

India's Contribution to Agriculture and Food Sciences through Open Access Literature

Hemantha Kumar G.H.* , Srinivasa V.** , Bhaskara Reddy M.# , and Chandra B.T.**

*M.S. Ramaiah Medical College, MSRIT Post, MSR Nagar, Bengaluru-560 054

**University Library, University of Agricultural Sciences, Bengaluru-560 065

#Raman Research Institute, C.V. Raman Avenue, Sadashivanagar, Bengaluru-560 080

E-mail: ghhemanth@gmail.com; vsrinivas28@gmail.com; bhaskarmreddy@gmail.com; chaandu2007@gmail.com

ABSTRACT

The present study attempts to evaluate the initiatives taken by India to make this intellectual output accessible for all by publishing them in open access resources like open access journals and repositories. The results revealed that India is continuously contributing in open access literature as some of the premier institutions, particularly in the agriculture sciences. The position of India in terms of number of journals in the Directory of Open Access Journals (DOAJ) is 5th and in Directory of Open Access Repositories (OpenDOAR) India has 11th place in the world repository.

Keywords: Open access, DOAJ, OpenDOAR, agricultural journals, India, Directory of Open Access Journals

1. INTRODUCTION

The technology that dramatically increases the ability to record, store, analysis and transmit the information. "Bethesda statements on open access publishing" states that open access work meets two criteria; The Author (s) and Copyright holder (s) to all users a free, irrevocable, worldwide, perpetual right to access to, and a license to copy, use, distribute, transmit and display the work publicity and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribute of authorship, as well as the right to make small number of printed copies for their personal use. Open access (OA) literature is digital, online, free of charge, and free from most copyright and licensing restrictions. It can be delivered through open access journals, which perform peer review, or through OA archives or repositories, which do not. One of the achievements of the world wide OA movement is to persuade 80 per cent of non-OA journals to let their authors deposit the peer-reviewed versions of their work in OA repositories.

2. OBJECTIVE OF STUDY

The main objective of the study is to evaluate India's contribution in the field of agriculture and food science for delivering open access literature through Directory of

Open Access Journals (DOAJ) and Directory of Open Access Repositories (OpenDOAR).

3. METHODOLOGY

The literature was reviewed on the open access movement in India. Then, DOAJ and OpenDOAR were accessed to get the data related to the study. In the final stage, the data were interpreted and analysed based on a set of parameters to get the precise picture of India's contribution to agriculture and food sciences in open access literature.

DOAJ covers free, full-text, and quality-controlled scientific and scholarly journals. There are now 6080 journals in the directory. Currently, 2582 journals are searchable at article level. As of 1st Feb 2011, 504526 articles are included in the DOAJ and the OpenDOAR service provides a quality-assured listing of open access repositories around the world. OpenDOAR staff harvest and assign metadata to allow categorisation and analysis to assist the wider use and exploitation of repositories. Each of the repositories has been visited by OpenDOAR staff to ensure a high degree of quality and consistency in the information provided. OpenDOAR is maintained by SHERPA services, based at the Centre for Research Communications at the University of Nottingham. OpenDOAR has over 1851 listings.

4. ANALYSIS AND INTERPRETATIONS

The findings of the study are interpreted into two sections (i.e., DOAJ and OpenDOAR) and discussed into successive tables with their interpretations:

4.1 India's Contribution to Directory of Open Access Journals

In terms of the number of journals, Indian ranks number 5 in the DOAJ, well ahead of countries such as USA, and UK. The top ten countries as per journals in the DOAJ are listed in Table 1.

Table 1. India's position in DOAJ

Rank	Country	Number of journals
1.	USA	1173
2.	Brazil	546
3.	UK	487
4.	Spain	344
5.	India	292
6.	Germany	208
7.	Canada	189
8.	Turkey	160
9.	Italy	155
10.	Romania	154

4.1.1 Year-wise Contribution

India was not among the countries who contributed their journals to the DOAJ when it was created in 2002. Since 2003, India has contributed to DOAJ continuously as shown in Table 2.

Table 2. India's year-wise contribution

Year	Number of journals	Cumulative total
2002	00	00
2003	14	14
2004	18	32
2005	14	46
2006	18	64
2007	19	83
2008	23	106
2009	50	156
2010	129	285
Till Feb. 1 st 2011	07	292

4.1.2 Publisher-wise Contribution

India's journals in DOAJ are mainly published by 10 Indian journal publishers: Medknow Publications; Academy & Industry Research Collaboration Centre (AIRCC); Indian Academy of Sciences; Kamla-Raj Enterprises; Engg. Journals Publication; Integrated Publishing Association; Advanced Research Journals; and others. However, there are total 143 Indian publishers, of which 131 publish one journal each as shown in Table 3.

Table 3. No. of journals by publisher

S. No.	Publisher	No. of Journals published
1.	Medknow Publications	76
2.	Academy & Industry Research Collaboration Center (AIRCC)	20
3.	NISCAIR	15
4.	Bioinfo Publications	12
5.	Indian Academy of Sciences	11
6.	Kamla-Raj Enterprises	9
7.	Engg. Journals Publication	4
8.	Integrated Publishing Association	5
9.	Advanced Research Journals	3
10.	Association of Pharmaceutical Innovators	2
11.	Sphinx Knowledge House	2
12.	KEJA Publications	2
13.	Others	131
Total		292

4.1.3 Subject-wise Contribution

The Indian journals in DOAJ have contributed to different subject areas of human knowledge: public health & medical sciences, general sciences, social sciences, agricultural sciences, engineering, information science, computer science, and law. The journals related to social science are more in number (21.60 % of total journals), followed by health science (11.68 %), technology and engineering (11.26 %), earth and environmental science (7.62 %), language and literature (6.46 %), agriculture and food science (5.41 %), and business and economics (5.22 %), respectively as shown in Table 4.

4.1.4 Contribution by Agriculture and Food Science Literature

The Indian journals in DOAJ have contributed to different subject in agriculture and food sciences areas of agriculture general, animal sciences and plant sciences. The journals related to agriculture general are more in number (70 % of total journals), followed by animal sciences (20 %) and plant sciences (10 %) and respectively as shown in Table 5.

4.2 India's Contribution to Directory of Open Access Repositories

4.2.1 Number of Repositories–World Wide

India shares the 11th position in OpenDOAR in terms of number of repositories in the world, whereas it is second in UK after Germany. The top twelfth countries which have the maximum contribution to OpenDOAR in terms of number of repositories are listed in Table 6.

Table 4. Journals by subject

S. No.	Subject	No. of Journals (World)	Percentage	No. of journals(India)	Percentage
1.	Social Sciences	1268	21.60	12	4.93
2.	Health Sciences	684	11.68	119	48.98
3.	Technology and Engineering	662	11.26	47	19.34
4.	Earth and Environmental Sciences	448	7.62	06	2.46
5.	Languages and Literatures	380	6.46	03	1.23
6.	Agriculture and Food Sciences	318	5.41	10	4.11
7.	Business and Economics	307	5.22	04	1.67
8.	Biology and Life Sciences	293	4.98	13	5.34
9.	Law and Political Science	265	4.50	03	1.23
10.	Philosophy and Religion	218	3.70	00	0.00
11.	Mathematics and Statistics	212	3.60	02	0.82
12.	History and Archaeology	206	3.50	00	0.00

Table 5. Journals by agriculture and food science

S. No.	Subject	No. of journals (World)	Percentage	No. of journals (India)	Percentage
1.	Agriculture (General)	116	36.47	07	70.00
2.	Animal Sciences	84	26.41	02	20.00
3.	Plant Sciences	43	13.52	01	10.00
4.	Forestry	31	9.74	00	0.00
5.	Nutrition and Food Sciences	31	9.74	00	0.00
6.	Aquaculture and Fisheries	13	4.12	00	0.00
Total		318	100	10	100

Table 6. Top 12 India's position in OpenDOAR

Rank	Country	Repositories	Percentage (%)
1.	USA	383	21
2.	UK	185	10
3.	Germany	142	8
4.	Japan	129	7
5.	Spain	68	4
6.	Australia	64	3
7.	Italy	57	3
8.	France	56	3
9.	Africa	46	2.4
10.	Norway	42	2.2
11.	India	44	2.3
12.	Netherland	23	1.2

4.2.2 Subject-wise Contribution

The 68 per cent of India's repositories in OpenDOAR are subject specific and only 31 per cent are multidisciplinary. The subject specific repositories are mostly related to the science & technology rather than social sciences and humanities as show in Table 7.

4.2.3 Documents Archived in India's Repositories

Most of India's repositories in OpenDOAR archive a variety of information sources such as articles, conference papers, theses and many others whereas some repositories are document specific that is, archiving

Table 7. Repositories by subject

S. No.	Subject	Repository
1.	Multidisciplinary	19
2.	Physics and Astronomy	5
3.	Mathematics and Statistics	5
4.	Chemistry and Chemical Technology	5
5.	Technology General	5
6.	Health and Medicine	4
7.	General Science	3
8.	Biology and Biochemistry	3
9.	Agriculture, Food and Veterinary	3
10.	Library and Information Science	2
11.	Business and Economics	2
12.	Mechanical Engineering and Materials	2
13.	Arts and Humanities	1
14.	Management and Planning	1

only one type of document like theses. However, articles, conference papers, theses, and unpublished papers are archived by maximum number of repositories as revealed by Table 8.

4.2.4 Contribution to Agriculture, Food, and Veterinary Repository

The world repository in OpenDOAR has contributed to Agriculture, Food and Veterinary (2.53 %), and Indian repository (0.16 %) respectively.

Table 8. Document type

S. No.	Type of document	Repository	Percentage
1.	Articles	34	24.11
2.	Conference papers	22	15.60
3.	Theses	21	14.89
4.	Unpublished papers	15	10.63
5.	Learning objects	15	10.63
6.	Books	09	06.38
7.	Special	08	05.67
8.	Multimedia	08	05.67
9.	Patents	06	04.25
10.	References	03	02.12
Total		141	100

5. OPEN ACCESS RESOURCES AT A GLANCE

The following are the scholarly e-resources in the field of agricultural sciences and their allied subjects and listed according to the nature of the publications:

5.1 Journals

5.1.1 Full-text Journals

- Directory of Open Access Journals (DOAJ)
<http://www.doaj.org>
- African Journals On Line (AJOL)
<http://www.ajol.info>
- Bio line International
<http://www.bioline.org>
- Electronic Journals Library.
- High wire (Stanford University)
<http://highwire.stanford.edu>
- Scholarly Journals Distributed via World Wide Web (University of Houston Libraries)
<http://info.lib.uh.edu>
- British Library for Development Studies
<http://blids.ids.ac>
- Ideas at RePEc
<http://ideas.repec.org>

5.1.2 Freely Accessible Journals for Selected Developing Countries (some may require registration)

- Electronic Information for Libraries
<http://www.eifl.net>
- AGORA–Access to Global Online Research in Agriculture
<http://www.aginternetwork.org>
- HINARI–Health Inter Network Access to Research Initiative
<http://extranet.who.int>

- OARE–Online Access to Research in Environment
<http://www.springer.com>
- Highwire Press (Stanford University)
<http://highwire.stanford.edu>
- Oxford Journals - Developing Countries Offer
<http://www.oxfordjournals.org>
- Global Development Network (GDN)-Free Journal Access Portal
<http://www.gdnet.org>
- TEEAL-The Essential Electronic Agricultural Library
<http://www.teeal.org>

5.1.3 Directories/Indexes for Determining Publisher Open Access Status

- Index of Author-Archiving Status
<http://www.sherpa.ac>

5.2 Institutional Repositories

5.2.1 Full-text Open Access Repositories

- OpenDOAR
<http://www.openoar.org>
- OAlster
<http://oaister.umdl.umich.edu>
- ARC - A Cross Archive Search Service
<http://arc.cs.odu.edu>
- EPrints-UK project
<http://eprints-uk.rdn.ac.uk>
- Bielefeld Academic Search Engine (BASE)
<http://www.base-search.net>

5.2.2 Full-text Institutional Repositories Focusing on Development

- FAO Corporate Document Repository/FAO
<http://www.fao.org>
- Development Experience Database/US AID
<http://www.dec.org>
- World Bank 'Documents & Reports' Database
<http://www-wds.worldbank.org>
- Development Gateway/Development Gateway Fdn.
<http://www.developmentgateway.org>
- Eldis Gateway to Development Information/Inst of Dev Studies
<http://www.eldis.org>
- UN Best Practices Database
<http://www.bestpractices.org>
- Projects & Operations–World Bank
<http://www.worldbank.org>

5.2.3 Free Statistical Data Sources Focusing on Development Topics

- World Development Indicators (text display)
<http://www.worldbank.org>
- FAOSTAT Database/Food and Agriculture Organisation
<http://faostat.fao.org>
- LABORSTA Database/International Labor Organisation.
<http://laborsta.ilo.org>
- Creditor Reporting System/OECD & World Bank
<http://www.oecd.org>
- DAC Online/OECD
<http://www.oecd.org>
- UN Monthly Bulletin of Statistics/United Nations
<http://unstats.un.org>
- UNSTATS UN Common Database/United Nations
<http://unstats.un.org>

5.2.4 Free Citation Databases

- Online Journals Requiring Subscriptions/Global Development Network
<http://www.gdnet.org>
- JOLIS Library Catalog / World Bank/IMF
<http://jolis.worldbankimflib.org>
- Global Jolis Library Catalog/World Bank
<http://jolis.worldbankimflib.org>
- ERIC/US Department of Education [English, French, Spanish]
<http://www.eric.ed.gov>
- FAOBIB–FAO Library Catalog/Food and Agriculture Organisation
<http://www4.fao.org>
- Agricola/US Department of Agriculture
<http://agricola.nal.usda.gov>
- UNESBIB–UNESCO Documents Database
<http://unesdoc.unesco.org>
- PubMed
<http://www.ncbi.nlm.nih.gov>
- Popline
<http://db.jhuccp.org>
- Science Direct
<http://www.sciencedirect.com>
- UNBISnet/U.N. Dag Hammarskjöld Library
<http://unbisnet.un.org>
- Google Scholar
<http://www.google.com>

5.2.5 Open [free] Courseware

- MIT Open Courseware
<http://ocw.mit.edu>
- SOFIA–Sharing of Free Intellectual Assets
<http://sofia.fhda.edu>
- JHSPH Open Courseware
<http://ocw.jhsph.edu>
- Tufts Open Courseware
<http://ocw.tufts.edu>
- Utah State University Open Course Ware
<http://ocw.usu.edu>
- Open Learning Initiative at Carnegie Mellon
<http://www.cmu.edu>
- Information Management Resource Kit (FAO)
<http://www.fao.org>

5.3 Open Access Special Subject Collections

5.3.1 Agriculture

- AgNIC–Agriculture Network Information Center
<http://www.agnic.org>
- AGORA–Access to Global Online Research in Agriculture. UN/FAO
<http://www.aginternetwork.org/en>

5.3.2 Business and Economics

- IDEAS–Economics and Finance Research, University of Connecticut
<http://ideas.repec.org>

5.3.3 Education

- AERA Open Access Journals in Education.
<http://aera-cr.asu.edu>

5.3.4 Medical and Health Sciences

- BioMed Central
<http://www.biomedcentral.com>
- HINARI, WHO
<http://www.who.int/hinari/en>
- Philson Library guide to Open Access Journals and Working Papers
<http://www.library.auckland.ac>

5.3.5 Science

- ArXiv.org for physics. Cornell University Library
<http://arxiv.org>
- OARE – Research in the environment from UNEP/ Yale University
<http://www.oaresciences.org>

- National Science Digital Library (NSDL)–Resources for Science, Technology, Engineering, & Mathematics Education
<http://nsdl.org>.

6. CONCLUSIONS

India becomes an active contributor to global open access literature by establishing open access archives, institutional repositories, document-specific repositories, and subject-specific repositories, and by launching open access journals and converting subscription-based journals. The Indian journals in DOAJ have contributed to 10 journals related to agriculture and food sciences are more in number (4.11 % of total journals). The world repository in DOAR has contributed to 47 (2.53 %) repository in Agriculture, Food and Veterinary and Indian repository (0.16 %) only. Indian researchers are continuously contributing to open access literature as some of the premier institutions, particularly in the

science and technology area, are providing open access to their research publications.

REFERENCES

1. Devi, Purnima & Phuritsabam, Bobby. Open access: An overview. 6th Convention PLANNER, 6-7 November 2008, Nagaland University, Nagaland. INFLIBNET Centre, Ahmedabad, 2008.
2. Open access resources. http://units.sla.org/chapter/cdc/presentations/OAhandout_Apr_062006.doc (accessed on 1.2.2011).
3. Lund University Libraries. Directory of Open Access Journals. 2010. <http://www.doaj.org> (accessed on 1.2.2011).
4. University of Nottingham, UK. Directory of Open Access Repositories–OpenDOAR. 2010. <http://www.opendoar.org> (accessed on 1.2.2011).