

Bibliometric analysis of *imperata cylindrica* papers in Scopus database (2012–2021)

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ABSTRACT: *Imperata cylindrica* (*I. cylindrica*) is a plant that is popular in Asia. There has been an increase in papers on *I. cylindrica* from various research fields in recent years. The contribution of research on *I. cylindrica* from different institutions and authors is compared in this study, which observed at the trend in *Imperata cylindrica* research from 2012 to 2021. The aim of to identify and describe the scientific literature of *I. cylindrica* in the scopus database from 2012 to 2021. The top ten institutions/universities, list of significant authors, top ten journals that published research, top twenty cited articles, and global distribution of publications on *I. cylindrica* were all identified using keywords from the Scopus database. The University of Florida and IOP Conference Series Earth and Environmental Science published the highest number of articles on *I. cylindrica*. Over the past 10 years, the literature on *I. cylindrica* has continuously grown, with the rate increasing after 2015. Countries in Asia are the ones that published the most papers on *I. cylindrica*, and the most widely written subject area is about agriculture.

1 INTRODUCTION

Medicinal plants are plants with medicinal characteristics or that have a positive pharmacological effect on the human or animal body. With the rise in human requirements, population and commercial commerce, demand for a wide range of wild species is expanding (Namdeo 2018). For generations, Traditional Chinese Medicine (TCM) therapies have been employed in China. The trend of finding and extracting bioactive substances in the polymixture of TCM is growing. Natural medicines are not only meeting the main healthcare needs of the majority of the population in developing nations but are also gaining traction in wealthy countries as healthcare expenses rise and everyone faces financial hardship (Zhang et al. 2018).

Imperata cylindrica is a plant that is endemic to the tropical and subtropical zones and is widely dispersed throughout southern Asia (Jung & Shin 2021). *I. cylindrica* in Southeast Asia can be found around 35 million ha. *I. cylindrica* is also known as a weed that usually attacks agricultural land and can inhibit or interfere with the growth of a plant (Rusdy 2017). However, several compounds from *I. cylindrica* have been found to have a wide range of biological actions, including hemostasis, improved urination, anti-inflammatory, antibacterial, anticancer, and immune system stimulation, according to modern pharmacology studies (Pinilla & Luu 1999).

Bibliometric analysis has recently become a widely accepted method for presenting the current state and research patterns of a specific scientific domain, gaining information on the progress of specific knowledge, and highlighting the most relevant sources, authors, institutions, and countries involved in the field (Jacimovic *et al.* 2021). The study of bibliometric could also assess study quality, analyze major research areas, and forecast the direction of future research (Yu *et al.* 2020). However, no bibliometric analysis of publications on *I. cylindrica* has been published till now. The present study is a bibliometric analysis of *I. cylindrica* research output as found indexed in Scopus – an online database of international research output in Science, Technology, Humanities, and Social Sciences. This study covered a period of ten years spanned between 2012 and 2021.

2 RESEARCH METHOD

2.1 Data source and search strategy

The keyword *I. cylindrica* was used to search the Scopus database. The data was gathered using the Scopus database and pertinent papers that had been indexed at the time. Other databases, such as PubMed and Web of Science, are not included in this research. In this study, the search terms were as follows: TITLE-ABS-KEY (imperata AND cylindrica) AND PUBYEAR > 2012 AND PUBYEAR < 2021.

2.2 Information extraction

The data was manually entered into Microsoft Excel v.2016 after being retrieved from the Scopus database. Articles, initial authors, co-authors, and the first and corresponding author's h-index from Scopus are among the data entered. Data was gathered on the number of Scopus citations of selected articles. Other information includes the name of the journal/conference, Scopus (CiteScore) journal ranking, date of publication as per the journal website, year of paper according to Scopus, data on article submission, number of universities/organizations that contributed to the publication, names of universities/organizations that contributed to the publication, type of article, most important topic/category, subject area, keywords, and a list of the significant issue addressed, number of nations, authors' locations, number of pages, corresponding author's affiliation, first author's affiliation, and department/institution/faculty.

3 RESULTS AND DISCUSSION

The University of Florida is the institution/university that published the highest number of papers on *I. cylindrica* (n = 23), followed by CSK Himachal Pradesh Agriculture University (n = 19). However, the United States and Indonesia are the countries that have two different institutions/universities in the top 10 list (Table 1).

Chaudhary, H. K. from CSK Himachal Pradesh Agricultural University was found to be the most prominent researcher to contribute to *I. cylindrica* (n = 20). Flory, S. L. was the stand-out second to contribute (n = 12). Among the top 10 lists of most prominent authors, 4 authors are from the University Teknologi Malaysia and 3 authors from CSK Himachal Pradesh Agricultural University (Table 2).

IOP Conference Series Earth and Environmental Science is the journal that publishes the most papers on *I. cylindrica* during the period 2012–2021 (n = 17), followed by Cereal Research Communication as the second to be published (n = 12). Journal of Ethnopharmacology was the third most published journal on *I. cylindrica* (n = 10), and also has the highest CiteScore (2020) among other journals in the top 10 list (Table 3).

Table 1. The top 10 institutions/universities published research on *I. cylindrica*.

Name	Country	Number of Records
University of Florida	United States	23
CSK Himachal Pradesh Agriculture University	India	19
Chinese Academy of Science	China	13
University of Dschang	Cameroon	11
Lembaga Ilmu Pengetahuan Indonesia	Indonesia	10
Universiti Sains Malaysia	Malaysia	8
Kyoto University	Japan	8
IPB University	Indonesia	8
Tribhuvan University	Nepal	8
USDA Agricultural Research Service	United States	7

Table 2. List of most prominent authors in studying *Imperata cylindrica*.

Name	Number of records	Institution/Universities	h-index (Scopus 2021)
Chaudhary, H. K.	20	CSK HP Agricultural University	13
Flory, S. L.	12	University of Florida	25
Abdullah, T. A. T.	7	Universiti Teknologi Malaysia	25
Kuete, V.	7	University of Dschang	46
Ahmad, A.	6	Universiti Teknologi Malaysia	24
Kaila, V.	6	CSK HP Agricultural University	5
Nyakuma, B. B.	6	Universiti Teknologi Malaysia	12
Oladokun, O.	6	Universiti Teknologi Malaysia	9
Rather, S. A.	6	CSK HP Agricultural University	5
Das, A. K.	5	Assam University	19

Table 3. The top 10 journals where papers on *I. cylindrica* were published.

Rank	Journal	Number of records	ISSN	CiteScore (2020)
1	IOP Conference Series Earth and Environmental Science	17	1755-1307	0.5
2	Cereal Research Communication	12	0133-3720	1.4
3	Journal of Ethnopharmacology	10	0378-8741	6.0
4	AIP Conference Proceedings	9	1551-7616	0.7
5	Biodiversitas	9	2085-4722	1.3
6	Journal of Physics Conference Series	7	1742-6588	0.7
7	Journal of Threatened Taxa	6	0974-7893	0.8
8	BMC Complementary and Alternative Medicine	5	1472-6882	4.9
9	Invasive Plant Science and Management	5	1939-7291	1.6
10	IOP Conference Series Materials Science and Engineering	5	1757-8981	0.7

Papers written by Korres, N. E. as the main author were cited the most during 2012–2021 ($n = 92$). The list of the top 20 cited papers on *I. cylindrica* is presented in Table 4. There was an increase in publications of more than 100% from 2012 ($n = 30$) to 2021 ($n = 70$). However, the number of publications in 2013 ($n = 27$) and 2015 ($n = 28$) decreased when compared to

Table 4. List of top 20 cited papers on *I. cylindrica* published during the period 2012–2021.

Rank	First Author Name	Number of citations	Reference
1	Korres N. E.	92	(Korres <i>et al.</i> 2016)
2	Zhou, W	89	(Zhou <i>et al.</i> 2017)
3	Kuete, V	80	(Kuete <i>et al.</i> 2013)
4	Chakraborty, U	68	(Chakraborty <i>et al.</i> 2013)
5	Fan, J.	55	(Fan <i>et al.</i> 2016)
6	Fusco E. J.	54	(Fusco <i>et al.</i> 2019)
7	Jumaidin, R.	53	(Jumaidin <i>et al.</i> 2020)
8	Zhu, G.	49	(Zhu <i>et al.</i> 2018)
9	Liguori, R.	46	(Liguori <i>et al.</i> 2016)
10	Li, Y.	45	(Li <i>et al.</i> 2016)
11	Jagoret, P.	45	(Jagoret <i>et al.</i> 2012)
12	Fosu-Mensah, B. Y.	44	(Fosu-Mensah <i>et al.</i> 2017)
13	Nath, A. J.	42	(Nath <i>et al.</i> 2018)
14	Marin-Felix, Y.	39	(Marin-Felix <i>et al.</i> 2017)
15	Tekwu, E.M.	39	(Tekwu <i>et al.</i> 2012)
16	Tong, J.	38	(Tong <i>et al.</i> 2017)
17	Huang, J.	36	(Huang <i>et al.</i> 2012)
18	Crouch J.A.	35	(Crouch 2014)
19	Hidayat, S.	33	(Hidayat <i>et al.</i> 2018)
20	Xue, L.	33	(Xue <i>et al.</i> 2014)

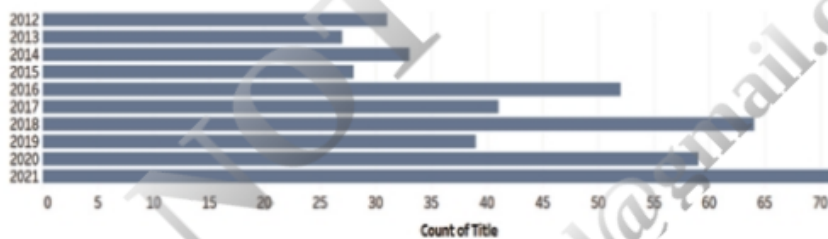


Figure 1. Number of published papers on *I. cylindrica* during the period 2012–2021.

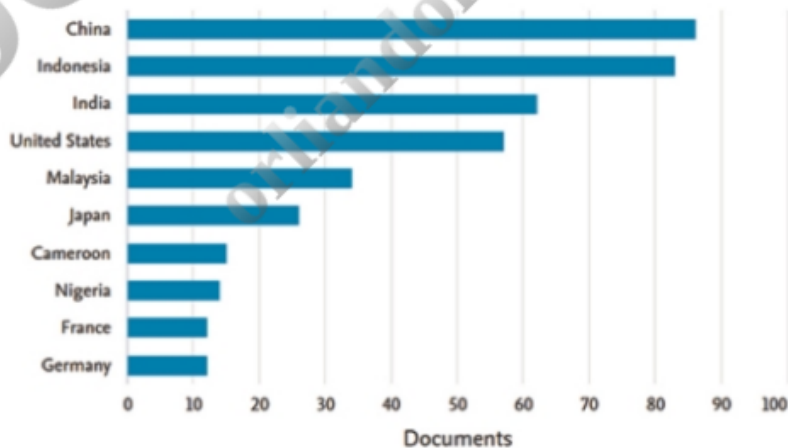


Figure 2. Top 10 countries published papers on *I. cylindrica* during the period 2012–2021.

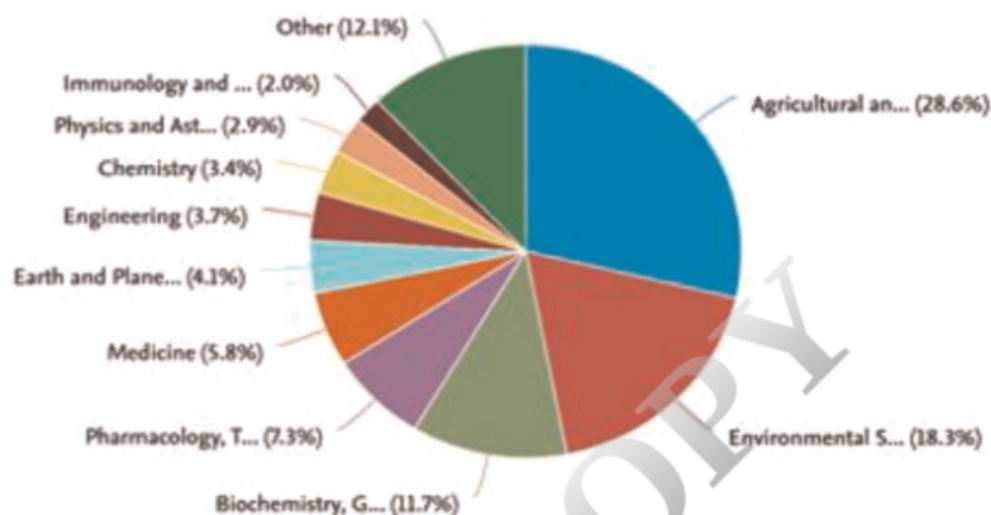


Figure 3. Subject area published papers on *I. cylindrica* during the period 2012–2021.

the number of publications in 2012. In 2016, the number of publications increased sharply ($n = 52$) (Figure 1). China was the country that published the most *I. cylindrica* papers ($n = 86$), followed by Indonesia ($n = 83$) (Figure 2). Agriculture is the most published subject area (28.6%) (Figure 3).

The bibliographic analysis shows past patterns on relevant issues, current research progress, and helps find similar funding by identifying top researchers and institutions. This bibliometric study is novel in being the first study to identify and assess the papers of *I. cylindrica* that were published during 2012–2021.

Imperata cylindrica is one of the popular plants studied by researchers in Asia. It turns out that not only Asia is researching this plant, the United States, Africa, and Europe were also interested in researching this plant. Even institutions from the United States are the ones who publish the most papers. From the data in Table 1, we can find out the map of the research interest of this plant. Three researchers from CSK HP Agricultural University occupy the list of 10 outstanding researchers: Chaudhary, H. K., Kaila, V., and Rather, S. A. These three researchers are in the field of agriculture, which is in line with the data in Figure 3, and as mentioned above, agriculture is the most studied subject area of *I. cylindrica*.

Table 3 showed that IOP Conference Series Earth and Environmental Science is the journal that publishes the most about *I. cylindrica*. However, this journal's CiteScore (2020) is the smallest (0.5) compared to other journals on this list. The paper written by Korres N. E. *et al.*, was the most cited, titled "Cultivars to face climate change effects on crops and weeds: a review" (Korres *et al.* 2016). The subject of this paper is agriculture. The second most cited paper is from the field of environmental studies sector (first author is Zhou, W.) (Zhou *et al.* 2017), and the third most cited is from the ethnomedicine field (first author Kuete, V.) (Kuete *et al.* 2013). Interestingly, Kuete, V. has the highest H-index (Scopus 2021) compared to other authors, as shown in Table 2.

The most written subject areas, as shown in Figure 1, are agriculture (28.6%), followed by medicine (5.8%), pharmacology (7.3%), immunology (2%), biochemistry (11.7%), totaling 26.8%. This shows that although *I. cylindrica* has many biological activities, it has not been extensively explored. It means that this is a good opportunity for researchers in the field of



Figure 4. Mapping of keywords in *I. cylindrica* research.

ethnomedicine to explore this plant from the side of physiology, immunology, biochemistry, or biomolecular. Likewise in other fields, there are still opportunities to write about this plant.

Asian countries, such as China, Indonesia, India, Malaysia, and Japan, published the most research about *I. cylindrica*, followed by countries from the African continent, namely Nigeria and Cameroon, the countries from Europe, namely France and Germany, and the United States (Fig. 2).

The limitation of this study is that there are still many papers on *I. cylindrica* that are not included in the Scopus database. Besides that, many papers were not written in English, so they could not be entered into the Scopus database, even though those papers may have important information that could contribute to the advancement of *I. cylindrica* research. Despite these limitations, we believe that the information reported in this study provides valuable insight into the scope and nature of *I. cylindrica* literature.

4 CONCLUSION

Imperata cylindrica is one of the important plants in Asia that has many benefits. These data give a somewhat objective reference to research trends for peer scientists, editors and publishers, clinicians, healthcare providers, and policymakers on *I. cylindrica*.

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