

## COLLABORATIVE RESEARCH IN THE UNIVERSITY OF AGRICULTURAL SCIENCES, DHARWAD, INDIA

*Dr. Deepthi*

*Dr. P. G. Tadasad*

**Dr. Deepthi**

Assistant Librarian  
College of Forestry, Sirsi,  
Karnataka  
[deepthi.k67@gmail.com](mailto:deepthi.k67@gmail.com)

And

**Dr. P. G. Tadasad**

Registrar (Evaluation) and  
Professor of Library and  
Information Science  
Karnataka State  
Akkamahadevi Women's  
University, Vijayapura,  
Karnataka, India  
[pgtadasad@gmail.com](mailto:pgtadasad@gmail.com)

*Corresponding Author*

Based on a study of 357 scientific publications of research fraternity of University of Agricultural Sciences, Dharwad published and indexed in Google Scholar and CABI Abstracts during 2017, finds that a majority of publications were the result of team research. It also identifies that collaboration within the same departments is more predominant among the collaborated publications and very few individuals have international collaborated articles. It is recommended to encourage collaborations with national and international institutions. Further, it is also required to define what team research is and draft guidelines for collaborative research to encourage collaborative research.

**Keywords:** Scientometrics: Collaborative research, Institutions of Higher Learning, Universities, University of Agricultural Sciences, Dharwad, Karnataka, India.

### INTRODUCTION

Scientific research is not self-dependent. It requires cooperation. Scientific cooperation is a process wherein a work is created by two or more researchers sharing their resources and ideas. Co-authorship is one form of scientific cooperation as it involves several collaborators (researchers, scholars etc) to create a product. Solo Research which was too prominent in the ancient and medieval period, has become almost extinct these days. On the other hand, collaborative research more specifically team research is gaining a great momentum barring few disciplines like literature, linguistics, philosophy, etc. This trend of collaborative research is the need of the hour since different types of collaborations carry different weightages in the ranking of institutions and also in the accreditation process. As such every institution encourages its research fraternity to enter into collaborations in conducting research studies. This necessitates the institution to map what kind of collaboration is happening within the institution.

Scientometrics is a method of research used to map the scientific productivity of different natures. The study of the use of different types of information sources and patterns of publications in which statistical

techniques are used can throw light on degree of collaborative research. Many studies have been conducted in India and other countries to map authorship pattern and research collaboration. As far as agriculture and allied science is concerned there are very few studies reported on the topic. Hence an effort is made in this paper to identify the pattern of collaboration in a university environment to add value to the scientometric literature and provide publishing trends.

### **REVIEW OF LITERATURE**

Collaborative research is an area that has generated a number of studies in different disciplines over the last four-five decades. Bibliometricians / scientometricians from India are no exception to this phenomenon and they have also produced many studies in all disciplines. But very few studies have been reported in the field of Agriculture as well. Subbaiah (1983) almost four decades back noticed a significant collaboration in the weed science research in India. Five years later Begum and Sami (1988) also noticed a definite trend towards collaboration in agricultural sciences. Ramesh and Nagaraju (2002) and Ramesh et al. (2000) in two different studies concluded that collaborative research in agricultural sciences belongs to academic institutions. A study by Kumar and Kumar (2005) finds that prolific contributors had collaborations in the articles published in the Journal of Oilseeds research.

Hasan and Singh (2007) also observed collaborative research among the agricultural researchers in Himachal Pradesh. An average degree of collaboration of 0.84 was observed by Arya and Sharma (2012) among veterinary science

researchers in India. Siwach and Parmar (2018) find that CCS Haryana Agricultural University, Hisar has collaborated with many institutions at national and international level in its research publications. Laxman et al. (2018) using MEDLINE database found that collaborative research is on a decline in the field of Ebola.

Thavamani (2018) notices the average degree of collaboration as 0.861 that clearly indicates dominance of collaborative research in the discipline of Astrobiology. Thavamani (2017) also notices a greater trend towards collaborative research in the Journal of Biofuels from 2010-2016 as average degree of collaboration was 0.93. Indrani and Murugan (2018) also found a high degree of collaboration on fossil fuels publications indexed in A & HCI and SCi-Expanded. A study by Singh (2017a) finds that international collaboration is quite significant among IBSA countries in the field of Biotechnology research. Another study of Singh (2017b) claims 0.63 as degree of collaboration of India in biotechnology research.

This phenomenon of researchers in Agriculture and allied sciences paved way to conduct this study.

### **OBJECTIVES OF THE STUDY**

The primary objective of the study is to analyse the publications of University of Agricultural Sciences, Dharwad (UASD) to know the pattern of collaboration among UASD fraternity. Specifically the objectives of the study are to identify:

1. Nature of collaborative research
2. First authorship in collaborated publications

3. Authorship of UASD in publications where first authorship belongs to non-UASD research fraternity
4. Nature of collaboration among publications particularly to identify
  - a. Countries and Institutions of authors who have collaborated with UASD faculty;
  - b. Institutions of authors within the state who have collaborated with UASD faculty;
  - c. Institutions of authors within the country who have collaborated with UASD faculty;
  - d. Departments of authors within the University who have collaborated; and
  - e. Publications with collaborations within the same departments

### METHODOLOGY

Google Scholar and CABI Abstracts were searched using the following strings: “University of Agricultural Sciences, Dharwad” or “College of Agriculture, Dharwad” or “College of Agriculture, Bijapur (Vijayapura) or “College of Agriculture, Hanumanatti” or “College of Forestry, Sirsi” or “College of Community Sciences, Dharwad”

The search was limited to the year 2017 only. In all 947 full text articles were retrieved. Each one of them was checked to know whether at least one author belonged to UASD and its constituent colleges. After checking 489 articles were found to contain at least one author from UASD and its constituent colleges. Later duplication of articles was checked and 132 articles were removed as these were duplicates. Finally 357 articles were retained for analysis. Hence 357 scientific

publications of research fraternity of University of Agricultural Sciences, Dharwad published and indexed either in Google Scholar or CABI (Centre for Agriculture and Bioscience International) Abstracts during 2017 were analysed to know and analyse the nature of collaborations among the fraternity. The full-text of the articles were downloaded. Authors’ affiliations were recorded in structured worksheet and were analyzed using MS-Excel.

### RESULTS AND DISCUSSIONS

It can be interpreted from table 1 that the collaboration trend is towards team research as more than half of the publications are written by more than two authors (56.86%), where as joint papers account for 43.14% of total articles.

Table 1: Nature of collaborative research

Nature	Number	Percentage
Joint	154	43.14
Team	203	56.86
Total	357	100%

Table 2: First Authorship in collaborated publications

No	First authorship	Number (%)
1	UASD research fraternity	324 (90.76%)
2	Non-UASD	33 (9.24%)
	Total	357 (100%)

From table 2, it can be observed that of the 357 collaborated papers, more than ninety percent of first authorship occurs among the UASD research fraternity (90.76%, N=324) while a small number of papers had first authorship claimed by Non-UASD fraternity (9.24%, N=33).

Table 3: Authorship of UASD in publications where first authorship belongs to non-UASD research fraternity

Sl. No.	Authorship	Number (%)
1	Second	19 (57.58%)
2	Third	8 (24.24%)
3	Fourth and above	6 (18.18%)
	Total	33 (100%)

From table 3, it can be observed that of the 33 publications, second authorship was claimed by UASD fraternity for more than half of the publications where first authorship belongs to non-UASD research fraternity. UASD fraternity were third authors for nearly a quarter of 33 publications (24.24%, N= 8). UASD fraternity were the fourth authors for few publications (N=6).

Table 4: Nature of collaboration among publications

Nature of collaboration	Number (%)
Within the same department	223 (62.46%)
Within the UASD	60 (16.81%)
Within the state of Karnataka	25 (7.01%)
Within the country	43 (12.04%)
Outside the country	06 (1.68%)
Total	357 (100.00%)

It can be interpreted from table 4 that the collaboration occurs within the same departments as third of papers were written with collaboration occurring within the same department (N=223) and though international collaboration is visible, its magnitude is too small to recognise (1.68%, N=6). Collaboration for more than sixteen percent of papers published during the period occurs within the UASD (N=60). More than ten percent of papers are collaborated within the country (12.04%, N=43). Collaboration within the state of Karnataka accounts for 7.01% of articles published during 2017 (N=25).

From table 5, it can be noticed that international collaboration took place with 4 institutions only namely: Kazusa Research Institute, Chiba Japan; International Center for Agricultural Research in the Dry Area Rabat, Morocco; Dilla University, Ethiopia and Biodiversity International, Pokhara, Nepal. Of the four, three papers were collaborated with Kazusa Research Institute, Chiba Japan (one by the Department of Biotechnology and two by the Departments of Biotechnology, Plant Pathology and Genetics and Plant Breeding). Department of Agronomy, UASD, Department of Environmental Science, UASD and College of Forestry, Sirsi have also collaborated with International Center for Agricultural Research in the Dry Area Rabat, Morocco; Dilla University, Ethiopia and Biodiversity International, Pokhara, Nepal respectively.

Table 5: Countries and Institutions of authors who have collaborated with UASD faculty

Department (s) collaborated	Institute and Country	Number (%)
Biotechnology	Kazusa Research Institute, Chiba Japan	1
Biotechnology Plant Pathology Genetics and plant breeding		2
Agronomy, UASD	International Center for Agricultural Research in the Dry Area Rabat, Morocco	1
Environmental Science UASD	Dilla University, Ethiopia	1
College of Forestry, Sirsi	Biodiversity International, Pokhara, Nepal	1
Total		6

It can be observed from table 6 that the neighbouring universities like University of Horticulture Science, Bagalkot (8 papers) and University of Agricultural Sciences Dharwad (7 papers + 1 jointly with Gulbarga University, Kalaburagi) are the two major collaborators within

Table 6: Institutions of authors within the state who have collaborated with UASD faculty

Department (s) collaborated	Institute and Country	Number (%)
Agronomy	UHS Bagalkot	2
AgriBiotechnology		1
Biotechnology		1
Genetics and Plant Breeding IARI, Dharwad		1
RARS, Vijayapura		
Horticulture, CAS Hanamanatti		1
Plant Pathology		1
NRM, COFS, Sirsi		1
Physiology	Gulbarga University, Kalburagi	1
	Gulbarga University, Kalburgi	1
	UAS Raichur	
	Bheemarayanagudi	
Soil Science and Agricultural Chemistry	University of Horticultural Sciences, Shivamogga	1
Agricultural Economics	UAS Bengaluru	1
Agricultural Extension Education		1
Agricultural Entomology	S Nijalingappa Sugar Institute, Belagavi	2
Food Science and Nutrition	McGill University, Bengaluru	1
Genetics and Plant Breeding	College of Agriculture Mandya	1
Plant Pathology	UAS Raichur	1
Genetics and Plant Breeding		1
Seed Science and Technology		2
Agricultural Entomology		1
Food Technology		1
Veterinary Hospital		1
	Veterinary College Hebbal	1
<b>Total</b>		<b>25</b>

the state to have been associated with many departments of UASD. S. Nijalingappa Sugar Institute, Belagavi (2 papers) and Gulbarga University, Kalaburagi (1 paper = 1 jointly with UAS Raichur) is the third largest collaborator within the state. Department of Agronomy, Department of Agricultural Entomology, Department of Seed Science and Technology have published two papers each with UHS Bagalkot, S. Nijalingappa Sugar Institute, Belagavi and UAS Raichur respectively.

From table 7 it can be interpreted that UASD fraternity have collaborated with different institutions throughout the country. Prominent among them include: CA OUAT, Bhubaneswar (3 papers), M G College of Agricultural Biotechnology, Nanded (3 papers), Ministry of Agriculture, GOI (3 papers) and UAS Raichur jointly with ICAR Pusa Campus (3 papers), Agharkar Research Institute Pune (2 papers), Mahatma Phule Krishi Vidyapeeth, Rachuri Maharashtra (2 papers), Tamil Nadu Agricultural University, Coimbatore (2 papers), Dr YSR Horticulture University, Medak jointly with ICRISAT, Hyderabad (2 papers). Department of Soil Science and Agricultural Chemistry (7 papers), Department of Biotechnology (6 papers), Department of Genetics and Plant Breeding (6 papers), Department of Agronomy (5 papers), Department of Agricultural Entomology (3 papers), Department of Crop Physiology (3 papers) and Department of Plant Pathology (3 papers) are the major departments that have collaborated with institutions within the country.

Table 7: Institutions of authors within the country who have collaborated with UASD faculty

Department (s) collaborated	Departments Associated	Institute and Country	Number (%)
Agricultural Entomology	-	PTJS Agricultural University, Telangana	1
	-	Tumkur University, Tumkur	1
	-	NMTC, Mumbai	
	-	Rajiv Gandhi Institute of Technology and Research Center, Bengaluru	1
Agronomy	-	Assam Agricultural University, Jorhat	1
	-	BHU, Varanasi	1
	-	CA OUAT, Bhubaneswar	3
	-	College of Agriculture, Baramati	1
Agricultural Biotechnology	-	Konkan Krishi Vidyapeeth, Dapoli	1
Agricultural Engineering	-	Punjab Agricultural University, Ludhiana	1
AICRPAM Vijayapura	-	ICAR – CRIDA, Hyderabad	1
AICRP for Dryland Agriculture, Vijayapura	-	ICRISAT, Hyderabad	1
Biochemistry	Agronomy	Bidhan Chandra Krishi Viswavidyalay, Mohanpur	1
Biotechnology	AICRP on Wheat MARS	Indian Institute of Wheat and Barley Research, Karnal	1
	-	M G College of Agricultural Biotechnology, Nanded	3
	-	Sant Baba Bhag Singh University, Jalandhar	1
	-	IIHR Bengaluru	
	-	Mata Gujri College Fategarh Sahib	
	Genetics and Plant Breeding	IARI, Pusa CRURRS, Hazaribagh CSKHPKV, Palampur National Research Center on Plant Biotechnology, Pusa	1
Crop Physiology	-	UAS Raichur	3
	-	ICAR Pusa Campus	
Genetics and Plant Breeding	-	UASR and ICRISAT	1
	Protection of Plant Varieties and Farmers Rights Authority and MARS	Ministry of Agriculture, GOI	3
	-	Agharkar Research Institute Pune	2
	AICRP on Groundnut	ICRISAT Hyderabad	1
Microbiology	-	PDR Hyderabad	1
	-	UHS, Shivamogga AU, Kota	
Soil Science and Agricultural Chemistry	Agronomy	Mahatma Phule Krishi Vidyapeeth, Rachuri Maharashtra	2
	-	UHS Shivamogga and Higginbotham Institute of Agriculture, Technology & Sciences Allahabad	1
	-	UHS Shivamogga and Mahatma Phule Krishi Vidyapeeth, Rachuri Maharashtra	1
	-	Tamil Nadu Agricultural University, Coimbatore	1
	-	Dr YSR Horticulture University, Medak ICRISAT, Hyderabad	2
ARS Mudhol	-	Agriculture, Water and Land Management Institute Aurangabad	1
Environmental Sciences	-	ICAR New Delhi and Hyderabad	1
Food Science and Nutrition	-	Acharya N G Ranga Agricultural University Hyderabad	1
Plant Pathology	-	Regional Plant Quarantine Station, DPPQS, Chennai and UHS Shivamogga	1
	-	ICAR-IIMR Hyderabad ICAR – NAARM Hyderabad MAU Parabhani MPKV, Rahuri DPDKV, Akola NAU Athwa Surat	1
	-	Bihar Agricultural University, Sabour	1
	-		
Total			43

The analyses from table 8 reveals that Department of Agronomy (11), Department of Agricultural Entomology (10), department of Soil Science (8), department of Genetics and Plant Breeding (5) and Department of Food Science and Nutrition (5) are the prominent departments which have collaborated with other departments. AC

Hanumanatti with Department of Entomology (5) and Soil Science (5), Human Development and Family Studies with Department of Food Science and Nutrition (3) and ARS Annigeri with Department of Agronomy (3) are the prominent ones that are associated with other departments.

Table 8: Departments of authors within the University who have collaborated

Department (s) collaborated	Departments Associated	Number (%)
Agronomy	ARS Mugad	1
	ARS Annigeri	3
	Environmental Sciences	1
	Plant Pathology	2
	Horticulture	1
	Soil Science	1
	Genetics and Plant Breeding	1
Agricultural Entomology	Agricultural Microbiology	2
	AC Vijayapura	1
	RARS Vijayapura	
	AICRP Vijayapura	
	AC Hanumanmatti	5
	Institute of Organic Farming	1
	Plant Pathology	2
Agricultural Economics	Directorate of Education	1
	Animal Sciences	1
Agricultural Microbiology	Agro-business Management	1
	Biotechnology	1
Biochemistry	Plant Pathology	1
	Agronomy	1
	ARS Dharwad	1
Biotechnology	Biotechnology	1
	Agricultural Microbiology	2
Forest Biology and Tree Improvement	Biochemistry	1
	Director of Education	1
Genetics and Plant Breeding	Plant Pathology	1
	Biotechnology	2
	Entomology	
	MARS, Dharwad	1
	All India Coordinated Maize Improvement Project	1

Department (s) collaborated	Departments Associated	Number (%)
Horticulture	Soil Science	1
	ARS Vijayapura Agricultural Entomology	1
NRM	Directorate of Education	1
Institute for Agricultural Research on Climate Change	AICRP on Integrated Water Management	1
Food Science and Nutrition	Human Development and Family Studies	3
	AICRP on Dry land Agriculture, Vijayapura	1
	Extension and Communication Management	1
Molecular Biology and Biotechnology	Agricultural Microbiology	1
Plant Biotechnology	Genetics and Plant Breeding	1
Plant Pathology	Horticulture	1
	Agricultural Microbiology	1
	Agricultural Microbiology Horticulture Organic Farming	
Soil Science	AC Hanumanmatti	5
	Agricultural Engineering Water4Crops Project	2
	Agronomy	1
RARS Vijayapura	Genetics and Plant Breeding	1
No affiliation	-	1
<b>Total</b>		<b>60</b>

From table 9, it can be concluded that 29 Departments / institutions / centers / colleges have collaborated within themselves to produce 223 research papers. The Department of Plant Pathology accounts for 14.35% (N= 32) of articles collaborated within the department itself. The Department of Agricultural Entomology with 13.9% (N=31) of articles is the second most contributing articles to the research world. The departments of Agronomy (10.76%), Genetics and Plant Breeding (8.97%) and Crop Physiology

(7.17%) are ranked third fourth and fifth. Together these five departments have contributed to more than half of the research publications (55.15%). Departments of Soil Science (5.83), Agricultural Extension Education (5.38%), Food Science and Nutrition (4.04%), Seed Science and Technology (4.04%) and Agricultural Economics (2.69%) are ranked from 6<sup>th</sup> to 10<sup>th</sup> ranks. Together the 10 departments have contributed to more than three-fourth of research publications (77.13%).



Table 9: Publications with collaborations within the same departments

Departments	Number (%)	Rank
Plant Pathology	32 (14.35%)	1
Agricultural Entomology	31 (13.90%)	2
Agronomy	24 (10.76%)	3
Genetics and Plant Breeding	20 (8.97%)	4
Crop Physiology	16 (7.17%)	5
Soil Science	13 (5.83%)	6
Agricultural Extension Education	12 (5.38%)	7
Food Science and Nutrition	9 (4.04%)	8
Seed Science and Technology	9 (4.04%)	8
Agricultural Economics	6 (2.69%)	10
Agricultural Microbiology	5 (2.24%)	11
Biotechnology	5 (2.24%)	11
Horticulture	5 (2.24%)	11
Textile and Apparel Designing	5 (2.24%)	11
Family Resource Management	4 (1.79%)	15
Water Management Research Center, Belavatagi	4 (1.79%)	15
ARS Dharwad	3 (1.35%)	17
Extension and Communication Management	3 (1.35%)	17
AICRP on Agroforestry	2 (0.90%)	19
AICRP on Home Science	2 (0.90%)	19
AICRP MULLaRP	2 (0.90%)	19
Human Development and Family Studies	2 (0.90%)	19
MARS	2 (0.90%)	19
Water4Crops Project	2 (0.90%)	19
Agricultural Statistics	1 (0.45%)	25
AICRP on Agronomy	1 (0.45%)	25
AICRP on Groundnut	1 (0.45%)	25
Organic Farming	1 (0.45%)	25
Plant Biochemistry	1 (0.45%)	25
<b>Total</b>	<b>223 (100.00%)</b>	

## CONCLUSIONS

Majority of publications were the result of team research. First authorship occurs among the UASD research fraternity in a large majority of publications. Collaboration within the same departments is more predominant among collaborated publications. Very few individuals have international collaborated articles.

Collaboration within the country is more visible compared to collaboration within the state. International collaboration has taken place with few institutions. Neighbouring universities are the major collaborators within the state. 29 Departments / institutions / centers / colleges have collaborated within themselves to produce a large number of research papers. The Department of Plant Pathology accounts for large number of collaborated articles collaborated within the department itself. It is recommended to encourage collaborations with national and international institutions. Further it is also required to define what team research is and draft guidelines for collaborative research to encourage collaborative research.

## REFERENCES

1. Arya, C., & Sharma, S. (2012). Authorship trends and collaborative research in veterinary sciences: A bibliometric study. *Chinese Librarianship*, 34, 38-47.
2. Begum, K J., & Sami, L K. (1988). Research collaboration in agricultural science. *International Library Review*, 20 (1), 57-63.
3. Hasan, N., & Singh, S. (2007). Agricultural research in Himachal Pradesh: A profile based on AGRICOLA, AGRIS and FSTA CDROM databases. *SRELS Journal of Information Management*, 44 (3), 279-300.
4. Indrani, M., & Murugan, C.(2018). Mapping of Authorship Pattern and Collaborative Research on Fossil Fuels Publications indexed

- in A & HCI and SCI-Expanded. *Library Philosophy & Practice*. 9(6), 1-15.
5. Kumar, S., & Kumar S. (2005). A bibliometric study of the Journal of Oilseeds research since 1993-2001. *SRELS Journal of Information Management*, 42 (3), 305-334.
  6. Laksham, S., Ramakrishnan, J., Sankar, G R & Thavamani, K (2018). Authorship pattern and collaborative research in the field of Ebola (1995 - 2014): A Bibliometric Analysis. *Library Philosophy & Practice*, (8)2, 1-18.
  7. Ramesh, LSRCV., Ramana, P V., & Hussain, M. V. (2000). Publication pattern in *Oryza* (*Oryza Sativa* L.) from 1986 – 1995: A bibliometric study. *SRELS Journal of Information Management*, 37 (3), 215-227.
  8. Ramesh, L.S.R.C.V., & Nagaraju, A.V.S.S. (2002). Publication pattern in 'International Journal of Tropical Agriculture, 1991-2001: A bibliometric study, *SRELS Journal of Information Management*, 39 (4), 457-465.
  9. Siwach, A K., & Parmar, S. (2018). Research contributions of CCS Haryana Agricultural University, Hisar: A bibliometric study, *DESIDOC Journal of Library & Information Technology*, 38 (5), 334-341.
  10. Singh, M. (2017a). Authorship Pattern and Collaboration Coefficient of India in Biotechnology research during 2001-2016: Based on Scopus database. *Library Philosophy & Practice*, 1-14.
  11. Singh, M. (2017b). Authorship and Collaboration Pattern in Biotechnology Research: A study of IBSA Countries. *Library Philosophy & Practice*, 1-14.
  12. Subbaiah, R. (1983). Thirty-two years' of weed science research in India (1950-1982): A case study, *Library Science*, 20 (3), 132-144.
  13. Thavamani, K. (2017) Authorship Patterns and Collaborative Research in the Journal of Biofuels, 2010-2016. *Library Philosophy & Practice*. 1-16.
  14. Thavamani, K. (2018). Authorship Patterns and Collaborative Research in the Astrobiology, 2012-2017. *Library Philosophy & Practice*. 4/2, 1-16.

