

Prof. Dr. Ayhan Demirbas' scientometric biography¹

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Abstract

It is well established fact that Turkish scientists have increasingly contributed to the literature on the bio-energy in recent years. However, there has not been any biographic study of these scientists as well as scientists working in the field of bio-energy. Therefore, as a first-ever case study of Turkish scientists, this paper presents a scientometric biography of Prof. Dr. Ayhan Demirbas working in the area of bio-energy since 1980s. He produced 454 articles and reviews in the interdisciplinary areas relating to the bio-energy between 1984 and 2010 where 379 of them were indexed by the SCI or the SSCI. He received 7,309 citations for his 454 papers giving a ratio for the "Average Citations per Item" as 16.1 and "H-index" over 39 as of July 2011, suggesting that the scientific impact of his research on the relevant literature has been significant. This paper suggests that scientometric methods are useful for the evaluation of individual researchers and for publicizing their scientific achievement.

Keywords: Prof. Dr. Ayhan Demirbas; Bio-energy; Scientometric biography; Research productivity; Research evaluation

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1. Introduction

There has been intensive research activity on the bio-energy at a global scale in recent years [2-16]. The Turkish researchers' contribution to the global research activity has increased at an exponential scale in recent years [17-19]. Prof. Dr. Ayhan Demirbas has been one these eminent Turkish researchers.

This paper introduces the scientometric biography of Prof. Dr. Ayhan Demirbas who has been one of the leading scientists of Turkey in the areas of bio-energy.

Professor Dr. Ayhan Demirbas was born in Trabzon, Turkey in 1949. He studied Chemical Engineering in Ankara University eventually getting his Ph.D. degree there in 1980 as listed in the Table 1 concerning his career development.

He has worked as a doctoral member of academic staff in Selcuk University, Konya, Turkey; Karadeniz Technical University, Trabzon, Turkey; Sila Science and Energy, Trabzon, Turkey; Auburn University, US; and Sirnak University, Sirnak, Turkey working as a Professor since 1991.

¹A previous version of this paper was presented in an international conference [1].

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He has researched and taught in the areas of renewable energies such as biodiesels, biofuels, biomass pyrolysis, liquefaction and gasification, biogas, bioalcohols, and biohydrogen. He has also had studies on development of pulp from plants, chemical thermodynamics, engineering thermodynamics, cement chemistry, potentiometric titrations in non-aqueous mediums, heavy metal determination in mushrooms, supercritical fluid extraction of various biopolymeric materials, briquetting of biomass, chemical education, energy education, kinetics for non-isothermal flash pyrolysis of hazelnut shell and biomass, determination of the higher heating values of different biomass and vegetable oils using noncalorimetric methods, dehydration kinetics of some boron minerals, toxic mineral determinations in mushrooms and chicken meats, sulfur removal from coal using alkali from biomass ashes, toxic emissions from firing and co-firing processes, global climate change, hazardous materials, organic pollutants, spectrophotometric determination of carbaryl pesticides in soil, drinking water and, and cereal analyses etc.

He has supervised many graduate students and edited the “Energy Education Science and Technology” since 1998 (splitting later as “Energy Education Science and Technology Part A- Energy Science and Research“ and “Energy Education Science and Technology Part B- Social and Educational Studies“), besides “Future Energy Sources”, “Social Political Economic and Cultural Research”, and “Innovative Energy Policies”.

Table 1. Prof. Dr. Ayhan Demirbas’ career development

Year	Qualifications	Institution
1972	Technical Diploma of the University: Chemical Engineering	University of Ankara, Ankara
1973	Master of Energy in Technology	University of Ankara, Ankara
1980	Ph.D. in Energy Technology	University of Ankara, Ankara
1982	Assist. Prof. Dr. in Energy Technology	Selcuk University, Konya
1985	Assoc. Prof. Dr. in Energy Technology	Karadeniz Technical University, Trabzon
1991	Prof. Dr. in Energy Technology	Karadeniz Technical University, Trabzon
2003	Prof. Dr. in Energy Technology	Selcuk University, Konya
2007	Prof. Dr. in Energy Technology	Sila Science and Energy, Trabzon,
2008	Prof. Dr. in Energy Technology	Auburn University, Auburn, AL, US
2009-	Prof. Dr. in Energy Technology	Sirnak University, Sirnak

2. Materials and methods

A search was carried out in the Science Citation Index-Expanded (SCIE) and Social Sciences Citation Index (SSCI) using the ISI Web of Knowledge database (v.4.10- Web of Science) of the Thomson Scientific Inc., in February 2011 as in the relevant studies [17-21].

The traditional methods of scientometric research as applied in many scientific fields were applied in this study. The analysis was carried out using the SSCI and SCIE. These indices have established themselves as the gold standard for the retrieval of the scientific information; becoming preferred indices for the scientometric analysis [22].

As opposed to many technical studies, in addition to the SCIE, the SSCI database was also selected considering the social science aspects of the research on the bio-energy. Indeed, there were 6 papers indexed by the SSCI whilst remaining of the papers indexed by the SCIE.

A number of preliminary search strategies were carried out to locate the papers written by the Researcher. First, a number of databases including SSCI, SCIE, Google Scholar, EBSCO, ScienceDirect, InformaWorld were used. Second, a copy of the publication list prepared by the Researcher was obtained. This was necessary since it was found that there were two other researchers with the same surname and initial as well. One of them was Ahmet Demirbas of Karadeniz Technical University Faculty of Arts and Sciences Department of Chemistry working in the field of Chemistry (applied sciences). The other one was Alper Demirbas of a hospital working in the area of transplantations (medical sciences). The papers by these two scientists produced the research noise and were eliminated from the whole data set found from the various resources. Preventing too much noise in the research sample has been an important issue at this stage of the research [20].

Third, the references found from these various resources were compared and a full data set for the paper of the Researcher was obtained.

The search was refined restricting the research to “article”, “review” and “proceedings papers” for the papers indexed by the SSCI and SCIE. Thus the materials like discussion, and editorial were removed from the research sample.

The search in SSCI and SCIE produced 477 publications for A. Demirbas. 454 of them were articles, reviews and proceedings. However, only 379 of them were written by the Researcher. 75 of them were written by two other scientists. Therefore, they were discarded from the sample.

It was found that the references found using the “distinct author set feature” of the Web of Knowledge did not completely match the references contained in the final research sample. This produced 374 total references where 368 of them were articles, proceeding papers, and reviews by selecting the journals related to the publications of the Researchers, omitting journals relating to the transplantation and chemistry. However, 16 of these references were belonging to one of the other two scientists with the same surname and initial, leaving only 350 references for the Researcher. Therefore it was not possible to obtain 29 of the references belonging to the Researcher using this special feature procedure.

Next, a scientometric analysis was carried out as a first step for the papers indexed by the SSCI and SCIE using the “analyze the results” tool of the Web of Knowledge database. The used tools were “author”, “country”, “document type”, “institution name”, “language”, “publication year”, “source title”, and “subject area”. The data obtained from these indices were noted and additional data was obtained for the papers not indexed by these indices.

As a second step of the scientometric analysis, a citation analysis was carried out using the “create citation report” tool of the Web of Knowledge database. The information relating to the “sum of the times cited”, “average citations per item”, “h-index” was noted down. Additionally, the citations for the papers not indexed by the SSCI and SCIE were found manually for each paper separately.

3. Results and discussion

3. 1. Research sample

The Table 2 presents summary data on the research output of Prof. Dr. Demirbas. The data are presented in two separate sections. In the first part, the data on the papers published in the journals not indexed by the SSCI and SCIE are presented whilst in the second part the data on the papers published in the journals indexed by the SSCI and SCIE are given. For each year, the data on the number of papers are given.

The data in the Table 2 shows that there were 379 papers published by the Researcher and indexed by the SSCI or SCIE. There were also 75 papers not indexed by these indexes. The whole sample size was 454. In other words, the Researcher published 454 papers (articles, reviews, and proceedings papers) between 1984 and 2010. %17 of the sample papers was not indexed by these indices. The production rate is 17.4 papers per year.

For the papers indexed by these indices, only 6 of these papers were indexed by the SSCI whereas the remaining part of the sample was indexed by the SCIE.

3. 2. Document type

The papers in the sample are mostly articles. 11 of the papers indexed by the indices are reviews. There are no proceedings papers.

In the research assessment of the researchers, institutions and countries, articles, reviews, and proceedings papers have been considered as the core group [23]. Therefore, this core group of papers was selected for the sample of the study.

Table 2 The research output summary

	Not indexed by SCIE/SSCI indexes	Indexed by SCIE/SCIE indexes	Whole sample	
	Paper no.	Paper no.	Total paper no.	Total paper no %
1984	3	0	3	0.7
1985	5	0	5	1.1
1986	1	0	1	0.2
1987	0	0	0	0.0
1988	0	0	0	0.0
1989	1	0	1	0.2
<i>1984-89</i>	<i>10</i>	<i>0</i>	<i>10</i>	<i>2.2</i>
1990	0	0	0	0.0
1991	2	2	4	0.9
1992	2	1	3	0.7
1993	0	1	1	0.2
1994	3	4	7	1.5
<i>1990-94</i>	<i>7</i>	<i>8</i>	<i>15</i>	<i>3.3</i>
1995	0	2	2	0.2
1996	0	5	5	1.1
1997	0	6	6	1.3
1998	15	12	27	6.0
1999	11	12	23	5.1
<i>1995-99</i>	<i>26</i>	<i>37</i>	<i>63</i>	<i>13.7</i>
2000	5	16	21	4.6
2001	4	20	24	5.3
2002	1	36	37	8.2
2003	1	20	21	4.6
2004	3	37	40	8.8
<i>2000-04</i>	<i>14</i>	<i>129</i>	<i>143</i>	<i>31.6</i>
2005	0	31	31	6.9
2006	3	36	39	8.6
2007	2	30	32	7.1
2008	1	47	48	10.6
2009	7	39	46	10.2
<i>2005-09</i>	<i>13</i>	<i>183</i>	<i>196</i>	<i>43.4</i>
2010	5	22	26	5.8
<i>1984-2010</i>	<i>75</i>	<i>379</i>	<i>454</i>	<i>100.0</i>

3. 3. Collaborators

The most prolific authors collaborating with the Researcher were Erdogan Y of Karadeniz Technical University (13 papers), Caglar A of Kastamonu University (11 papers), Aslan A of Celal Bayar University (9 papers), Bakis R of Anadolu University (9 papers).

3. 4. Institutions

The most contributing institutions were Karadeniz Technical University (88 papers), Selcuk University (113 papers), Sila Science (93 papers) where the Researcher had worked in the past and Sirtak University (16 papers). The data shows the different spellings of the institutions such as Karadeniz Technical University (Tech Univ Black Sea, Black Sea Tech Univ, KTU, KT Univ).

Anadolu University, Gazi University, Celal Bayar University, Gaziosmanpasa University, and Kafkas University were the institutions of the collaborators.

3. 5. Historical development of the research

The Table 2 presented summary data on the research output of Prof. Dr. Demirbas. The data in this table were graphed as shown in the Fig. 1.

The data shows that the Researcher produced 27 papers between 1984 and 1994, comprising 5.9% of the research sample. Only 9 of these papers were indexed by the indices. There was a sharp increase for the period 1995-1999 with 62 papers, comprising 13.7% of the sample. 36 of these papers were indexed by the indices. This increase was especially notable for 1998 (27 papers) and 1999 (23 papers) where the number of both indexed and non-indexed papers increased as seen from the Figure as well. 1998 was the year when the journal of “Energy Education Science and Technology” was established.

The following decade saw the sustained growth of the publications comprising 31.5% of the sample between 2000 and 2004 and comprising 43.2% of the sample between 2005 and 2009. During this decade, the share of the papers not indexed by the indices decreased as 27 papers was not indexed whilst 339 papers were indexed. The journal of “Energy Education Science and Technology” was first indexed in 2008, splitting as part A and part B in 2009. 20.7% of the papers were published between 2008 and 2009 with separate peaks in the graph. There were additional 26 papers published in 2010.

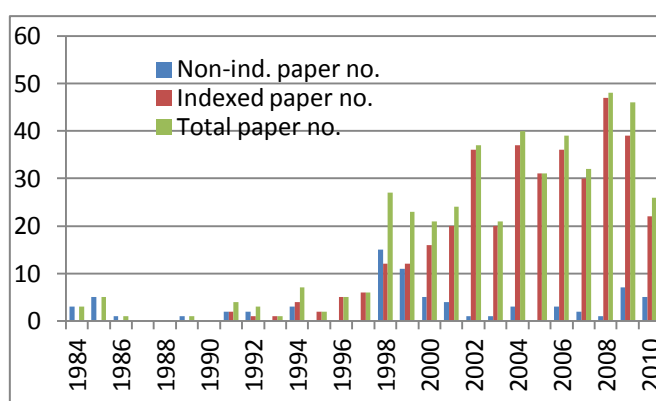


Fig. 1. The historical progress of the research output.

3. 6. Journals

17 journals where the Researcher published his papers were listed in the Table 3. “Energy Sources” was the most publishing journal with 218 published papers contributing to 48.0% of the sample including Part A and Part B of the Journal; followed by “Energy Conversion and Management” (45 papers, 10%), “Energy Education Science and Technology” (63 papers, 13.9%) including Part A and Part B of the journal, “Energy Exploration & Exploitation” (19 papers, 4.2%), and “Food Chemistry” (10 papers, 2.2%). These 5 top journals constituted 78.2% of the whole sample.

The data in the Table also shows the distribution of the sample among the indexed and non-indexed journals. The data also gives information about the respective subject headings of the journals. It is notable that the five top journals were indexed under the subject heading of “Energy & Fuels” together with other headings in some cases. 19 of 52 journals were indexed under the same subject heading of “Energy & Fuels”.

Most of these journals have relatively high journal impact factors as calculated by the Journal Citation Report, suggesting that papers on the bio-energy and related scientific fields strive for excellence for publication outlets and the high impact journals highly value this field as an emerging societal field [23].

For example, the first specialist leading journal, “Energy Sources” including its branched versions published 2,411 articles, proceedings papers, and reviews during the last three

decades with 7,981 total citations and an average rate of citation of 3.3 and with an H-Index of 27 as of February 2011. This means that on average a paper published by this Journal was cited 3 times. The value of the H-Index is moderately high suggesting that the scientific impact of the journal has been relatively high.

The second specialist leading journal, "Energy Conversion and Management" published 5,095 articles, proceedings papers, and reviews during the last three decades with 34,396 total citations and an average rate of citation of 6.75 and with an H-Index of 58. This means that on average a paper published by this Journal was cited nearly 7 times. The value of the H-Index is very high suggesting that the scientific impact of the journal has been relatively high.

The third leading journal, "Energy Education Science and Technology" including its branched versions published 136 articles, proceedings papers, and reviews with 1,581 total citations and an average rate of citation of 11.6 and with an H-Index of 25. This means that on average a paper published by this Journal was cited nearly 12 times. The value of the H-Index is moderately high suggesting that the scientific impact of the journal has been relatively high. This journal was first indexed in 2008.

These findings suggest that the research by this Researcher in this area have been well diffused on the journal basis except four top journals. The other interesting finding from the examination of this list is that these journals are in the subject areas most related to the applied engineering fields rather than basic natural sciences.

3. 7. The most publishing Web of Knowledge subject areas

The Table 4 shows the subject area of the journals. "Energy & Fuels" was the area where 70.3% of the sample was published. This was followed by "Engineering, Chemical" (48.7%), "Environmental Sciences" (28.9%), "Thermodynamics" (11.9%), and "Mechanics" (9.9%), and "Physics, Nuclear" (9.9%).

The decomposition of scientific literature into disciplinary and sub-disciplinary structures is one of the core goals of scientometrics [24]. The ISI subject categories classify journals included in the SCIE and SSCI. The aggregated journal-journal citation matrix contained in the Journal Citation Reports can be aggregated on the basis of these categories.

The first six most publishing subject areas contribute to nearly 180% of the sample papers as the journals are usually designated with more than one subject area as seen from the Table 4. For example "Energy Sources Part A" was assigned the subject headings of Energy & Fuels; Engineering, Chemical; Environmental Sciences whilst "Energy Sources Part B" was assigned one subject heading of Energy & Fuels as seen from Table 3.

It is notable that the most top publishing subject areas fall within the realm of the applied sciences as well as basic natural sciences supporting a similar finding relating to the most publishing journals.

Another important finding from this table is that the research carried out by the Researcher was of the interdisciplinary nature ranging from "Energy & Fuels", to "Environmental Sciences" and "Materials Science, Multidisciplinary" following a similar pattern in biofuels research [17-19].

3. 8. Subject analysis of papers

Although a subject analysis was carried out above using the index-produced subject headings based on the subject headings allocated to the journals, it would also be interesting to have a look into the subjects of the papers themselves.

The abstracts of the papers written by the Researcher were evaluated and the papers were

Table 3. The journals

	Journal Title	Indexed paper no	Not-indexed paper no	Total paper no	Total paper %	Subject headings
1	Energy Sources Part A-Recovery Utilization and Environmental Effects	114	0	114	25.2	Energy & Fuels; Engineering, Chemical; Environmental Sciences
2	Energy Sources	87	0	87	19.2	Energy & Fuels; Engineering, Chemical
3	Energy Conversion and Management	45	0	45	10.0	Thermodynamics; Energy & Fuels; Mechanics; Physics, Nuclear
4	Energy Education Science and Technology	3	40	43	9.5	Energy & Fuels; Engineering, Environmental; Engineering, Chemical
5	Energy Exploration & Exploitation	19	0	19	4.2	Energy & Fuels
6	Energy Sources Part B-Economics Planning and Policy	17	0	17	3.8	Energy & Fuels
7	Food Chemistry	10	0	10	2.2	Chemistry, Applied; Food Science & Technology; Nutrition & Dietetics
8	Cement and Concrete Research	9	0	9	2.0	Construction & Building Technology; Materials Science, Multidisciplinary
9	Fuel Science & Technology International	5	4	9	2.0	Energy & Fuels
10	Social Political Economic and Cultural Research	0	8	8	1.8	None
11	Journal of Analytical and Applied Pyrolysis	6	0	6	1.3	Chemistry, Analytical; Spectroscopy
12	Modelling, Measurement and Control	0	6	6	1.3	None
13	Deutsche Lebensmittel-Rundschau	5	0	5	1.1	Food Science & Technology
14	Resources Conservation and Recycling	5	0	5	1.1	Engineering, Environmental; Environmental Sciences
15	Fuel	4	0	4	0.9	Energy & Fuels; Engineering, Chemical
16	International Journal of Green Energy	4	0	4	0.9	Thermodynamics; Energy & Fuels
17	Journal of Hazardous Materials	4	0	4	0.9	Engineering, Environmental; Engineering, Civil; Environmental Sciences
		377	75	452	100.0	

coded in the areas of production of bio-energy, social policy aspects of bio-energy, general energy policy, food science, construction materials, energy education, ingredients of bio-energy, mining engineering, soil science, polymer science, and social sciences.

The Table 5 shows the results of subject analysis of the papers. The most researched area was the production of bio-energy (303 papers, 66.7%), followed by social policy aspects of bio-energy (43 papers, 9.5%), general energy policy (35 papers, 7%), food science (20 papers, 4.4%) and construction materials (18 papers, 4%). The other research areas were energy education, ingredients of bio-energy, mining engineering, soil science, polymer science, and social sciences.

The same table also provides data on the development of the research during the consecutive five-year periods. The data shows that the research on the production of the bio-energy has exponentially grown over time from 1 paper during the period 1980-1984 to 144 during the period 2005-2009. The papers on the social aspects of the bio-energy production were published in the 2000s. In parallel with this finding the papers on the general energy policy were published during the same period. Papers on the food science were published starting from the period of 1995-1999 and papers on the construction materials were published starting from the period of 1990-1994 making a peak with 13 papers in the following period. Besides the area of ingredients of bio-energy, the papers on other areas were published starting from the period of 1995-1999.

Table 4 The Web of Knowledge subject area of the journals publishing papers

Subject Area	Paper numbers	Paper numbers (%)
1 Energy & Fuels	319	70.3
2 Engineering, Chemical	221	48.7
3 Environmental Sciences	131	28.9
4 Thermodynamics	54	11.9
5 Mechanics	45	9.9
6 Physics, Nuclear	45	9.9
7 Food Science & Technology	16	3.5
8 Chemistry, Applied	13	2.9
9 Engineering, Environmental	13	2.9
10 Nutrition & Dietetics	10	2.2
11 Construction & Building Technology	9	2.0
12 Materials Science, Multidisciplinary	9	2.0
13 Chemistry, Analytical	6	1.3
14 Spectroscopy	6	1.3
15 Agricultural Engineering	4	0.9
16 Biotechnology & Applied Microbiology	4	0.9
17 Education, Scientific Disciplines	4	0.9
18 Engineering, Civil	4	0.9
19 Engineering, Mechanical	4	0.9
20 Materials Science, Paper & Wood	4	0.9
21 Chemistry, Multidisciplinary	3	0.7
22 Chemistry, Physical	3	0.7
23 Engineering, Petroleum	3	0.7
24 Environmental Studies	2	0.4
25 Forestry	2	0.4
26 Physics, Atomic, Molecular & Chemical	2	0.4
27 Agronomy	1	0.2
28 Chemistry, Medicinal	1	0.2
29 Engineering, Multidisciplinary	1	0.2
30 Polymer Science	1	0.2
	940	207

It is notable that most of the papers (76.2% of the sample) were related to the bio-energy production as well as the social policy aspects of the bio-energy production from an interdisciplinary perspective. However, the papers in the remaining part of the sample were related to the other areas such as general energy policy, energy education and food science.

Table 5. The subject analysis of papers based on the manual analysis

Year	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	Total	Total (%)
Production of bio-energy	1	3	13	29	97	144	16	303	66.7
Social policy aspects of bio-energy	0	0	0	0	11	28	4	43	9.5
Other energy policy	0	0	0	0	15	16	1	32	7.0
Food science	0	0	0	6	11	1	2	20	4.4
Construction materials	0	0	2	13	2	1	0	18	4.0
Energy education	0	0	0	6	1	4	2	13	2.9
Ingredients of bio-energy	2	4	0	1	3	0	0	10	2.2
Mining engineering	0	0	0	7	3	0	0	10	2.2
Soil science	0	0	0	0	1	1	0	2	0.4
Polymer science	0	0	0	1	0	0	0	1	0.2
Social sciences	0	0	0	0	0	1	0	1	0.2
Total	3	7	15	63	144	195	26	453	99.8
Total (%)	0.7	1.5	3.3	13.9	31.7	43.0	5.7	99.8	

3. 9. Citation analysis

The results from the use of the “citation” tool of the Web of Knowledge database based on the 379 paper references show that the brute total number of citations was 7,028, giving a ratio for the “Average Citations per Item” as 18.6 and “H-index” as 39. He received further 941 citations for 75 papers, not indexed by the indices of SCI or SSCI. As a total he received

7,309 citations for his 454 papers with the “Average Citations per Item” as 16.1. The citation analysis results were given in the Table 6.

These findings suggest Prof. Dr. Ayhan Demirbas had an important contribution to the literature on the bio-energy as measured by the number of publications indexed, the average citation rates, and the H-index., graphically shown in the Fig. 2.

“Citations support the communication of specialist knowledge by allowing authors and readers to make specific selections in several contexts at the same time” [25]. Thus, the citation analysis, based on the citations made by the authors provides valuable information on the scientific impact of the research as briefly outlined above. “Citation studies remain a valid method of analysis of individuals', institutions', or journals' impact, but need to be used with caution and in conjunction with other measures” [26].

Table 6. The citations*

	Not indexed by SCIE/SSCI indexes			Indexed by SCIE/SCIE indexes			Whole sample	
	Paper no.	Citation no.	Citation rate	Paper no.	Citation no.	Citation rate	Total cit no.	Cit rate
1984	3	16	5.3	0	0	0	16	5.3
1985	5	49	9.8	0	0	0	49	9.8
1986	1	5	5.0	0	0	0	5	5.0
1987	0	0	0	0	0	0	0	0.0
1988	0	0	0	0	0	0	0	0.0
1989	1	2	2.0	0	0	0	2	2.0
<i>1984-89</i>	<i>10</i>	<i>72</i>	<i>7.2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>72</i>	<i>7.2</i>
1990	0	0	0.0	0	0	0.0	0	0.0
1991	2	48	24.0	2	64	32.0	66	16.5
1992	2	29	14.5	1	17	17.0	46	15.3
1993	0	0	0.0	1	48	48.0	48	48.0
1994	3	12	4	4	76	19.0	88	12.6
<i>1990-94</i>	<i>7</i>	<i>89</i>	<i>11.5</i>	<i>8</i>	<i>205</i>	<i>16.2</i>	<i>247</i>	<i>16.6</i>
1995	0	0	0	2	18	18.0	18	18.0
1996	0	0	0	5	74	14.8	74	14.8
1997	0	0	0	6	239	39.5	237	39.8
1998	15	243	16.2	12	365	30.4	608	22.5
1999	11	28	2.6	12	137	11.4	165	7.2
<i>1995-99</i>	<i>26</i>	<i>271</i>	<i>10.4</i>	<i>37</i>	<i>833</i>	<i>22.5</i>	<i>1102</i>	<i>17.5</i>
2000	5	317	63.4	16	380	23.8	697	33.2
2001	4	38	9.5	20	700	34.9	738	30.8
2002	1	2	2.0	36	789	21.9	791	21.4
2003	1	2	2.0	20	551	27.6	553	26.3
2004	3	19	6.3	37	569	15.4	588	14.7
<i>2000-04</i>	<i>14</i>	<i>378</i>	<i>27.0</i>	<i>129</i>	<i>2989</i>	<i>23.2</i>	<i>3367</i>	<i>23.6</i>
2005	0	0	0	31	585	18.9	585	18.9
2006	3	60	20.0	36	334	9.3	394	10.1
2007	2	14	7.0	30	749	25.0	763	23.8
2008	1	1	1.0	47	658	14.0	48	11.4
2009	7	48	6.9	39	499	16.6	547	11.9
<i>2005-09</i>	<i>13</i>	<i>123</i>	<i>11.5</i>	<i>183</i>	<i>2825</i>	<i>15.4</i>	<i>2337</i>	<i>11.9</i>
2010	5	8	1.6	22	176	8.0	184	6.3
<i>1984-2010</i>	<i>75</i>	<i>941</i>	<i>12.5</i>	<i>379</i>	<i>7028</i>	<i>18.6</i>	<i>7309</i>	<i>16.1</i>

*As of July 2011.

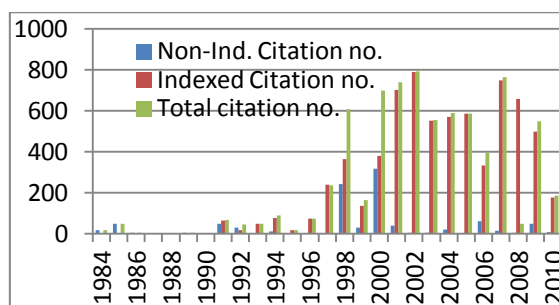


Fig. 2. The historical citation impact of the research output.

3. 10. The citation classics

The most cited paper analysis has been helpful to highlight the papers with highest impact on the relevant research. Therefore, 15 most cited papers with citations over 100 are located through the citation analysis for both indexed and non-indexed papers.

The Table 7 shows that there were 15 “citation classics” [27-28] by Prof. Dr. Ayhan Demirbas with over 100 citations. 2 of these papers were not indexed by the Web of Science (SSCI or SCIE). 9 of these papers were reviews.

The paper on the progress and recent trends in biofuels had received 318 citations as of July 2011. This paper was published in a journal impact factor of over 10 in the 2010 edition of the Journal Citation reports.

The journals publishing the citation classics were Progress in Energy and Combustion Science (4), Energy Conversion and Management (6), Energy Education Science and Technology (2), Energy Education Science and Technology Part B (1), Fuel (1), and Energy Policy (1).

Table 7. The citation classics by Prof. Dr. Ayhan Demirbas*

Reference	Index	Doc. type	Journal	Topic	Citation no.
[2]	WoS**	Review	Prog Energy Combust	Progress and recent trends in biofuels	318
[3]	WoS	Article	Energy Convers Manage	Biodiesel fuels from vegetable oils	271
[4]	WoS	Article	Energy Convers Manage	Biomass resource facilities and biomass conversion processing for fuels and chemicals.	224
[5]	WoS	Article	Energy Convers Manage	Liquefaction and pyrolysis reactions of biomass	191
[6]	WoS	Article	Energy Convers Manage	Biodiesel from vegetable oils	182
[7]	WoS	Review	Prog Energy Combust	Biodiesel production from vegetable oils	147
[8]	Non-WoS	Review	Energy Educ Sci Tech	Biomass conversion technologies	146
[9]	WoS	Review	Energy Educ Sci Tech Part B	Social, economic, environmental and policy aspects of biofuels	144
[10]	Non-WoS	Review	Energy Educ Sci Tech	Biomass resources for energy and chemical industry	139
[11]	WoS	Review	Prog Energy Combust	Combustion characteristics of different biomass fuels	127
[12]	WoS	Article	Fuel	Heating values of biomass fuels	122
[13]	WoS	Review	Energy Convers Manage	Biodiesel fuels	112
[14]	WoS	Review	Prog Energy Combust	Applications of renewable energy sources	105
[15]	WoS	Article	Energy Convers Manage	Energy sources, energy policy in Turkey	104
[16]	WoS	Review	Energy Policy	Biodiesel as transportation fuel	102

*As of July 2011 ** WoS: Web of Science.

4. Conclusions

Although there have been a limited number of scientometric studies in the area of bio-energy, there has not been any remarkable scientometric studies of the leading scientists working in this area in the published and indexed literature. In the first-ever scientometric biography in this area, a study in this area is presented for Prof. Dr. Ayhan Demirbas, one of the leading scientists of Turkey working in the field of bio-energy [29, 30].

Results provided helpful insights into Prof. Dr. Demirbas' research covering nearly three decades in many fronts including the document type, sample size, the most collaborating authors, the most publishing countries, the most publishing research institutions, and the language of papers, the publication year, the most publishing journals, and the subject areas in the first strand of the analysis [31-40].

The results showed that the research by Dr. Demirbas had grown steadily during the last three decades, more sharply between 1998 and 2010. The results also provided valuable information on the citations made to including total number of citations, Average Citations per Item, and H-index. There were 7,309 citations to 454 papers with H-index over 39 as of July 2011. The scientific impact of the research carried out by Prof. Dr. Ayhan Demirbas on the development of the literature on the bio-energy has been significant.

“Bibliometric measures should be viewed as a useful supplement to other research evaluation measures rather than as a replacement” [26] such as biographies [41].

This work could be extended to the other leading scientists working in the field of bio-energy as well as to other leading Turkish scientists in general.

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