Annals of Library and Information Studies
Vol. 58, March 2011, pp. 63-70

Ranking of Indian institutions in agriculture & allied sciences for their research output during 1999-2008

B. M. Gupta

Emeritus Scientist, National Institute of Science, Technology & Development Studies, New Delhi 110 012, Email: bmgupta1@gmail.com

Analyses the ranking of the India's productive institutions in agricultural sciences, based on the basis of various quantitative indicators, such as the total number of papers and international collaborative papers and qualitative indicators, such as the average number of citations per paper and h-index value, and also in terms of a new composite indicator, which combines quantitative and qualitative aspects. Many institutions changed their ranking positions, when their ranking based on mean citation rate and h-index was compared with their ranking based on the composite indicator. Concludes that the ranking based on composite indicator gives much better results than other indicators as it combines both quantity and quality aspects.

Introduction

India, being an agrarian society, has always regarded agriculture as the backbone of her economy. Time and again, the agriculture sector has highlighted its importance by contributing towards the overall growth of the whole nation.

The agricultural sector is important for food security, employment generation and economic growth. India is one of the largest agro-based economies. The agriculture and allied sector, like forestry, logging and fisheries accounted for 16.6 percent of the Gross Domestic Product (GDP), 14.7 percent to total Indian exports and employed 65 percent of the total workforce during 2007[1]. The agriculture sector although witnessed decline of its share in GDP from 36.4 percent in 1982-83 to 18.5 percent in 2006-07, but continue to remain the largest economic sector in India. Low and volatile growth rate plaguing agriculture is symptomatic of agrarian crisis in several parts of India countryside. Public investment in agriculture has also declined and this sector has not been able to attract private investment because of lower and unattractive returns. A well thought strategy for promoting agriculture growth is essential for alleviating and achieving food security at the national level.

During the past 60 years, agricultural education has expanded rapidly in India to meet the nation's demand for human resources and agricultural technology. India, predominantly an agricultural country, has significantly improved the well being of its people in recent decades. However, poverty remains India's most compelling challenge. With over half a century of development, agricultural education and research have been instrumental in ushering in a Green Revolution in the country.

The organized courses in agriculture education were started in the beginning of twentieth century when six agricultural colleges were established at Poona, Cawnpore (Kanpur), Sabour (Bihar), Nagpur, Lyallpur and Coimbatore with diploma programs. The Imperial (now Indian) Agricultural Research Institute was established in Pusa-Behar in 1905. It also offered two years of training in various disciplines of agriculture. Subsequently on the recommendation of the Royal Commission of Agriculture, Imperial Council of Agricultural Research was established in 1929.The degrees programs in agricultural education were started in early 1920s. The post graduate teaching in agriculture could however be organized only after 1930, when most post graduate colleges and institutions secured university recognition for imparting training at M.Sc and Ph.D level, Central institutes like the Indian Agricultural Research Institute and Indian Veterinary Research Institute, which were primarily developed as research institutions under Ministry of Food and Agriculture and which developed over the years certain

educational functions, however, continue to offer specialized post graduate courses in agriculture and animal sciences, respectively, leading to award of diplomas and certificates. The National Dairy Research Institute at Karnal and with a second campus at Bangalore, also has been offering post graduate training facilties[2-5].

After India attained independence in 1947, there were 17 institutes of higher education offering higher education in agriculture. Agriculture education in India until the late fifties was organized after the British model. The need to bring about a rapid increase in food production in the beginning of post independence India necessitated the re-examination of the existing pattern of agricultural research, teaching and development.

The role of agriculture research and education for the progress of agriculture has been realized better than ever before in the context of "New Agricultural Strategy" launched by the then Union Minister of Food and Agriculture. The task of organization, support and coordination of agricultural research and education received urgent and compelling attention to ensure maximum efficiency. As a result, after the reorganization of Indian Council of Agricultural Research (ICAR), a new Department of Agriculture Research and Education (DARE) was created in the Ministry in 1965 which was made responsible for addressing agricultural research and education needs of the country. The DARE discharges this responsibility through Indian Council of Agricultural Research (ICAR), apex and autonomous organization for agricultural research and education. The DARE has an extensive network comprising 48 central research institutes, 5 national bureaus, 12 project directorates, 32 national research centers and 62 all India coordinated projects[6].

The ICAR become responsible for planning, development, coordination and quality assurance in the higher agricultural education in the country. The ICAR[7] is (i) providing quality insurance through policy support, accreditation, academic regulation, personnel policies, review of course curricula and delivery systems, development support for creating/strengthening infrastructure and facilities, improvement of faculty competence and admission of students through an all India competition; (ii) enhancing performance and visibilities of these agricultural universities by augmenting their strategic strength in the specific niche areas of research and education, facilitating experimental learning towards imparting and appropriate blend of knowledge, skill and attitude of students and fostering need based partnership and linkages, (iii) promoting excellence and expertise in education and research at national level by creating chairs/positions through National Professor, National Fellow and Emeritus Scientist schemes and by providing incentives and rewards through scholarship and fellowships to students and best teacher awards; and (iv) Facilitating capacity building of National Agricultural Research System (NARS) and fostering national linkages for capacity building.

At present 49 renowned university level institutions and more than 200 colleges offer various courses in agriculture and allied subjects. India has a very strong agricultural education system in the country consisting of one Central Agricultural University, forty-five State Agricultural Universities (SAUs) and four National Institutes of Indian Council of Agricultural Research having the status of Deemed to be University. Among the Deemed Universities, Indian Agricultural Research Institute (IARI) was established a century ago and was given the status of Deemed University in 1958. The other Deemed Universities viz., Indian Veterinary Research Institute (IVRI), Izatnagar (U.P.), National Dairy Research Institute (NDRI), Karnal and Central Institute of Fisheries Education (CIFE), Mumbai cater to quality education in animal sciences, dairy & fishery sectors respectively. The SAUs are spread over the entire country and cater to HRD in agriculture and allied fields in different agro-climatic regions. In addition to this, there are large number of private colleges both affiliated and non-affiliated to SAUs which also annually admit larger number of students. Many general universities also offer agricultural education either themselves or through affiliated colleges. Agricultural education is a broad term which includes disciplines of Agriculture (Agronomy), Veterinary Science, Forestry, Fisheries, Horticulture, Home Science, etc. These state agricultural universities enroll on annual basis more than 15,000 students at UG level in as many as 11 disciplines and over 7,000 students at PG and 1700 at PhD level. At any point, there are over 75,000 students studying in SAUs[8].

These agricultural universities are major partners in

the growth and development of agricultural research and education under the national agricultural research system.These agricultural universities are responsible for research, training and dissemination of agriculture related information in the State. They generate new technologies to increase production, provide degree and certificate programmes in agriculture and help in the transfer of technology by participating in farmer training classes organised by local agricultural bodies. The state agricultural universities carry out research programmes to tackle location specific problems of different agro-climatic zones. The research programmes and activities are constantly and critically reviewed and the research activities are mainly focused on thrust areas identified. Research, to constantly improve and generate technologies for increasing production in agriculture, animal husbandry, home science and allied sectors is one of the major mandates of these universities

All the agricultural universities formed an Indian Agricultural Universities Association (IAUA), with the primarily aim of promoting agricultural research and education in the country. IAUA holds annual convention and also brings out a journal in order to exchange and promote ideas. At present, under-graduate programs are offered in eleven major disciplines such as Agriculture, Horticulture, Fisheries, Forestry, Home Science, Sericulture, Agricultural Engineering, Dairy Technology, Food Science & Technology, Agricultural Marketing, Banking & Cooperation, and Veterinary Science. At post-graduate level programs are offered in as many as 65 different disciplines. All Universities also offer Ph.D. programs in these subjects.

Very few Indian agricultural universities and other educational institutions make it to the several international ranking schemes, which are complex evaluation exercises involving both quantitative and qualitative parameters[9-12]. In the present communication, an analysis is presented for ranking of Indian institutions involved in agriculture and allied sciences based on quantum of research output and quality of research using data from SCOPUS database (http://www.scopus.com). This study uses evaluation parameters similar to the ones used by the authors in earlier studies published in 2009[13-14].

Objective of the study

The chief objective of the study is to analyse the performance ranking of education and research institutions in agriculture and allied sciences in India during 1998-2008 based on their research output and using different quantitative and qualitative indicators.

Methodology

The study uses the 10 years publication data (1999-2008) of leading institutions of India in the field of agricultural sciences, retrieved from the international bibliographical multidisciplinary SCOPUS database. A total of 32 institutions with comparatively high output in publications during a ten-year period from 1999-2008 were identified. Citations received by the papers (P) are considered for the first three-years from the date of their publications, which allows the average number of citations per paper (C/P) to be computed for each of 32 institutions. H-Index for these 32 institutions for the same period (i.e. 1999-2008) was determined from the Scopus bibliographical database. Similarly, the number of papers, which resulted from total international collaborative papers (TICP) was also derived from the Scopus database using a formulated search strategy and from this the percentage share of international collaborative papers (TICP Share) in total papers of the 32 institutes could be determined. There are several ranking methods used here for comparison. We have based our ranking based on quantitative parameters (the number of raw count of papers (P), qualitative parameters (mean citation rate (C/P)), and a combination of both quantitative and qualitative parameters (h-index and p-index). Prathap suggested the possible use of p-index[13-14] for ranking institutions, which combines both quantitative and qualitative parameters. According to him p-index can be defined as $(C^2/P)^{(1/3)}$, where P stands for papers and C for citations.

Analysis

A total of 32 institutions with research output of 80 and above publications during 1999-2008 were identified as productive institutions. These institutions together contribute 16713 papers in agricultural sciences during this period. A total 17679 citations were received by these 16713 papers published from these 32 institutions during 1999-2008, with an average of 1.06 citations per paper. Considering the share of international collaborative research output,

these 32 institutions together contributes 8.66 percent share (1447 papers) in the total output of India in agricultural sciences during 1999-2008. The average h-index of these 32 institutions was 11.94.

Table 1 presents publications profile of top 32 most

Table 1—Top 32 Institutions in agricultural and allied sciences based on papers published during 1998-2008

S.No.	Name	P	C	C/P	ICP	%ICP	H-Index	p-Index
1	Indian Veterinary Research Institute, Bareilly	2016	2381	1.18	113	5.61	20	14.11
2	Indian Agricultural Research Institute, New Delhi	2008	3652	1.82	253	12.6	31	18.80
3	Punjab Agricultural University, Ludhiana	1772	1669	0.94	194	10.95	24	11.63
4	CCS Haryana Agricultural University, Hisar	1367	1461	1.07	174	12.73	24	11.60
5	G.B.Pant Agricultural University of Technology, Pantnagar	1170	943	0.81	91	7.78	15	9.13
6	Tamil Nadu Agricultural University, Coimbatore	977	1271	1.3	128	13.1	22	11.82
7	Tamil Nadu Veterinary & Animal Science University, Chennai	883	465	0.53	18	2.04	13	6.26
8	University of Agricultural Sciences, Bangalore	718	1259	1.75	140	19.5	23	13.02
9	National Dairy Research Institute, Karnal	680	950	1.4	48	7.06	16	10.99
10	Assam Agricultural University, Jorhat	521	194	0.37	5	0.96	9	4.16
11	Acharya N.G.Ranga Agricultural University, Hyerabad	420	206	0.49	12	2.86	10	4.66
12	Rajasthan Agricultural University, Bikaner	372	175	0.47	3	0.81	8	4.35
13	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni and Solan	308	139	0.45	8	2.6	7	3.97
14	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur	303	295	0.97	5	1.65	15	6.60
15	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu	276	110	0.4	15	5.43	8	3.53
16	Kerala Agricultural University	257	175	0.68	49	19.07	9	4.92
17	Mahrana Pratap University of Agriculture & Technology, Udaipur	251	149	0.59	11	4.38	8	4.46
18	Orissa University of Agriculture & Technology	245	95	0.39	3	1.22	7	3.33
19	West Bengal University of Animal and Fishery Sciences	241	171	0.71	20	8.3	7	4.95
20	Bidhan Chandra Krishi Viswavidyalaya	237	209	0.88	18	7.59	11	5.69
21	University of Agricultural Sciences, Dharwad	225	130	0.58	22	9.78	8	4.22
22	Institute of Agricultural Science, BHU, Varanasi	188	390	2.07	21	11.17	14	9.32
23	Anand Agricultural University	181	129	0.71	10	5.52	8	4.51
24	Indira Gandhi Krishi Vishwavidyalaya	163	193	1.18	19	11.66	11	6.11
25	Narendra Dev University of Agriculture & Technology	150	73	0.49	2	1.33	10	3.29
26	Rajendra Agricultural University	143	81	0.57	6	4.2	6	3.58
27	Guru Angad Dev Veterinary and Animal Sciences University	127	12	0.09	8	6.3	3	1.04
28	Birsa Agricultural University	126	73	0.58	12	9.52	6	3.48
29	Central Institute of Fishery Education, Mumbai	115	240	2.09	16	13.91	10	7.94
30	Allahabad Agricultural Institute	96	256	2.67	3	3.12	8	8.81
31	Chandra Shekhar Azad University of Agriculture & Technology	93	25	0.27	10	10.75	3	1.89
32	Forest Research Institute, Dehradun	84	108	1.28	10	11.9	8	5.18
		16713	17679	1.06	1447	8.66	11.94	

productive Indian institutions in agricultural sciences during 1999-2008. It provides data on their publications output (P), citations (C) received by these publications on a three years citations window, average citations per paper (C/P), h-index value, p-index value, and the number (TICP) and share (percent TICP) of international collaborative papers.

Although there are several ways of ranking as suggested in the literature, but we present here ranking of agricultural science institutions according to quantitative indicators, such as the total number of papers, qualitative indicators, such as the average number of citations per paper, and composite indicators which combines quantity and quality aspects, such as h-index value and p-index. The various possibilities of ranking these institutions using the three indications mentioned above are presented in Table 2.

On ranking the top 32 institutions in agricultural sciences based on performance index value of p, we find that the Indian Agricultural Research Institute, New Delhi tops the list with p value of 18.80, followed by Indian Veterinary Research Institute, Izatnagar (14.11), University of Agricultural Sciences, Bangalore (13.02), Tamil Nadu Agricultural University, Coimbatore (11.82), Punjab Agricultural University, Ludhiana (11.63), CCS Haryana

Table 2—Top 32 institutions in agricultural and allied sciences ranked using various schemes

S. No.	Ranking according to C/P	Ranking according to H-Index	Ranking according to p-Index
1	Allahabad Agricultural Institute (2.67)	Indian Agricultural Research Institute, New Delhi (31)	Indian Agricultural Research Institute, New Delhi (18.80)
2	Central Institute of Fishery Education, Mumbai (2.09)	Punjab Agricultural University, Ludhiana (24)	Indian Veterinary Research Institute, Bareilly (14.11)
3	Institute of Agricultural Science, BHU, Varanasi(2.07)	CCS Haryana Agricultural University, Hisar (24)	University of Agricultural Sciences, Bangalore (13.02)
4	Indian Agricultural Research Institute, New Delhi (1.82)	University of Agricultural Sciences, Bangalore (23)	Tamil Nadu Agricultural University, Coimbatore (11.82)
5	University of Agricultural Sciences, Bangalore (1.75)	Tamil Nadu Agricultural University, Coimbatore (22)	Punjab Agricultural University, Ludhiana (11.63)
6	National Dairy Research Institute, Karnal (1.4)	Indian Veterinary Research Institute, Bareilly (20)	CCS Haryana Agricultural University, Hisar (11.60)
7	Tamil Nadu Agricultural University, Coimbatore (1.3)	National Dairy Research Institute, Karnal (16)	National Dairy Research Institute, Karnal (10.99)
8	Forest Research Institute, Dehradun (1.28)	G.B.Pant Agricultural University of Technology, Pantnagar (15)	Institute of Agricultural Science, BHU, Varanasi (9.32)
9	Indian Veterinary Research Institute, Bareilly (1.18)	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur (15)	G.B.Pant Agricultural University of Technology, Pantnagar (9.13)
10	Indira Gandhi Krishi Vishwavidyalaya (1.18)	Institute of Agricultural Science, BHU, Varanasi	Allahabad Agricultural Institute (8.81)
11	CCS Haryana Agricultural University, Hisar (1.07)	Tamil Nadu Veterinary & Animal Science University, Chennai (13)	Central Institute of Fishery Education, Mumbai (7.94)
12	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur (0.97)	Bidhan Chandra Krishi Viswavidyalaya (11)	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur (6.60)
13	Punjab Agricultural University, Ludhiana (0.94)	Indira Gandhi Krishi Vishwavidyalaya (11)	Tamil Nadu Veterinary & Animal Science University, Chennai (6.26)
14	Bidhan Chandra Krishi Viswavidyalaya (0.88)	Acharya N.G.Ranga Agricultural University, Hyerabad (10)	Indira Gandhi Krishi Vishwavidyalaya (6.11)
15	G.B.Pant Agricultural University of Technology, Pantnagar (0.81)	Narendra Dev University of Agriculture & Technology (10)	Bidhan Chandra Krishi Viswavidyalaya (5.69)

Contd—

Table 2—Top 32 institutions in agricultural and allied sciences ranked using various schemes

—Contd

16	West Bengal University of Animal and Fishery Sciences (0.71)	Central Institute of Fishery Education, Mumbai (10)	Forest Research Institute, Dehradun (5.18)
17	Anand Agricultural University (0.71)	Assam Agricultural University, Jorhat (9)	West Bengal University of Animal and Fishery Sciences (4.95)
18	Kerala Agricultural University (0.68)	Kerala Agricultural University (9)	Kerala Agricultural University (4.92)
19	Mahrana Pratap University of Agriculture & Technology, Udaipur (0.59)	**Rajasthan Agricultural University, Bikaner (8)**	Acharya N.G.Ranga Agricultural University, Hyerabad (4.66)
20	University of Agricultural Sciences, Dharwad (0.58)	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (8)	Anand Agricultural University (4.51)
21	Birsa Agricultural University (0.58)	Mahrana Pratap University of Agriculture & Technology, Udaipur (8)	Maharana Pratap University of Agriculture & Technology, Udaipur (4.46)
22	Rajendra Agricultural University (0.57)	University of Agricultural Sciences, Dharwad (8)	**Rajasthan Agricultural University, Bikaner (4.35)**
23	Tamil Nadu Veterinary & Animal Science University, Chennai (0.53)	Anand Agricultural University (8)	University of Agricultural Sciences, Dharwad (4.22)
24	Acharya N.G.Ranga Agricultural University, Hyerabad (0.49)	Allahabad Agricultural Institute	Asssam Agricultural University, Jorhat (4.16)
25	Narendra Dev University of Agriculture & Technology (0.49)	Forest Research Institute, Dehradun (8)	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni and Solan (3.97)
26	Rajasthan Agricultural University, Bikaner (0.47)	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni and Solan (7)	**Rajendra Agricultural University (3.58)**
27	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni and Solan (0.45)	Orissa University of Agriculture & Technology (7)	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (3.53)
28	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (0.4)	West Bengal University of Animal and Fishery Sciences (7)	Birsa Agricultural University (3.48)
29	Orissa University of Agriculture & Technology (0.39)	Rajendra Agricultural University (6)	Orissa University of Agriculture & Technology (3.33)
30	Assam Agricultural University, Jorhat (0.37)	Birsa Agricultural University (6)	Narendra Dev University of Agriculture & Technology (3.29)
31	Chandra Shekhar Azad University of Agriculture & Technology (0.27)	Guru Angad Dev Veterinary and Animal Sciences University (3)	Chandra Shekhar Azad University of Agriculture & Technology (1.89)
32	Guru Angad Dev Veterinary and Animal Sciences University (0.09)	Chandra Shekhar Azad University of Agriculture & Technology (3)	Guru Angad Dev Veterinary and Animal Sciences University (1.04)

Agricultural University, Hisar (11.60), National Dairy Research Institute, Karnal (10.99), Institute of Agricultural Science, BHU, Varanasi (9.32), G.B.Pant Agricultural University of Technology, Pantnagar (9.13), Allahabad Agricultural Institute, Allahabad (8.81), Central Institute of Fishery Education, Mumbai (7.94), Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur (6.60), Tamil Nadu Veterinary & Animal Science University, Chennai (6.26), Indira Gandhi Krishi

Vishwavidyalaya, Raipur (6.11), Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (5.69), Forest Research Institute, Dehradun (5.18), West Bengal University of Animal and Fishery Sciences, Kolkata (4.95), Kerala Agricultural University, Thrissur (4.92), Acharya N.G.Ranga Agricultural University, Hyderabad (4.66), Anand Agricultural University, Anand (4.51), Maharana Pratap University of Agriculture & Technology, Udaipur (4.46), Rajasthan Agricultural University, Bikaner (4.35), University of Agricultural Sciences, Dharwad (4.22), Asssm Agricultural University, Jorhat (4.16), Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni and Solan (3.97), Rajendra Agricultural University, Samstipur (3.58), Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (3.53), Birsa Agricultural University, Ranchi (3.48), Orissa University of Agriculture & Technology, Bhubaneswar (3.33), Narendra Dev University of Agriculture & Technology, Faizabad (3.29), Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (1.89) and Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (1.04)

On comparing the performance of top 32 institutions on the basis of p-value and with those based on other parameters, it was observed that many institutions witnessed a major shift/change in their ranking position

Some of the institutions, which have improved their positions are as follows: (i) Indian Agricultural Research Institute, New Delhi holds 1st rank in performance index (p), in spite of 4th rank in average citation per paper, 1st rank in h-index value and 2nd rank in terms of number of publication (P); (ii) University of Agricultural Sciences, Bangalore holds 3rd rank in performance index (p), in spite of 5th rank in average citation per paper, 4th rank in h-index value and 8th rank in terms of number of publication (P); (iii) Tamil Nadu Agricultural University, Coimbatore holds 4th rank in performance index (p), in spite of 7th rank in average citation per paper, 5th rank in h-index value and 6th rank in terms of number of publication (P); (iv) Institute of Agricultural Sciences, BHU, Varanasi holds 8th rank in performance index (p), in spite of 3d rank in average citation per paper, 10th rank in h-index value and 22th rank in terms of number of publication (P); (v) Allahabad Agricultural Institute holds 10th rank in terms of performance index (p), in spite of 1st rank in average citation per paper, 24th rank as per h-index value (21) and 30th rank in terms of number of publication (P); (vi) Central Institute of Fishery Education, Bombay holds 11th rank in performance index (p), in spite of 2nd rank in average citation per paper, 16th rank as per h-index value and 29th rank in terms of number of publication (P);(vii) Indira Gandhi Krishi Vishvidalaya holds 14th rank in terms of performance index (p), in spite of 10th rank in average citation per paper, 13th rank as per h-index value (21) and 24th rank in terms of number of publication (P) (viii) Forest Research Institute, Dehradun holds 16th rank in performance index (p), in spite of 8th rank in average citation per paper, 25th rank as per h-index value and 32th rank in terms of number of publication (P) and (ix) West Bengal University of Animal & Fishery Science holds 17th rank in performance index (p), in spite of 16th rank in average citation per paper, 28th rank as per h-index value and 19th rank in terms of number of publication (P).

Some of the institutions which have lost their position in ranking in terms of performance index are as follows: (i) Punjab Agricultural University, Ludhiana holds 5th rank in performance index (p), in spite of 13th rank in average citation per paper, 2nd rank in h-index value and 3rd rank in terms of number of publication (P); (ii) CCS Haryana Agricultural University, Hisar holds 6th rank in performance index (p), in spite of 11th rank in average citation per paper, 3rd rank in h-index value and 4th rank in terms of number of publication (P); (iii) GB Pant Agricultural University, Pantnagar holds 9th rank in performance index (p), in spite of 15th rank in average citation per paper, 8th rank in h-index value and 5th rank in terms of number of publication (P); (iv) Tamil Nadu Veterinary & Animal Science University holds 13th rank in performance index (p), in spite of 23rd rank in average citation per paper, 11th rank in h-index value and 7th rank in terms of number of publication (P); (v) Assam Agricultural University holds 24th rank in terms of performance index (p), in spite of 30th rank in average citation per paper, 17th rank as per h-index value (21) and 10th rank in terms of number of publication (P); (vi) Dr YSR University of Horticulture & Forestry, Nauni holds 25th rank in performance index (p), in spite of 27th rank in average citation per paper, 26th rank as per h-index value and 13th rank in terms of number of publication (P); (vii)

Acharya NG Ranga Agricultural University, Hyderabad holds 19th rank in performance index (p), in spite of 24th rank in average citation per paper, 14th rank as per h-index value and 11th rank in terms of number of publication (P) and (viii) Sher-e-Kashmir University of Agricultural Sciences holds 27th rank in performance index (p), in spite of 28th rank in average citation per paper, 20th rank as per h-index value and 15th rank in terms of number of publication (P).

Conclusion

Although there are several ranking methods used in literature for comparison, the present study based the ranking on composite indicator, which combines quantity and quality. On comparing the ranking of Indian institutions based on mean citation rate and h-index with the ranking based on the composite indicator, it was observed that many institutions changed their position. Concludes that the ranking based on composite indicator gives much better results than other indicators as it combines both quantity and quality aspects.

References

1. Agriculture in India. http://en.wikipedia.org/wiki/Agriculture_in_India
2. Randhawa M S, Agricultural universities in India – Progress and problems. Available at: http:/pdf.usaid.gov/pdf_docs /PNABJ266.pdf (Accessed on 15 July 2010)
3. Rae R and Parker F W, India: university and post-graduate agricultural education and research. Paris; Unesco. November 1966 (WS/1166.97-APS). http://unesdoc.unesco. org/images/0000/000079/007971eb.pdf
4. Sinha S K, Education for agriculture in India: Time for change, *Current Science,* 79 (3) (2000) 302-10.
5. Tyagi N I, Transforming agricultural education and research. Institutions for better future: some thoughts http://www.hillagric.ernet.in/hr/vip_lectures/pdf_files/Lecture_Dr.N.K.Tyagi,Member,ASRB%20_21-5-09.pdf (Accessed on 15 July 2010)
6. http://dare.nic.in?agri_ed.htm
7. http://www.icar.org.in/agricultural_education.htm
8. Bechelor of Science in Agriculture. http://en.wikipedia.org/ wiki/Bachelor_of_Science_in_Agriculture
9. Balaram P, The Shanghai rankings, *Current Science*, 86 (10) (2004) 1347-48.
10. http://www.armu.org/
11. Prathap G, Hirsch type indices for ranking institutions scientific research output, *Current Science*, 91 (11) (2006) 1439.
12. Virk H S, Shanghai rankings and Indian universities, *Current Science*, 87 (2004) 416.
13. Prathap G and Gupta B M, Ranking of Indian engineering and technological institutes for their research performance during 1999-2008, *Current Science*, 97 (3) (2009) 304-06.
14. Prathap G and Gupta B M, Ranking of Indian universities for their research output and quality using a new performance index, *Current Science*, 97 (6) (2009) 751-52.