).

The VOSviewer keyword analysis further deepens the understanding of thematic evolution within medicinal plant research. It uncovers four distinct clusters: (1) the blue cluster highlights the role of essential oils and antimicrobial properties, especially against pathogens and microbial resistance; (2) the green cluster captures the molecular and cellular implications of phytochemicals in regulating oxidative stress, inflammation, and cancer, with keywords like "nf-kappa-b," "in-vitro," and "curcumin"; (3) the yellow cluster emphasizes phytochemical compounds such as flavonoids, tannins, and polyphenols, and their antioxidant capacity; and (4) the red cluster focuses on natural product discovery, plant species identification, and the use of analytical techniques such as liquid chromatography. The keyword "medicinal plants" appears centrally, signifying its core relevance and interdisciplinary connections.

Together, the citation data and keyword visualization affirm that global medicinal plant research is a dynamic and integrative field, where traditional knowledge intersects with modern science. The strong focus on bioactivity screening, compound isolation, anti-inflammatory and antioxidant mechanisms, and plant-based drug discovery reflects the urgent need for natural therapeutic alternatives in the face of antibiotic resistance and chronic diseases. This study not only maps the intellectual structure of the field but also provides valuable direction for future investigations, especially in the areas of standardization, molecular validation, and clinical applications of plant-based remedies.

CONCLUSION

this study underscores the significant and growing impact of medicinal plant research within the scientific community, as evidenced by the highly cited literature and the thematic visualization through VOSviewer keyword analysis. The top 20 most-cited articles reflect a concentrated global interest in the pharmacological, antimicrobial, antioxidant, and chemo preventive properties of natural plant compounds, with essential oils, flavonoids, tannins, and polyphenols emerging as key bioactive agents. These studies have not only laid the foundation for a deeper understanding of plant-derived therapeutics but have also inspired interdisciplinary approaches across phytochemistry, molecular biology, biotechnology, and traditional medicine. The keyword co-occurrence network further highlights the evolving research landscape, revealing interconnected clusters focused on antimicrobial activity, oxidative stress, cancer inhibition, compound identification, and *in vitro* validation. Central terms like "medicinal plants," "natural products," and "antioxidant activity" affirm the core relevance of plant-based research in addressing global health challenges. In conclusion, this study confirms that medicinal plant research remains a vital and dynamic area of inquiry, offering promising avenues for drug discovery, disease management, and sustainable healthcare solutions. Future research should aim at bridging gaps between traditional knowledge and modern scientific validation, enhancing molecular characterization, and advancing clinical trials to fully realize the therapeutic potential of medicinal plants.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

Alarcon-Ruiz, C. A., Maguiña, J. L., Apolaya-Segura, M., Carhuapoma-Yance, M., Aranda-Ventrura, J., & Herrera-Añazco, P. (2023). Bibliometric analysis of medicinal plants' original articles from Latin America and the Caribbean region. Journal of Scientometric Research, 12(1), 79–91. https://doi.org/10.5530/jscires.12.1.011

Chaman Sab, M., Kappi, M., & Ahmed, K. K. M. (2022). Ethnopharmacology research: A scientometric assessment of Indian publications during 2011 to 2020. Journal of Pharmacology and Pharmacotherapeutics, 13(1), 48–58. https://doi.org/10.1177/0976500X221082839

Funada, S., Yoshioka, T., Luo, Y., Iwama, T., Mori, C., Yamada, N., Yoshida, H., Katanoda, K., & Furukawa, T. A. (2023). Global trends in highly cited studies in COVID-19 research. JAMA Network Open, 6(9), Article e2332802. https://doi.org/10.1001/jamanetworkopen.2023.32802

Gholampour, S., Gholampour, B., & Noruzi, A. (2022). Highly cited papers in sport sciences: Identification and conceptual analysis highly cited papers in sport sciences: Identification and conceptual analysis (April).

Gupta, B. M., & Ahmed, K. K. (2020). Moringa oleifera: A bibliometric Analysis of International Publications during 1935–2019. Pharmacognosy Reviews, 14(28), 82–90. https://doi.org/10.5530/phrev.2020.14.12

Gupta, B. M., K K Mueen Ahmed, M. A., & Gupta, R. (2018). Glycyrrhiza glabra (medicinal plant) research: A scientometric assessment of global publications output during 1997–2016. Pharmacognosy Journal, 10(6), 1067–1075. https://doi.org/10.5530/pj.2018.6.180

Gupta, B. M., & Mueen Ahmed, K. K. (2018). Research on Nigella sativa: A scientometric assessment of global publications' output during 1989–2018. International Journal of Pharmaceutical Investigation, 8(4), 173. https://doi.org/10.4103/jphi.JPHI_10_19

Gupta, B. M., Mueen Ahmed, K. K., Dhawan, S. M., & Gupta, R. (2018). Aloe vera (medicinal plant) research: A scientometric assessment of global publications output during 2007–16. Pharmacognosy Journal, 10(1), 1–8. https://doi.org/10.5530/pj.2018.1.1

Hani, N., Baydoun, S., Nasser, H., Ulian, T., & Arnold-Apostolides, N. (2022). Ethnobotanical survey of medicinal wild plants in the Shouf biosphere Reserve, Lebanon. Journal of Ethnobiology and Ethnomedicine, 18(1), 73. https://doi.org/10.1186/s13002-022-00568-y

Hani, N., Baydoun, S., Ulian, T., Nasser, H., & Arnold-Apostolides, N. (2023). An ethnobotanical survey of poisonous medicinal plants in the Shouf biosphere Reserve, Lebanon. Japanese Journal of Medical Research, 1(2), 1–10. https://doi.org/10.33425/2993-6799.1009

Hu, D., Hu, L., Xiao, O., Chen, J., Dai, X., Sun, Y., & Kong, Z. (2024). Bibliometric analysis of research trends and advancements in medicinal plant microbiome. Frontiers in Plant Science, 15((November)), Article 1495198. https://doi.org/10.3389/fpls.2024.1495198

Islam, A. T. M. R., Hasan, M. H., Islam, T., Rahman, A., Mitra, S., & Das, S. K. (2020). Ethnobotany of medicinal plants used by Rakhine indigenous communities in Patuakhali and Barguna District of Southern Bangladesh. Journal of Evidence-Based Integrative Medicine, 25, Article 2515690X20971586. https://doi.org/10.1177/2515690X20971586

Kumar, Dr D. S. (2023). Global publication output of Tinospora cordifolia (medicinal plant) research: A scientometric study. International Journal for Research in Applied Science and Engineering Technology, 11(9), 80–91. https://doi.org/10.22214/ijraset.2023.55516

Miraldi, E., & Baini, G. (2019). Medicinal plants and health in human history: From empirical use to modern phytotherapy. Journal of the Siena Academy of Sciences, 10(1), 7–12. https://doi.org/10.4081/jsas.2018.8529

Rahaman, M. S., Ansari, K. M. N., Tewari, L., & Shah, K. (2021). A bibliometric study of Indian medicinal plant research: An analysis of quality research papers based on the Web of Science. Qualitative and Quantitative Methods in Libraries, 10(4), 505–530.

Ringle, C. M., & Sarstedt, M. (n.d.). Partial least squares structural equation modeling (PLS-SEM) using R.

Rosa Paraguison, L. D., Tandang, D. N., & Duran Alejandro, G. J. (2021). Medicinal plants used by the Manobo tribe of Prosperidad, Agusan del Sur, Philippinesan ethnobotanical survey. Asian Journal of Biological and Life Sciences, 9(3), 326–333. https://doi.org/10.5530/ajbls.2020.9.49

Salmerón-Manzano, E., Garrido-Cardenas, J. A., & Manzano-Agugliaro, F. (2020). Worldwide research trends on medicinal plants. International Journal of

Environmental Research and Public Health, 17(10), Article 3376. https://doi.org/10.3390/ijerph17103376

Senthamilselvi, A., Surulinathi, M., Srinivasaragavan, S., & Jayasuriya, T. (2021a). A scientometric mapping of highly cited works on Medicianal plants. Library Philosophy and Practice, 2021, 1–20.

Senthamilselvi, A., Surulinathi, M., Srinivasaragavan, S., & Jayasuriya, T. (2021b). A scientometric mapping of highly cited works on Medicianal plants. Library Philosophy and Practice, 2021(July 2022), 1–20.

Surulinathi, M., Jayasuriya, T., Duraipandi, R., & Senthamilselvi, A. (2021). A scientometric analysis of highly cited works on herbal drugs, medicines and vaccines. Library Philosophy and Practice, 2021, 1–17.

Trivedi, G., Gupta, N. K., Kumar, V., Ramanathan, T., Bharadwaj, A., Gupta, S. K., Noviar, R. A., & Kumar, A. (2022). Top 100 most cited papers on medicinal plants research. International Journal of Health Sciences, 6(March), 5509–5528. https://doi.org/10.53730/ijhs.v6nS1.6106

Vaishya, R., Gupta, B. M., Dhawan, S. M., Singh, Y., & Bansal, J. (2025). High cited papers in type 1 diabetes mellitus immunotherapy: A bibliometric analysis of global publications during 1996–2023. DESIDOC Journal of Library and Information Technology, 45(2), 123–130. https://doi.org/10.14429/djlit.20408

Cite this article: Sab MC, Ahamed KKM, Bagalkoti V. Mapping Global Research Trends in Medicinal Plants: A Scientometric Analysis of Highly Cited Publications. Info Res Com. 2024;1(3):261-75.