Scientometric Mapping of Bluetongue Virus

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Abstract

An analysis of 1167 publications published by scientists on Blue tongue during 1989-2014 and indexed by Web of Science online Database indicates that the publication output in the Global Research Publication. The highest numbers of papers were published during the year 2014 with 117records and the following year 2013 with 101 records there were contributions. The least number of papers was recorded during 1989 and 1990 with 2 records. Overall, 3260 authors contributed 226 publications in the journal and Institutions with 1081 records of the articles. Using the VOS viewer analyzing of co-author, co-citation, institutions and document wise distribution of publications of clustering of dimension can be drawn.

Keywords: *Bluetongue, Virus*

1. INTRODUCTION

Bluetongue disease is a non-contagious, insect-borne, viral disease of ruminants, mainly sheep and animal husbandry. It is caused by the Bluetongue virus (BTV). The virus is transmitted by the midge Culicoides imicola, Culicoides variipennis and other culicoids. In sheep, BTV causes an acute disease with high morbidity and mortality. BTV also infects goats, cattle and other domestic animals as well as wild ruminants. Some animals also develop foot lesions, beginning with coronitis, with consequent lameness. In sheep, this can lead to knee-walking. In cattle, constant changing of position of the feet gives bluetongue the nickname The Dancing Disease. Torsion of the neck (opisthotonos or torticollis) is observed in severely affected animals. Bluetongue is caused by the pathogenic virus, Bluetongue virus (BTV) of the genus Orbivirus, of the Reoviridae family. Twenty-six serotypes are now recognised for this virus.

2. VOS VIEWER

VOSviewer is a software tool for constructing and visualizing bibliometric networks. These networks may for instance include journals, researchers, or individual publications, and they can be constructed based on co-citation, bibliographic coupling, or co-authorship relations. VOSviewer also offers text mining functionality that can be used to construct and visualize co-occurrence networks of important terms extracted from a body of scientific literature.

3. OBJECTIVES

The main objective of this study was to use Scientometric Mapping of Blue tongue virus with special reference to research activities at global level:

i To identify and analyze the rate of growth of research productivity;
ii To examine the Year wise distribution of publications;
iii To note the Document wise distribution of publications;
iv To analyze the authorship pattern and examine the extent of research collaboration
v To identify journal wise distribution of publications;
vi To assess the Institution wise research concentration;
vii To identify Country – wise Collaborative Distribution of Publications;
viii To identify the word wise distribution of publications.
ix To test the law of metrics.
x Mapping of network using VOS viewer.

4. ANALYSIS AND INTERPRETATIONS

4.1 Year-wise Distribution of Publications

To analyze the year wise publication of research on Bluetongue diseases the data has been presented in Table-1. The table depicts the research output in the global level. From the below table, we could clearly see that during the period 1989 – 2014 a total of 1167 publications were published. In the present study the research output on Bluetongue diseases publication is taken as a tool to evaluate the performance at various levels.

Table 1 Shows that Yearly-wise distributions during the year 1989-2014. The highest publication of records with 117 in the year2014 and least records of publication with 2 in the year 1989 and 1990. The calculation with the variance and Standard Variations in 250262.5 and 500.26.

Table 1 Shows Yearly-wise Distributions of Publications

Sl.No.	Year	Records	Percent	TLCS	TGCS	D	D^2	Variance	S.D((σ)
1	1989	2	0.2	8	12	-24	576		
2	1990	2	0.2	53	95	-22	484		
3	1991	29	2.5	326	775	-290	84100		
4	1992	31	2.7	343	646	-279	77841		
5	1993	22	1.9	170	524	-176	30976		
6	1994	46	3.9	522	1098	-322	103684		
7	1995	31	2.7	301	707	-186	34596		
8	1996	35	3.0	313	745	-175	30625		
9	1997	32	2.7	145	637	-128	16384		
10	1998	22	1.9	109	251	-66	4356		
11	1999	20	1.7	70	260	-40	1600		
12	2000	25	2.1	266	822	-25	625		
13	2001	24	2.1	154	508	0	0		
14	2002	21	1.8	278	628	21	441		
15	2003	26	2.2	238	600	52	2704	**250262.5**	**500.26**
16	2004	24	2.1	164	449	72	5184		
17	2005	24	2.1	288	791	96	9216		
18	2006	34	2.9	197	666	170	28900		
19	2007	42	3.6	490	1055	252	63504		
20	2008	87	7.5	943	2179	609	370881		
21	2009	96	8.2	737	1800	768	589824		
22	2010	85	7.3	315	1321	765	585225		
23	2011	95	8.1	231	815	950	902500		
24	2012	94	8.1	143	631	1034	1069156		
25	2013	101	8.7	101	398	1212	1468944		
26	2014	117	10.0	12	124	1521	2313441		
	Total	**1167**				**5789**	**7795767**		

Table 2 shows that the highest publication of doubling time as well as followed by 356.08 and 220.20 in the year of 2005 and 1990.

Table 3 shows that the Average moving publications method as well as followed. It's also calculation on short term fluctuation in 1989-2014. The Total No. of publication records is 1167 and short term fluctuation is 360.5.

Table 4 Shows that the Top 10 author wise distributions of publications during the study period 1989-2014 in the field of Blue tongue virus at Global level. The Total number of author publication in these records with 3260. The highest Productivity of publications goes to Roy P with 50 records and followed by the Mellor PS with 49 records. The least productivity of publications goes to Baylis M and Breard E with 27 records.

Table 2 Showing Exponential Growth Rate and Doubling time in Number of Publication was observed during 1989 to 2014

Sl.No.	Year	Records	Exponential Growth Rate	Log W1	Log W2	R(a)	Doubling Time(DT)
1	1989	2	1.00		0.69	0.69	1.00
2	1990	2	14.50	0.69	0.69	0.00	220.20
3	1991	29	1.07	0.69	3.37	2.68	0.26
4	1992	31	0.71	3.37	3.43	0.06	11.05
5	1993	22	2.09	3.43	3.09	0.34	2.01
6	1994	46	0.67	3.09	3.83	0.74	0.94
7	1995	31	1.13	3.83	3.43	0.40	1.74
8	1996	35	0.91	3.43	3.56	0.13	5.50
9	1997	32	0.69	3.56	3.47	0.09	8.12
10	1998	22	0.91	3.47	3.09	0.38	1.84
11	1999	20	1.25	3.09	3	0.09	7.61
12	2000	25	0.96	3.00	3.22	0.22	3.09
13	2001	24	0.88	3.22	3.18	0.04	17.83
14	2002	21	1.24	3.18	3.04	0.14	5.02
15	2003	26	0.92	3.04	3.26	0.22	3.22
16	2004	24	1.00	3.26	3.18	0.08	8.87
17	2005	24	1.42	3.18	3.18	0.00	356.08
18	2006	34	1.24	3.18	3.53	0.35	1.97
19	2007	42	2.07	3.53	3.74	0.21	3.24
20	2008	87	1.10	3.74	4.47	0.73	0.95
21	2009	96	0.89	4.47	4.56	0.09	7.37
22	2010	85	1.12	4.56	4.44	0.12	5.57
23	2011	95	0.99	4.44	4.55	0.11	6.46
24	2012	94	1.07	4.55	4.54	0.01	49.94
25	2013	101	1.16	4.54	4.62	0.08	9.03
26	2014	117	0.00	4.62	4.76	0.14	4.78
	Total	**1167**					

Table 3 Short term Fluctuation

Sl.No.	Year	Records (Y)	4 Years Moving Publication	2 Years Moving Publication	4 Years average Publications (Yt)	Short term Fluctuation (Y-Yt)
1	1989	2				2
2	1990	2	64			2
3	1991	29	84	4	2	27
4	1992	31	128	31	15.5	15.5
5	1993	22	130	60	30	-8
6	1994	46	134	53	26.5	19.5
7	1995	31	144	68	34	-3
8	1996	35	120	77	38.5	-3.5
9	1997	32	109	66	33	-1
10	1998	22	99	67	33.5	-11.5
11	1999	20	91	54	27	-7
12	2000	25	90	42	21	4
13	2001	24	96	45	22.5	1.5

14	2002	21	95	49	24.5	-3.5
15	2003	26	95	45	22.5	3.5
16	2004	24	108	47	23.5	0.5
17	2005	24	124	50	25	-1
18	2006	34	187	48	24	10
19	2007	42	259	58	29	13
20	2008	87	310	76	38	49
21	2009	96	363	129	64.5	31.5
22	2010	85	370	183	91.5	-6.5
23	2011	95	375	181	90.5	4.5
24	2012	94	407	180	90	4
25	2013	101				101
26	2014	117				117
	Total	**1167**				**360.5**

4.2 Author-wise Distributions of Publications

Table 4 Author-wise Distribution of Publications

Sl.No.	Author	Records	TLCS	TGCS
1	Roy P	50	649	1560
2	Mellor PS	49	1511	3250
3	Mertens PPC	45	784	1694
4	Zientara S	42	381	894
5	MacLachlan NJ	39	533	1185
6	Stallknecht DE	30	234	350
7	Wilson WC	30	271	467
8	Sailleau C	28	297	609
9	Baylis M	27	689	1482
10	Breard E	27	287	680

Bibliometric mapping of co-authorship relations among authors allows for the representation of information in many ways, which make relationships among them easier to understand. Figure 1 show a co-occurrence network map generated from publications of the authors. Several different components including author nodes (circles), co-occurrence weight (circle size), networked relationship clustering (color and proximity), and name of authors (text) are included in a map. The paper co-authorship network is a network expressing existence of co-authorship relation between authors of scientific papers (Roy.P, Mellor and Mertens). In Fig. 1 the circle's color indicates the cluster or group which the authors are associated. Clustering shows the dimension of similarity to other authors in the display. The co-authorship relations are relations representing whether an author have written a paper with another author, typically a paper is written by two or more authors. Analyzing co-authorship information on a larger database of scientific publications will assist in identifying groups of people who work closely together (Roy.P, Mellor and Mertens).

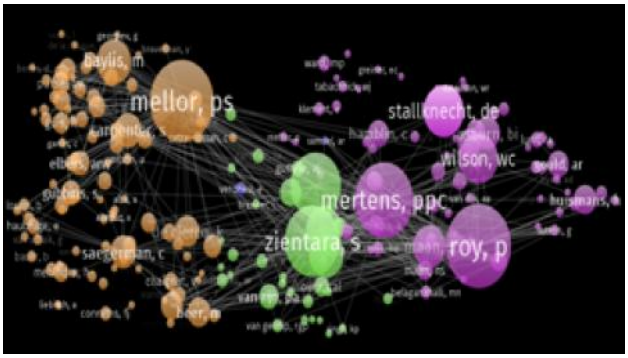

Fig.1 Co-Citation author

Figure 2 shows a co-occurrence network map generated from publications of the first authors only. The paper co-citation with first author is a network expressing existence of co-citation relation between authors of scientific papers (Roy.P, is link with other authors Mellor and Mertens etc.). In Fig. 2 the circle's color indicates the cluster or group which the authors are associated. Clustering shows the dimension of similarity to other authors in the display. The co-authorship relations are relations representing whether an author have written a paper with another author, typically a paper is written by two or more authors. Analyzing co-authorship information on a larger database of scientific publications will assist in identifying groups of people who work closely together (Roy.P, Mellor and Mertens).

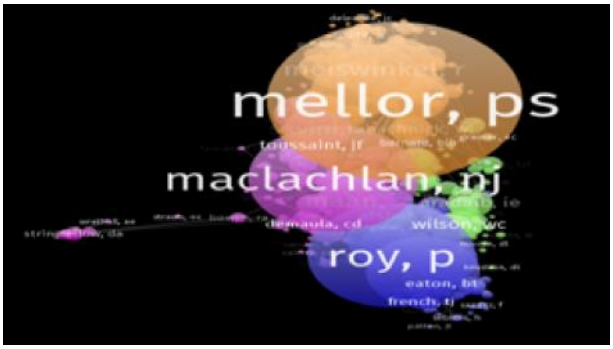

Fig.2 Co-citation with first author only

Figure 3 shows that the co-authorship with co-citation as well as the 203 items of the authors is recording to the 14 clusters follows. Every one clusters including in the 21 items of author's wise publication of the records as well as follows. Differentiated by difference colors of the clusters. Analyzing co-authorship with co-citation of the information on a larger database of scientific publications will assist in identifying groups of people who work closely together.

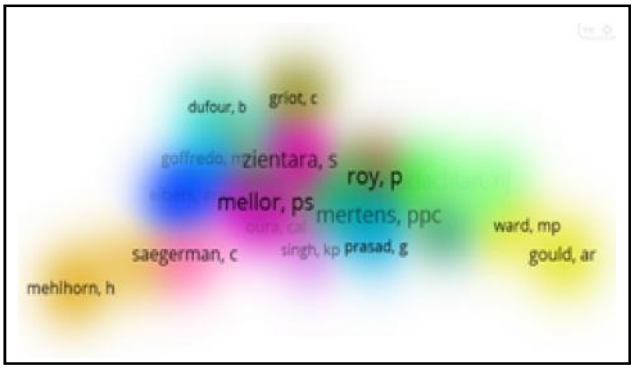

Fig.3 Co-authorship with co-citation

4.3 Document-wise Distributions of Publications

Table 5 Document-wise Distributions of Publications

Sl.No.	Document Type	Records	Percent	TLCS	TGCS
1	Article	1008	86.4	5442	13974
2	Review	84	7.2	1154	3638
3	Article; Proceedings Paper	27	2.3	98	345
4	Note	19	1.6	152	309
5	Letter	10	0.9	19	50
6	Editorial Material	8	0.7	15	37
7	Meeting Abstract	4	0.3	0	0
8	News Item	4	0.3	15	26
9	Review; Book Chapter	3	0.3	22	158

Figure 4 shows the collaboration network analysis between Document wise distributions of publications of 1134 records has been investigated. That is, the color of a point in a map depends on the 1134 documents is divided by the 7 clusters. Every one Cluster share or divided in the 320 items of the source of documents. The seven Clusters difference between the seven colors.

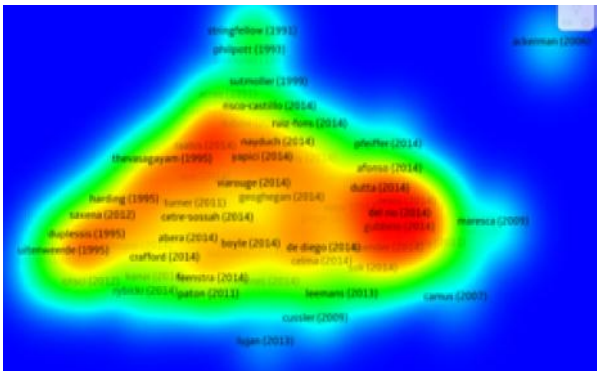

Fig.4 Document-wise distributions of publications

4.4 Journal-wise Distribution of Publications

The study found that the total research output of the Tuberculosis diseases for the study period (1989-2014) published in 226 journals. As the major portion of the research productivity 15 journals that are coincide with the ranking of journals according to the theory of Bradford's Law of scattering of journals in research productivity (Table 6).

Figure 5 shows the collaboration network analysis between Journals wise distribution of publications has been investigated. That is, the color of a point in a map depends on the first 52 items is divided by the 3 clusters in the neighborhood of the point and on the importance of the neighboring items. The density view is particularly useful to get an overview of the general structure of a map and to draw attention to the most important areas in a map.

Table 6 Top 20 Ranking of Journals According to Bradford's Distribution

Sl. No.	Journal	Records	Percent	Rank	TLCS	TGCS	TLCR
1	Veterinary Microbiology	62	5.3	1	371	807	510
2	Journal of Wildlife Diseases	51	4.4	2	256	608	161
3	Plos One	49	4.2	3	0	525	517
4	Preventive Veterinary Medicine	46	3.9	4	385	755	249
5	Virus Research	45	3.9	5	360	645	371
6	Journal of Virological Methods	42	3.6	6	311	693	288
7	Journal of General Virology	35	3.0	7	427	940	236
8	Vaccine	33	2.8	8	279	609	284
9	Medical and Veterinary Entomology	32	2.7	9	244	581	175
10	Veterinary Record	32	2.7	9	293	506	129
11	Journal of Virology	30	2.6	10	215	744	272
12	Virology	26	2.2	11	313	702	152
13	Journal of Veterinary Diagnostic Investigation	22	1.9	12	93	182	149
14	Revue Scientifique Et Technique-Office International Des Epizooties	22	1.9	12	107	321	97
15	Journal of Medical Entomology	21	1.8	13	90	229	91

Fig.5 Journal-wise distributions

Figure 5 shows the collaboration network analysis between Journals wise distribution of publications has been investigated. That is, the color of a point in a map depends on the first 52 items is divided by the 3 clusters in the neighborhood of the point and on the importance of the neighboring items. The density view is particularly useful to get an overview of the general structure of a map and to draw attention to the most important areas in a map.

In a view of institutions, about 1081 institutions published the stent-related journal articles. But the first 96 institutions Institute for Animal Health in USA published 94 papers and University of California Davis (67), University of Pretoria (49), USDA ARS (44) and University of Oxford (39) published as well as follow the papers. Many of institutes are collaborating with each other for a research on stent. Thus, we have used the international collaboration strength (ICS) indicator which is obtained by 'the share of foreign institutions collaborating with a certain institution in its total collaborating'. High quality and high international network where almost the whole top-15 institutions are belonging.

4.5 Top 15 Institution-wise Distributions of Publications

Table 7 Institution-wise Distribution of Publications 1081

Sl.No.	Institution	Records	Percent	TLCS	TGCS
1	Institute for Animal Health	94	8.1	1610	3683
2	University of California Davis	67	5.7	736	1873
3	University of Pretoria	49	4.2	267	655
4	USDA ARS	44	3.8	357	757
5	University of Oxford	39	3.3	622	1539
6	University of Georgia	35	3.0	246	379
7	INRA	33	2.8	134	482
8	CSIRO	32	2.7	225	480
9	University of Alabama	32	2.7	506	1150
10	AFRC	29	2.5	507	1045
11	Onderstepoort veterinary institute	29	2.5	161	439
12	CIRAD	25	2.1	45	227
13	University of Liege	23	2.0	189	424
14	NERC	22	1.9	337	777
15	Friedrich Loeffler Institutes	21	1.8	192	461

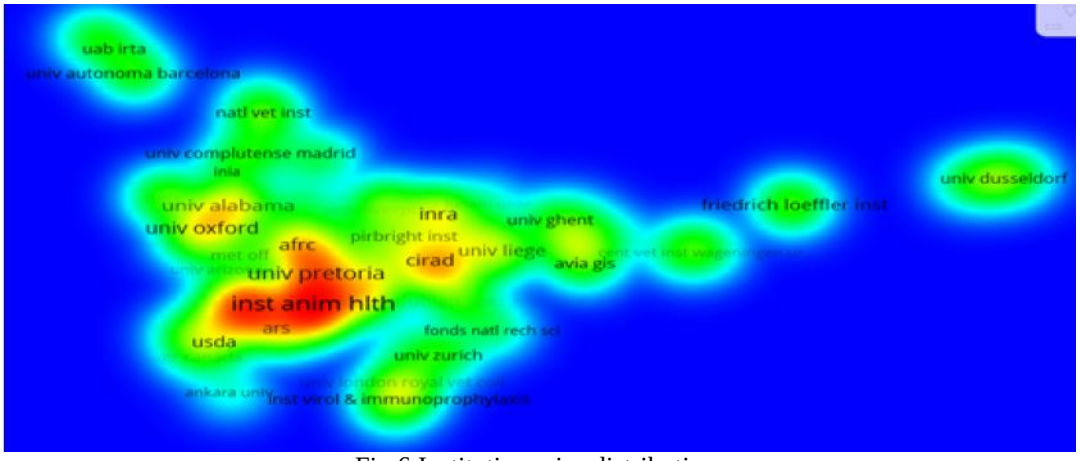

Fig.6 Institution-wise distributions

4.6 Top 15 Words-wise Distributions of Publications

Table 8 Top 15 Ranking of words according to Zif Law's Distribution

Sl.No	Word	Records	Percent	Rank	K	TLCS	TGCS
1	BLUETONGUE	552	47.3	1	552	4712	9990
2	VIRUS	529	45.3	2	1058	3549	8496
3	DISEASE	258	22.1	3	774	1490	3233
4	CULICOIDES	179	15.3	4	716	1128	2854
5	SEROTYPE	154	13.2	5	770	1051	2152
6	EPIZOOTIC	126	10.8	6	756	956	1462
7	HEMORRHAGIC	113	9.7	7	791	859	1269
8	SHEEP	106	9.1	8	848	625	1283
9	AFRICAN	93	8.0	9	837	570	1651
10	DETECTION	90	7.7	10	900	484	1156
11	CATTLE	88	7.5	11	968	507	982
12	INFECTION	86	7.4	12	1032	462	1167
13	DIPTERA	73	6.3	13	949	263	764
14	CERATOPOGONIDAE	72	6.2	14	1008	272	769
15	DISEASES	72	6.2	14	1008	144	938

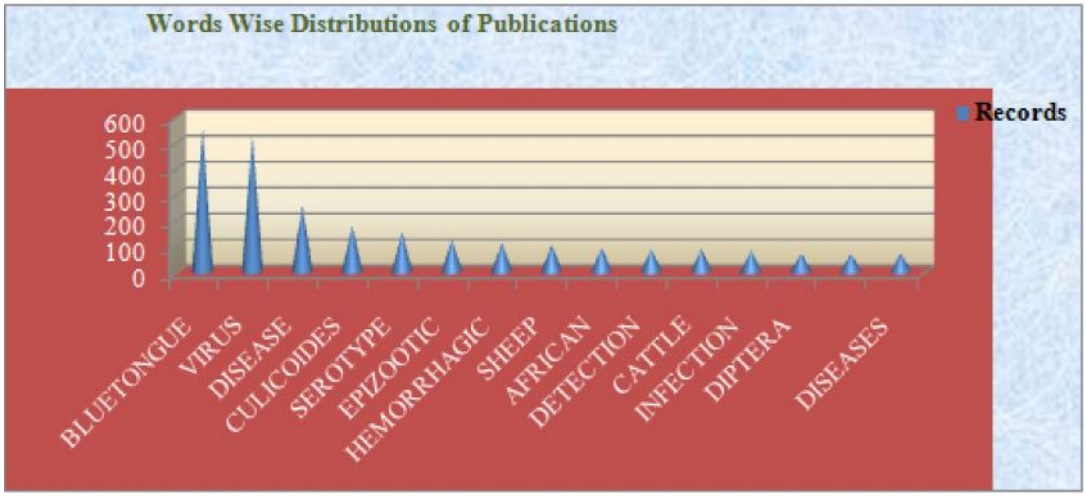

Fig.7 Top 15 Words-wise distributions of publications

The below table 8 shows that total word wise of distribution of publications with 2450 records. Among this the word "Bluetongue" with 552 records and TGCS with 9990 records. The next word follows as "Virus" with 529 records and TGCS 8496 records as well as follows the publications.

4.7 Top 15 Country-wise Distributions of Publications

The below table indicates that among the country wise distribution of BLUETONGUE DISEASES covered by the study tops USA with 301 publications followed by UK with 259, France with 130, South Africa with 90, Germany and Spain with 79 research publications respectively. First place goes to USA with 5935 publications, UK secured second rank in terms of GCS with 7475 records of 72 Countries were contributed the publications.

4.8 Language-wise Distributions of Publications

The below table 10 shows that Language wise distribution of publications. Among this the language "English" with 1099 records and TGCS with 18135 records. The next language follows as "German" with 28 records and TGCS 119 records as well as follows the publications.

Table 9 Top 15 Country-wise Distributions of Publications

Sl. No.	Country	Records	Percent	TLCS	TGCS
1	USA	301	25.8	2159	5935
2	UK	259	22.2	2926	7475
3	France	130	11.1	805	2134
4	South Africa	90	7.7	492	1272
5	Germany	79	6.8	573	1321
6	Spain	79	6.8	264	894
7	Belgium	67	5.7	560	1238
8	Australia	61	5.2	307	788
9	Netherlands	58	5.0	334	911
10	Unknown	55	4.7	308	795
11	Italy	49	4.2	278	696
12	India	47	4.0	113	280
13	Switzerland	35	3.0	248	517
14	Canada	34	2.9	128	314
15	Japan	21	1.8	65	

Table 10 Language-wise Distributions

Sl.No.	Language	Records	Percent	TLCS	TGCS
1	English	1099	94.2	6824	18315
2	German	28	2.4	72	119
3	French	21	1.8	15	68
4	Polish	6	0.5	0	2
5	Portuguese	4	0.3	1	6
6	Dutch	3	0.3	2	3
7	Spanish	3	0.3	3	24
8	Turkish	2	0.2	0	0
9	Italian	1	0.1	0	0

5. CONCLUSION

During the period (1989-2014) 1167 (100%) articles were published which are indexed in Web of Science. Overall, 3260 authors contributed 226 publications in the journal. The authorship pattern of Scientometric Mapping of Bluetongue diseases identified that majority of papers authored. This study has highlighted quantitatively the contributions made by the Scientometric Mapping of Bluetongue virus researchers during 1989-2014 as reflected in Web of Science database. During 26 years period (1989-2014) contributions in terms of number of publications is significant. WOS and VOS Viewers is useful for researchers, administrators, policy makers, editors, librarians and analysts for their respective nature of work.

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