Research Article

Indian Journal of Extension Education
Vol. 59, No. 1 (January–March), 2023, (32-36)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Assessing Research Productivity of Agricultural Scientists of Professor Jayashankar Telangana State Agricultural University

Apoorva Veldandi[1]*, Madhu Babu K.[2], V. Ravinder Naik[3] and G. E. CH Vidya Sagar[4]

[1]PhD Research Scholar, ICAR-National Dairy Research Institute, Karnal, Haryana, India
[2]Professor & Head, [3]Associate Professor, Department of Agricultural Extension, Professor Jayashankar Telangana State Agricultural University, Hyderabad, India
[4]Professor, Department of Agronomy, Professor Jayashankar Telangana State Agricultural University, Hyderabad, India
*Corresponding author email id: veldandiapoorva4@gmail.com

ARTICLE INFO

Keywords: Research productivity, Agricultural scientists, Publication behaviour

http://doi.org/10.48165/IJEE.2023.59107

Conflict of Interest: None

ABSTRACT

Productivity is the quintessential indicator of efficiency in any system. Research productivity is the work outcome of the scientists in the area of research in a given period of time. The present study was conducted to assess the level of research productivity among the agricultural scientists of PJTSAU in the year 2021. A sample of 120 agricultural scientists including Scientists, Senior Scientists and Principal Scientists with a minimum of 3 years of experience in research after 2014, when the university PJTSAU was formed due to bifurcation of the state, were selected for the study purposively. An index to compute research productivity was developed with six indicators- Publication behaviour, Research activities undertaken, Research guidance and Mentoring, Awards and Recognition, Technologies/Knowledge generated and Intellectual Property Rights generated and was standardized by testing its validity and reliability. The majority of agricultural scientists had medium research productivity (47.5%) followed by very low (15.83%), low (15.00%), high (15.00%) and very high (6.67%). The lowest research productivity index score was 0.11 while highest was 0.88 which indicates that there is a scope to increase productivity among the agricultural scientists with low research productivity.

INTRODUCTION

In the current scenario of ever changing climatic conditions, agricultural productivity is the one getting most affected. In our country, 54.6 per cent of the total workforce depends on agriculture and allied sectors. The agriculture and allied sectors account for 17.8 per cent of the total Gross Value Added of the country. Almost 42.4 per cent of the country's geographical area is net sown area with a cropping intensity of 143.6 per cent (Annual Report, 2020-21, DAC&FW). Yet, there is a huge starving population in the country along with malnourished people. This emphasizes the need to strengthen research systems concerned with agriculture which help in increasing the agricultural productivity. National Agricultural Research System is one of the largest research systems in the world, which works in close association with education and extension systems. It aims at increasing agricultural production and productivity in the country while maintaining sustainability. The research system includes about 30,000 scientists engaged in research.

Devi (2013) revealed that among teachers, 16.98 per cent had high scientific productivity in research, whereas among researchers, most of them (41.90%) had medium scientific productivity in research. Santhosh and Vaishali (2019) revealed that the journal articles (90.93%) were the most published form of literature followed while Journal of Agrometeorology (31.09%) was the most productive journal followed by Communications in Soil Science and Plant Analysis (27.43%) and other journals and agriculture (45.00%) was the most productive research area followed by plant

Received 22-11-2022; Accepted 09-12-2022

sciences (16%), meteorology atmospheric sciences (11%) and other disciplines at ICAR-CRIDA-Central Research Institute for Dryland Agriculture. Bellagi et al., (2020) revealed that achievement motivation, job stress and training received were predicted to account for more variation in the role performance of scientists. Borah (2020) found communication followed by leadership team work and physical facilities were the most important dimensions of organizational climate. Ramkumar (2020) stated that among Sanskrit universities in India, universities in India, universities with single-campus had a higher per-capita productivity compared to those with multi-campus and guides who offered guidance on more than one topic were 2-3 times more productive than those who offered guidance on one topic. Jayasingh et al., (2022) found lack of enough teaching staff, duty related workload, insufficient staff quarters and shortage of lands for research and practical classes were the main factors hampering the job satisfaction of scientists and majority of them had medium level of job satisfaction. Tripathi et al., (2022) pointed out educational qualification and job experience were positively correlated to the occupational stress of teachers and the gap between role expectation and role performance mainly depended on the opportunity to earn money, wealth and property followed by delegation of authority. Haqyar et al., (2022) stated that most of the faculty members of State Agricultural Universities had computer/laptop, internet, e-mail and mobile phone/telephone facilities available at the department/ workplace. Research in the state of Telangana is being conducted through the State Agricultural University, Professor Jayashankar Telangana State Agricultural University (PJTSAU). Hence, the present study was conducted aiming at assessing the level of research productivity among agricultural scientists of PJTSAU, for further improvement in the research output from the University.

METHODOLOGY

The state of Telangana was selected for the study purposively as esteemed agricultural and rural development institutes like International Crops Research institute for the Semi-Arid Tropics (ICRISAT), National Institute for Rural Development and Panchayati Raj (NIRD & PR), National Institute for Agricultural Extension Management (MANAGE) and National Academy of Agricultural Research Management (NAARM) are present in this state. Research in this state is conducted at agro-climatic zone and local level, aimed at fulfilling the needs of farming community and solving the location-specific problems. The only university in the state, Professor Jayashankar Telangana State Agricultural University (PJTSAU) was selected for current investigation. The university has ranked 10th (Agricultural Education Portal-ICAR) among all the agricultural universities in India.

All the three zones in the state of Telangana were purposively selected for the investigation as the research activities are planned by preparing thematic programmes at each agro-climatic zone and local level. Twenty Seven All India Coordinated Research Project (AICRP) centers, two All India Network Project centers and seven schemes of Government of India are under operation in the three agro-climatic zones of the state. The three zones of the state are- Northern Telangana Zone, Central Telangana Zone and Southern Telangana Zone. The thirty six research stations under all the zones were selected for the study. A sample of 120 respondents was purposively selected for the study. Agricultural scientists with a minimum of three years of experience in research were selected for the study. An agricultural scientist is operationally defined as the one who conducts research on farmers, crops, soil, pests, and diseases etc., either at Agricultural Research Stations (ARS) or Regional Agricultural Research Stations (RARS) and has a minimum of three years of experience in research.

Questionnaire was developed online using Google forms and mailed to the respondents. Google forms were communicated through WhatsApp also. Telephonic interviews were conducted with some of the respondents. Interview schedule was developed and some of the respondents were interviewed personally. Research productivity is the work outcome of the scientists in the area of research in a given period of time. A number of indices have been used so far to assess research productivity like, h-index (Hirsch, 2005), g-index (Egghe, 2006), AR-index (Jin, 2007), RP-index and CP-index (Altmann et al., 2009) etc. In the present study the Research Productivity was operationalized as the work outcome of agricultural scientists with a minimum of three years of experience in research, in the form of publications, research projects undertaken, technologies developed, knowledge generated, research guidance offered, awards received, recognition achieved and Intellectual Property Rights (IPR) generated.

An index was developed to measure Research Productivity with six indicators- publication behaviour, research activities undertaken, research guidance and mentoring, awards and recognition, technologies/knowledge generated, intellectual property rights generated and standardized by testing its validity and reliability. Arithmetic mean, frequency, percentage, range, class interval, etc. were the statistical tools used in the study.

RESULTS AND DISCUSSION

The research productivity was computed under six indicators- Publication behaviour, Research activities undertaken, Research guidance and Mentoring, Awards and Recognition, Technologies/ Knowledge generated and Intellectual Property Rights generated.

Majority of agricultural scientists had ‘medium’ publication behaviour (50.84%) which might be due to the higher publication costs, inadequate publication skills among the agricultural scientists and lack of rule as such to publish a certain number of articles per year in the university. The publication behaviour was studied under 5 sub-indicators: number of publications, bibliometric parameters, frequency of publications, publication skills and reading behaviour. Majority of agricultural scientists have made ‘low’ number of publications (61.67%) which might be due to the higher publication costs, inadequate publication skills among the agricultural scientists and lack of rule as such to publish a certain number of articles per year in the university. Bibliometric parameters were measured in terms of h-index, Research Gate score, Research Gate citations, Research Gate reads and Google scholar citations. Majority of agricultural scientists had h-index ranging from 1-4 (70.84%) followed by 5-8 (25.00%) and 9-12 (4.16%). Majority of agricultural scientists had Research Gate score ranging from 1-9.2 (72.50%) followed by 9.3-18.5 (25.84%) and 18.6-27.8 (1.66%). Majority of agricultural scientists had

Table 2. Various indicators and sub-indicators used to measure research productivity

S.No.	Indicators & Sub-indicators	Class interval	Normalized score	Percentage
1.	Publication behaviour			
	Low	53-203	0-0.32	30.83
	Medium	204-354	0.33-0.66	50.84
	High	355-505	0.67-1	18.33
	a) Number of publications			
	Low	0-34	0-0.32	61.67
	Medium	35-69	0.33-0.66	34.16
	High	70-104	0.67-1	4.17
	b) Bibliometric parameters			
	i) h-index			
	0-4	0-4	0-0.33	70.84
	5-8	5-8	0.34-0.66	25.00
	9-12	9-12	0.67-1	4.16
	ii) Research Gate Score			
	1-9.2	1-9.2	0-0.33	72.50
	9.3-18.5	9.3-18.5	0.34-0.66	25.84
	18.6-27.8	18.6-27.8	0.67-1	1.66
	iii) Research Gate Citations			
	1-149	1-149	0-0.29	89.17
	150-299	150-299	0.30-0.59	7.50
	300-499	300-499	0.6-1	3.33
	iv) Research Gate Reads			
	1-34819	1-34819	0-0.33	96.67
	34820-69639	3480-69639	0.34-0.66	1.66
	69640-104458	69640-104458	0.67-1	1.67
	v) Google Scholar citations			
	1-447	1-447	0-0.33	93.34
	448-895	448-895	0.34-0.66	5.83
	896-1342	896-1342	0.67-1	0.83
	c) Frequency of publications			
	Weekly	42	0.09	5.00
	Monthly	18	0.04	2.50
	Quarterly	140	0.29	23.30
	Half yearly	148	0.31	30.80
	Annually	114	0.24	31.70
	Bi annually	12	0.025	5.00
	Once in 5 years	2	0.005	1.70
	d) Publication skills			
	Low	32-38	0-0.73	6.67
	Medium	39-45	0.74-0.86	70.83
	High	46-52	0.87-1	22.50
	e) Reading behaviour			
	Low	5-6	0-0.60	43.33
	Medium	7-8	0.61-0.80	50.84
	High	9-10	0.81-1	5.83
2.	Research activities undertaken			
	Low	1-39	0-0.32	27.50
	Medium	40-79	0.33-0.66	44.17
	High	80-119	0.67-1	28.33
3.	Technologies/Knowledge generated			
	Low	1-9	0-0.32	26.67
	Medium	10-19	0.33-0.66	52.50
	High	20-29	0.67-1	20.83
4.	Research guidance and mentoring			
	Low	1-25	0-0.32	28.33
	Medium	26-51	0.33-0.66	41.67
	High	52-77	0.67-1	30.00

Table 2 contd...

S.No.	Indicators & Sub-indicators	Class interval	Normalized score	Percentage
5.	Awards and Recognition			
	Low	1-7	0-0.32	79.17
	Medium	8-15	0.33-0.66	12.50
	High	16-23	0.67-1	8.33
6.	Intellectual Property Rights generated			
	Low	0-3	0-0.32	96.60
	Medium	4-7	0.33-0.66	1.70
	High	7-10	0.67-1	1.70

Research Gate citations ranging from 1-149 (89.17%) followed by 150-299 (7.50%) and 300-449 (3.33%). Majority of agricultural scientists had Research Gate reads ranging from 1-34819 (96.67%) followed by 34820-69639 (1.66%) and 69640-104458 (1.67%). Further, agricultural scientists had Google Scholar citations ranging from 1-447 (93.34%) followed by 448-895 (5.83%) and 896-1342 (0.83%).

Majority of agricultural scientists made publications 'annually' (31.70%) which might be due to publishing articles only from the research projects working on and not on the other topics of contemporary relevance. Majority of agricultural scientists had 'medium' publication skills (70.83%) which might be due to inadequate training given to agricultural scientists on up scaling of reading, drafting, analytical and publication skills. Majority of agricultural scientists had 'medium' reading behaviour (50.84%) which might be due to lack of regular reading habit among the agricultural scientists. Most of agricultural scientists had 'medium' research activities undertaken (44.17%) which might be due to lesser externally funded projects being undertaken by the agricultural scientists. Majority of agricultural scientists had 'medium' technologies/knowledge generated (52.5%) which might be due to the fact that it takes few to many years in order to develop a hybrid or variety or any other technology. Most of agricultural scientists had 'medium' research guidance and mentoring (41.67%) which might be due to allotting fewer advisory students to agricultural scientists and lack of mentoring system as such in the research stations. Majority of agricultural scientists had 'low' awards and recognition received (79.17%) which might be due to lesser editorial involvement and membership in professional societies of the agricultural scientists. Most of the respondents had 'low' IPR generated (96.6%) which might be due to inadequate awareness on the IPR among agricultural scientists and complex procedures need to be followed for registration of IPRs. The distribution of agricultural scientists according to the various indicators and sub- indicators used to measure Research Productivity is given in the Table 2.

Majority of agricultural scientists had medium research productivity (47.5%) followed by very low (15.83%), low (15.00%), high (15.00%) and very high (6.67%). The findings are in agreement with Paul (2012). Their results indicated that the level of research productivity among agricultural scientists was medium to low. This might be due to the fact that there are more Scientists (Assistant Professor Cadre) and Senior Scientists (Associate Professor Cadre) in the university compared to Principal Scientists (Professor Cadre). Higher administrative workload to the principal scientists, lack of mentoring system in the research stations, no mandate for publications to be made, less number of externally funded projects and projects in collaborative mode undertaken, inadequate infrastructure and research grant available, involvement of Scientists and Senior Scientists in non-technical activities apart from research related activities due to which they won't be able to devote adequate time for research. Also, the agricultural scientists differ in their motivation, perseverance and commitment which are the important individual factors influencing research productivity. And lack of training sessions needed to improve motivation among the agricultural scientists.

Publication behaviour can be improved by providing specialized training sessions at regular intervals to improve reading, analytical, drafting and publication skills of scientists and incentives, awards and recognition for the publications made. Agricultural scientists will be able to undertake more research projects if they are provided with good infrastructure, timely research inputs and adequate research grant. Interdisciplinary team work has to be facilitated for project execution with regular monitoring and evaluation. Training sessions may be conducted on procedure of project proposal preparation and effective execution. Vacant positions need to be filled in order to reduce workload among the scientists. Scientists have to be encouraged to take up externally funded projects by giving it a fair weightage in the promotion criteria. The generation of Intellectual Property Rights can be improved by providing training on the procedures and implications of Intellectual Property Rights generation. A separate cell has to be deputed for managing Intellectual Property Rights in the university. Specialized training modules need to be adopted to increase the level of creativity and innovativeness among scientists. Adequate fund, incentives, awards, and recognition need to be provided for Intellectual Property Rights generation. Research consultancy may be improved by appointing man power to look after administrative and non-technical activities. A list of areas where scientists can offer consultancy can be documented on the university website to invite clients.

Table 3. Distribution of agricultural scientists according to their Research Productivity

Research Productivity	Class interval	Percentage
Very low	0.11-0.26	15.83
Low	0.27-0.42	15.00
Medium	0.43-0.58	47.50
High	0.59-0.74	15.00
Very high	0.75-0.90	6.67

The lowest research productivity index among all the agricultural scientists was 0.11 and highest was 0.88. There is a huge difference between the index scores which indicates that there is a scope to increase the research productivity of those in very low and low categories by up scaling their potential through proper guidance, mentoring, periodical training sessions and workshops.

CONCLUSION

As evident from the results, the level of research productivity among agricultural scientists was 'medium to low'. There is a scope to improve research productivity among agricultural scientists as the lowest RPI score was 0.11 and the highest was 0.88. The agricultural scientists have to be motivated by providing incentive and promotional policies. Periodical assessment and renewal of organization research climate will promote improvement in the research productivity. The agricultural scientists have to be trained periodically to increase the levels of motivation, creativity and innovativeness among them which contributes to higher research productivity.

REFERENCES

Agricultural Education Portal (2020, Nov 5). Indian Council of Agricultural Research. Retrieved Nov 5, 2020, https://education.icar.gov.in/Report_UniversityName.aspx

Agro Climatic Zones of Telangana State (2021, Jan 12). Professor Jayashankar Telangana State Agricultural University (PJTSAU). Retrieved Jan 12, 2021, from https://www.pjtsau.edu.in/agro-climatic-zones.html

Altmann, J., Abbasi, A., & Hwang, J. (2009). Evaluating the productivity of researchers and their communities. The RP-Index and the CP-Index. *International Journal of Computer Science and Applications*, *6*(2), 104-118.

Annual Report (2020-21). Department of Agriculture, Cooperation & Farmers' Welfare. Ministry of Agriculture & Farmers' Welfare, Government of India, www.agricoop.nic.in

Bellagi, R. D., Patel, H. B., Patil, N. D. C., Manunayaka, G., & Pavithra, V. (2020). Predictors of variation in role performance of scientists working in KVKs. *Indian Journal of Extension Education*, *56*(3), 104-106.

Borah, S. (2020). Perception of the Faculty about the importance of the dimensions of organizational climate of selected state agricultural universities. *Indian Journal of Extension Education*, *55*(4), 47–50.

Devi, U.S. (2013). *Study of organizational stress and scientific productivity of scientists of Punjab Agricultural University, Ludhiana*. (Doctoral dissertation, Punjab Agricultural University, Ludhiana, India). Retrieved from Krishi Kosh.

Egghe, L. (2006). Theory and practice of the g-index. *Scientometrics*, *69*(1): 131-152.

Haqyar, Z., Rohila, A. K., Mukteshawar, R., Malik, J. S., & Niwas, R. (2022). Accessibility of information and communication technology services by faculty members of a state agricultural university. *Indian Journal of Extension Education*, *58*(3), 182-185.

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Science*, *102*(46), 16569-16572.

Jayasingh, D. K., Gowda, N. S. S., Tripathy, M., & Nandy, A. (2022). Constraints affecting the teachers' job satisfaction of Odisha University of Agriculture and Technology, Odisha. *Indian Journal of Extension Education*, *58*(4), 170–172.

Jayasingh, D. K., Panja, A., & Tripathy, M. (2022). Job satisfaction of teachers of Orissa University of Agriculture and Technology, Bhubaneswar. Odisha. *Indian Journal of Extension Education*, *58*(3), 151-156.

Jhansi, R. G. (1985). Scientific productivity of agricultural scientists - an activity analysis approach. (Doctoral dissertation Andhra Pradesh Agricultural University, Hyderabad, India). Retrieved from Krishi Kosh.

Jin, B. H. (2007). The AR-index: Complementing the h-index. *ISSI Newsletter*, *3*(1): 6.

Paul, S. (2012). *Work styles, best practices and productivity of agricultural scientists*. (Doctoral dissertation, Indian Agricultural Research Institute, Division of Agricultural Extension, New Delhi, India).

Ramkumar, S. (2020). Research productivity through the lens of doctoral guidance: a study of Sanskrit universities in India. *Journal of Scientometric Research*, *9*(1): 19-28.

Santosh, D., &Vaishali, K. (2019). Research productivity of ICAR-Central Institute of Dryland Agriculture (CRIDA): A scientometric study. *International Journal of Recent Scientific Research*, *10,11*(F), 36085-36088.

Tripathy, M., Mishra, B., Jayasingh, D. K., & Nandy, A. (2022). Occupational stress and role performance-expectation gap amongst teachers of OUAT, Bhubaneswar. *Indian Journal of Extension Education*, *58*(4), 176–179.