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BIBLIOMETRIC ANALYSIS OF RESEARCH LITERATURE ON PIPER BETLE

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Abstract:

Betel leaf plays an important role in ancient civilization. Chewing betel leaves with areca nut was pointed out in the pre-historic books. In 13th century, Marco Polo mentioned about the betel chewing among kings and nobles in India. Betel and areca nut plays an important role in Indian Culture, especially among Hindus. On that basis of idea the keyword of "Piper betle" or betel was collected from the Web of Science. This study is limited for the period 1997- 2016 with **Bibexcel** and **Pajek** tool. Scientists are so much interested to publish the research immediately in the journal article. English is the widely used communicable language. It is true in the betel research also. Added to that, this study focuses on publishing trend, authorship pattern, author's productivity, h-index, co-authorship map, citation map.

Keywords: *Piper betle, Betel leaves, Traditional Medicine, Home Remedy, Bibexcel, Bibliometric Analysis.*

Introduction:

. The betel plant has originated from South and South East Asia. Betel plant is an evergreen and perennial creeper, with glossy heart-shaped leaves and white catkin. For its intestinal, carminative, anti-flatulent and gastro-protective properties, chewing betel leaves are considered as an edible digestive aid. Betel leaves have the properties of warm and spicy flavor. It has the

medicinal values of controlling coughs, inflammation, nose bleeding and relieves itching. It acts as the best medicine for treating dental caries, and oral infections caused by bacteriaIt stimulates the central nervous system, stimulates the intellect, increases peristalsis, stimulating spasms, relieve nature of the snoring. The database covered in the Web of Knowledge was Science Citation Index (SCI), Social Science Citation Index (SSCI), Arts and Humanities Citation Index (A&HCI). In Web of Knowledge Database the key word "**Piper betle" or betel** was used in the Topic field 1997-2016. The result of **1730** was downloaded in a separate text files. The data was analysed with the Bibexcel. It is a powerful analytical tool. This Bibexcel was developed by Olle Persson, Inforsk, Umeå Univ (Sweden). This software is designed to assist a user in analysing bibliographic data, or any data of a textual nature formatted in a similar manner. Scientific collaboration is accepted in the new interdisciplinary research. By that there is a chance of improving funds and professional advancement.[1]

Need for the study:

The Piper betle leaves, areca nuts and lime powder were used ceremonially in traditional India. It acts as a stimulant to suppress hunger and reduce stress. Piper betle leaves have been chewed along with the areca nut since very ancient times. This plant cures cough, bronchitis, burns and nose bleeding. It contains cholinomimetic and possible calcium channel antagonist constituents, which are concentrated in the aqueous and ethyl acetate fractions respectively.[2] Piper betle (Piperaceae) leaves which are traditionally used in India and China in the prevention of oral malodor was examined by bioassay-guided fractionation to yield allyl pyro catechol (APC) as the major active principle which showed promising activity against obligate oral anaerobes responsible for halitosis. The biological studies with APC indicated that the potential to reduce methylmercaptan and hydrogen sulfide was mainly due to the anti-microbial activity as established using dynamic in vitro models. [3] Leaves of Piper betle (Piperaceae) possess several bioactivities and are used in traditional medicinal systems. However, its antidiabetic activity has not been scientifically investigated so far. The aim of this study therefore, was to investigate the antidiabetic activity of Piper belle leaves. [4] Rapid increase in the incidence of type 2 diabetes (DM2) in Papua New Guinea, coupled with compelling epidemiological evidence supporting a diabetogenic association with betel quid (BQ) chewing has lead us to investigate dietary strategies that might offer protection from developing DM2.[5] P. betel may offer a new therapeutic approach for the control of allergic diseases through inhibition of production of allergic mediators.[6] Betel leaf

chewing is an old traditional practice in India and other countries of East Asia. We have investigated the antioxidant and antihyperlipidaemic potential of an alcoholic leaf-extract of Piper betel against D-galactosamine. P. betel could afford a significant antioxidant and anti hyperlipidaemic effect against D-GaIN-intoxication. [7] The leaves of this plant have been long in use intropical countries for the preparation of traditional herbal remedies. The antifungal activity exhibited by this compound warrants its use as an antifungal agent particularly for treating topical infections, as well as gargle mouthwash against oral Candida infections.[8] Piper betle Linn is a traditional plant associated with the Asian and southeast Asian cultures. Its use is also recorded in folk medicines in these regions. Several of its medicinal properties have recently been proven. Photochemical analysis showed the presence of mainly trepans and phenols in betel leaves. These constituents vary in the different cultivars of Piper betel.[9] The leaves of Piper betle Linn. (Family: Piperaceae) possess several bioactivities and are used in the Traditional Medical systems of Sri Lanka. The betel dried powder exercise for determination of physicochemical parameters, presence or absence of heavy metals, and microbial contamination. Added to that, it is screening for phyto-chemicals and development of High Pressure Liquid Chromatography (HPLC) fingerprint and densitogram.[10]

Objectives:

The research is designed to deal with more general information processes. It is a set of methods used to study or measure texts and information. This term is often used in the field of library and information science. Raj Kumar Bhardwaj and Shri Ram had done research on Osteoporosis. They find out the literature growth and identify India's contribution.[12] The researcher examine the following objectives to analysis the downloaded data.

- To identify the literature growth of Piper betle Research
- To identify the Publication Type and language wise distribution
- To analyze authorship pattern and h-index
- To identify the Co-Authorship pattern
- To identify the country colloboration
- To analyze Co-Citation works by applying Pajek tools.

Quantum of literature for Piper betle L.Research

Medicinal plants have been largely used in traditional medicine. It acts as major source for the treatment of various diseases. Shri Ram had done research on various aspects of literature growth in Podophyllotoxin, like publication pattern, language of publications, authorship pattern, and country wise production and so on.[13] Table 1 shows the year wise global distribution Piper betle research productivity for a period of 1997- 2016. It is found that there is no uniformity shown in the year wise growth of literature. The total publication count is 1730 and the maximum productivity occurred in the year 2013, having 151 and this is 8.73 percent of the total output. Minimum productivity occurred in the year 1997 with only 23 publications and this is 1.33 percent of the total output.

Table - 1

Quantum of Literature published by year wise

Publication Year List			
S.No	**Publication Year**	**No. of Publication**	**%**
1	1997	23	1.33
2	1998	36	2.08
3	1999	35	2.02
4	2000	34	1.97
5	2001	43	2.49
6	2002	62	3.58
7	2003	52	3.01
8	2004	58	3.35
9	2005	64	3.70
10	2006	81	4.68
11	2007	84	4.86
12	2008	95	5.49
13	2009	107	6.18
14	2010	135	7.80
15	2011	112	6.47
16	2012	126	7.28
17	2013	151	8.73

18	2014	147	8.50
19	2015	143	8.27
20	2016	142	8.21
Total		**1730**	**100.00**

Publication Types of Piper betle Research:

Table 2 reveals the distribution of the 'Piper betle' research output according to publication type. It is a usual fact that most of the scholarly literature of scientific research is published in Journals and sometimes offered in the review. In this study, out of 1730 about 1468 were published as Journal articles and 107 had published as Reviews. Publication types like Meeting abstract, Editorial material, note, correction, news items, and book review, book chapter, bibliography, and biographical-item has less number of records.

Table - 2

Publication Type Piper betle Research

S.No	Publication Type	No. of Records
1	Article	1468
2	Review	107
3	Meeting Abstract	83
4	Article; Proceedings Paper	26
5	Letter	19
6	Editorial Material	14
7	Correction	7
8	News Item	3
9	Review; Book Chapter	1
10	Bibliography	1
11	Biographical-Item	1
Total		**1730**

Piper betle Research Production by Language:

The distribution of Piper betle literature by language is shown in Table 3. The scholarly declaration is achieved through English language in almost all the countries irrespective of the local language of the country.[14] This event is not exclusion to the subject of Piper betle which published about 1721 (99.48%) of the research output in English. The other languages like German, French, Spanish and Chinese are identified in Piper Betel research in a minimum percentage.

Table - 3

Piper betle Research by Languages

Table 5- Language wise Distribution			
S.No	**Language**	**No of Article**	**%**
1	English	1721	99.48
2	German	3	0.17
3	French	2	0.12
4	Portuguese	1	0.06
5	Spanish	1	0.06
6	Chinese	1	0.06
7	Polish	1	0.06
Total		**1730**	**100.00**

Authorship Pattern of Piper betle Research:

S Aswathy and A.Gopikuttan analyzed various parameters like growth pattern, authorship pattern and distribution with regard to subject, year, institution and geographical area of space graft and rockets.[15] In Piper betel research, the authorship pattern is analyzed in Table 4. Majority of papers are four & five author papers with 268(15.49%) publications. Three authors paper constitutes 212 publications (13.6%), followed by six authors' papers constitute 220 publications (12.72%). Three authored papers constitutes 226 publications (13.06%) followed by two authored papers, which constitutes 174 publications (10.06%). The trend appears to be that the highest number of joint authors, the higher number of articles they contribute. More research was done by collaborative authors than single contribution.

Table - 4

Authorship pattern in Piper betle Research

Table 4 - Authorship Productivity			
S.No	**No. of Authors**	**No. of Articles**	**%**
1	Single	91	5.26
2	Two	174	10.06
3	Three	226	13.06
4	Four	268	15.49
5	Five	268	15.49
6	Six	220	12.72
7	Seven	133	7.69
8	Eight	109	6.30
9	Nine	69	3.99
10	Ten	66	3.82
11	More than ten authors	106	6.13
Total		**1730**	**100**

Find author's h-index for highly productive research with Bibexcel:

Bibexcel tool is used to identify h-index of authors. **8095** authors contribute research in Piper betle .from 1997 to 2016. The research output is 1730. With the author field, the .doc file is created. The total number of times the article is cited is identified with the command 'tc' and jn1 file is created. Select .jn1 file, type 2/3 'The Box' and run Edit out files/Select columns. The result is .col file. The command, 'run Analyze/h-index' produces the outcome i.e. hdx file. This can be opened in excel format. Table 5 shows that Liu TY published 39 research articles, with the h-index of 19. The researcher received 678 citations of 19 articles. But his total citation for his publication is 870. The highly prolific 20 scientist's h-index, citation counts, citation total sum of h-index are shown in table 5.

Table - 5

h- index score for Highly Productive authors

S. No.	h-index	Author	Citation sum within h-core	All citations	All articles
1	19	Liu TY	678	870	39
2	17	Jeng JH	969	1061	30
3	16	Chang KW	642	739	24
4	16	Lee CH	656	836	43
5	16	Chang MC	912	971	27
6	16	Hahn LJ	936	1001	26
7	15	Warnakulasuriya S	895	994	31
8	15	Lin SC	597	640	20
9	15	Lin CC	783	859	30
10	15	Ko YC	631	805	44
11	14	Wu DC	532	574	21
12	14	Shieh TY	578	692	35
13	14	Chen CH	486	589	30
14	13	Ralhan R	482	496	15
15	12	Wu MT	477	532	18
16	12	Chiang CP	455	474	16
17	11	Kao SY	433	433	12
18	11	Lee JM	404	424	16
19	11	Yang YH	326	428	28
20	11	Yang SF	246	315	24

Co-authorship Pattern of Piper betle Research:

The co-authorship gives a social status and the total number of co-authors is **3663.** The scientist gave important scientific assistance by sharing the liability and accountability of his research work. The results of citation, publication are shared by the co-authors. Bibexcel is used to analyze the co-authorship pattern. 'AU' field was selected in Bibexcel tool and converted as upper lower case. Some authors had more than one initials. Create 'New .out file' which will remove duplicates. On the basis of the result, analyze co-occurrences and pair file. The result of .coc file is

given in Table 6. On the basis of .coc file, .net file was created. The table shows the name of the highly prolific first authors, their co-authors and number of contributions.

Table -6

Co-authors of Piper betle L.Research

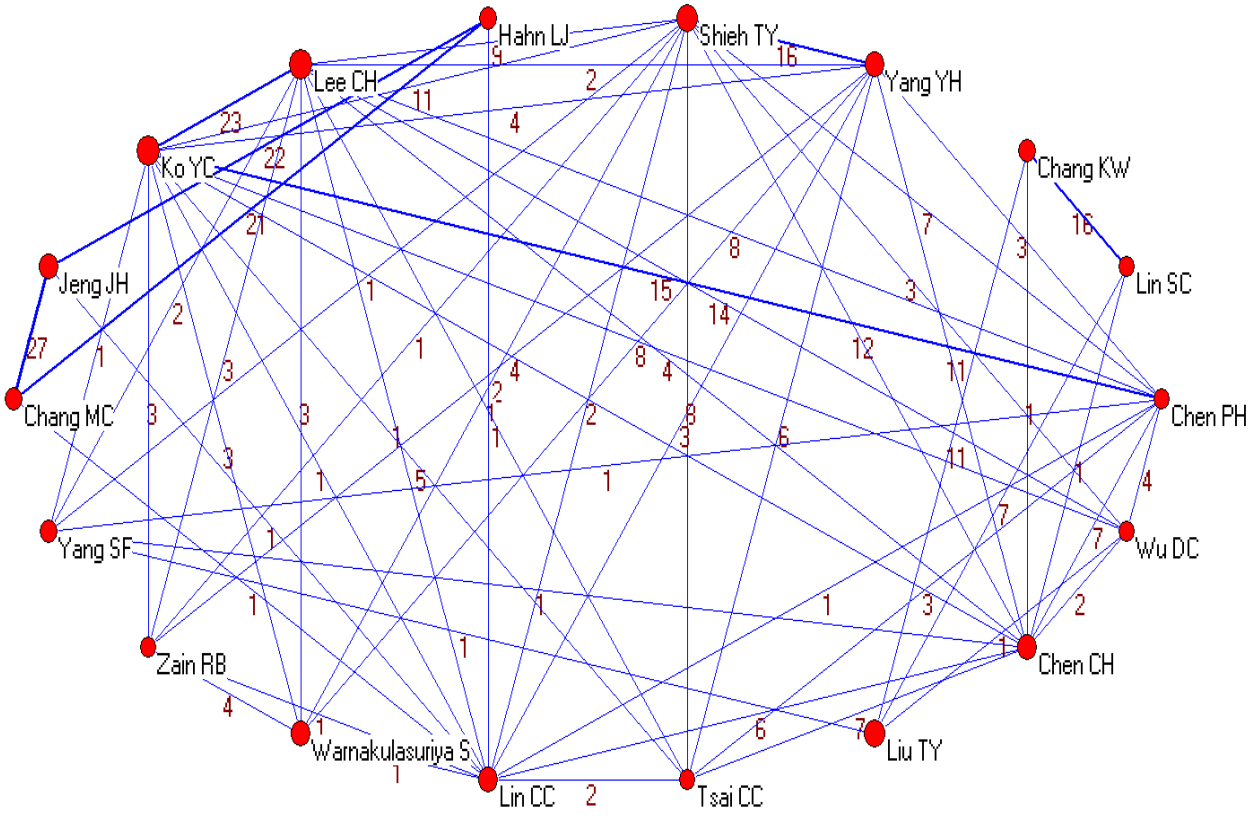
S. No.	First Author	Co-Author	No of Records
1.	Chang MC	Jeng JH	27
2.	Ko YC	Lee CH	23
3.	Hahn LJ	Jeng JH	22
4.	Chang MC	Hahn LJ	21
5.	Jeng JH	Lee JJ	16
6.	Lin CW	Yang SF	16
7.	Chang MC	Lee JJ	14
8.	Chiang SL	Ko YC	14
9.	Liao CT	Wang HM	12
10.	Chan CP	Jeng JH	11
11.	Ko YC	Lee KW	11
12.	Lee CH	Lee KW	11
13.	Chan CP	Chang MC	11
14.	Hahn LJ	Lee JJ	11
15.	Ko YC	Shieh TY	11
16.	Lian IB	Su CC	11
17.	Chen MK	Yang SF	11
18.	Chiang SL	Lee CH	10

The .net file is called from the maping tool ‘Pajek’ and the following image was created. Total number of coauthors is described in Figure.1. The density of lines indicates the number of publications of the scientists, if they produce more publications, the line will be dark and broad in colour. Chang MC has collaborated with 27 works with Jeng JH. The line, which indicates the density of co authorship between them, is very dark. If the line is very thin, the number co-authored publication is less. Ko YC has done 23 works with Lee CH, which is also shown in Image

1. Suresh kumar also examine the author's research in the field of Computer Interaction Research. Different countries of scientist carried on research together.[16]

Image -1

Co-authors Network and number of works



Co - Citation Analysis of Piper betel:

The total number of Co-citations is **2366**. In co-citation analysis, studies look into the formation of scientific examination based upon citations and co-citations. By that we can find out the groups of scientists and their publications results can be drawn about the research disciplines. For Co-citation analysis of Piper betle research 'Cited Document' C1 field was in use for the analysis with the facilitates of 'Any:separator text' in the Bibexcel tool. As a result .out file was obtained. On that basis low, cit was created. The researcher selects the top 20 cited articles. On that basis of .coc files were created. The result is .net file which is given in Table 7 which shows the top twenty co-citations.

S.No.	Cited References	Co-cited References	No. of Recs
1	Ko YC, 1992, V21, P261, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1992.Tb01007.X	Ko YC, 1995, V24, P450, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1995.Tb01132.X	63
2	Ko YC, 1995, V24, P450, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1995.Tb01132.X	Lee CH, 2003, V88, P366, Brit J Cancer, Doi 10.1038/Sj.Bjc.6600727	39
3	Jeng JH, 1994, V73, P1043, J Dent Res	Sundqvist K, 1989, V49, P5294, Cancer Res	36
4	Gupta PC, 2002, V7, P77, Addict Biol, Doi 10.1080/13556210020091437	Gupta PC, 2004, V33, P31, Ann Acad Med Singap	35
5	Jeng JH, 2001, V37, P477, Oral Oncol, Doi 10.1016/S1368-8375(01)00003-3	Ko YC, 1995, V24, P450, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1995.Tb01132.X	33
6	Gupta PC, 2002, V7, P77, Addict Biol, Doi 10.1080/13556210020091437	Ko YC, 1992, V21, P261, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1992.Tb01007.X	32
7	Boucher BJ, 2002, V7, P103, Addict Biol, Doi 10.1080/13556210120091464	Gupta PC, 2002, V7, P77, Addict Biol, Doi 10.1080/13556210020091437	32
8	Gupta PC, 2002, V7, P77, Addict Biol, Doi 10.1080/13556210020091437	Ko YC, 1995, V24, P450, J Oral Pathol Med, Doi 10.1111/J.1600-0714.1995.Tb01132.X	31
9	Jeng JH, 2001, V37, P477, Oral Oncol, Doi 10.1016/S1368-8375(01)00003-3	Jeng JH, 2003, V24, P1301, Carcinogenesis, Doi 10.1093/Carcin/Bgg083	31
10	Jeng JH, 2001, V37, P477, Oral Oncol, Doi 10.1016/S1368-8375(01)00003-3	Sundqvist K, 1989, V49, P5294, Cancer Res	30

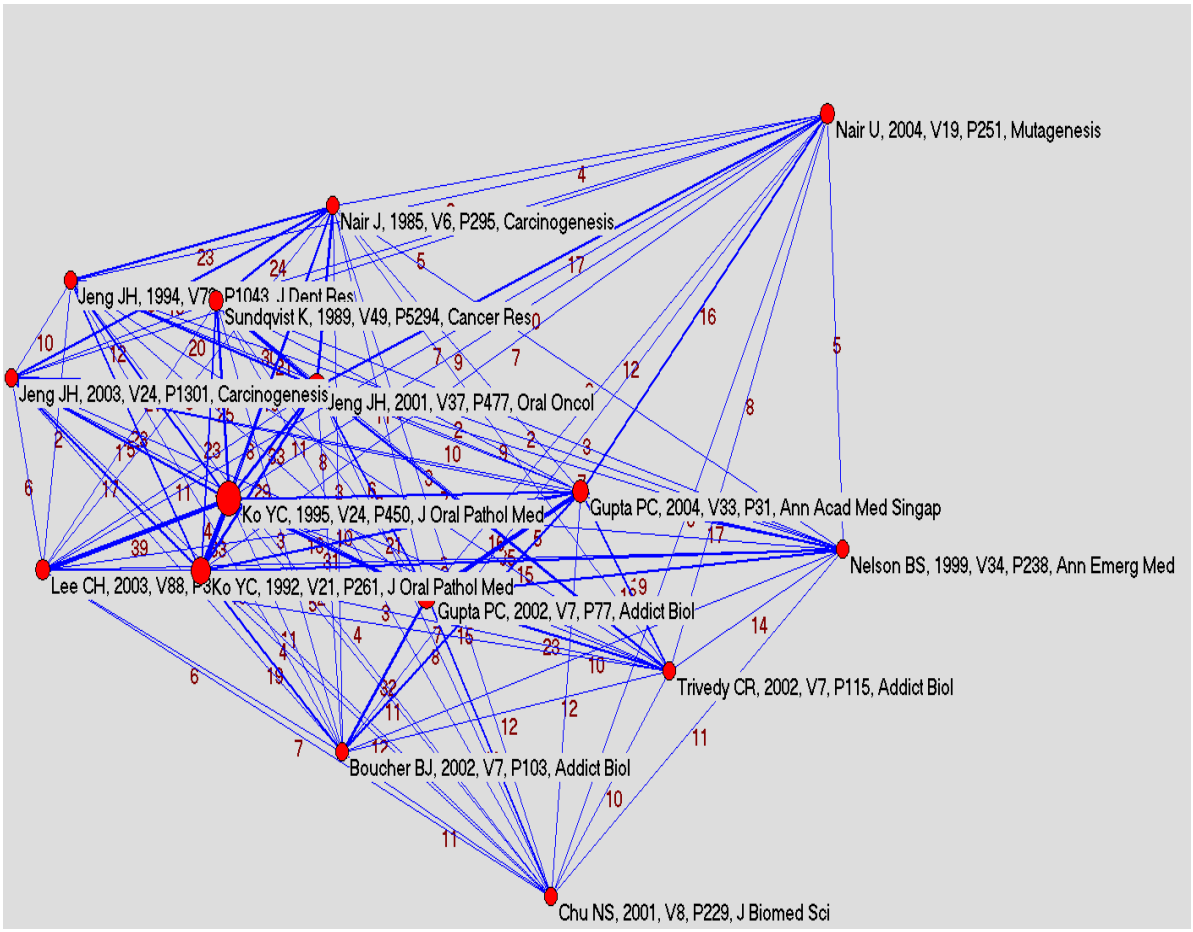
Table – 7

Co-citation table in Piper betle Research

This Kamadakavai map, we can view the citation and co-citation. We can find out how many time each are cited. The number is also indicated here. We can view the author name, year, and volume number, page number the journal name and which article cited.

Image – 2

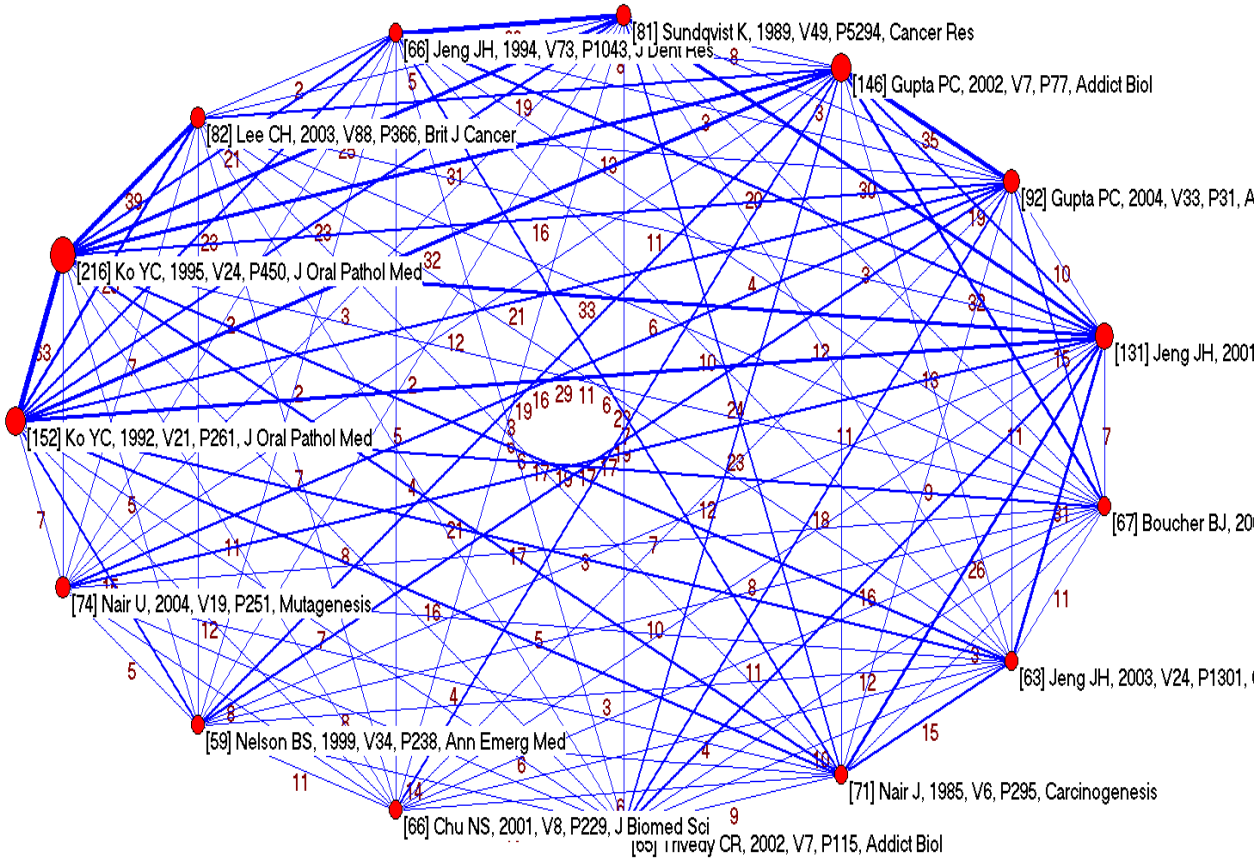
kamadakavai citation map



The above images is very good and transparent also. From the Pajek, Layout/Circular/Original was selected. We can find out the Author's Name, Year of Publication, Volume, Page Numbers and the Name of the journal. Olle Persson used Google map and Pajek, which is rich and sufficiently beautiful for the illustration for combining the visualization with statistical analysis[14]

Image - 3

Citation Mapping of Pajek for Piper betle Research



International Collaboration:

The total number of collaboration among countries is **709**. Trend of Collaborative research is increasing among countries. Here many countries are involved in collaborative research. Suresh Kumar also examined author's research in the field of computer interaction research. Different countries of scientist carried on research together.[16.] The highest collaboration is done by Taiwan. It collaborated with USA in 45 times. India has also done a collaborated research with USA (22), UK (14), Japan (12), Norway (5), Malaysia (5), Sweden (4), Taiwan (3), Saudi Arabia (3), Mexico (2), Myanmar (2), South Korea (2), Pakistan (2), Sri Lanka (2), Switzerland, Spain, South Africa, Italy, Maldives, and Nepal (1). The top twenty four countries were selected for study.

Table - 8

Countries Collaboration

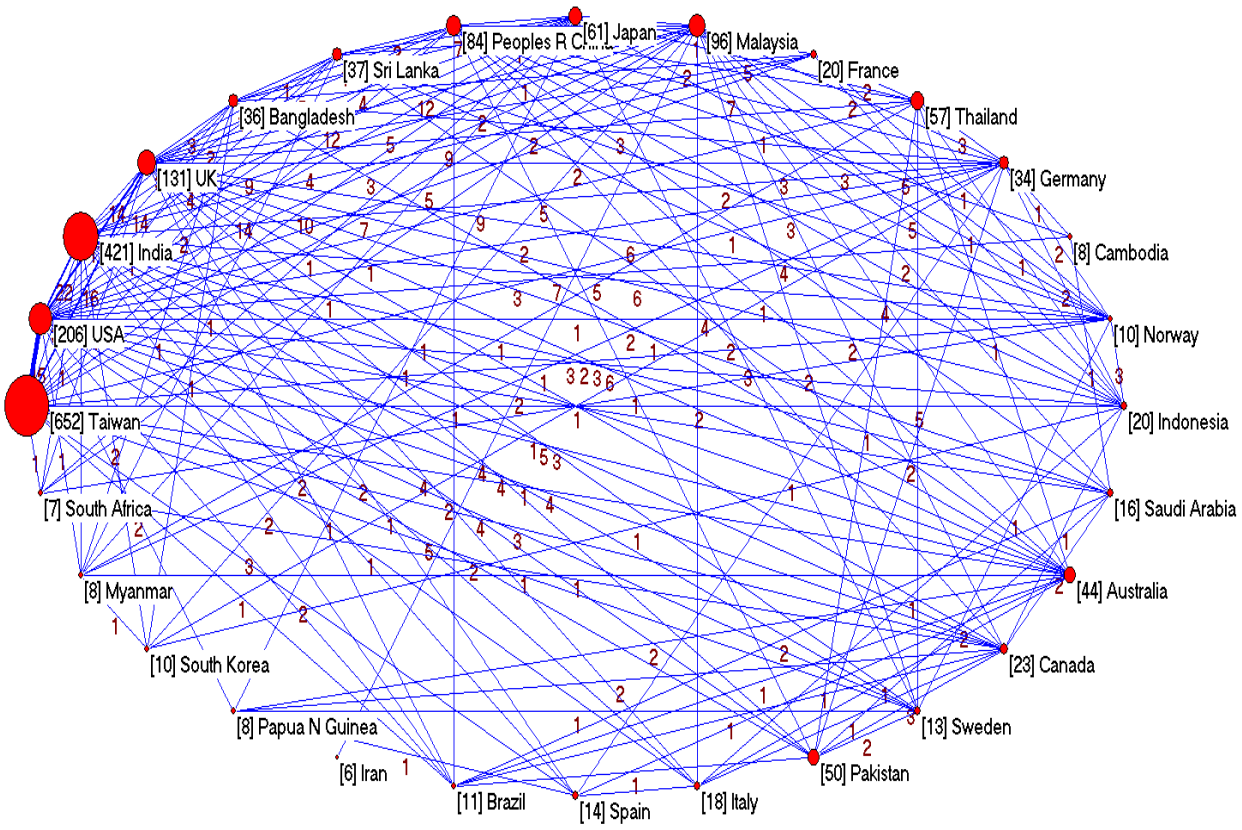
S.No	Country	Collaborative Country	No. of Records
1.	Taiwan	USA	45
2.	India	USA	22
3.	UK	USA	17
4.	Taiwan	UK	16
5.	Peoples R China	Taiwan	14
6.	Sri Lanka	UK	14
7.	India	UK	14
8.	Bangladesh	USA	14
9.	Malaysia	UK	12
10.	India	Japan	12
11.	Japan	Taiwan	10
12.	Peoples R China	USA	9
13.	Thailand	USA	9
14.	France	India	9
15.	Japan	Malaysia	8
16.	Bangladesh	Japan	8
17.	Cambodia	USA	7
18.	Japan	Sri Lanka	7
19.	Germany	Peoples R China	7
20.	Malaysia	Taiwan	7
21.	Australia	UK	6
22.	Saudi Arabia	USA	6
23.	Indonesia	UK	6
24.	Norway	UK	6

On the basis of the authors address field, the country was found out. The authors are ready to share their experience with other country scientists. In the below image-4 the large ball indicates

the highest collaborative country & the smaller ball indicates the lowest collaboration with other countries. The collaborative publications of Taiwan & India are more so the; the size of the balls is big.

Image - 4

Collaborative map of Piper betle Research



Application of Zipf law

This law was introduced in the year **1926**. Zipf law explains that, the frequency of keyword occurs in number of times. Using the bibexcel tool, the data collected from web of science arranged. **501** keyword titles are used and the total number of Keywords used to search the "Piper Betle" was **7908**. The first keyword is a "Cancer" used most frequently of 198 times and followed that, the second keyword is "Squamous-Cell Carcinoma" used frequently of 192 times. The third keyword related to Piper Betle is "Betel Quid" used in 168 times. And it takes the third place only. Other keywords related to Piper Betle are Betel is used in (44) times, Betel-Quid (37), Betel Nut

(27), Betel-Nut (25), Betel Quid Chewers (24), Betel Quid Ingredients (16), Betel -Quid Ingredients (10), Betel Leaf Extract (10), Betel-Quid Use (7) and Betel Leaf (5) times.

Table – 9 Top 10 keywords		
S.No	**Keywords**	**No. of times used to search the title "Piper Betle"**
1	Cancer	198
2	Squamous-Cell Carcinoma	192
3	Betel Quid	168
4	Areca Nut	143
5	Taiwan	131
6	Risk	127
7	Expression	119
8	Head	108
9	Prevalence	107
10	Smoking	105
11	Cancer	198

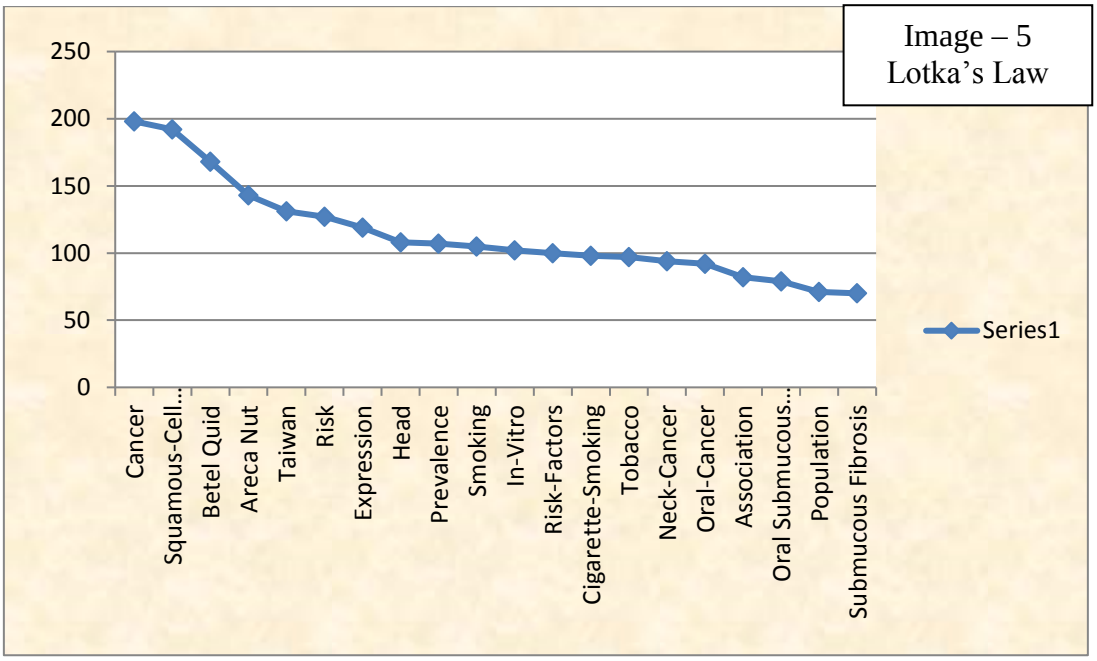


Image – 5
Lotka's Law

Lotka's law

The total number of authors contributing for the title "Piper Betle" is **5148.** And the total number of articles produced by the 5148 authors is **9410**. The main concept of this law is **"maximum number of articles are produced by minimum number of author"**. This law states that, the some authors are contributing more to produce articles. Most of 44 publications were produced by the author "Ko YC". The 43 publications were produced by "Lee CH" and 39 publications were produced by the "Liu TY". Most of the authors produce very few articles. The last least count of articles produce by some authors is 1.

Table – 10 Highly Productivity Authors

S.No	Authors	No. of Articles
1	Ko YC	44
2	Lee CH	43
3	Liu TY	39
4	Shieh TY	35
5	Warnakulasuriya S	31
6	Chen CH	30
7	Lin CC	30
8	Jeng JH	30
9	Yang YH	28
10	Chang MC	27

Out of 5148 authors

S.No		S.No	
1	3605 publish one article	17	16 publish six articles
2	812 publish two articles	18	17 publish one article
3	281 publish three articles	19	18 publish one article
4	147 publish four articles	20	19 publish three articles
5	81 publish five articles	21	20 publish two articles
6	64 publish six articles	22	21 publish two articles
7	31 publish seven articles	23	24 publish one article

8	21 publish eight articles	24	26 publish one article
9	20 publish nine articles	25	27 publish one article
10	10 publish eleven articles	26	28 publish three articles
11	11 publish twelve articles	27	30 publish one article
12	12 publish sixteen articles	28	31 publish one article
13	16 publish two articles	29	35 publish one article
14	13 publish six articles	30	39 publish one article
15	14 publish eight articles	31	43 publish one article
16	15 publish five articles	32	44 publish one article

The number of authors making n contribution to the "Piper Betle" is about 1/n2 of,

70 % of authors make one contribution

15.8 % of authors make two contributions

5.5 % of authors make three contributions

2.9 % of authors make four contributions

1.6 % of authors make five contributions

1% of authors make six contributions

< 1% of authors makes seven contributions

Conclusion:

Betel and areca are having an important part in Indian culture, particularly to the Hindus. It is a tradition that the Priest, Bride or Bridegroom was given gifts with betel leaves and areca nuts. Piper betle leaves are used as a folk medicine in India and other Asiatic countries. Twenty-one P. betel landraces were analyzed using a Direct Analysis in Real Time (DART) mass spectral technique and evaluated on the basis of molecules detected in the leaves.[11] Betel leaves cures ulcers, eye itching, stop bleeding of gums, cures gastric ulcers, cures boils, control blood sugar levels, treats cough, heals the wounds, relieves headache. In addition to the numerous health benefits, it is a cultural symbol of status and hospitality for guests. Chewing habits of people changed gradually over time. Tobacco has added with betel leaves which create many incurable diseases to the people. Though the medicinal values are recorded in conventional medicines, several of its medicinal properties have been proved recently. By this Bibliometric analysis the researcher assess the growth and quality of scientific production of Piper betle or betel.

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