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Scientometric Analysis of the Ethiopian Journal of Agricultural Sciences

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አጎፅሮተ-ጥናት

ጥናቱ የኢትዮጵያ የግብርና ሳይንስ መፅሄት ለ36 ዓመታት በ24 ቅፆች ሲያሣትማቸው የቆዩትን የምርምር ፅሁፎች በመመርኮዝ ተንትኗል። መፅሄቱ ሁሉንም የግብርና ሳይንስ ክፍሎች ያካተተ ሲሆን ብዙዎች ጥናታዊ ፅሁፎች በአንድ፣ ሁለት ወይም ሶስት ደራሲዎች አማካኝነት ቀርበዋል። ሆኖም ብዛት አይኑራቸው እንጂ በዘጠኝና ከዚያም በላይ በሆኑ ደራሲዎች የቀረቡ ጥናታዊ ፅሁፎች አሉ። ከታተሙት 279 ወረቀቶች መካከል በአግሮኖሚ፣ ሰብል ጥበቃና ሰብል ማሻሻል ላይ የቀረቡት ጥናታዊ ፅሁፎች የበዙ ሲሆኑ በእርሻ መካናይዜሺን፣ ቦታኒና ታክሶኖሚ ላይ የቀረቡት ጥናታዊ ፅሁፎች ደግሞ ጥቂቶች ነበሩ። በአንድ ቅፅ ውስጥ ከ7 እስከ 16 በአማካይ 11 ወረቀቶች የታተሙ ሲሆን የገጾችም ብዛት ከ84 እስከ 189 በአማካይም 129 ነበር። የአንድ ጥናታዊ ፅሁፍ ይቀርብ የነበረው የገጽ ብዛትም 10.9-11.9ነበር።

Abstract

A Scientometric analysis of the Ethiopian Journal of Agricultural Sciences from volume 1 to 24 covering 279 papers is reported. The journal was covering all areas of agriculture with most papers having single, two or three authors and; in a rare cases up to nine and twelve authors. The number of papers in agronomy, field crop breeding and crop protection was large and very few in agricultural education, botany and taxonomy. The number of papers per volume varies from 16 to 7 with an average of 11 papers and a total number of pages per volume varying from 189 to84 with an average of 129 pages per volume. Similarly the average number of pages per paper citations per paper was 11.8 and 10.9 respectively. The highest authorship productivity was nine.

Introduction

The Ethiopian Journal of Agricultural Sciences (here after the Journal or EJAS) was established at the 11th National Improvement Conference during April 25-27 in 1978. At that conference, the need for a scientific Journal was raised, a resolution was passed for its establishment and editorial board was elected among the participants. Subsequently, the first issue of EJAS Volume 1 number 1 came out in January 1979. The Journal was financed by then Institute of Agricultural Research (IAR), Alemaya College of Agriculture and Ethiopian Science and Technology Commission. The first Editor-in-chief was Dr. Berhane Gebere Kidan who as replaced by Professor Mesfin Abebe in 1981. Professor Mesfin Abebe served for three years and was replaced by Dr. Yilma Kebede who was succeeded by Dr. Hailu Gebre Mariam in 1990. During 1979 to 1990 EJAS was printed with no interruption from the first to its 12th Volume. However, during 1991 to

2009, printing was interrupted from time to time and only seven volumes out of 19 were printed.

The Editorial Board of the Journal till 1990 was elected by the National Improvement Conference for a period of five years. The current Editorial Board took over the responsibility in the end of 2009 and has printed volumes 20 to 24 with no interruption and delay.

The current and previous Editor-in-chiefs of the Journal were member of the executive committee of the Ethiopian Association of Agricultural Professionals (EAAP). However, neither there existed formal relation nor it received financial assistance form the Association. During the last 34 years, the necessity of permanent staff and budget has been the major concern and agenda of the Journal. This issue has become pressing now than ever due to increase in printing cost, increase in activities and the need for a managing editor. This forced the Editorial Board to approach Haromaya University and Ethiopian Institute of Agricultural Research (EIAR) for permanent funding and employment of staff. Although this has been raised before, the current top management of the Ethiopian Institute of Agricultural Research has agreed to own the Journal under its Information and Communication Directorate. In this paper, a Scientometric analysis of EJAS with particular emphasis on volumes 20-24 is carried. The objective of the paper is to analyze the growth of the Journal and its trends at a time of its transformation to a full-fledged Official Journal of the Ethiopian Institute of Agricultural Research.

Materials and Methods

The data for this paper was obtained from the EJAS Volume 1 to 24 regarding the total papers published with particular emphasis on the recent last five volumes. Analysis was made on authorship, author productivity, and degree of authorship and sources of papers. The authorship pattern and degree of collaboration (C) was analyzed according to Nattar (2009) using the formula;

$$C = \frac{N_M}{N_M + N_S}$$

Where C= Degree of Collaboration

N_M = Number of Multi authored papers

N_S= Number of single authored papers

Average authors per paper and productivity per author was determined according to Fuyuki (2009) using the formula

Average authors per paper = No. of Authors/No. of papers

Productivity per author = No. of papers/No. of authors

The pattern of co authorship was calculated using the following formula (Rajendran 2011).

$$CAI = \frac{Nij/Nio}{Noj/Noo} \times 100$$

Where CAI= Pattern of Co authorship
Nij = number of papers having authors in block i
Nio = total output of block i
Noj = total number of papers having J authors of all blocks
Noo = total number of papers for all authors and all blocks

Results and Discussion

Discipline distribution

The subject/ discipline distribution scatter of EJAS of volumes 1-24 include all areas of agriculture including botany, education, food science and veterinary (Table 1). Most of the papers were on plant protection (18%), field crops breeding (13%) and agronomy (11%). This is even with establishment of Pest Management Journal of Ethiopia that was established in 1997. Out of 279 articles, one paper was published in agricultural education in volume 4 and another one in volume 11 on taxonomy. There were relatively few papers on agricultural mechanization, fisheries, irrigation, weed science, rodent control and meteorology.

Authorship pattern

Out of 279 papers published in 24 volumes, 30% were written by single author and 70% multiple authors. The degree of collaboration was 70% indicating that the Journal promotes high degree of collaboration among authors. The number of single and two authors was almost equal. Papers with single authors were very common the first decade and rare since then particularly in the last five volumes (Table 2).

Volume 21 had manuscripts that had eight and nine authors each. These papers were out of internationally coordinated pyrethrum control project consisting of several graduate students and their professors. Papers with seven, eleven and twelve authors were on malt sorghum, pearl millet, avocado and mango variety registrations respectively.

Table 1. Subject scatter of EJAS Vol. 1-24.

Subject categories	Frequency	Percentage
Agronomy	32	11.4
Agricultural Economics	16	5.7
Agricultural Education	1	0.03
Agricultural Mechanization	3	1.0
Animal Nutrition	13	4.6
Animal Breeding	23	8.2
Botany	2	0.35
Biotechnology	3	1.0
Breeding Field crops	38	13.6
Food Science	5	1.79
Forage and Range Science	16	5.7
Fisheries	3	1.0
Forestry	5	1.79
Horticulture	10	3.5
Irrigation	3	1.0
Metrology	5	1.79
Plant Protection	51	18.3
Poultry	8	2.86
Registration of Plant Varieties	14	4.7
Soil Science	12	4.4
Rodents	3	1.0
Veterinary	8	2.86
Taxonomy	1	0.3
Weed Science	4	1.4
Total	279	100

Table 2. Authorship pattern in EJAS Vol 1-24.

Number of Authors	Number of Manuscripts	Percentage
One	84	30.1
Two	85	30.3
Three	68	24.3
Four	22	7.9
Five	4	1.3
Six	7	2.4
Seven	2	0.7
Eight	1	0.3
Nine	1	0.3
Ten	0	0.0
Eleven	2	0.7
Twelve	1	0.3
Total	279	100

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Number of manuscripts by source

Table 3 shows number of manuscripts by source. Although, the majority of the papers were out of research, graduate studies at M. Sc and Ph.D level contributed significantly to the Journal. These studies were carried out in Ethiopia and abroad. During the last 24 volumes only five papers were based on reviews.

Table 3.Source pattern of EJAS Vol 1-24.

Source	Number of Manuscripts	Percentage
Parts of M. Sc Thesis	43	15.4
Part of Ph.D Thesis	41	14.7
Out of Researchers	190	69.5
Review	5	1.7
Total	279	100

Papers per volume, number of pages per paper, number of citations and self-citations

The number of papers per volume varies from 16 papers for volume 18 to 7 for volume 16 with an average of 11 papers for volumes 1 to 24 (Table 4). The total number of pages per volume varies from 189 for volume 18 and 180 for volume 20 to 84 for volume 16 with an average of 129 pages per volume. Similarly the average number of pages per paper, citations per paper was 11.8 and 10.9 respectively. The degree of self-citation is 2 for Volumes 1 to 24.

Table 4.Total number of papers, total pages, total citations and; pages per paper, citations per paper and self-citations for volumes 1-24.

Volume No.	No of Papers	Total Pages	Total Citations	Pages per Paper	Citations per Paper	Self-Citation
1	17	130	64	7.6	3.7	2
2	14	157	65	11.2	4.6	1
3	13	134	138	10.3	10.3	3
4	11	108	104	9.8	9.4	1
5	14	142	176	10.5	10.1	5
6	10	114	146	11.4	11.4	4
7	10	118	96	11.8	11.8	2
8	10	115	125	11.5	11.5	2
9	10	135	112	13.5	13.5	1
10	10	120	131`	12.0	12.0	4
11	13	97	164	7.5	7.4	0
12	10	82	115	8.2	8.2	2
13	12	104	158	8.7	8.7	1
14	14	137	228	9.8	9.7	2
15	14	137	162	9.8	9.7	3
16	7	84	111	12.0	12.0	2
17	8	101	108	12.6	12.6	0
18	16	189	202	11.8	11.8	2
19	8	110	151	13.5	13.5	0
20	12	180	276	15.0	15.0	1
21	10	135	175	13.5	13.5	1
22	11	158	313	14.4	14.3	1
23	9	156	244	17.3	17.3	1
24	8	162	222	20.2		4
Mean	11.3	129.4	158.9	11.8	10.9	1.9

Detailed analysis of volume 20 to 24

Year wise distribution

During 2010 to 2013, an average of 12 papers per volume were published every year (Table 5). Out of the total of 69 papers, published in five volumes equal number of papers were contributed from research and graduate studies. The only exception was Volume 22 where only two papers out of nine were from research. Most of the papers were out of graduate studies and 13 were part of Ph. D theses by Ethiopians both locally and abroad.

Table 5. No of papers per year in volume 20-24.

Year	Volume no.	No of issues	Total no of papers	No of papers from Research	% of Papers From Research
2010	20	2	21*	14*	70
2011	21	2	14	7	50
2012	22	2	11	5	50
2013	23	2	23**	9	40

*Nine papers were variety registrations,** one paperswas variety registrations

Subject scatter

The subject scatter of Volumes 20-24 includes all areas of agriculture however agricultural education, agricultural mechanization, botany, food science, fisheries, irrigation and poultry rodent control were missing as compared to previous volumes (Table 6).

Authorship pattern

Out of 69 papers published in Volumes 20 to 24, only three have single author (Table 8). This was also reflection of the year wise distribution of papers from graduate students that includes advisors. Out of the total papers 5% have single and 95% multiple:31% have three, 22% four, 18%two and 9% six authors. One paper has 12 and two eleven authors indicating that the degree of collaboration is very high.

Table 6.Subject scatter of EJAS Vol. 20-24.

Discipline	Number of Manuscripts	Percentage
Agronomy	4	6.3
Agricultural Economics	9	14.1
Animal Breeding	2	3.1
Animal Nutrition	4	6.2
Biometrics	3	4.7
Biotechnology	3	4.7
Breeding field Crops	8	12.5
Forestry	2	3.1
Forages	3	4.7
Horticulture	3	4.7
Meteorology	2	3.1
Plant Protection	4	6.3
Registration of Plant varieties	14	21.9
Soil Science	1	1.6
Weed	2	3.1
Total	64	100

Table 7. Authorship pattern in EJAS Volume 20-24 in EJAS.

Number of Authors	Number of manuscripts	Percentage
One	3	4.7
Two	12	18.7
Three	20	31.2
Four	14	21.9
Five	2	3.1
Six	6	9.4
Seven	2	3.1
Eight	1	1.6
Nine	1	1.6
Ten	0	0
Eleven	2	3.1
Twelve	1	1.6
Total	64	100

Author productivity

The data pertaining to author productivity is presented on Table 8. The table shows that the average number of authors per paper was 3.4. There were equal number of authors per paper during 2010 and 2012.

Table 8. Author productivity Vol 20-24.

Year	Total number of Papers	Total number of authors	Author per paper	Productivity per author
2010	21	78	3.7	0.26
2011	14	65	4.6	0.21
2012	11	40	3.6	0.25
2013	9	25	2.7	0.36
Mean	14	36	3.7	0.38

Authors, pages, citations per paper

On the average, the average number of citations, pages and authors per paper from volume 20- 24 was 17, 16, and 3.6 respectively (Table 9). The total number of pages was high for volume 20 and low for volume 21 while pages, citations per paper and self-citations were maximum for volume 24 no. 1. On the other hand, the number of authors per paper did not vary significantly among the volumes.

Table 9.Number of pages, authors, citations per paper from volume 20-24.

Volume No.	No of Papers	Total Pages	Total Citations	Pages per Paper	Total Number of Authors	Citations per Paper	Self-Citation	Authors per paper
20	12	180	276	15.0	52	15.0	1	4.3
21	10	135	175	13.5	35	13.5	1	3.5
22	11	158	313	14.4	40	14.3	1	3.6
23	9	156	244	17.3	25	17.3	1	2.8
24	8	162	222	20.2	30	28.5	4	3.8
Mean	10	158	246	16	36	17	1.6	3.6

Sources of papers

Out of the total papers, almost equal numbers of papers were contributed by graduate studies and research (Table 10). There were also one review and one paper based on sabbatical studies. It appears that the human resource development program in Ethiopia is getting stronger and local universities are also offering M. Sc and Ph. D studies in significant number. It could also show that the scientific research in the national agriculture research system is getting weaker by the day.

Table 10. Sources pattern of Manuscripts Published in EJAS Vol 20-24

Source	Number of manuscripts	Percentage
Parts of M.Sc Thesis	15	23.4
Part of Ph.D Thesis	14	21.8
Out of Researchers	33	51.5
Sabbatical	1	1.6
Review	1	1.6
Total	64	100

Degree of collaboration

The average degree of collaboration between 2010 and 2013 is 0.95 that shows clearly very high degree of collaboration among authors (Table 11).

Table 11. Degree of collaboration among authors Volume 20-24.

Year	Single author	Multi authors	Degree of collaboration
2010	0	21	1
2011	0	14	1
2012	1	11	0.91
2013	2	23	0.92

Authorship nationality

Out of 69 papers published in five Volumes, 53 or 77% have exclusively Ethiopian authors and 23% have international collaboration. These collaborations were through graduate studies of both M. Sc and Ph. D studies.

Reference

Fuyuki Y. 2009. An analysis of the connection between researchers productivity and their co-authors past attributions, including the importance of collaborations network, Scientometrics 79(2)435-449.