

# Measuring the Honey Bee Research Output: Scientometrics Analysis from 2004 To 2019

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## Abstract:

This effort purposes to arrange for a complete study of the accessible investigation of statistics in honey bees through literature analysis. The research advancements within this research field from 2004 to 2019 are addressed using the Web of Science database. The results from the 10136 articles analyzed and indicate that in the research field is the focus of research nowadays by the USA 3114 produced more articles, followed by Germany, Brazil, UK, and Peoples R China. We dignified an output mark for respective authors and the maximum creative authors in the honey bee field Oldroyd BP (112), Evans JD (109), and Robinson GE (102). It is clear that the US Department of Agriculture institutes Research Service form is the biggest procedure of the total citations (16902) followed by The University of Sao Paulo (14573), Arizona state university (11662) followed by University Illinois (10947) has contributed. To the best of our knowledge, our study was the first in this area and we have been brought more support to further research.

**Keywords:** Honeybee, Scientometrics, Natural Food and Apis-mellifera, WoS

## INTRODUCTION

Nowadays two thousand types are known in the genus fly. We have been researching scientific analysis through Histcite software and web of Science in honey bee literature during the years 2004-2019. Honey containers are well-defined as a portion of natural and sweet food, created by honey bees, which can be recycled right by persons with no more processing (Osman et al., 2020). Bees are particular of the six-limbed flying pests. These absorb nectar from flowers and bring to nests. Honey bee's quantity about fifteen mille meters long and are light brown in color. It is generally oval-shaped creatures with golden-yellow colors and brown bands. Honey bee species are found worldwide. They are furthestmost observable in the summertime and late spring after new queens leave their old societies along with 1000 employees to form fresh nests. At this time, big clusters of bees jerry can be seen swarming together to discover a new nesting site. It takes a swarm around one day to trace a fresh nesting place. While most swarms are harmless, certain species of bees are extremely aggressive and may attack senseless and provide bee venom. Bee venom produced by Apis mellifera is a complex mixture of biogenic amines, enzymes, and bioactive peptides (Şenel, E. 2019). Honey has powerful action against antibiotic-sensitive and -resistant bacteria (Kwakman, P. H., et al 2011). Apitherapy is the use of honey bee harvests for medical purposes containing raw honey, beeswax, pollen, propolis, royal jelly, and bee venom. While bee venom treatment has been used of alive bee stings to treat several illnesses followed by rheumatoid arthritis, arthritis, multiple sclerosis (MS), sciatica, tennis elbow, low

back pain, and lupu (Ali, M.A.A.S.M 2012). At the same time, bee venom therapy is the use of live bee stings (or injectable venom) to treat various diseases such as rheumatoid arthritis, arthritis, multiple sclerosis (MS), sciatica, tennis elbow, low back pain, lupus, gastroenteritis, gastric ulcers, wounds, and other disorders is reviewed (Jeffrey, A. E., & Echazarreta, C. M. 1996). Apitherapy had been healthy known in old-style medicine for treating universal viral diseases, allergic diseases, immune diseases, and organic-specific inflammatory diseases for more than one thousand years (Hegazi, A. G. (2012 and Şenel, E., & Demir, E. 2018). Honey bee colonies demonstrate robust adaptive efficient agent-based communications, the most advanced technology between honey bee insects (Farooq, M.2008 and Mucignat-Caretta, C. Ed. 2014). It hives have long been given to humans through honey and beeswax. Such money making usages have spawned a large beekeeping production. (Naug 2009; Spleen et al 2013) debate Honey bees (*Apis mellifera*) are valued pollinators of commercial nourishment products in western Asia, North America and Europe.

### **OBJECTIVES OF THE STUDY**

- The foremost objective of this study is to analyse the articles published in honey bee between 2004 and 2019.
- Definitely, the study will succeed in the following objectives:
- Isolate the number of articles published in every of the identified years wise type of documents;
- Inspect the authorship pattern and authorship collaborations to honey bee;
- To find the subjects area during the period 2004 to 2019.
- To find the number of most cited articles in Authors, Institution and Countries
- Identify the published articles through Funding Agencies

### **MATERIAL AND METHODS**

The scientific productivity material of the current scientometrics research was downloaded from the Web of Science (WOS) core collection database (Clarivate Analytics, New York, NY, USA, 2018). The provisional search period chosen was from inception 2004 to 2019 and the search in the WOS database was performed on March 19th, 2020. histcite, and Microsoft Excel (v. 2016) were used to analyze publication. VOSviewer software was similarly used to complete the co-occurrence of all keywords. The scientometrics limits used to research the articles in honey bee during the last 15 years (2004 to2019) were those analyses by the years wise type of documents, Yearly growth rate, and citation, Rescaled Distance Cluster Combine, Research Areas, Institutional publication, Country publication, Journal publication, Dual-map intersection of journals publication, authorship collaborations, Authorship Pattern, Funding Agencies, Cloud chart of keywords, Editors, Book Series and co-occurrence.

### **RESULT**

Table 1 shows the major types of papers that have been distributed in honey bee since 2004 to 2019. It is witnessed that examination documents dwell in the highest point articles (8683), allowed by Review (640 ) Editorial Material (220) Meeting Abstract (205), Article; Proceedings Paper (127), Letter (78), Review; Book Chapter (60), Correction (40), Article; Early Access (33), Book Review (19) and News Item (18), while the number of articles published under the Reprint, Article; Book Chapter, Biographical-Item, Poetry, Review;

Early Access category is found to be very low (below 6) and inconsequential. Hence, it is obvious that popular honey bee authors have conveyed their thought subjects completed study documents. On the evaluation of this situation with that of the honey bee, it is observed that, though this journal has given first priority to the publication of articles (Eardley C 2010), another importance has been on the publication of Review, and somewhat less importance is given to Review; Early Access. On the conflicting, position after Article, the honey bee has given the second most priority to the publication of Review and the publication of case readings is wherever on a minor step, separating its Review; Early Access features from that of the honey bee.

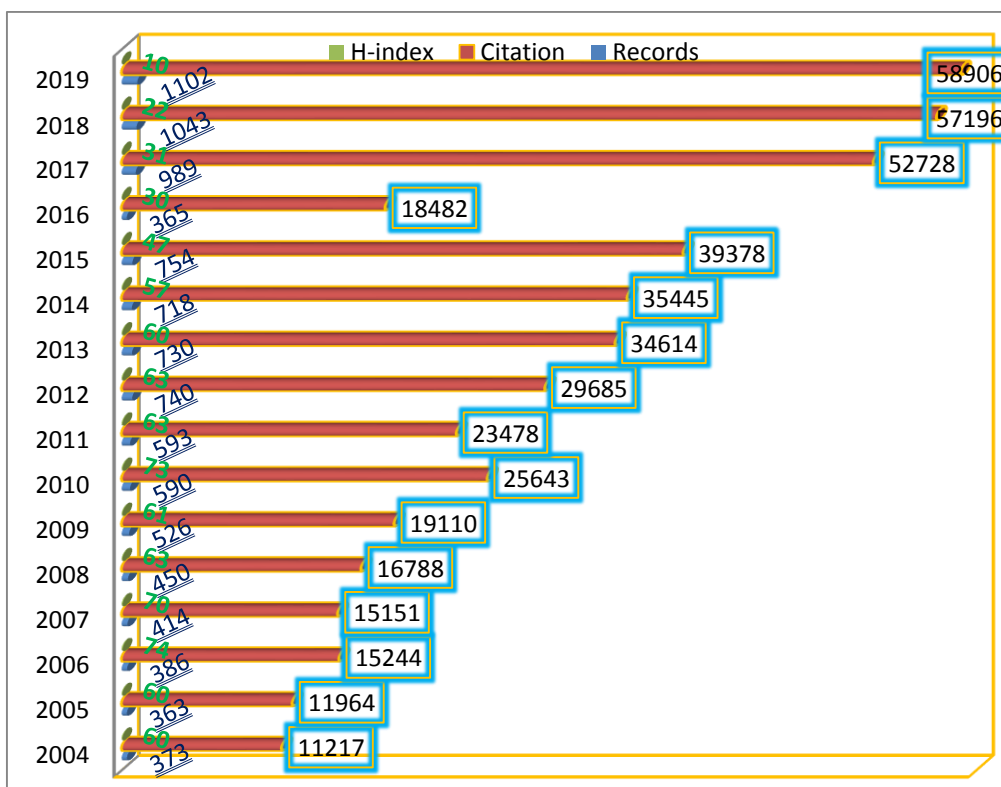
**1. Table Years wise Honey Bee Research Types of Documents**

Types of Documents	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Article	315	304	314	340	393	445	497	521	643	600	639	674	324	854	898	922	8683
Review	19	12	28	22	20	29	44	20	36	75	35	38	19	59	88	96	640
Editorial Material	14	13	14	16	10	19	12	20	25	24	8	7	8	8	9	13	220
Meeting Abstract	5	8	7	4	8	9	9	9	18	17	27	14	6	27	22	15	205
Article; Proceedings Paper	15	9	9	15	9	9	8	3	3		1	3	1	24	9	9	127
Letter	2	5	5	7	7	11	7	11	5	4	1	1	2	3	5	2	78
Review; Book Chapter	0	2	4	6	2	1	6	3	3	3	2	11	0	9	6	2	60
Correction	1	3	1	2	0	2	0	1	4	2	3	5	4	3	5	4	40
Article; Early Access	0		0	0	0	0	0	0	0	0	0	0	0	0	0	33	33
Book Review	0	4	2	0	0	0	3	2	2	0	0	1	0	1	1	3	19
News Item	1	3	1	1	1	1	0	2	0	4	0	1	1	1	0	1	18
Reprint	1	0	1	1	0	0	3	0	0	0	0	0	0	0	0	0	6
Article; Book Chapter	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	4
Biographical-Item	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Poetry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Review; Early Access	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	373	363	386	414	450	526	590	593	740	729	718	755	365	989	1043	1102	10136

**2. Table Yearly growth rate on Honey Bee Research Productivity**

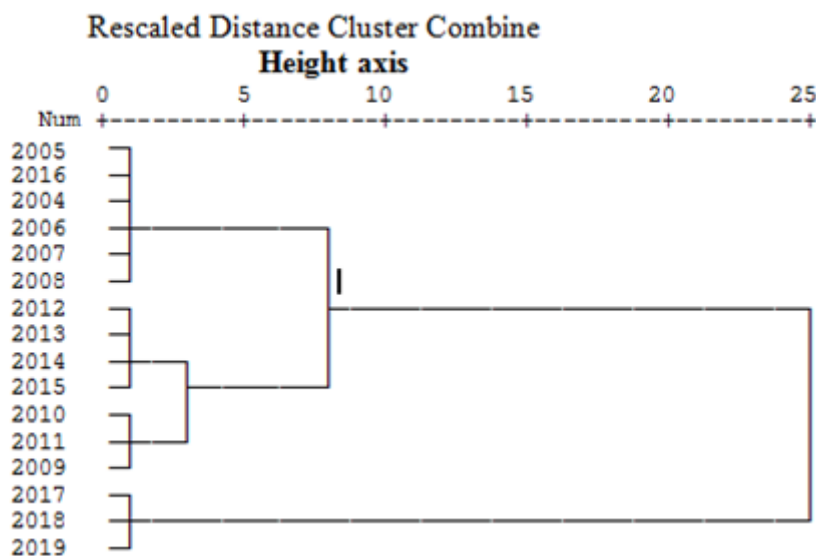
<b>Publication Year</b>	<b>Recs</b>	<b>Percent</b>	<b>Yearly growth rate</b>	<b>Citation</b>
2004	373	3.7	-	12043
2005	363	3.6	0.97	12055
2006	386	3.8	1.06	20070
2007	414	4.1	1.07	24519
2008	450	4.4	1.09	15638
2009	526	5.2	1.17	16784
2010	590	5.8	1.12	23707
2011	593	5.9	1.01	15743
2012	740	7.3	1.25	19238
2013	730	7.2	0.99	18315
2014	718	7.1	0.98	15311
2015	754	7.4	1.05	13144
2016	365	3.6	0.48	4030
2017	989	9.8	2.71	7722
2018	1043	10.3	1.05	4141
2019	1102	10.2	1.06	1392
	10136		1.07	

Our WoS database search recovered a total number of records during the year 2004-2019. Of a total of 10136 articles, the highest research productivity (1102) was contributed in the year 2019, representing 10.87 percent of the total number of articles published in the honey bee during the year. This is followed by 1043 research productivity, representing 10.29 percent, featured in 2018. Next to this are 989 research productivity, representing 9.76 percent, featured in 2013-2016 and 2942 research productivity, representing between 7.00 to 8.00 percent, featured in 2010 - 2012. Others followed in this order: 1709 research productivity, representing between 5.00 to 6.00 percent, featured in 2009 and 2008; and 864 research productivity, representing between 4.00 to 5.00 percent. From these analyses, the minimum number of research productivity was presented in the year 2004 - 2007, with 1487 research productivity, which each represents below 3.18 percent of the total number of research published in the period. This implies that within the study period 2004-2019.



**Figure 1. Number of Honey bee research productivity per year between 2004 and 2019**

The figure shows that 2019 was the greatest useful year and also reveals that the interest in the field of the honey bee has improved every year. Further, 2003 and 2004 were the least cited years; the citation of honey bee based documents increased step by step on a yearly basis and reached about 58906 by 2019. Only 2015 this year's lowest citation between other years but the percentage of the article continued great in the latter three years of a selection period of the learning. The effects make known that with the development of knowledge and databanks, with the passageway of the period, the usage of honey bee improved significantly.



**Diagram 1. Number of Honey bee research productivity per year between 2004 and 2019**

Subsequent is a dendrogram of the marks of consecutively these data complete the Group Average clustering algorithm. The height axis exhibits the distance amongst interpretations and/or clusters. The horizontal bars indicate the point at which four clusters/interpretations are combined of years. For illustration, ((2009, 2011, 2010) (2015, 2014, 2013, 2012), (2005, 2016, 2004, 2006, 2007, 2008) and (2019, 2018, 2017)) are merged years at a distance of 1.00, which is the smallest one among two cluster are combined ((2009, 2011, 2010) (2015, 2014, 2013, 2012) are merged years at a distance of 2.5, other distances. Also, ((2009, 2011, 2010) (2015, 2014, 2013, 2012), (2005, 2016, 2004, 2006, 2007, 2008)) are merged years at the value of 8.24. Finally, ((2009, 2011, 2010) (2015, 2014, 2013, 2012), (2005, 2016, 2004, 2006, 2007, 2008) and (2019, 2018, 2017)) are merged years and their distance is 24.06.

### 3. Table Top most Honey bee Research areas during year2004-2019

Research Areas	records	% of 10316
Entomology	3661	34.39
Environmental sciences ecology	1397	13.12
Science technology other topics	1069	10.04
Zoology	846	7.95
Biochemistry molecular biology	743	6.98
Life sciences biomedicine other topics	588	5.52
Agriculture	515	4.84
Chemistry	507	4.76
Genetics heredity	415	3.90

Shows that top most Research areas on the topic honey bee. Research area of Entomology (3661; 34.39 per cent) was the top Entomology with publications comprising 34.39per cent, Followed by Environmental sciences ecology (1397; 13.12 per cent) and Science technology other topics (1069; 10.04 per cent). Remained research areas Zoology, Biochemistry molecular biology, Life sciences biomedicine other topics, Agriculture, Chemistry, Genetics heredity below (10 percent).

### 4. Table Top Five Institution wise honey bee research productivity during year2004-2019

Institution	Recs	Percent	Citations
US Department of Agriculture Agricultural Research Service	384	3.8	10072
The University of Sao Paulo	278	2.7	5899
Unknown	244	2.4	183
University Illinois	199	2	11109
Arizona state university	187	1.8	6930

It will be seen that the US Department of Agriculture Agricultural Research Service is by far the most productive, contributing of the original articles; moreover, this institution received 16902 of the citations (44.02 percent) to USA innovative articles, confirming that this is by some way the most important center for The National Programs help to bring direction, announcement, and authorization to around 690 investigation projects approved out by ARS. National Programs effort on the significance, impact, and excellence of ARS

research. That said, it is not possible using the analysis tools available in Web of Science to discriminate between the many individual institutes that comprise the USA Academy of Sciences. The 468741 citations came from a total of 5709 institutions all over the world, with those providing at least 55845 citations listed indicated the table. Relate the bibliometric form of cited literature in honey bee for the 16 selected years. From the table, it is clear that the US Department of Agriculture Agricultural Research Service form the biggest procedure of the total citations (16902 citations; 44.02 percent) followed by The University of Sao Paulo (14573 citations; 52.42 percent), Arizona state university (11662 citations; 62.36 percent) followed by University Illinois (10947 citations; 55.01 percent) and Unknown Institutions very lowest (1761 citations; 07.22 percent) (Table 4).

Table 5. States output marks of the countries published honey bee papers by a simple formulation before used in the works and ordered by the first ten countries. The greatest productive countries in honey bee field were USA (30.72%), Germany (8.82%), Brazil (7.47%) and UK (7.27%), Peoples R China though (6.74%) and other countries below 4 percentage citing a reference in a record is obvious, here in the study as stated in the table, there is a great difference in the number of consulted references. The higher score of records referred by a country is 130 and the least is 25 are Cited References in Unknown countries.

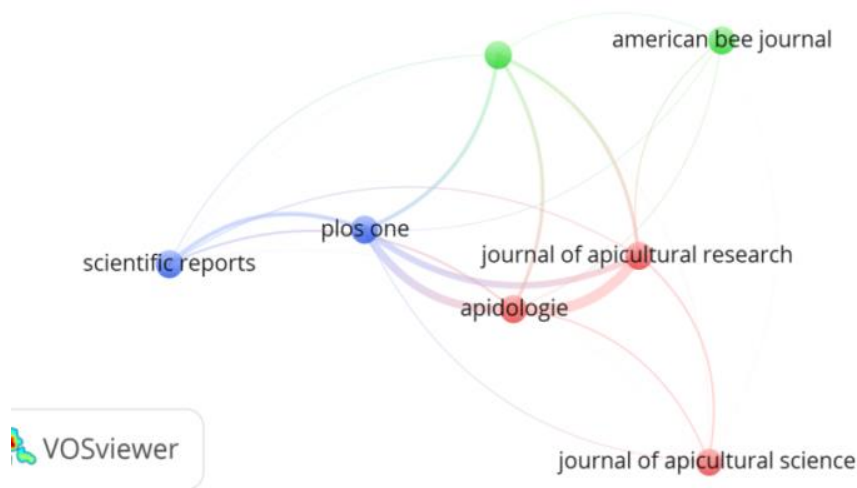
**5. Table Top Ten publications honey bee based developmental directories of the countries**

Country	Recs	Percent	Cited References
USA	3114	30.72	130
Germany	894	8.82	83
Brazil	757	7.47	51
UK	737	7.27	82
Peoples R China	683	6.74	45
Australia	502	4.95	59
France	492	4.85	62
Canada	450	4.44	54
Unknown	379	3.74	25
Poland	377	3.72	32

**6. Table Journals that most frequently published articles in honey bee**

Journal	Recs	Percent	Impact factor
Journal of Apicultural Research	693	6.80	1.752
Apidologie	507	5.00	2.390
American Bee Journal	428	4.20	0.040
Plos One	422	4.20	4.411
Journal Of Economic Entomology	208	2.10	2.776
Scientific Reports	178	1.80	1.779
Journal Of Apicultural Science	155	1.50	4.525
Journal Of Experimental Biology	144	1.40	0.69
Journal Of Invertebrate Pathology	142	1.40	1.630
Insectes Sociaux	140	1.40	2.101
Journal Of Insect Physiology	131	1.30	1.490

The journals that greatest regularly distributed articles in honey bee are obtainable in mentioned the Table 6 (divided by bold lines), from highest to lowest, and separated into three categories. Two journals are in the first category (only 2 journals published 1200 articles). The second category contains 3 journals (1 journal with 428 articles; 1 journal with 422 articles; 1 journal with 208 articles) The third category contains 1647 journals (1 journal with 178 articles; 1 journal with 155 articles, 1 journal with 144 articles, 1 journal with 142 articles, 1 journal with 140 articles, 1 journal with 131 articles and 1642 remaining journals with below 100 article). The original research was published in 10136 journals and the citations in 468741 honey bee. The research providing at least 1 percent of the articles or citations are listed above the table together with the highest journal impact factor Journal of Apicultural Science (4.525) followed by Plos One (4.411), Journal of Economic Entomology, Apidologie and Insectes Sociaux (2.776, 2.390 and 2.101) other journals below 2 impact factors (these are very low IF available for American Bee Journal and Journal of Experimental Biology in the web). Nearby is for a second time a high degree of correspondence among innovative articles and citing articles.



**Figure2. Dual-map intersection of journals publication effort linked to honey bee**

Figure 2 shows a dual-map intersection of the number of documents with reverence to the kind or motivation of the journal. Generally, journals with an effort in the grounds of medicine, food, and APIS published the greatest documents on the honey bee, while the maximum highly cited papers were published in Entomology, Environmental sciences ecology, Science technology, Zoology and Biochemistry molecular biology journals. About the top 15 journals, Clinical Plos One had the highest IF in 2018 (4.411) followed by Journal of Apicultural Science IF in 2018 4.525, and others had an IF below 2 to 3, including Journal Of Economic Entomology (2.776) Apidologie (2.390) and Insectes Sociaux (2.101). Largely, Journal of Apicultural The research was the journal that subsidized the maximum articles on honey bee in the latest period, and given its reliable at ease, we think forthcoming revolutions in this field to be distributed there.

**7. Table Top Ten Author Citations in honey bee**

Author	Recs	Percent	No. of Citations	% of Citations
Oldroyd BP	112	1.10	5871	52.42



Evans JD	109	1.10	5208	47.78
Robinson GE	102	1.00	5782	56.69
Mangum WA	99	1.00	74	0.75
Neumann P	92	0.90	4082	44.37
Chen YP	82	0.80	4240	51.71
Ellis JD	78	0.80	2938	37.67
Amdam GV	77	0.80	4819	62.58
Tarpy DR	74	0.70	3963	53.55
Higes M	69	0.70	3655	52.97

The table 7 shows 16144 authors who individually wrote or co-wrote 6304 articles related to honey bee related articles within stated years. The most prolific authors (Oldroyd BP) contributed 112 articles (1.10%). Evans JD wrote 109 articles (1.10%), and Robinson GE wrote 102 articles (1.00%). lists the source articles, total citations per authors, for the 16144 authors. It will be seen that more authors have the medium total citations (but with a higher Amdam GV, 62.58%); however, this situation may well change in the future, given the increased impact of authors' publications.

### 8. Table Authorship pattern in honey bee

Documents	Recs	SA	DA	TA	MTTA	Total
Article	8683	570	1352	1656	5106	8684
Review	640	85	177	120	258	640
Editorial Material	220	29	37	40	100	206
Meeting Abstract	205	11	29	26	62	128
Article;Proceedings Paper	127	49	11	1	18	79
Letter	78	13	20	10	17	60
Review; Book Chapter	60	5	4	7	24	40
Correction	40	0	7	5	22	34
Article; Early Access	33	19	0	0	1	20
Book Review	19	16	0	0	2	18
News Item	18	6	4	0	0	10
Reprint	6	22	5	0	3	30
Article; Book Chapter	4	22	5	0	3	30
Biographical-Item	1	0	2	0	0	2
Poetry	1	1	0	0	2	3
Review; Early Access	1	0	0	0	1	1
<b>Total</b>	<b>1013</b>	<b>6</b>	<b>848</b>	<b>1651</b>	<b>1865</b>	<b>5619</b>
	<b>6</b>	<b>848</b>	<b>1651</b>	<b>1865</b>	<b>5619</b>	<b>9985</b>

SA-Single Author, DA-Double Author, TA- Three Author, MTTA-More than Three Author

Table 8. Describe that popular honey bee authors desired to distribute their research consequences in More than Three authorship approaches (56.27 percent) than in collaborative approach. It is more than 18.68 percent of contributions addressed from three authorship approaches, only 16.55 percent since two authorship approaches and just 8.49 percent from better than single authorship approaches. Therefore, it is apparent that the publication of honey bee pointers since the separate heads.

The degree of collaboration in honey bee canister be calculated by using Subramanyam's (1983)

Formula as:

Devised by K. Subramaniam.

Subramaniam's formula has been accepted to observe the degree of examination collaboration in the learning.

The formula is

$$C = \frac{Ns}{Nm + Ns}$$

Where

DC = Degree of collaboration in a discipline

Ns = Number of single authored papers

Nm = Number of multiple authored papers

Therefore, the degree of collaboration has been calculated as surveys:

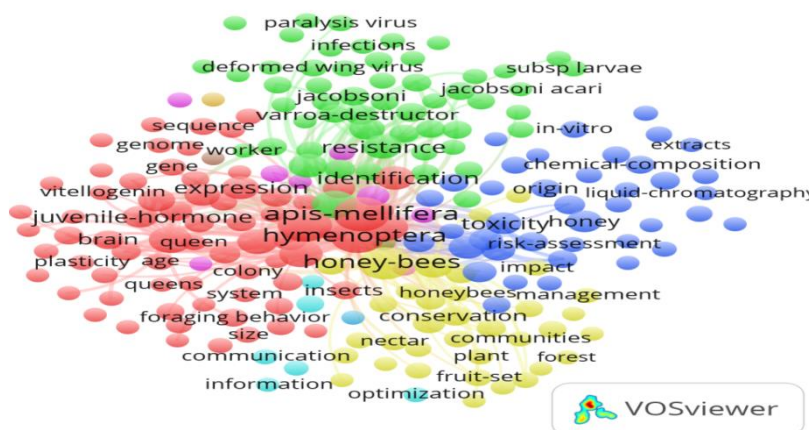
$$C = \frac{848}{848 + 9137} = \frac{848}{9985} = 0.08$$

As the degree of collaboration value is more than 0.5, it is noticeable that multi authored articles occupy the protruding condition demonstrative of the specialist of multi research in honey bee.

### 9. Table To ten Funding Agencies for Honey Bee Research during Years

Funding Agencies	Countries	records	%
National science foundation NSF	USA	471	4.65
National institutes of health NIH	USA	352	3.47
United states department of health human services	USA	352	3.47
United states department of agriculture USDA	USA	332	3.28
National council for scientific and technological development CNPQ	Brazil	327	3.23
National natural science foundation of china	China	303	2.99
Capes	India	222	2.19
German research foundation DFG	Germany	206	2.03
European union EU	Germany	204	2.01
Fundacao De Amparo A Pesquisa Do Estado De Sao Paulo Fapesp	Brazil	185	1.738

Table 9 shows that the greatest destructive National science foundation NSF was USA with 471 (4.65) articles out of the 10136 articles analyzed, followed by National institutes of health NIH and United states department of health human services, USA both funding agencies with 352 (3.47percent) articles and United states department of agriculture USDA, USA with 332 (3.28 percent) fund provide, National council for scientific and technological, Brazil327 (3.23 percent). The Funding Agencies National natural science foundation of china, Capes, India, German research foundation DFG, Germany and European union EU, Germany recorded very low (2.99) percent) fund providing output among the honey bee research.



**Figure3. Cloud chart of key words in names with VOSviewer**

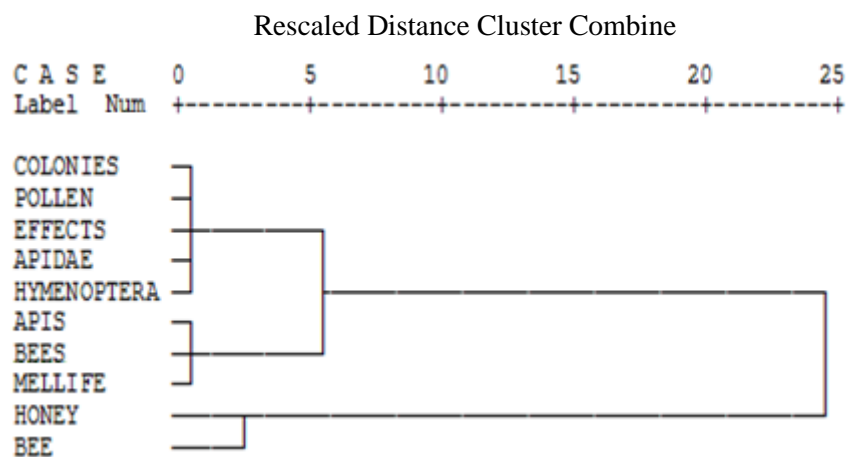
Keywords canister also assist as a significant catalogue to reproduce investigation hotspots at a confident period, and rupture confrontations known between all keywords in pertinent periodicals can help to predict new frontier topics. Thus, through analyzing the most common keywords of articles, we can start to understand the development of a research topic in a more comprehensive manner As shown in Figure 3 the keyword with the strongest citation strength was “HONEY” (46.3%), and this trend lasted for five Following years (2004–2019). In the previous year, China approved the world’s first honey bee for food and medicine. The other 2 strongly cited keywords were “BEE” (35.7, 2004–2019) and “APIS” (21.2, 2004–2019). Moreover, the results in Figure 8 indicate that an ongoing top hotspot in this field is BEES (20.6, 2004–2019). This trend is related to a paper published by Rodney S and Kramer VJ in 2019 Probabilistic assessment of nectar requirements for nectar-foraging honey bees.

**10. Table Top ten Book Series honey bee research**

Book Series	Records	%	Impact Factor	Rank
Annual review of entomology	28	0.28	11.79	1
Advances in insect physiology	13	0.13	2.11	5
Advances in experimental medicine and biology	4	0.04	2.12	4
Advances in ecological research	3	0.03	4.04	3
Annual review of ecology evolution and systematics	3	0.03	10.87	2

It is obvious that the production of honey bee Book Series between journals of study is similar. Table 10 Most of the honey bee was published in journals as articles and in conference proceedings. Still, further archival publications (various types of Book Series) are created in the honey bee field. The complete quantity of book chapters in together fields is virtually equivalent, communicated in percentages; these resources that little books chapters are produced in the honey bee, contrary to the Number of viewpoints which is future more in honey bee skills/capabilities section. A total number of 10136 records were complicated in honey bee research, the top five dynamic book series are shown in the table this top five maximum creative book series

had published 28 papers funding to 0.28 percent of the research results this is followed by the Advances in insect physiology, Advances in experimental medicine and biology, Advances in ecological research and Annual review of ecology evolution and systematics, which published 13, 4, 3 and 3 book series articles, accounting for 0.13, 0.04, 0.03 and 0.03 percent of the total output, respectively. Giving to the number of impact factor frequency, the most highly 1st rank-1 Annual review of entomology (11.79), 2nd rank Annual review of ecology evolution and systematics (10.87), 3rd rank Advances in ecological research (4.04), 4th rank Advances in experimental medicine and biology (2.12) and 5th rank Advances in insect physiology (2.11).



**Diagram 2 co-occurrence frequencies out of 12535 different keywords honey bee**

The co-occurrence honey bee largess descriptors associated to the topic of honey, while also provided that link-based information on their connection of the 50 keywords nominated, that of largest importance (the most frequently used keyword) was “honey” which occurred 4690 times and with a strong connection with additional keywords, particularly “bee,” “text mining,” “APIS,” “BEES,” “MELLIFERA,” and “COLONIES,” “POLLEN.” It should be noted that some terms arguably belong to more than one cluster, serving as the general noun phrases such as “COLONIES” and “POLLEN.” From the analysis of both meaning of the terms and their relationship with each other, one can infer the inherent dynamism and complexity of the digital humanities field, in which the clustering of general terms stands for.

**CONCLUSION**

This revision suggests a wide-ranging scientometrics review of honey bee study. Besides we have studied honey bee from several viewpoints: features of publication outputs, Types of Documents, Author Patten, Cloud chart of key words, Book Series, co-occurrence, Research areas, Funding Agencies, journals, geographical and organizational distribution in the past twenty years, there were 10136 journal articles relating to honey bee and the number of articles improved gradually but 2015 only very low contributed in this field, which specified scientists professional further and further helpfulness to this field. Overall the USA was the 30% dynamic provider with the maximum journal articles, funded project, and cooperation between

other nations. Most (23707) citation in the year of 2010, Yearly growth rate 2.71% from 2017, overall growth rate 1.07%, most frequently (6.80%) published articles by Journal of Apicultural Research, highest (4.525%) Impact factor by Journal of Apicultural Science, Amdam GV low publication in this field but highest (62.58%) citation

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