IMPLEMENTING AGRICULTURAL SCIENCE AND TECHNOLOGY INDICATORS (ASTI) DATA COLLECTION AND POLICY ANALYSIS IN INDIA

(NAARM-IFPRI COLLABORATIVE PROJECT)

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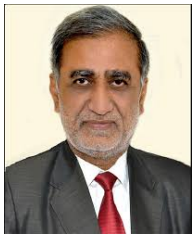
FOREWORD

Globally, agri-food system is rapidly transforming, resulting in improvement in food security and reduction in poverty. A large share of the transformation process is credited to agricultural research and development. Today, agri-food system is more efficient and resilient than before. The historic role of public and private sector in research resource allocation and human resource engagement is well acclaimed. Countries such as United States of America, Japan, Germany and France have significantly contributed in inventing high yielding varieties and improving capacity of developing countries to up-scale those for the benefit of poor farmers and consumers.

Public funding for research and development (R&D) in agri-food system is essential and prerequisite policy instrument to enhance agricultural productivity, improve economic wellbeing of poor, and improve sustainability of natural resources. Agri-food sector in India has well performed and remarkably responded to the changes in the past to meet the demand for food that transformed the country from a deficit to surplus in most of the agricultural commodities. However, the country is facing new challenges of degradation of natural resources, climate change, changing dietary patterns, etc. It is unlikely that the rate of knowledge improvement and discovery through existing pace of research and human resource allocation may keep pace with increasing global competition and domestic needs for ensuring a safe, healthy and nutritious food. The shrinking of public investment in developing countries, especially India, agricultural R&D may not compete with countries like China, Mexico, Brazil, and South Africa in inventing new technologies and management practices. The existing trends show that the future research will become more capital-intensive to develop capital- and resource-saving technologies. Therefore, there is a need to allocate more research resources in Indian agriculture to meet the future R&D challenges.

I and happy that International Food Policy Research Institute (IFPRI) through its flagship program on Agriculture Science and Technology Indicator (ASTI) periodically brings about data series on agricultural R&D in developing world, including India. The information generated under this program forms the basis for managing agricultural research resources and making appropriate R&D policies for higher, inclusive and sustainable agricultural growth through research and innovation. This report, latest in series, is an outcome of partnership between National Academy of Agricultural Research Management (NAARM) and the International Food Policy Research Institute (IFPRI). I complement the research teams from NAARM and IFPRI for bringing out such a useful report. I am sure that the findings of this joint study will be useful in making informed decisions for financial and human resource allocation in agricultural research in India.

P.K. JOSHI



Dr. D. Rama Rao
Director
ICAR – National Academy of Agricultural Research Management

FOREWORD

Over the years Indian agriculture had made tremendous progress, which in a large measure is due to its human resources and public investments in agricultural research, education and development. Such investments in agriculture are of long gestation, and needs considerable advance planning. In the context of national demands and changing global agricultural scenario, detailed data on agricultural human and financial inputs, and research outputs and outcomes are central to systematic assessments and, hence, are of strategic importance. Evidences on the impact of agricultural R&D have always been sought for by the policy makers and senior managers to know the utility of the allocations. The present project is the latest in this direction, and has been executed by the National Academy of Agricultural Research Management (NAARM) in partnership with International Food Policy Research Institute (IFPRI) to generate such evidences on agricultural R&D in India.

India has substantially increased its public funding of agricultural research since the late 1990s and this trend is likely to continue in coming years. Nonetheless, the public agricultural R&D spending as a share of agricultural output continues to be relatively low. In its upcoming years, the Indian Government seeks to address this deficiency by committing a significant percentage of AgGDP to agricultural R&D. ICAR and the AU system are making concerted efforts to improve coordination of research programmes across various institutions. Evidence clearly indicates that an enabling policy environment and attractive market opportunities play important role in the diversification of R&D through participation of the private sector. This is essential for enhancing research intensity and making the system more demand driven. The datasets generated in this study would augur well for such insights into the planning process.

It gives me immense pleasure to present the project report jointly prepared by NAARM and IFPRI. The report is timely and useful in preparing the future course of action on impact driven development in agriculture and allied sectors. I congratulate the project team on bringing out such valuable document, and hope it is useful for policy planners and other professionals associated with agricultural R&D. I also complement all the institutions who participated in this big task, helping in making this report timely.

D. RAMA RAO

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Acronyms and Abbreviations

APAARI	Asia-Pacific Association of Agricultural Research Institutions
ASTI	Agriculture Science and Technology Indicator
AU	Agricultural University
CGIAR	Consultative Group on International Agricultural Research
CSIR	Council of Scientific and Industrial Research
DARE	Department of Agricultural Research and Education
DBT	Department of Biotechnology
DRDO	Department of Research and Development Organization
DST	Department of Science and Technology
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GFAR	Global Forum for Agricultural Research
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
IFPRI	International Food Policy Research Institute
INR	Indian Rupees
KAB	Krishi Anusandhan Bhavan
KVKs	Krishi Vigyan Kendras
NARES	National Agricultural Research and Extension System
NARS	National Agricultural Research System
NCAP	National Institute of Agricultural Economics and Policy Research
NGOs	Non-Governmental Organizations
PPPs	Public Private Partnerships
R&D	Research & Development
TFP	Total Factor Productivity

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EXECUTIVE SUMMARY

Agriculture Science and Technology Indicators (ASTI) from International Food Policy and Research Institute (IFPRI) is an initiative globally to address the problem of availability of information on trends in public R&D investments in agriculture. Since 2000, IFPRI is solely working on periodic survey rounds on agricultural science and technology indicators which are widely considered as the most authentic source of information.

The present study is a collaborative initiative of ICAR-NAARM and IFPRI to understand and assess the role of agencies involved in agricultural R&D in India, including those in the government, non-profit, and higher education sectors with the help of identified indicators in agricultural science and technology. This is the third round (2009-10 to 2013-14) of the survey being conducted in India. The indicators abbreviated as 'ASTI' include attributes pertaining to(i) human resources; (ii) financial resources; (iii) research focus and (iv) research outputs.

The objectives of the study are:

(i) to understand the role of Indian public agricultural R&D agencies that include government, non-profit sectors;

(ii) to identify the output and performance indicators, policy developments in recent years, including the institutional changes; and

(iii) to disseminate the findings of the survey to policymakers and other relevant stakeholders.

The work plan for the current study was largely based on the quality data collection and updating datasets. A guided structure for survey form was taken up based on IFPRI template. As discussed,all the above indicators were taken into consideration for the data collection. The national survey round was initiated with a complete list of all agencies involved in agricultural research and development (R&D) in the country. A "Brainstorming meeting for pre-testing of ASTI survey forms" was held to ascertain the effectiveness of the questionnaire across NARS designed by NAARM in consultation with IFPRI. Two sets of survey forms were structured as, one for Government and Non-profit Institutions and other for Agricultural Universities. A total of 107 ICAR institutions and 68 Agricultural Universities & Higher Education Institutions were approached with request to assign a nodal officer each who would act as a contact point during the process of data collection and validation. They were briefed about the survey and data was thus collected. Secondary sources of information were used to further address gaps in the data to the possible extent. The data was then compiled into a structured MS-excel templates and analyzed component-wise.

I. Human Resources in Public Agricultural R&D Institutions

- ICAR research staff devoted only 62.7% of their time in research, which needs to be enhanced by cutting down their time spent on administrative aspects. AU research staff devoted more time on research (35.9%), followed by teaching (34.9%) and extension (17.4%) as per their mandates. However, effort should be made by them to devote more time on extension than on research, as they cater directly to the needs of farmers of their respective states on technological solution.
- The number of researchers in ICAR was more or less stable over the past five years. In the agricultural universities (AUs), there was a gradual increase till 2012-13, which was due to more recruitment during this period. However, a slight shortfall in the researchers'/faculty positions in NARES, particularly AUs and ICAR-DUs was observed during 2013-14. This decrease was more in AUs than in ICAR institutions.
- The total share of the doctorates was more in ICAR institutions (84%) as compared to universities (62%). Results also indicate that ICAR had more researchers withdoctorate degree at the early stages of their career; while in AUs, the researchers qualified with master degree enter the service and they get qualified with doctoral degree later.This is due to the fact that ICAR encourages their scientists at the initial stages of their career to get them qualified with PhD as they have a facilitating study leave policy, while AUs do not have any such a favourable policy.
- The share of female researchers was slightly more in AUs (21%) than in ICAR system (19%). This might clearly be due to the hesitation of female candidates to take up Agricultural Research Service of ICAR, which is of All-India service nature,besides the domestic and cultural compulsions of female researchers to be within the state from where they hail from. The age distribution of female researchers indicated that the maximum share of researchers in ICAR was in 41-50 age category (39%) and in AUs they were below to 31-40 years (49%).
- In ICAR, it was found that on an average, about 5.8 national trainings were undertaken by all scientist together in 2009-10 which increased to 9.7 in 2013-14. Correspondingly, the number of international trainings tripled from 0.8 during 2009-10 to 2.2 during 2013-14. This might be due to large scale capacity building programmes implemented by NAIP during the period in ICAR.
- While in AUs, the average number of national trainings that were undertaken by all faculty/ researchers together fluctuated during the period from 2009-10 to 2013-14. In addition, the number of international trainings followed a declining trend during

the above period. This kind of trend was perhaps due to the lack of funding for HRD of faculty/ researchers and unavailability of such opportunities.

II. Financial Resources in Public AgriculturalR&D Institutions

- The expenditure during the period from 2009-10 to 2013-14 in both ICAR as well as AUs increased in nominal terms. However, the rate of increase had been about 88% in case of AUs, while it was only 40% in ICAR. It might be because several new AUs were formed during this period and more allocation was made towards creation of infrastructure and payment salaries for the newly recruited staff.
- In ICAR, the share of expenditure on salaries of researchers was 61%, while the same was 66% in AUs. Conversely, the share on operating and programme costs was higher in ICAR (24%) than in AUs (17%).
- Results revealed that major source of funding for research was core government funding in both ICAR and AUs. The share was more in case of ICAR (83.8%) than in AUs (76.2). This share was relatively stable in case of former, while this was decreasing in AUs.
- During the period from 2009-10 to 2013-14, the amount of revenue generated was Rs. 6,25,881 by an AU, while the same was Rs.5,51,017 by an ICAR institute. It is understandable that by the size of the institution, the productivity of ICAR with respect to revenue generation was better than that of AUs. ICAR generated more revenue through sale of farm produce and biological kits, commercialization of technology, training and consultancy, while AUs generated the same mainly through securing research projects from external sources.

III. Research Focus in Public Agricultural R&D Institutions

- Researchers devoted more time on agricultural crops (49.7%), including horticultural crops followed by livestock and poultry (18.6%), non-commodity categories (14.8%) and fisheries (8.1%) in ICAR institutes. Among agricultural crops, they spent more time on research in cereals (8.9%), followed by fruits (8.6%), oilseeds (6.3%), vegetables (5.7%), fibres (5.4%) and pulses (3.4%).

- ICAR researchers devoted considerable time on research in non-commodity categories such as natural sources, social sciences, frontier sciences, etc. as compared to AU researchers, as they had separate institutions working on these aspects.

- In case of AUs, research faculty devoted more time on agricultural crops (40.4%), lesser than their counterparts in ICAR system followed by livestock and poultry (32.7%), fisheries (9.6%) and non-commodity categories (6.3%). Closer look at crop sector, it is understandable that AU researchers spent more time on research in cereals (13.6%) and pulses (7.5%) than their colleagues in ICAR.
- ICAR devoted slightly more time(14%)on research in the thematic areas of crop genetic improvement than AUs (11.7%). However, both ICAR and AU researchers devoted equal share of their time on crop production(10.6% and 11%) and crop protection (9.7% and 8.8% respectively).
- As understood, ICAR researchers spent considerable time on research on the aspects of biodiversity and germplasm conservation (7%), frontier areas (5.5%), food safety (1.5%), on-farm storage and post-harvest (6%) and farm mechanization (2.2%) and socio-economic research (13%) than their counterparts in AUs.
- Lesser time was devoted by the AU researchers on frontier areas perhaps due to the availability of very few advanced research facilities. Similarly, AUs don't involve much in germplasm conservation and biodiversity and they are mostly governed or maintained by national facilities.
- AUs worked more on variety and breed improvements as they cater to the needs of the farmers through the state extension functionaries.

IV. Research Outputs from Public Agricultural Research

- 15.41 crop varieties, 4.44 animal/fish breeds and lines, 15.00 microbes/transgenics and about 11.67 technologies/ non-crop products were developed and released by an ICAR institute during the period 2009-14. Similarly, in AUs 20.1 crop varieties, 2.4 animal/fish breeds and lines and 20 technologies/ non-crop products were developed and released.
- The productivity of researchers in terms of research papers in national and international journals and e-publications/open access articles in ICAR witnessed a positive trend. On an average, the researcher in ICAR produces 1.97 and 0.87 papers in national and international journals per annum respectively.
- Researchers in public agricultural R&D institutions get maximum number of awards from professional societies than from international agencies and state governments.
- The number of trainings conducted by AUs was more than that of ICAR, because of their mandate to train farmers of their respective state/region (1748), while ICAR was more engaged in training the trainers (280) in 2013-14.

CHAPTER-I

INTRODUCTION

Agriculture continues to be the most important sector of Indian economy. Despite significant fall in its share that accounts for less than 14% of the country'sGross Domestic Product (GDP), it still remains as the basic livelihood structure. This sector provides employment to more than half of the workforce in the country and is a source of income for vast majority of population that lives in rural areas of India. Agriculture is also crucial for sustaining food security of large and burgeoning population and for economic stability in the country. Besides, a large segment of India's industry is agro based and depends on this sector for raw material. Hence, agricultural growth is regarded as crucial for growth of overall economy and for inclusive growth.

In the years since its independence, India has made immense progress towards food security. Indian population has tripled, and food-grain production more than quadrupled. There has been a substantial increase in available food-grain per capita. During the last six decades of planned development, Indian agriculture has passed through different phases generally characterized as pre-green revolution phase, green revolution phase and post-green revolution. Since the beginning of the green revolution, national agriculture research system comprising Indian Council for Agricultural Research(ICAR) and Agricultural Universities (AUs) of the states has played a vital role in propelling the growth of agriculture and in improving and sustaining food security of the country. From a net importer of staple food in the pre-green revolution period, India has become the net exporter of food for several years now. These achievements are impressive by any measure. This was all due to the establishment of many higher agricultural education institutes across the country that developed skilled human resources in agriculture and allied sciences which led to development of new technologies for higher productivity in agriculture. This, coupled with proactive policies of the government and high receptivity of the farmers led to unprecedented increase in food grain production form a meagre 51 million tonnes in 1950-51 to over 265 million tonnes in 2013-14. However, the sector is now facing several challenges like shrinking land area for agri-food production, overexploitation and degradation of land and water, uncertainty of climate change, rising biotic and abiotic stresses and shrinking size of land holding and per capita arable land. Growth rate in TFP (Total Factor Productivity) of most of the crops and the sector as a whole is showing deceleration. Most of these challenges can be addressed only through effective system of Research & Development (R&D) and technology generation. Science - based solutions and options to address the problems involve large financial resources and scientific manpower. However, the demand for public funds is increasing manifold from other new development needs. With the available limited

resources, agricultural R&D system has to address many and often conflicting goals. This necessitates that resources are allocated very carefully based on well informed criteria and evidencein order to be utilized in the best manner. Besides, the use of public funds also demands greater transparency and accountability.

Agricultural sector in India has been benefited from the public investment in R&D and performed better than the other public sector investments (Pal et al. 2005; Fan et al. 2007; Joshi et al. 2015). Recognizing the importance of public funded R&D in agriculture, XI Five Year Plan emphasized role of technology and effectiveness of R&D investments to achieve target of 4 per cent growth (Vijay, 2011) in agriculture. The experienced growth rate of 3.3% currently is encouraging over the X Five Year Plan of 2.4% of achieved growth rate. The outlay for the agriculture and allied sector indicates an increase in the budget estimates over the past five years.[1]

1.1 Public Sector Outlays/ Expenditure in Agriculture and Allied sector

Table1: Budget outlay for Agriculture and Allied Sectors from Government of India

in crores

2009-10		2010-11		2011-2012		2012-13		2013-14	
B.E	A.E	B.E	A.E	B.E	A.E*	B.E	R.E*	B.E*	R.E
28772	29498	36983	40369	46255	16194	54748	15971	15971	N.A

**Estimates of only center and not states & U.Ts; B.E-Budget estimates; A.E-Actual expenditure; R.E-revised estimates; N.A- Not available*

The XI Five Year Plan focused on funding for research in spite of the evident technology fatigue, with an emphasis on revenue generation from the existing technologies. A substantial weightage was given to state and local levels in the fund allocation to address the food security and farmers' distress. This is indicative of faster and more inclusive growth in agriculture. The total value of output growth of crops and livestock has been highest in the XI plan among the past seven periods which averaged at 3.8% per year.In the XII Five Year Plan (2012-17), Indian government had targeted 1 percent intensity ratio of agricultural R&D to agricultural GDP (Pal et al. 2012). As agriculture is a state subject in India such a target could only be achieved by increasing the state contribution in agricultural R & D.

[1] Source: https://data.gov.in/catalog/share-public-sector-outlays-and-expenditure-under-agriculture-and-allied-activities

India has one of the largest agricultural research systems in the world. The two major type of institutions involved in agricultural R&D in India are Indian Council of Agricultural Research (ICAR) and Agricultural Universities (AUs). While ICAR conducts about 43% of the agricultural research, the AUs about 33%. The remaining is contributed by the private sector (16%), and International centres (8%) (Ramaswamy and Selvaraj 2008).

Currently, the agricultural research system in India includes about 27,500 scientists and little higher than 1,00,000 supporting staff (including administrative, financial, skilled and unskilled support) are actively engaged in agricultural research (Anwesha *et al*, 2012). They are part of National Agricultural Research and Education System (NARES) with ICAR as the apex research system and AUs including General Universities as the education system. In terms of number, it is a vast network of 108 ICAR institutes, 77 All India Coordinated Projects/Networks, 4 deemed to be universities, 2 Central Agricultural Universities and 641 Krishi Vigyan Kendras (KVKs) spread across the country. Additionally, there are 71 State Agricultural/ Veterinary/Horticultural/Fishery universities and four general universities with agricultural faculty forming part of NARES. A guided agricultural research policy driven with motto of the "farmer first" aims at accomplishing the food security, food safety, farmer prosperity and enhance natural resources base with science and innovation[2]. To achieve this, numerous collaborative efforts have been established within the public system, PPPs and international collaborations.

1.2 Structure of Public Sector Institutions in India

The public institutions have a definite and conscious role to play in the contribution for the agricultural growth and development in India. They have been structured at different levels to address the needs of the farmers and agri-preneurs of the country. The schematic representation in Figure.1 depicts the flow of technology solutions through agricultural R&D to reach the stakeholders of the agrarian system.

[2] ICAR Vision 2050 Source: http://www.icar.org.in/files/Vision-2050-ICAR.pdf

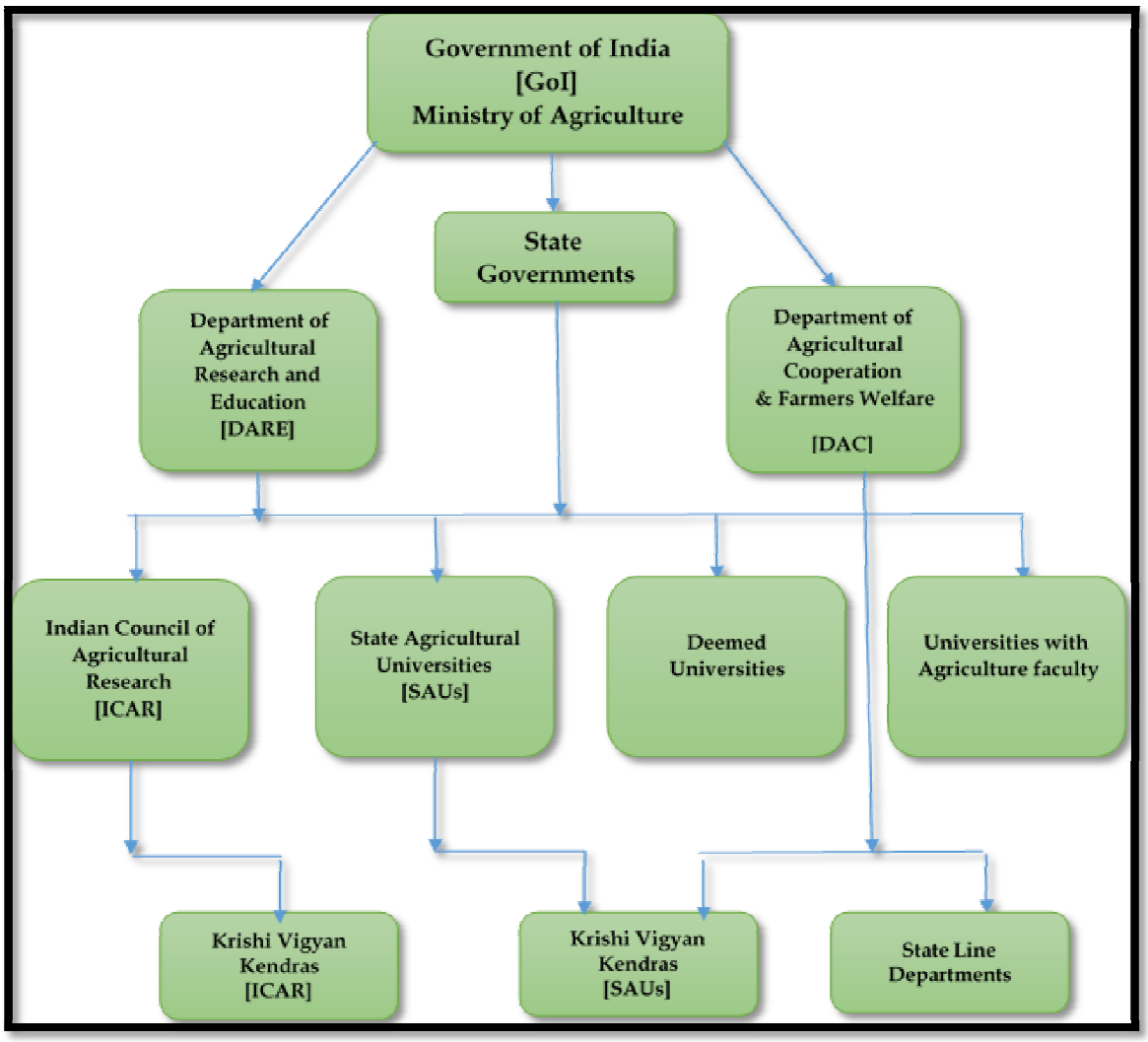


Figure.1 The Structure of Public Institutions in Agricultural R&D in India

1.2.1 Indian Council of Agricultural Research

Department of Agricultural Research and Education (DARE) was established under the Ministry of Agriculture and Farmers Welfare to coordinate and promote agricultural research and education in the country. ICAR, a registered society in DARE is the premier research organization with an annual outlay of 4881.08 crores INR[3] for coordinating, guiding and managing research and education in agriculture including natural resources management, crop

[3]DARE Annual Report 2014-15

Source: http://www.icar.org.in/files/reports/icar-dare-annual-reports/2014-15/APPENDICES-AR-2014-15.pdf

science, horticultural science, animal science and fisheries science in the entire country. It is in the forefront leading numerous agricultural innovations in achieving self-sufficiency.

1.2.2 Agricultural Universities and Higher Education Institutions with Agriculture Faculty

The establishment of the AUs, based on a pattern similar to that of the land-grant universities in the United States (Singh *et al,* 2013), was a landmark in reorganizing and strengthening the agricultural education system in India. These universities became the branches of research under the ICAR and became the partners of the NARES. AUs in the states are given autonomous status and provided direct funds from the state governments. They are responsible for the agricultural research, education and training or extension education at the state level. The green revolution, with its impressive social and economic impact, witnessed significant contributions from the AUs, both in terms of trained, scientific work force and the generation of new technologies.

State-wide integration of teaching, research and extension with multi-disciplinary teamwork in the development programs are directly and immediately related to solving social and economic problems of the countryside. It is designated for better performance to be driven through new knowledge dissemination through students in classrooms, to extension personnel and to farmers. Special focus is given to training the rural youth and adult men and women who are not candidates for degrees and through programmes for departments involved in responsibility for the subject matter being taught.

Presently, all important states have at least one AU, and most of the AUs are multi-campus universities. Some non-agricultural universities, are also involved directly or indirectly in agricultural research like Banaras Hindu University, Vishva Bharati University, Aligarh Muslim University and Nagaland university which have independent faculty for agricultural research and education.

1.2.3 Other Institutions in Agricultural R&D

Some government departments or scientific organizations—like the Department of Science and Technology (DST), Department of Biotechnology (DBT), Council of Scientific and Industrial Research (CSIR), Department of Research and Development Organization (DRDO), etc.—conduct or support agricultural research on sectorial platforms. To some extent, the public sector industrial units are also involved in agricultural research, mainly on inputs. The private sector undertakes research for the development of technologies, mostly that which have commercial pursuits like hybrids, agro-chemicals, farm implements and so on. However, private sector research is mostly adaptive in nature and is expected to intensify in the years to come with

the adoption of favorable industrial and regulatory policies. Several private foundations, both national and international, also conduct and/or invest in agricultural research in the country (Singh *et al,* 2013).

1.2.4 Role of ICAR and AUs

The ICAR as an apex body coordinates research and promotes inter-institutional research linkages. Since the ICAR supports AUs through regular grants, it has direct participation in the management of the AUs. In addition, regional committees were formed in 1975 to assess the status of research, extension and education in the ICAR institutes and the AUs in the eight regions of the country. These committees also make recommendations to undertake research on immediate problems of a region. Officials from the ICAR, ICAR institutes, AUs, State Line Departments, Non-Governmental Organizations (NGOs), members of parliament and farmers' representatives are members of these committees. Another informal but effective link between various research institutions is the cross-nomination of members in various committees and scientific panels. These committees and scientific panels have a major say in the planning and management of research. This is an effort to ensure effective use of research resources and to avoid duplication of research activities. Research collaboration with the Consultative Group on International Agricultural Research (CGIAR) System, NARES and research foundations overseas, etc. is operationalized by the ICAR through DARE. However, AUs can also directly collaborate with these international organizations. Linkages with the national and private research organizations are direct. Public research institutions extend support by activities such as supplying germplasm and training facilities to the private sector.

1.3 Global Scenario

Over the last half of the century with the doubling of world population the food supply tripled even though the land under cultivation grew by just 12% (FAO, 2012). The driving growth in agriculture is the contribution of rising productivity from existing resources. This is perhaps due to the fundamental changes in the research and innovation in farming technologies and practices especially due to capacity expansion in developing countries (Pardey and Bientema 2001). The gross value of share of fruits and vegetables increased from 18% to 22%, while those of oil crops grew from 5% to nearly 8%, but the cereal grains, root and tuber crops fell from 30% to 24% (FAO, 2012). This shifting location and composition of agricultural productivity globally especially from developed to developing countries is due to the contribution from a broad set of commodities and not just food staples (Fuglie.et.al.2012). Globally pattern of R & D spending in agriculture is changing (Beintema *et al,* 2012). Most of this change could be attributed to change in institutional investment in agricultural R & D by developing countries. The R & D investment in those countries had shifted from public to private sectors affecting the distribution of benefits among countries (Pardey et al. 2006). In the era of intellectual property rights developing

countries would no longer be able to reap the benefits of spillover of research from developed countries.

Research system in developing countries relays on developed countries individually and collectively (through CGIAR), and are only successful in the last phase of the R&D process (eg. selecting and developing varieties for local conditions through breeding of materials from developed countries and locally available germplasm). This warrants higher domestic investment in research and institution for self-reliance (Pardey *et al,* 2006). Between 1981 and 2000, public agricultural R&D expenditures of high-income countries increased in absolute terms but the rate of spending had decreased from 62 to 56 %. On the contrary, the share of middle income and low income countries had increased from 29 to 33 per cent and 9 to 11 per cent respectively (Beintema and Stads, 2010). India and China account about 70 % of the total research expenditure in Asia Pacific Region. The growth of public investment on R&D in India was 25 % from 2000 to 2008 (Pal *et al,* 2012).

1.4 Agricultural Science and Technology Indicators

In line with understanding of global trends in public R&D investments in agriculture, it is vital to recognize few initiatives like Agriculture Science and Technology Indicator (ASTI) from International Food Policy and Research Institute (IFPRI) to address the problem of availability of information on trends in public R & D investments in developing countries (Beintema & Stads 2010). Indicators developed from such datasets are important for the policy makers to frame research policies (Beintema and Stads, 2010). The "Indicator Series Project," launched in 1984 by ISNAR was renamed in 2000 as "Agricultural Science & Technology Indicators (ASTI)". Since 2004, IFPRI is solely working on the survey rounds on science and technology indicators which is widely considered as the most authoritative source of information on the support for and structure of agricultural R&D worldwide.

ASTI has been collaborating with the Global Forum for Agricultural Research (GFAR), the Asia-Pacific Association of Agricultural Research Institutions (APAARI) and several other national and international institutions. From the past studies, it has been observed that improving agricultural productivity features high on the agenda in most of the developing countries, which are constantly increasing their spending for agricultural R&D in recent years. For example, China's public agricultural research spending almost doubled during 2000-2008 and is estimated to have increased by a further 50 per cent (an additional $ 2 billion dollars in 2005 prices), during 2009-2010. Similarly, Government of Brazil has increased its commitment to agricultural R&D, resulting in an estimated increase in spending of 20 per cent during 2008-2011. Unlike these, though Government of India (GoI) has though increased its funding to agricultural research since the late 1990s, it is believed that the country has invested a lower percentage of its agricultural output in research as compared to either Brazil or China, both in absolute terms and

as a share of its agricultural GDP. Therefore, agricultural R&D stakeholders, including policy makers, R&D managers, international development groups, need reliable and up-to-date information on the status and direction of spending and human resource capacity levels.

The Agricultural Science and Technology Indicators (ASTI) collects primary data through national survey rounds in country focal points that are typically based at national agricultural research institutes and few independent consultants. The initiative compiles, analyses, and publishes primary data on institutional developments, investments, and human resources in agricultural R&D in low- and middle- income countries in the world.

1.4.1 ASTI in India

The knowledge on the various agricultural research inputs and outputs is integral to every country. Yet, it is challenging to gather and consolidate all such information of nations across the globe which has diverse agro-climatic patterns and working systems. The ASTI initiative is one such platform to bring all such information in a standard comparative scale of measurement to assess the human, financial and research resources for the benefit of the countries. The quantitative information from the datasets is used to determine the key factors responsible for the agricultural investments, the fluctuations in the climatic landscape and the market challenges for the agricultural production and consumption. It strives to address the system challenges region wise and country wise through the pathway for good policy interventions, redress stake holder problems and opportunities for global collaborations between developed, developing and underdeveloped nations.

India is known for its committed largest and well-coordinated public agricultural research systems in the world. It has considerable investment during the past few decades (Pal and Singh, 1997). It ranks fourth in total investments in public agricultural R&D in the world. These investments have been crucial determinants of agricultural productivity. The past empirical evidences indicate high rate of returns from agricultural R&D investments (Alston et al., 2000; Bientema et al.,2008). This is an encouraging trend for the public research system.

Since 2000, the ASTI studies have given enormous quantum of the information on the agricultural science indicators in two spells of survey rounds. The past policy briefs give the insights on the growing impact of the world agri-food markets on the agricultural development in developing countries and the upcoming second generation challenges of scarcity of resources, changing climatic conditions, increasing pest problems and resistance to new technological changes. The scenario being dynamic, instigates to continuous watch on the changing global trends for a renewing policy model.

1.4.2 ASTI-Current Study

The present study is an initiative of ICAR-NAARM and IFPRI to understand and assess the role of agencies involved in agricultural R&D in India, including those in the government, non-profit, and higher education sectors with the help of identified indicators in agricultural science and technology. This is the third round of survey being conducted in India. These indicators abbreviated as 'ASTI' include attributes pertaining to human resources, financial resources, research focus and research outputs. The inputs in this data survey essentially help to analyze the historic development of agricultural research and education in India with a relative stance of the country in the developing and developed world. Further, it deliberates an opportunity for the policy makers to assess the current R&D scenario to prepare for futuristic assessments and frame a comprehensive policy system in tandem with dynamic changes in the agricultural system.

Similar collaborative data collection, survey and analysis for Agricultural Science and Technology Indicators were conducted in the past by National Institute of Agricultural Economics and Policy Research (NCAP) and Indian Agricultural Research in India (IARI), New Delhi in collaboration with ASTI-IFPRI. However, the past studies havefocused mainly on the input data on agricultural research, viz. human and financial resources and little on research focus. Present round intends to collect information on research outputs besides collecting the past series on human resources, financial resources and research focus.

1.5 Objective of Study

Since the rationale for the study is to address the knowledge gaps towards a continuum of the compilation of the dataset for the 2009-2014, the objectives were framed as follows:

(i) to understand the role of Indian public agricultural R&D agencies that include government, non-profit sectors;

(ii) to identify the output and performance indicators, policy developments in recent years, including the institutional changes; and

(iii) to disseminate the findings of the survey to policymakers and other relevant stakeholders.

CHAPTER-II

METHODOLOGY

2.1 Data Collection

The work plan for the current study is largely based on the quality data collection and updating datasets on some key parameters on agricultural R&D system such as those on human resources, financial resources, research focus and research outputs. The datasets are used by the ASTI portal hosted by IFPRI, Washington, a decentralized system for data gathering, synthesis, compilation and analysis. This initiative intends to put forth the process of institutionalization for data collection on a regular basis via a network of national and regional focal points at ICAR institutions and Agricultural Universities. It provides an authentic information that can be used for policy advocacy at both regional as well as country-level. It is expected that in due course of time, a robust system with capacity would be in place in our country so as to know the trend in all the above mentioned parameters and also for devising futuristic policy measures in agricultural R&D investments.

The ASTI has been updating on the list of indicators from time to time and making dynamic changes based on their experiences and procedures from the preceding national survey rounds. This enhances the opportunity for understanding the current scenario in the agricultural R&D and also for comparing the trends in terms both inputs and outputs of agricultural R&D in the national agricultural research and education system. Accordingly, a data collection process was initiated for the third round (2009-2014) in India at ICAR-National Academy of Agricultural Research Management, Hyderabad.

2.1.1 Consultation with IFPRI

The project proposal was prepared on the basis of an invitation from IFPRI, Washington. As the work mandate in the proposal forms the mandate of National Academy of Agricultural Research Management (NAARM), Hyderabad, this collaborative research project was initiated and titled as “Implementing Agricultural Science & Technology Indicators (ASTI) data collection and policy analysis in India” through contract between ICAR-NAARM and IFPRI in 2014. The base guidelines mandated by IFPRI were taken up for the study and data collection.

2.1.2 Indicators for the study

The national survey rounds of ASTI focus on the agricultural R&D rather than expanding to include indicators on the manifold dimensions of the agricultural innovation process[4]. As there is no particular consensus on how to perform the multi-faceted analysis, few analytical measures were compounded as indicators assess agricultural R&D performance. The ASTI has four designated indicators as follows:

2.1.2.1 Human Resources

This indicator depicts the status of the human resources in the agricultural R&D and education system and indicates the direction to maintain the needed balance among different cadres, disciplines, gender and qualifications, etc. over a period of time.

2.1.2.2 Financial Resources

This indicator covers the information on funding source, expenditure pattern and revenue generation in the public agricultural R&D system. This vital information would give a deep insight about the intensity of investment as well as the actual share of it on research programmes.

2.1.2.3 Research Focus

This indicator provides information about the research portfolio of the institution according to commodities as well as research themes in public agricultural R&D system. This is essential for policy makers to know which way the agricultural research is being pursued currently and where it needs to go in future, considering the challenges ahead as per the needs of people of the country besides meeting global commitments.

2.1.2.4 Research Outputs

The technologies developed, products or biological outputs in the form of varieties released; breeds; transgenes; lines developed are the major indicators of the performance of R&D in a country. In addition to this, publications of research work are the direct outputs of researchers. This indicator covers aspects which are very important to know the productivity of agricultural research in the country.

2.1.3 Structuring of Survey Forms

A guided structure for survey form was taken up based on IFPRI template. As discussed all the above indicators were taken into consideration for the data collection. A structured survey form [refer to Annexure I(a)] comprising five sections were designed as per the public research setup in India as they play a major role in the agricultural R&D and education system. As the

[4] Practitioner's guide for national and regional focal points - ASTI methodology and data collection standards
Source: http://www.asti.cgiar.org/sites/default/files/pdf/methodology/ASTI-Practioners-Guide-complete-version.pdf

study is meant for five years, 2009-2014, some of the data are collected as time series and others for the current year 2013-2014.

The sections in the survey form were designated as:

1. *Section A- Institutional details*:
   Basic details of the institution where the survey is being conducted, the contact point, address, affiliation and the category of institution
2. *Section B- Human Resources:*
   The number of researchers, degree levels, the proportion of time that various staff spend on research, the age distribution of research staff, the number of women researchers, discipline of researcher, support staff (technical; administrative; financial; others) by numbers with qualification and capacity building activities information form the core of this section
3. *Section C- Financial Resources:*
   Expenditure by cost category on salaries, operational costs, capital investments; sources of funding (core government; other government; loans; bilateral /multilateral; sales); and revenue generation (research projects; institutional charges; sales; commercialization of technologies; other sources)
4. *Section D- Research Focus:*
   Full-time equivalent (FTE) researchers assigned to formal research programmes, commodity focus and thematic focus
5. *Section E- Agricultural R&D outputs:*
   Development of new (including transgenic) varieties of crops, animal/ fish/poultry breeds, strains, lines, technologies and products form the major information; publications by researchers; awards and recognitions received by researchers, training conducted by institutions

2.2 Institutions Covered in the Survey

The national survey round was initiated with a complete list of all agencies involved in agricultural R&D in the country. A broad classification of the agencies as suggested by IFPRI were taken up as :

a. Government and Non-profit Institutions
b. Universities or Institutions of Higher Education

The number of institutions which participated in this round of survey is depicted in Table 2.

Table 2. Institutions Participated in the Survey of ASTI

S. No	Institutes	Total*	Surveyed**
ICAR			
1	ICAR Deemed Universities	4	4
2	Central Institutes	49	49
3	National Research Centres	17	17
4	National Bureaus	6	6
5	Directorates and Project Directorates	23	23
6	Zonal Project Directorates	8	8
	Total	**107**	**107**
AU			
1	State Agricultural Universities	40	35
2	State Veterinary Universities	12	11
3	State Horticultural Universities	04	03
4	State Fisheries Universities	02	02
5	Central Agricultural Universities	02	01
6	Central Universities with Agricultural Faculty	04	00
7	Other Deemed Universities	01	01
8	Other Higher Education Institutions	01	01
	Total	**68**	**54**

*Note: * Total is the total number of institutes in India,*
*** Surveyed number includes collection of information from primary and secondary sources*
Source: Total numbers based on ICAR Annual Report, 2014-15 and surveyed as per ASTI, 2013-14.

The list of the institutions selected for participation in the survey is included in Annexure –II.

2.2.1 Validation of Survey Forms

A 'Brainstorming meeting for pre-testing of ASTI survey forms' was held on 17 November, 2015 to pre-test and ascertain the effectiveness of the questionnaire designed by NAARM in consultation with IFPRI across NARES. The meeting essentially intended to understand whether all the aspects in which data are required were properly covered in the survey forms in line with IFPRI frame work and the organizations contributing to agricultural research and education system in India. About 22 nodal officers representing various commodities, subject matter divisions, agro-ecological regions and research systems working under both ICAR and AUs who would be participating in the project attended the meeting.

The survey form was structured with five sections (Sections: A,B,C,D,E). The participants were organized into four groups to brainstorm (refer to Annexure III) and deliberate on the specific sections in the ASTI survey forms. Some of the suggestions were incorporated

and finally the survey forms were standardized. Few additional attributes were added in the survey form that were not part of IFPRI form meant for the country level studies and they were kept to cater for institutional policy making such as HRD programmes undergone by researchers, training &extension activities carried out by researchers, revenue generation by the institutions, awards and recognition secured by the researchers.

2.2.2 Approach for Data Collection

A total of 107 ICAR institutions and 68 Agricultural Universities and Higher Education Institutions were contacted (refer to Annexure II). Initial communication was sent from Director, NAARM with a request to nominate a Nodal Officer from the concerned institution. After receiving nominations, a communication from the Principal Investigator (PI) of the project along with survey form was sent to the nodal officers. E-mail communication was also sent with soft copy of the survey form to the Nodal Officers and Heads of the institution from where nominations were not received. The ASTI project team have also visited personally to some of the institutions to appraise the nodal officers and the Heads of the institutions about the survey. Sufficient time was given for nodal officers to respond with the data. Frequent communication and persuasion was done through mails, visits and telephonic conversations.

2.3 Data Consolidation, Compilation and Analysis

Based on the parameters that were addressed under the different sections in the survey form, 28 excels sheets were structured for the final consolidation and compilation. The template was standardised by IFPRI-ASTI for collating data with the ASTI portal. The institutions were indicated with agency numbers for collation in the portal.

The excel sheets data was used for further analysis on the parameters stipulated by ASTI.

2.3.1 Data Compilation

Primary Sources: Information pertaining to various institutes was obtained from the nodal officers in the circulated survey form. Both the received hard and soft copies were thoroughly checked and the data was entered in the structured excel sheets manually. To make up with the gaps, the institutes were approached through nodal officers.

Secondary Sources: For information about the institutions that have not responded, secondary sources of information were considered. Some of the information was taken up from the authentic archives[5] in the libraries of Krishi Bhavan, Krishi Anusandhan Bhavan, Directorate of Knowledge Management in Agriculture (DKMA), Indian Agricultural Research Institute (IARI) and Indian Agricultural Statistics Research Institute (IASRI) of ICAR, New Delhi. Few

[5] QRT reports, Accreditation reports, Annual reports, Financial reports, Self-study reports, Institute profiles

inputs were taken from the offices of Additional Director General (EQAR), and ADG (PIM) and Personnel Department, Krishi Bhavan, New Delhi. Websites of all the institutions in the selected list were checked for all the essential information required in the survey forms. Effort was made to gather all the secondary information that was available in bits and pieces from various sources for each institute. All such available data was sorted and consolidated for every individual institute and entered in the excel sheets. The financial information was also taken from the plan and non-plan budget books of ICAR for the said period (2009-10 to 2013-14). For figures on human resources AUs, the Indian Agricultural Universities Association (IAUA) website was referred.

2.3.2 Data Analysis

The various indicators designated in the survey form were used for analysis under the respective resource heads.

All the indicators on researchers were calculated on the basis of Full Time Equivalent (FTE). For FTE calculation, the time allocation of researchers on research activity exclusively in both ICAR institutions and AUs was taken as deflator.

In the human resources, distribution of researchers by qualification, age, discipline and gender were calculated based on Full Time Equivalents (FTE). The ratio of support staff to the researchers was calculated to understand the supporting ecosystem for R&D pertaining to human resources. The intensity of capacity building programmes on FTE researchers was measured.

For financial resources, the primary and secondary sources information on expenditures and allocations figures were used. They were shown in thousand INR.

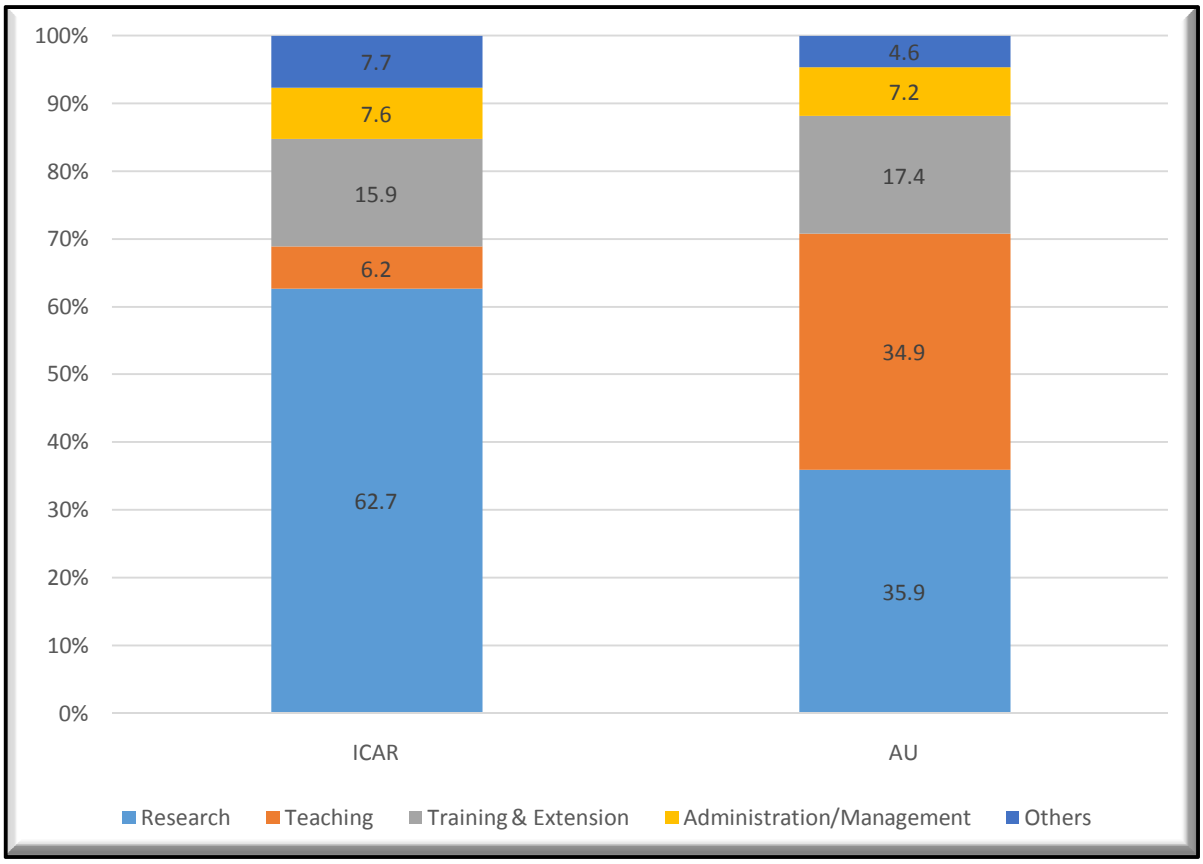
The research outputs for awards and recognitions; and contribution for training farmers/ agri-preneurs / SHGs were considered for FTE researchers contribution.

CHAPTER-III

RESULTS AND DISCUSSION

The results and discussion are laid out for all parameters chosen in public funded agricultural R&D institutions, viz. Indian Council of Agricultural Research (ICAR) and Agricultural Universities (AUs). The intention of this pattern of discussion is not to compare the institutions but to understand them further in detail accounting their difference in focus and mandate.

3.1 Time Allocation of Researchers in Public Agricultural R &D Institutions



Source: ASTI Survey, 2014-15; n:- ICAR=59; AUs=17

Note: Training denotes those given to the scientists and teachers of other organizations and agricultural development officials; Extension denotes those given to the farmers, agripreneurs and NGOs.

Figure 2. Time Allocation of Researchers in Public Agricultural R &D Institutions, 2013-14

Researchers in our public agricultural R&D system devote their time in various activities other than research. It is ought to have an implication on both quantity and quality of research work undertaken by them. This is bound to be variable between the ICAR and AUs, because of their very nature of the mandates. Hence, time allocation by researchers in both ICAR and AU system was studied. The share of their time in research during 2013-14 was then taken for calculating the full-time equivalent (FTE) researcher which should be used to know the real impact of researchers in terms of manpower, finance, productivity, etc. in this study.

It is observed that ICAR research staff was mostly (62.7%) engaged in research, followed by extension and training (15.9%). Administration/ management/coordination also accounted a considerable time (7.6%), than teaching (6.2%), since there are only four deemed universities and one training academy engaged in teaching.

Faculty at AUs devoted maximum time in teaching and research which almost equally accounts to 36% and 35% respectively. It is understood that they are mandated to transfer their technologies, especially varieties. Hence, faculty at AUs devoted more time on training and extension (17.4%) than those in ICAR. While the same on administration/ management/coordination was similar to ICAR (7.2%).

Hence, the value of 0.627 and 0.359 respectively had been used as deflator in this study.

3.2 Human Resources in Public Agricultural R &D Institutions

Human resources in agricultural R&D is one of the major inputs and the primary yardstick for assessment of performance. For the purpose of this survey, total research staff in position (scientists of all cadres, programme coordinators, project coordinators, professors of different cadres) of the institution was taken into account. The individuals holding a research position (including long-term consultancies) with the restriction that the person should have at least a BSc degree or equivalent (i.e., at least three, but usually four years of full-time university training); management positions like Deputy Directors and Heads of research programs, are also classified as research staff. Only staff on post but on long-term unpaid leave, or positions approved but not filled were excluded from the study.

3.2.1 Distribution of Researchers (including Research Managers) by Qualification

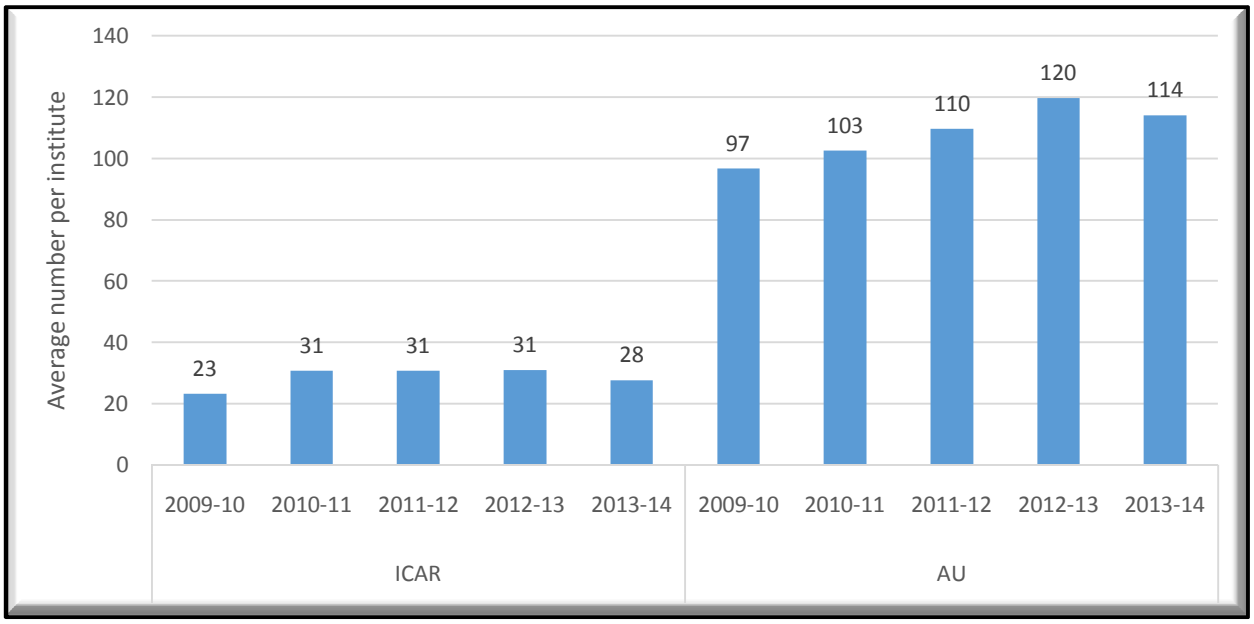
3.2.1.1 Number of Researchers

In the current survey period, 2009-10 to 2013-14, number of researchers working per ICAR institute had increased steadily from 23 in 2009-10 to 31 in 2012-13 and declined slightly (28) in the last year of survey, 2013-14 as shown in Figure 3a. In case of AU, the same trend was observed and the number of researchers was 97 per AU in 2009-10, which increased to 120 in

2012-13. It had seen a marginal fall (114) in 2013-14. The steep increase over the initial phase of this period in AUs might be due to establishment of many new universities, either by bifurcating the existing universities and/or by creating a new university itself on different sub-sectors of agriculture, viz. veterinary, horticulture and fisheries and the resultant recruitments of new faculty to meet the needs of the newly formed universities by different states.

Almost, a similar finding was observed in the previous round of ASTI. Human resource employed in public agricultural research institutes had shown a gradual decline in the last phase of the ASTI survey, 2008-09 (Pal et al. 2012).

Understandably, the number of researchers was found more in AU system, because of the size of the institutions, as well as multiple mandates / activities of AU in the areas of teaching and extension besides research. By nature, the university would have teachers from all faculty of agriculture and allied sciences discipline, while in case of ICAR which works on specific mandates, theme areas and commodities, the number of researchers would depend on the nature of research programmes they pursue.



Source: ASTI Survey, 2014-15; n:ICAR=79; AUs=54 (The maximum number of reported institutes)

Figure 3a: FTE Researchers Strength in Public Agricultural R&D Institutions

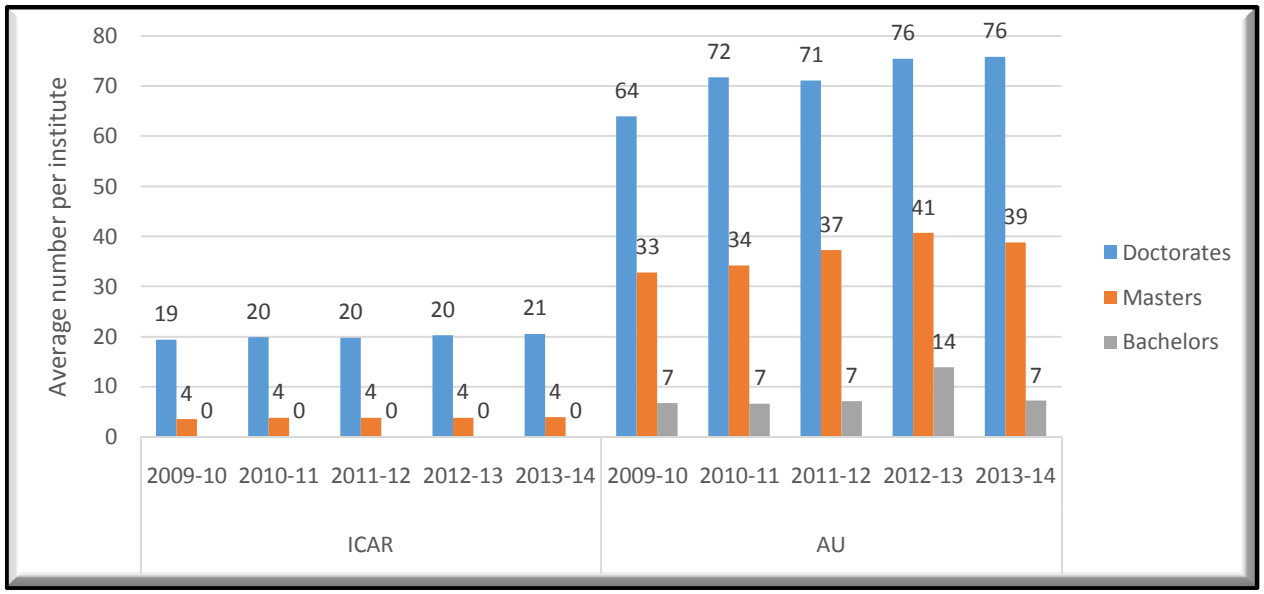
It is further observed that there was a significant shortfall in the researchers/faculty positions in AUs, including ICAR-DUs inspite of a general increase in their numbers during the period (Table 3) the deficit is more in AUs than in ICAR institutions. This explicitly indicates the need for more teaching/research staff at university level.

Table 3: Information on Researchers in State Agricultural Universities as on 2012-13

Universities	Sanctioned	In position	% deficient
AUs (61 including CAU,BHU&SHIATS)	27585**	17004*	38.35
ICAR-Deemed Universities (IARI, IVRI,NDRI, CIFE)	1202**	877*	27.03

**Source: NAARM-IFPRI ASTI Data and IARI Annual Report 2012-13*
***Source: IAUA web link: http://www.iauaindia.org/introduction.htm*

3.2.1.2 Number of Researchers by Qualification



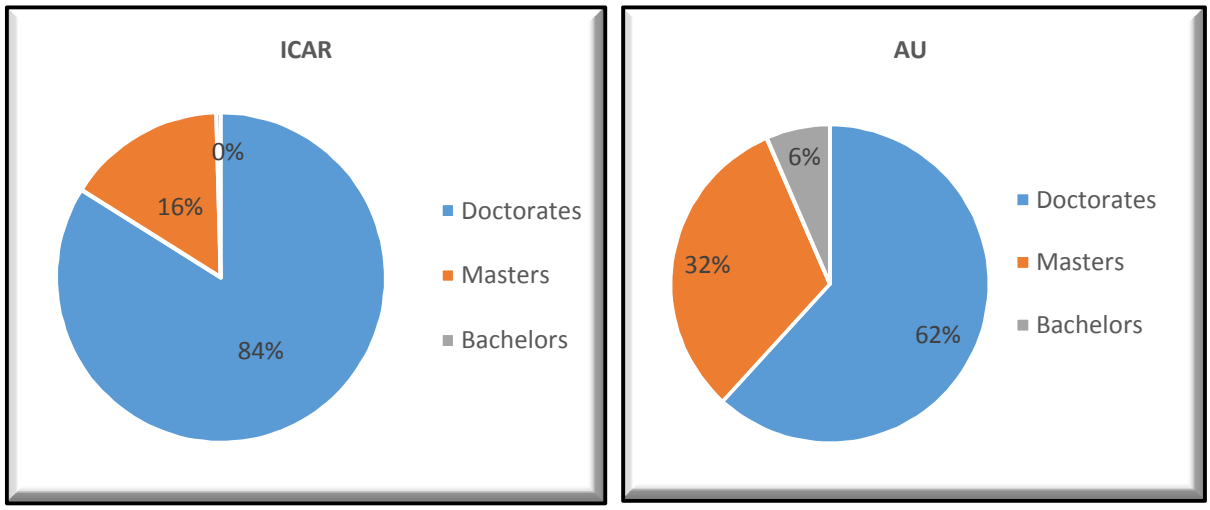
Source: ASTI Survey, 2014-15; n: ICAR=79; AUs=54 (The maximum number of reported institutes)
Note: If the degree-level equivalence is unclear, apply the following educational scale:
Doctorate is equivalent to more than 6 years full-time university education, including a doctorate thesis.
Master is equivalent to 5-6 years of full-time university education.
Bachelor is equivalent to at least 3 (but usually 4) years of full-time university education.

Figure 3b. Number of FTE Researchers by Qualification in Public Agricultural R&D Institutions

It is observed that the average number of doctorate qualified researchers was increasing from 19 in 2009-10 to 21 in 2013-14 in ICAR and similar trend was seen in AUs, where it increased from 64 to 76 during the corresponding years. As expected, the numbers were more in AUs than ICAR. Interestingly, some of the faculty were only bachelor degree qualified in AUs, which might be due to the fact that in some disciplines, there might have been difficulty in

getting in the master degree qualified persons to be recruited as faculty in the earlier years and they continue to be as faculty there. Hence, it was reflected during the survey period.

3.2.1.3 Share of Researchers by Qualification



Source: ASTI Survey, 2014-15; n: ICAR=79; AUs=54 (The maximum number of reported institutes)

Figure 3c: Average Share of FTE Researchers' by Qualification in Public Agricultural R&D Institutions

It can be seen from Figure 3c that the share of doctorates was more in ICAR (84%), as compared to AUs (62%) during the period from 2009-10 to 2013-14. The share was less as they also employed other staffs with Masters and Bachelor's degree to assist in research carried out in laboratories and research farms (Pal et al. 2012). Conversely, the share of master degree holders was more (32%) in AUs than in ICAR (16%). There could be two reasons for this finding. One is that relatively more number of doctorate qualified candidates were entering the ICAR service compared to AUs and the second is that ICAR encourages their scientists at the initial stages of their career to get them qualified with PhD due to their facilitating study leave policy.

The share of under-graduate researchers was nil in case of ICAR as the eligibility for scientists selection is post graduate degree and the selection is based on competitive examination[6].

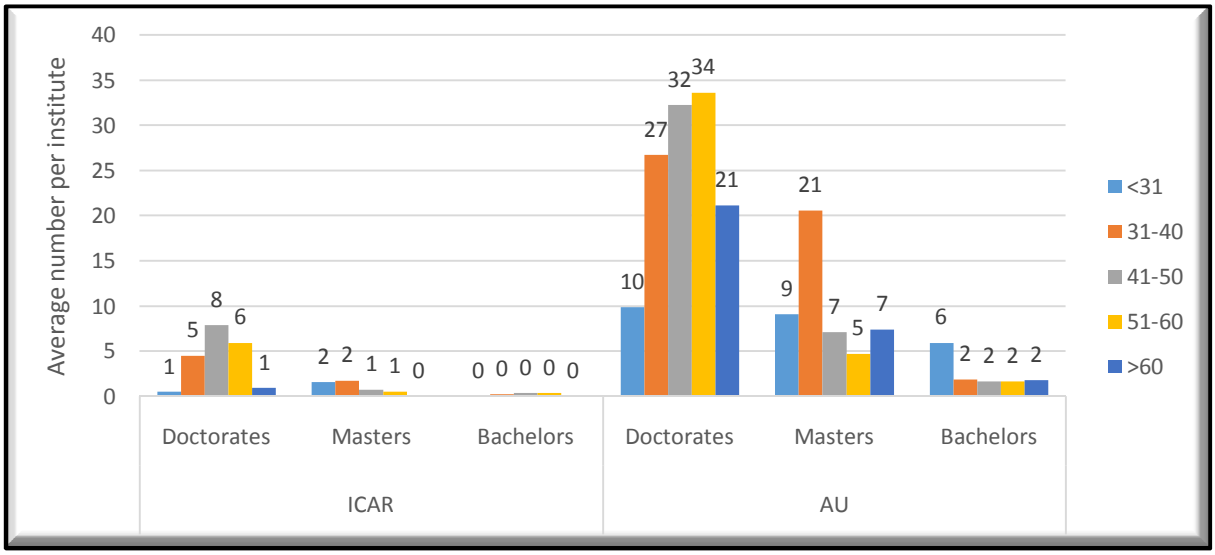
The share of doctorates in the total research staff increased from 67 percent in 1996 to 80 percent in 2003 and further 86 percent in 2009 (Pal et al. 2012),where eligibility criteria is master's degree.

[6] ARS examination conducted by Agricultural Scientists Recruitment Board (ASRB), New Delhi
Source:http://asrb.org.in/images/asrb/pdfs/notification-for-ars-2015-and-net-2015.pdf Accessed on 12-02-16

3.2.2 Distribution of Researchers byAge

The age of the researchers provides the distribution of researchers involved in the current research system and perhaps gives a direction about the future recruitment so as to maintain an optimum balance or composition in the scientists' cadre.

3.2.2.1 Number of Researchers by Age



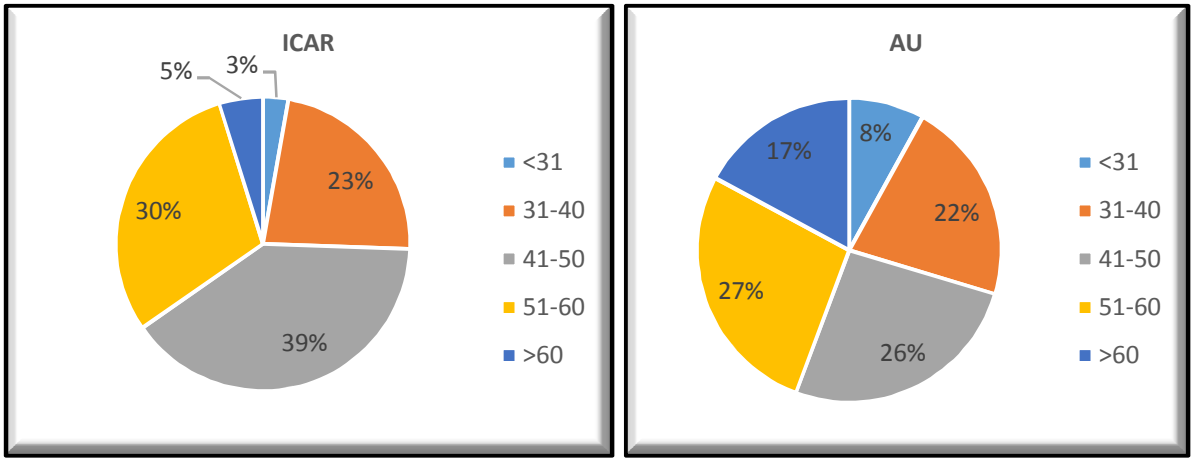
Source: ASTI Survey, 2014-15; n: ICAR=64; AUs=17 (The maximum number of reported institutes)

Figure 4a. Number of FTE Researchers by Age in Public Agricultural R&D Institutions

In furtherance to the findings in the earlier sub-head, the number of researchers was found more in numbers in AUs than in ICAR.

In ICAR, maximum number of doctorates was in the age group of 41-50 years, while masters were in the age group of 31-40. This indicates in general ICAR has a stable manpower policy with relative better regularity in recruitment keeping in mind the equitable distribution of different cadres of scientists that takes care of generational gap of scientists in the system. While in AU's the maximum number of doctorates were in age group of 51-60 years and masters in 31-40 years. The gap in the age distribution shows that most of the personnel in the initial years of service were qualified with master's degree, as they were recruited with that degree and need to undergo doctorate programmes as soon as possible to bridge the gap.

3.2.2.2 Share of Doctorate Researchers

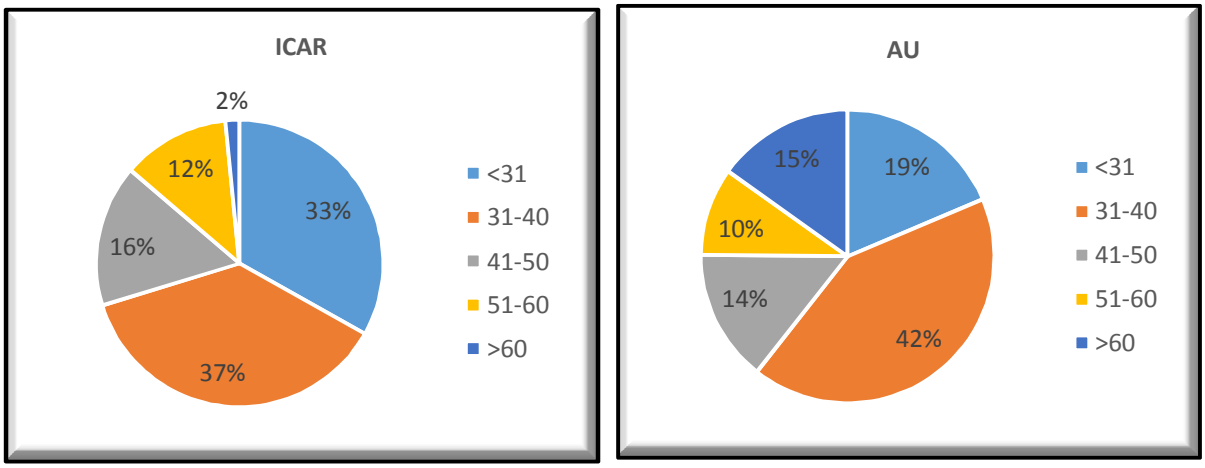


Source: ASTI Survey, 2014-15; n: ICAR=64; AUs=17 (The maximum number of reported institutes)

Figure 4b. Share of Doctorate FTE Researchers by Age in Public Agricultural R&D Institutions

Figure 4b indicates the share of doctorate researchers by age group. It shows that the large share (39%) of researchers fell in the age group of 41-50 years in ICAR, while in AUs, the same belonged to the age group of 51-60 years.

3.2.2.3 Share of Post-Graduate Researchers



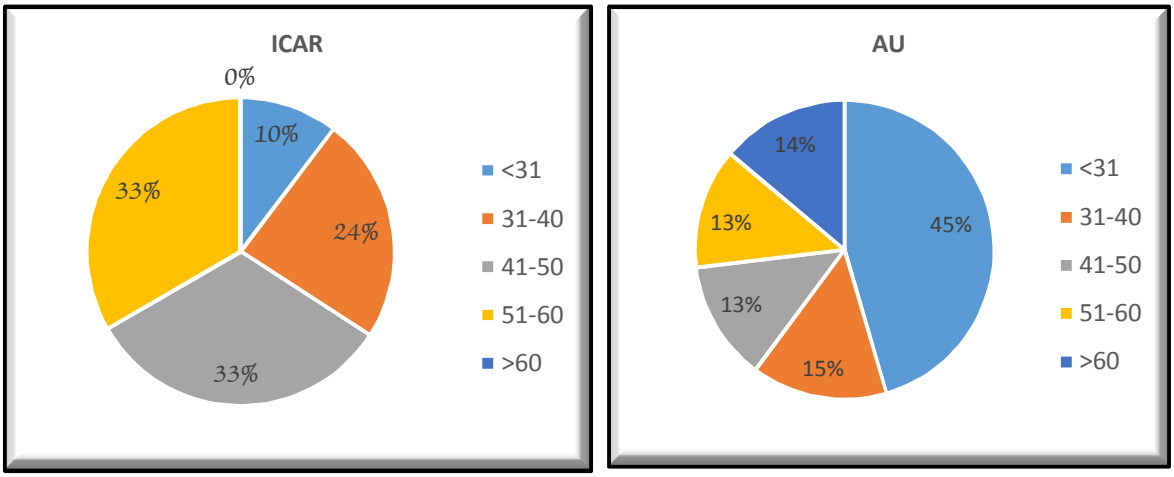
Source: ASTI Survey, 2014-15; n: ICAR=64; AUs=17 (The maximum number of reported institutes)

Figure 4c. Share of Post-Graduate FTE Researchers by Age in Public Agricultural R&D Institutions

Figure 4c indicates the share of master researchers by age group. It shows that the researchers in the age group of 31-40 years constituted the largest share (42%) in AUs, while in

ICAR, the same age group constituted 37% only, indicating the faster movement of them in terms of their academic qualification in the latter than in the former.

3.2.2.4 Share of Under-Graduate Researchers



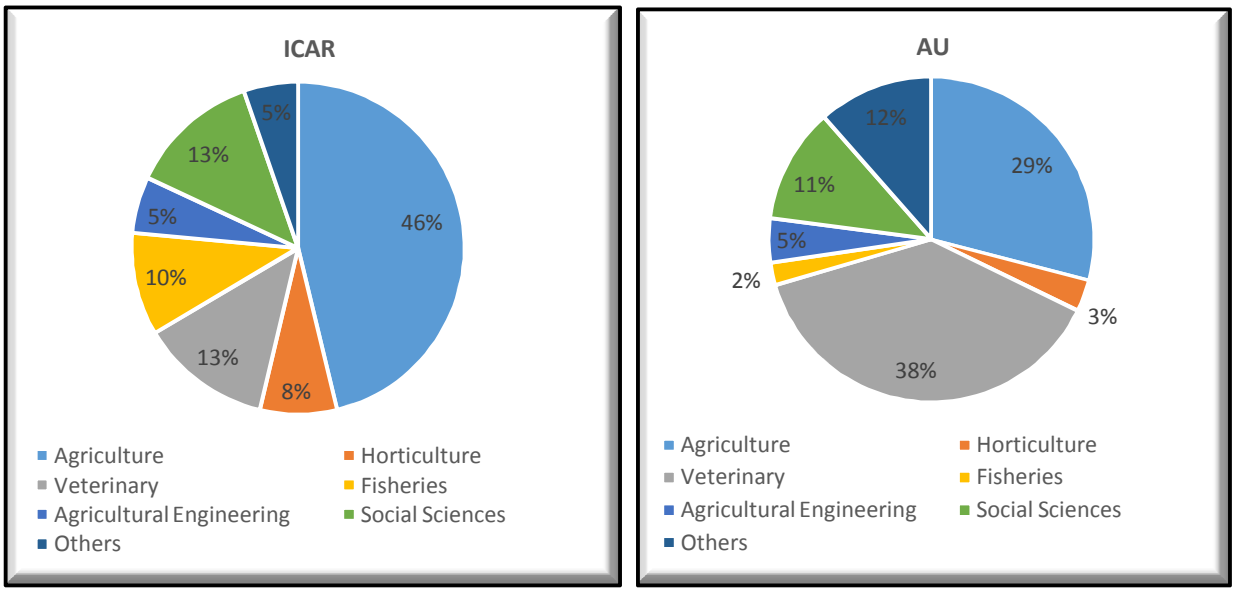
Source: ASTI Survey, 2014-15; n: ICAR=64; AUs=17 (The maximum number of reported institutes)

Figure 4d. Share of Under-Graduate FTE Researchers by Age in Public Agricultural R&D Institutions

The size of the researchers with bachelor degree qualification was more in AUs in the age group <31 when compared to ICAR system as they had more opportunities as researcher or research assistant and its equivalent positions in AUs. However, the present criteria for recruitment as researchers in both ICAR and AU systems stipulate a minimum of post-graduate degree in the concerned discipline. The numbers in the survey might indicate the research positions that had been filled well before the survey period and they continue to be the faculty in the system. Hence, a sizable percent was in age group of 41-50 & 51-60 indicative of the previous recruitment policy, and having acquired positions with bachelor's degree.

3.2.3 Distribution of Researchers by Discipline

3.2.3.1 Composition of Researchers by Broad Disciplines of Agriculture and Allied Sciences



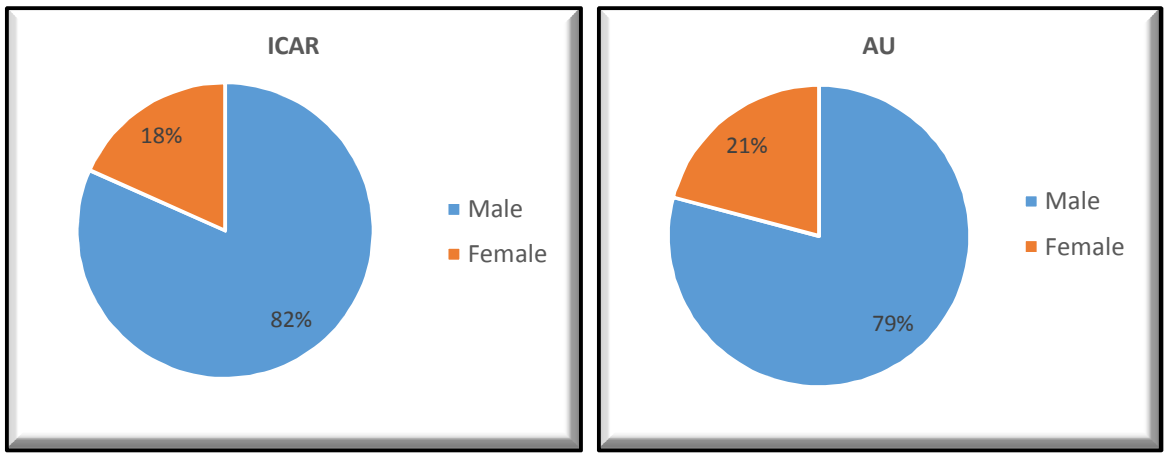
Source: ASTI Survey, 2014-15; n:ICAR=66; AUs=16 (The maximum number of reported institutes)
Note: The disciplines in agriculture and its allied groups have been categorised into 7 broad groups, namely:

Agriculture: Agricultural Biotechnology, Agricultural Entomology, Agricultural Microbiology, Economic Botany & Plant Genetic Resources, Genetics & Plant Breeding, Nematology, Plant Biochemistry, Plant Pathology, Plant Physiology, Seed Science & Technology, Agricultural Chemicals, Agricultural Meteorology, Agroforestry, Agronomy, Environmental Science, Soil Science
Horticulture: Floriculture & Landscaping, Fruit Science, Spice, Plantation, Medicinal & Aromatic Plant, Vegetable Science, Horticulture
Veterinary: Animal Biochemistry, Animal Biotechnology, Animal Genetics & Breeding, Animal Nutrition, Animal Physiology, Animal Reproduction & Gynaecology, Dairy Chemistry, Dairy Microbiology, Dairy Technology, Livestock Products, Technology Livestock Production Management, Poultry Science, Veterinary Medicine, Veterinary Microbiology, Veterinary Parasitology, Veterinary Pathology, Veterinary Pharmacology, Veterinary Public Health, Veterinary Surgery, Veterinary Anatomy
Fisheries: Aquaculture, Fisheries Resources Management, Fish Processing Technology, Fish Nutrition, Fish Health, Fish Genetics & Breeding
Agricultural Engineering: Farm Machinery & Power, Agricultural Structures & Environment Management, Land & Water Management Engineering, Agricultural Process Engineering, Food Technology, Soil and Water Conservation Engineering
Social Sciences: Agribusiness Management, Agricultural Economics, Agricultural Extension, Agricultural Statistics & Informatics, Home Science
Others: Others not included in the above disciplines

Figure 5a. Composition of FTE Researchers by Broad Disciplines of Agriculture and Allied Sciences in Public Agricultural R&D Institutions

In ICAR, more number of researchers were from agriculture discipline (46%), followed by those from veterinary and social sciences disciplines (13% each) during 2013-14, whereas in AUs the same was more from veterinary discipline (38%), followed by agriculture (29%). This puzzling picture in AUs is perhaps due to more veterinary institutes reporting in the survey. The bigger share of researchers from the broad disciplines of agriculture is understandable from the national requirement on food security for the ever increasing population and to have self-sufficiency in the foodgrain stock in the country.

3.2.3.2 Share of Researchers by Gender



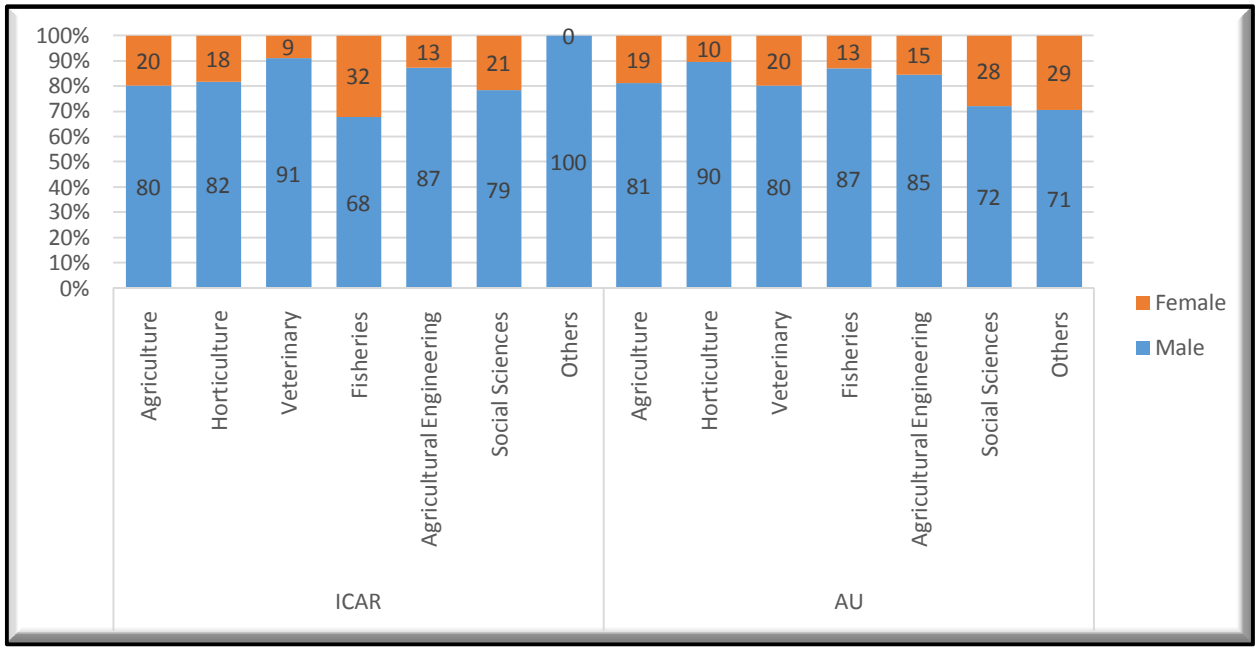
Source: ASTI Survey, 2014-15; n:- ICAR=66; AUs=16

Figure 5b. Composition of FTE Researchers by Gender in Public Agricultural R&D Institutions

It is observed that the share of women researchers was more in AUs (21%) than in ICAR (18%) (Figure 5b). This might clearly be due to the hesitation of female candidates to take up Agricultural Research Service, which is of All-India service nature and the domestic and cultural compulsions of female researchers to be within the state from where they hail from. However, this could also negatively result in in-breeding of researchers, impacting the quality of research works undertaken by them.

The average female research staff shares 25% in case of developing countries (Beintema 2014). The ratio in India is less than the average in developing countries. Hence, there is aneed to attract the women researchers into the national agricultural R&D system to enhance the overall productivity of agricultural researchers, as they have the inherent strength and advantages of taking up research in certain disciplines, which require more of in-house laboratory and equipment handling skills.This could be made possible by developing adequate policy for recruitment such as special drive, choice of posting, preference for certain disciplines, etc. to attract more women researchers into NARES.

3.2.3.3 Share of Researchers by Gender among Broad Disciplines of Agriculture and Allied Sciences



Source: ASTI Survey, 2014-15; n:- ICAR=66; AUs=16
Note: The disciplines were consolidated into 7 broad categories (refer to Fig.4a)

Figure 5c. Composition of FTE Researchers by Gender among Broad Disciplines of Agriculture and Allied Sciences in Public Agricultural R&D Institutions

Figure 5c depicts the picture of composition of researchers by gender in broad disciplines of agriculture and allied sciences in public agricultural R&D institutions.

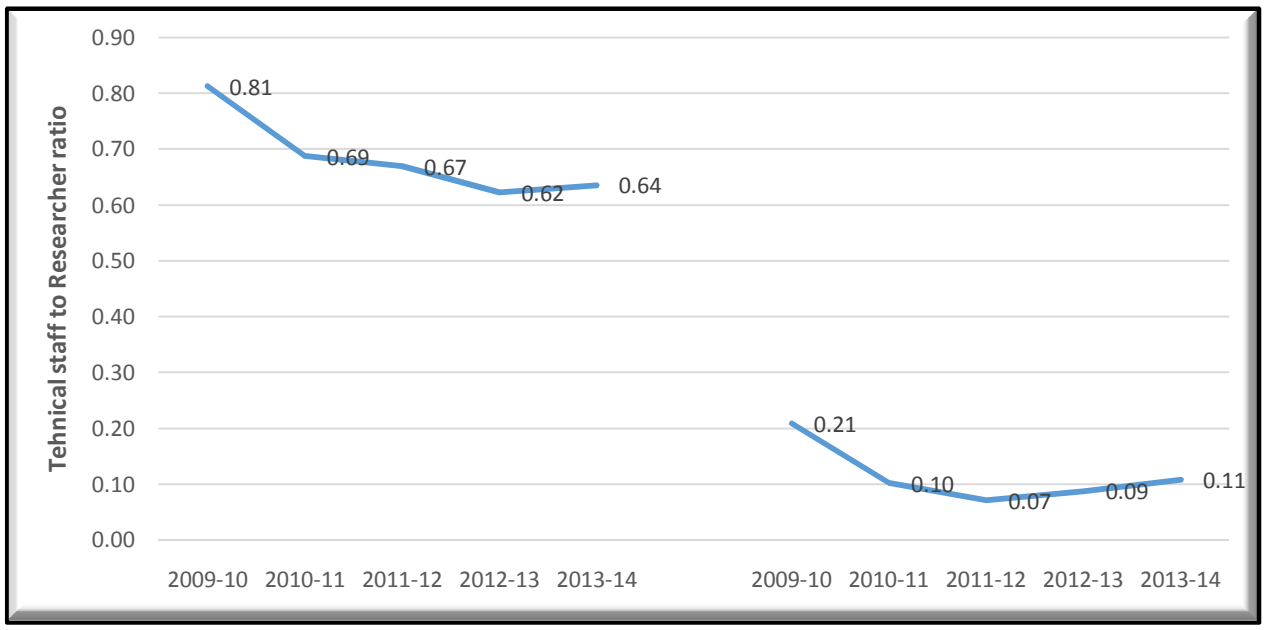
As seen in the previous sub-heads, agricultural research is carried predominantly by male researchers in both ICAR and AU systems. However, a closer observation reveals that in certain broad disciplines, share of female was better in both the systems.

In ICAR, the share of female researchers was more in fisheries (32%), followed by social sciences (21%). The obvious reason for this could be due to the location of two large fisheries research institute in the state of Kerala, where sizeable share of the researchers are females.

In AUs, the same was more in social sciences (28%), followed by veterinary (20%) and agriculture (19%). This might be due to the fact that most of the AUs has a college or faculty in home sciences which are preferred mostly by women candidates.

3.2.4 Technical, Administrative and Other Support Services to Researchers

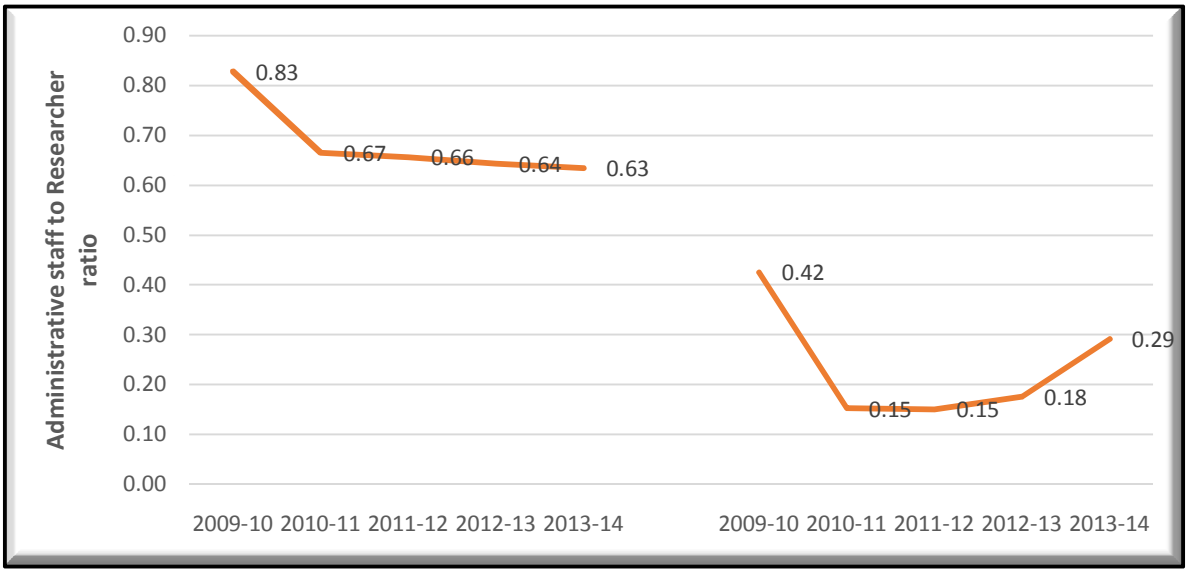
Technical, Administrative and other support services to researchers in public agricultural R & D institutions play a significant role in conducting research in the system. The staff under technical, administrative and financial cadres and other support staff, including the research project staff assist the researchers in the management of the experimentation, in carrying out other activities than research in the institutions so that they devote their productive time in research and arranging the logistics to undertake research, etc. This enables the researchers to focus better on the research work so as to lead to research outputs in time. Hence, the ratios of these staff to researchers were worked out during the period, which has direct bearing on the productivity and outputs by the researchers in both ICAR and AU systems.



Source: ASTI Survey, 2014-15; n:- ICAR=75; AUs=15

Note: Technical support staff is defined as those staff members that directly support the design and conduct of agricultural research activities and have at least secondary education plus additional technical training (e.g., laboratory and field technicians and station managers).

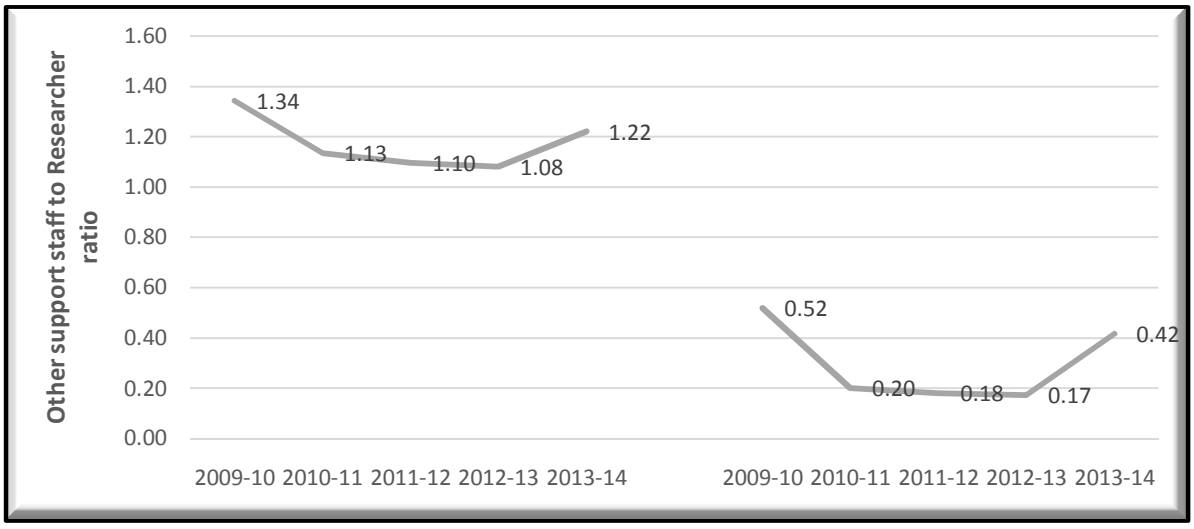
Figure 6a. Technical Support Staff to Researchers in Public Agricultural R&D Institutions



Source: ASTI Survey, 2014-15; n:- ICAR=75; AUs=15

Note: Administrative and financial support staff includes personnel who carry out secretarial and administrative tasks (examples: assistants, superintendents, clerks, accountants, personnel assistants, secretaries). Other administrative support staff includes staff positions not classified in any of the above categories (examples: drivers and guards).

Figure 6b. Administrative Support Staff to Researchers in Public Agricultural R & D Institutions



Source: ASTI Survey, 2014-15; n:- ICAR=75; AUs=15

Note: Other support staff includes both permanent and contractual staff. Excluded are staff on long-term unpaid leave and positions that are approved, but not filled.

Figure 6c.Other Support Staff to Researchers in Public Agricultural R & D Institutions

In general the ratio of technical, administrative and other support staff to researchers was more in ICAR than in AUs. However, these supports were found decreasing over the period.

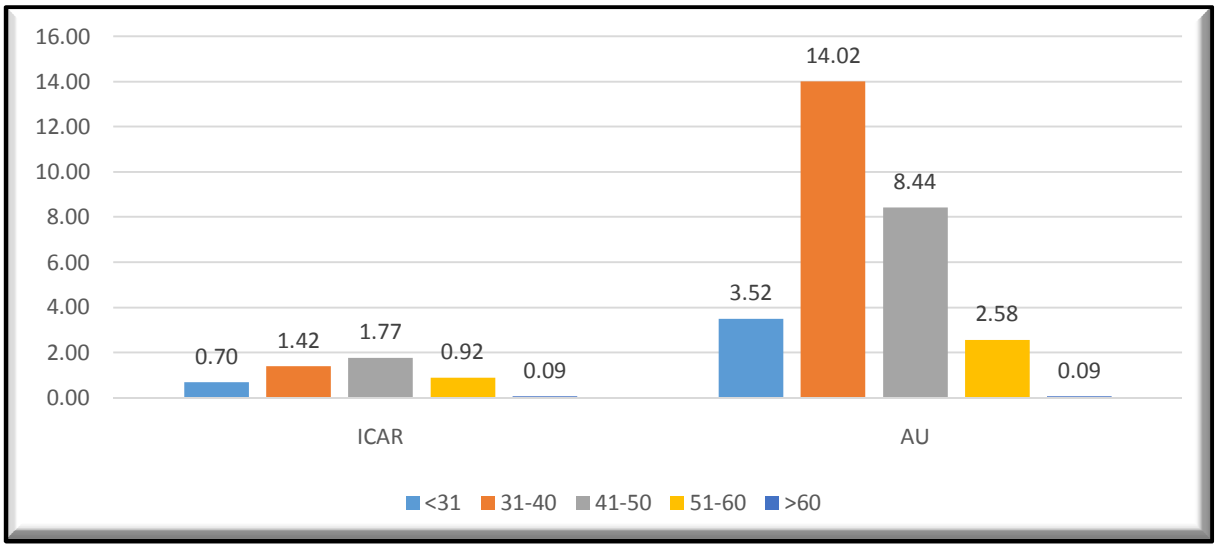
The ratio of technical staff to researchers fell from 0.81 in 2009-10 to 0.64 in 2013-14 in ICAR, while the same decreased from 0.21 to 0.11 during the corresponding years in AUs. The continuous decline in this parameter is due to the fact there has not been much recruitment in the category of technical staff services in ICAR system for the past many years due to policy decision.

Similarly, the ratio of administrative staff to researchers fell from 0.83 in 2009-10 to 0.63 in 2013-14 in ICAR, while the same declined from 0.42 to 0.29 during the corresponding years in AUs. The reason here is the same as in the case of technical staff recruitment.

Further, the ratio of other support staff to researchers decreased from 1.34 in 2009-10 to 1.22 in 2013-14 in ICAR, while the same fell from 0.52 to 0.42 during the corresponding years in AUs. The reason for this is the same as in the case of previous two category of staff, besides the policy of outsourcing and engagement of contractual services to meet the needs of the research institutions. Similar is the trend observed in Latin American countries (Stads and Beintema, 2009).

3.2.5 Distribution of Female Researchers by Age

3.2.5.1 Number of Female Researchers by Age

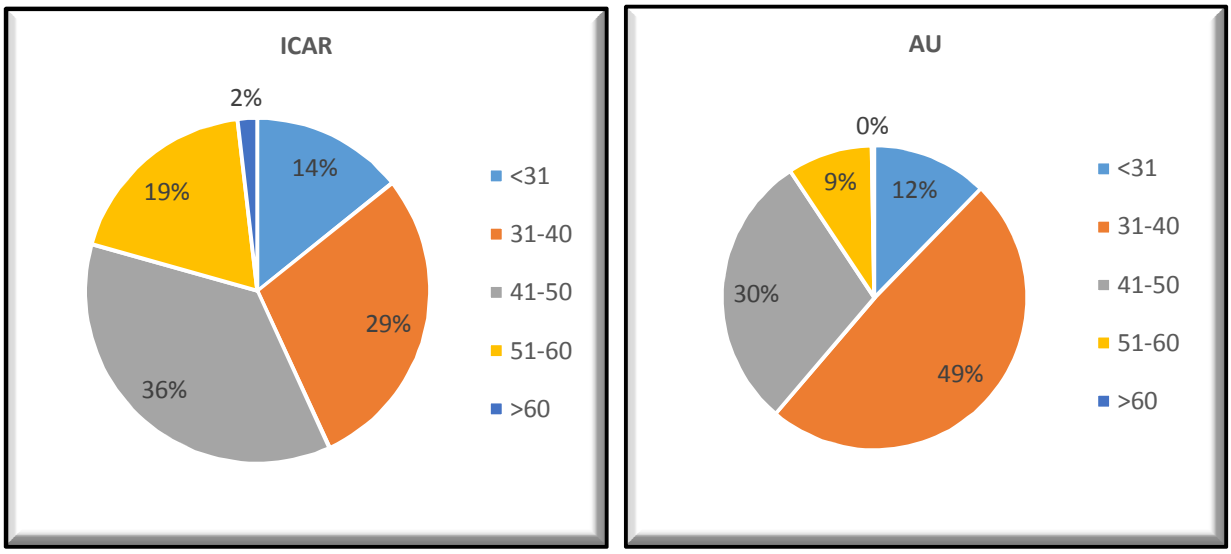


Source: ASTI Survey, 2014-15; n:- ICAR=63; AUs=16

Figure 7a. Number of FTE Female Researchers by Age in Public Agricultural R&D Institutions

It is observed that in ICAR, more number of female researchers was in the age group of 41-50 years, while in AUs the same are in age group of 31-40 years. The reason for this could be due to the entry of more number of female candidates into the teaching profession in recent years than into the research system, which has an All-India liability postings and service nature.

3.2.5.2 Share of Female Researchers by Age



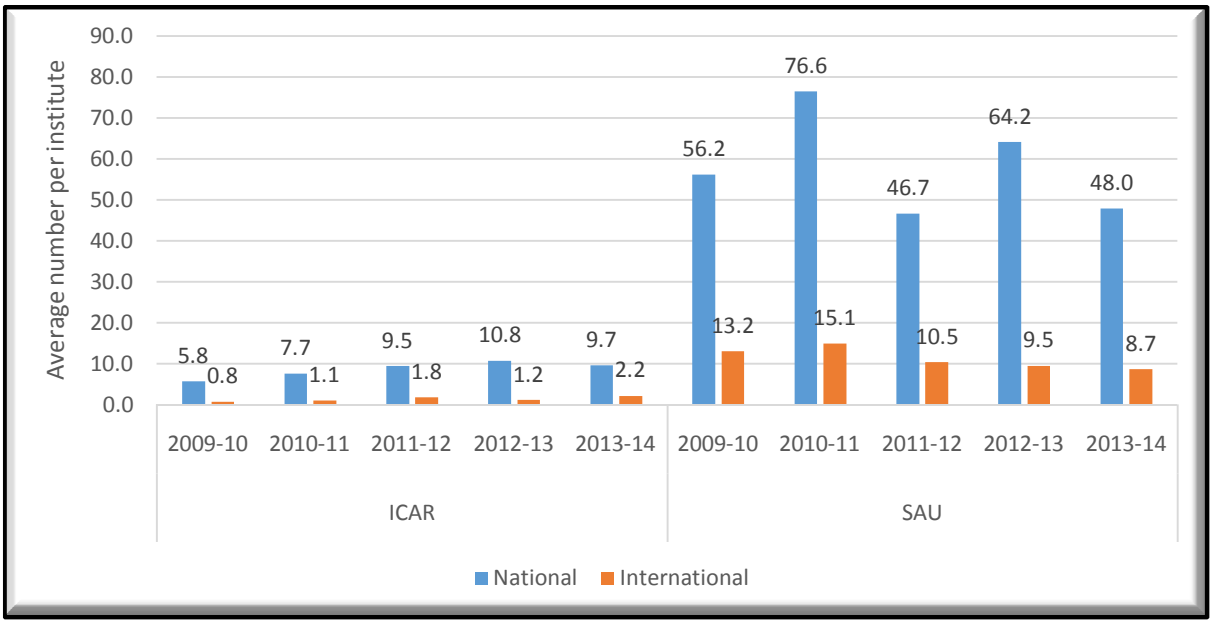
Source: ASTI Survey, 2014-15; n:- ICAR=63; AUs=16

Figure 7b. Share of Female FTE Researchers by Age in Public Agricultural R&D Institutions

But, in case of age distribution of female researchers, the maximum number of researchers in ICAR belongs to 41-50 age category and in AUs they below to 31-40 age category. It means that more young female researchers are joining AUs as discussed in 3.2.3.2

3.2.6 Human Resource Development Programmes undergone by Researchers

3.2.6.1 Number of Capacity Building Programmes undergone by FTE Researchers



Source: ASTI Survey, 2014-15; n:- ICAR=72; AUs=20

Note: National programmes include refresher courses / trainings sponsored by ICAR, DST, DBT, SAUs of 21 days duration.

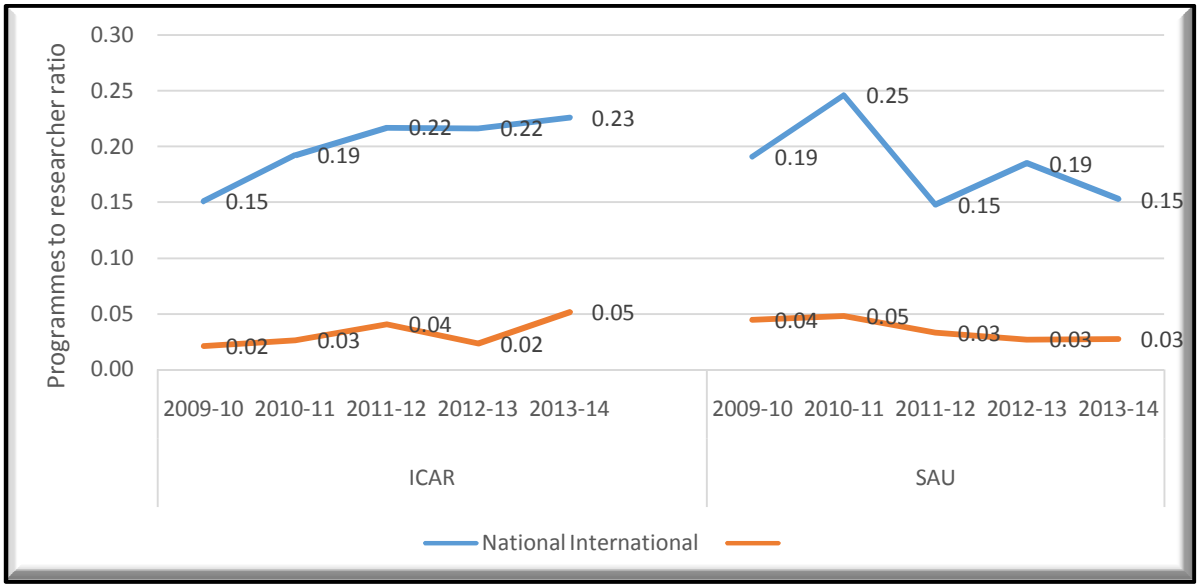
International programmes include advanced trainings of minimum 1month duration sponsored by Government of India (GoI) or by other governments, with which GoI has MoU.

Figure 8a. Capacity Building Programmes undergone byFTE Researchers

In ICAR, it is found that on an average, about 5.8 national trainings were undertaken by all scientist together in 2009-10 which increased to 9.7 in 2013-14. It was increasing in the initial period and found decreasing in the last year, 2013-14. Correspondingly, the number of international trainings tripled from 0.8 during 2009-10 to 2.2 during 2013-14. This might be due to large scale capacity building programmes implemented by NAIP during the period in ICAR.

While in AUs, the average number of national trainings that were undertaken by all faculty/ researchers together fluctuated during the period from 2009-10 to 2013-14. In addition, the number of international trainings followed a declining trend during the above period. This trend was perhaps due to the lack of funding for HRD of researchers and unavailability of such opportunities.

3.2.6.2 Intensity of Capacity Building Programmes undergone by FTE Researchers in Public Agricultural R&D Institutions



Source: ASTI Survey, 2014-15; n: ICAR=72; AUs=20

Figure 8b. Intensity of Training Programmes Done by FTE Researchers

Looking at the number of both national and international training programmes undergone by a researcher in ICAR, it was found that the trend is increasing during the period, 2009-14. While in AUs, the number of national programmes increased from 2009-10 to 2010-11 and then it declined in 2011-12 significantly and kept almost level during the later years. Conversely, the international training programmes declined from the initial years and kept constant in the later years. The reasons could be the same as mentioned in 3.2.7.

3.3 Financial Resources in Public Agricultural R&D Institutions

Financial allocation in public agricultural research institutions is usually from 1st April to 31st March in India. The survey was done keeping this timeline for understanding the expenditures incurred, funding allocations and revenue generated for each year. Finance is one of the important inputs in agricultural research to generate outputs for the welfare of the humankind.

3.3.1 Research Expenditure by Cost

Table 4: Research Expenditure by Cost in Public Agricultural R&D Institutions

(in lakhs INR adjusted to FTE)

Institutes	2009-10	2010-11	2011-12	2013-14	2014-15
ICAR	181272.6	198908.4	223281.9	232117.3	253861.8
Agricultural Universities	188370.1	242687.9	291542.2	332716.1	354640.1
Total	**369642.7**	**441596.3**	**514824.1**	**564833.4**	**608501.9**

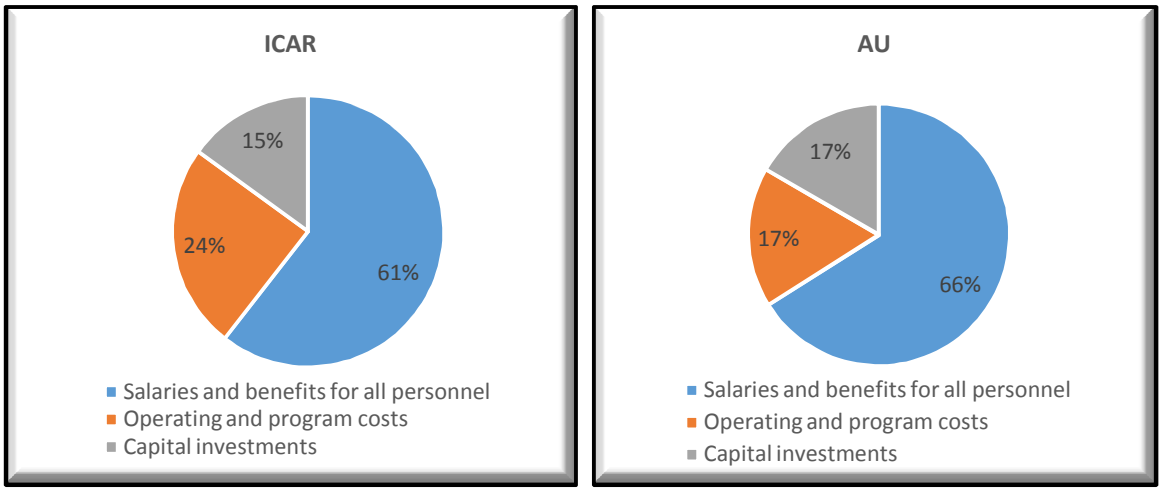
Source: ICAR Budget books

The research expenditures include revenues from the government and other sources (refer to Table C3 of survey form-Annexure-I). In this survey, information on expenditure is gathered from the participating institutions under three major heads, viz. salaries, operating and programme expenses and capital investments. Salaries include staff remuneration expenditures such as wages, pension plan contributions, insurance premiums, child education, and housing allowances; labour cost of temporary staff like day labourers and long-term consultants. Operating and program expenditures include costs of gasoline, electricity, stationery, books, agricultural inputs, staff training, travel, per diem expenses, running costs and maintenance of buildings, cars and equipment, furniture, computers, vehicles, land and buildings as well as depreciation costs, and interest charges for past capital investments. New capital investments includes durable infrastructure such as buildings, furniture and vehicles and equipment and machinery. These were then totalled to get the actual expenditure.

This information was collected from budget books of ICAR for both the public funded R&D institutions for the period from 2009-10 to 2013-14 (Table 4). It was found that the expenditure during the period in both ICAR as well as AUs increased in nominal terms. However, the rate of increase in the last five years has been about 88% in case of AUs, while it was only 40% in ICAR. It might be because several new AUs were formed during this period and more allocation was made towards creation of infrastructure, payment salaries for the newly

recruited staff and also on operational expenses. Otherwise, the increase follows the long term trend in budget outlays for agricultural R&D in the country.

3.3.1.1 Share of Various Components in Research Expenditure

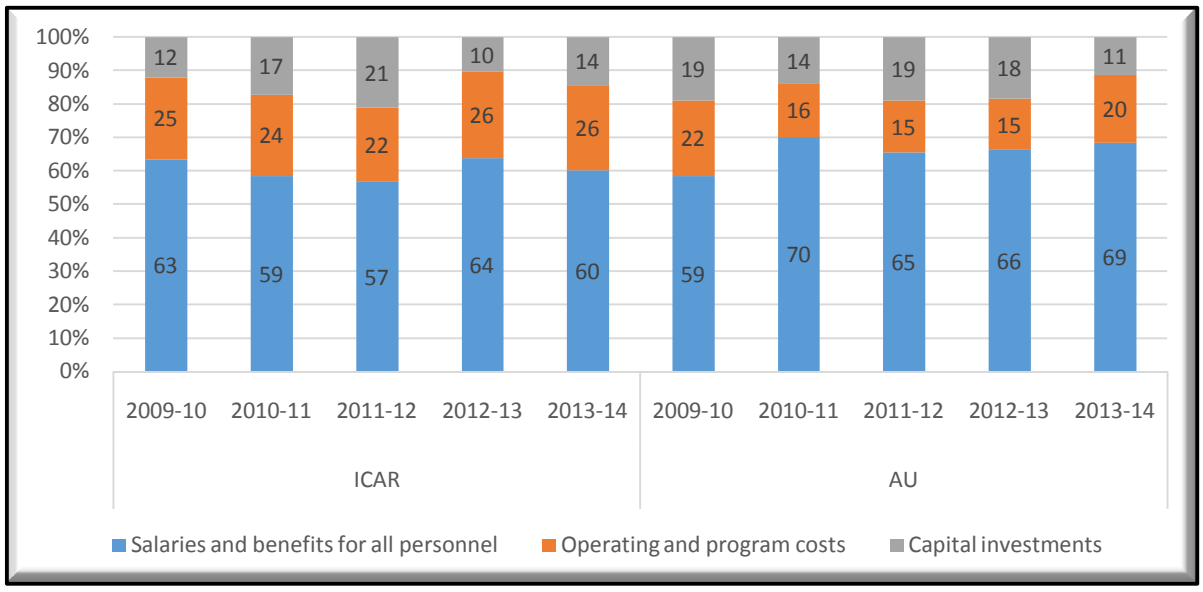


Source: ASTI Survey, 2014-15; n:- ICAR=46; AUs=11

Figure 9a. Average Share of Various Components in Research Expenditure (adjusted to FTE)

Research expenditure is incurred on various items in the institutions. Mainly, this is spent for three major aspects, viz. salaries and benefits for all personnel, operating and programme costs and capital investments. The allocation of research budgets across the cost categories influence efficiency of R&D (Bientema et al. 2008). The share of different cost categories in total expenditure is given in Figure 9a. The share of salary in total budget had increased from 50 percent in 2001-03 (Bientema et al. 2008) to roughly 68% in 2009-10. The share of salaries in AUs had increased from 67 percent in 2001-03 to almost 77% in 2010-11.

In ICAR, the share of expenditure on salaries of researchers was 61%, while the same was 66% in AUs during the period from 2009-10 to 2013-14. Conversely, the share on operating and programme costs was higher in ICAR (24%) than in AUs (17%). The outlay for operating and programme costs is very closely and linearly related to the quantum of research works carried out in the R&D institutions. Hence, this finding indicates that there is a better and efficient allocation of budget towards research in the former than in the latter. It is also understood by the nature of mandates and activities carried out by these two categories of institutions in our country. The primary responsibility of ICAR system is to conduct research to generate technological solutions to the farmers' and farming needs, while that of AUs to produce quality man power in various fields of agriculture and allied sciences through higher education and teaching. Hence, the salary component was more in AUs than in ICAR.



Source: ASTI Survey, 2014-15; n:- ICAR=46; AUs=11

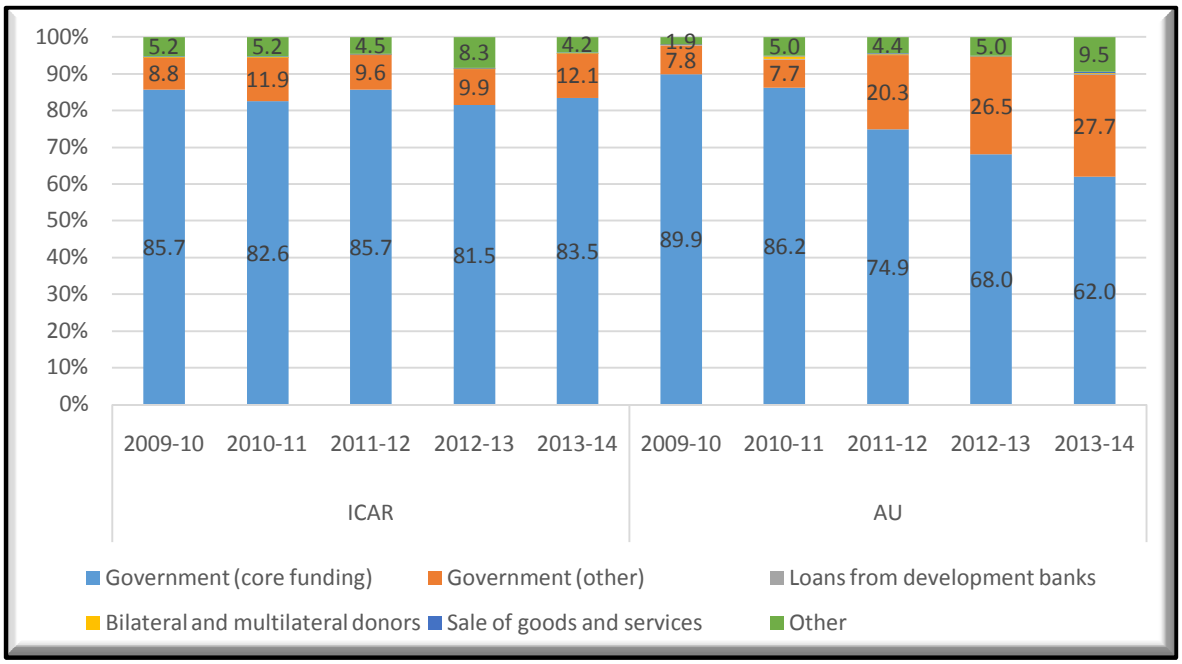
Figure 9b. Share of Various Components in Research Expenditure (adjusted to FTE)

Figure 9b shows the pattern of research expenditure on the three major aspects in both the systems during the period from 2009-10 to 2013-14.

3.3.2 Sources of Research Funding

Various sources of funding for research activities in the public agricultural R&D institutions indicate the broad scenario about who are the major donors for research activities. In order to know the status in this regard, information was collected from all the participating institutions in the survey. The government funds were broadly categorized as core government funds and other government funds, which include funding for research projects from agencies like DST, DBT, MoE, other ministries, etc. There are also other sources of funding for research institutions such as bilateral and multilateral donors which include grants from regional or international organizations and private foundations. Research institutions also generate the revenue, which are used for research purpose. Sale of goods and services were taken as earnings from contract research for public and private enterprises.

(in lakhs of INR)



Source: ASTI Survey, 2014-15; n:- ICAR=68; AUs=51
Note: Government (core funding) is from state government and Government (other) in case of AU are funding provided by ICAR for research projects.

Figure 10. Research Funding by Various Resources

Results revealed that major source of funding for research was core government funding in both ICAR and AUs. It is to understand that the ICAR is funded by central government, while AUs are funded by the respective state governments. The share was more in case of ICAR (83.8%) than in AUs (76.2). This share was relatively stable in case of former, while this was decreasing in AUs. But, the decline in share from state governments is offset by increasing share from other government sources, which is mainly ICAR itself through its Education division (Figure 10). The contribution from ICAR to AUs steadily increased from 7.8% in 2009-10 to 27.7% in 2013-14.ICAR channels a significant portion of funding to AU as development grants and funding for AICRP (Pal et al. 2012).

Pal and Byerlee (2003) observed that the central government provided 52% of public funding for agricultural research and education (R&E) in India, which almost entirely passed through the Indian Council of Agricultural Research (lCAR). A significant proportion of the funds allocated to the ICAR (30%) was made available to other research providers, mainly the state agricultural universities (SAUs), with small amount going to public research institution

outside the agricultural sector and to private research organizations (for profit and non-profit). About 30% of this extramural funding from ICAR is made through the All India Coordinated Research Projects (AICRPs) in the form of block grants, 12% through competitive funding schemes, 17% through grant to district outreach centers. The Krishi Vigygan Kendras (KVKs) and the rest as donor-funded and development grants to SAU.

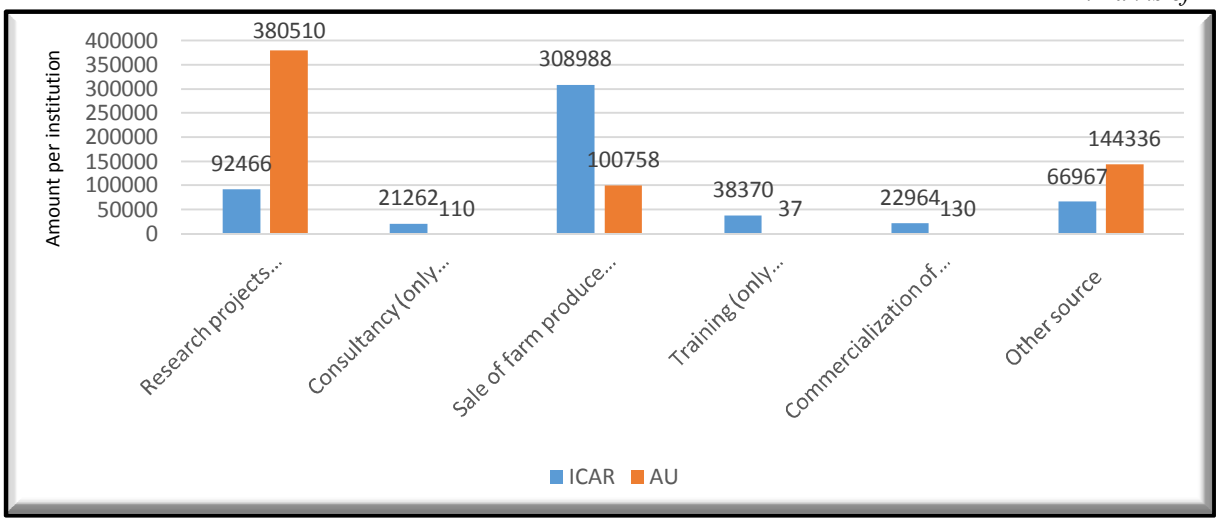
The significant increase in the share of core government funding in case of ICAR was because of the fact that it created several new KVKs during this period in line with the policy of having a KVK in each district of the country to strengthen the transfer of technology activities by mostly the public extension system, though several of them were also being managed by NGOs and private entities. The KVKs in the public extension system are under the administrative and financial control of either ICAR institutions and AUs depending on the location of KVKs and the finance is routed through the respective ICAR institutes/AUs. ICAR though its Extension division funds almost entirely for these KVKs, which added to the steep increase in the share of funding from core government funding in case of ICAR.

3.3.3 Revenue Generation by Researchers

Revenue generation in research institutions is one of the major indicators to assess the self sufficiency of them in managing the financial needs in the long run. Government also encourages them to have a regular mechanism to generate revenue though their various activities and outputs. This aspect is added as an additional indicator in this round of survey to assess the capacity of ICAR as well as AUs and the information was collected accordingly. Figure 11a shows the amount of money they generated through various sources, viz. research projects, consultancy, sale of farm produce and biological kits, etc., training, commercialization of technologies and other sources. It was found that during the period from 2009-10 to 2013-14, the amount of revenue generated was Rs. 6,25,881 by an AU, while the same was Rs.5,51, 017 by a ICAR institute. It is understandable that by the size of the institution, the productivity of ICAR with respect to revenue generation is better than that of AUs. Closer look reveals that ICAR generated more revenue through sale of farm produce and biological kits, commercialization of technology, training and consultancy, while AUs generated the same mainly through securing research projects from external sources (Figure 11a). This is indicative of the fact that ICAR had made the comprehensive Guidelines for Intellectual Property Management and Technology Transfer/ Commercialization and adopted from 2006, as a result of which commercialization activities gained momentum. Similarly, The ICAR had formulated the Rules and Guidelines on 'Training, Consultancy, Contract Research and Contract Service in ICAR System' during the year 1997, which was later revised in 2014 as 'ICAR Rules and Guidelines for Professional Service Functions (Training, Consultancy, Contract Research and Contract Service)'. These enabling provisions in the ICAR influence their institutions to generate more revenue than their counterparts in states, AUs.

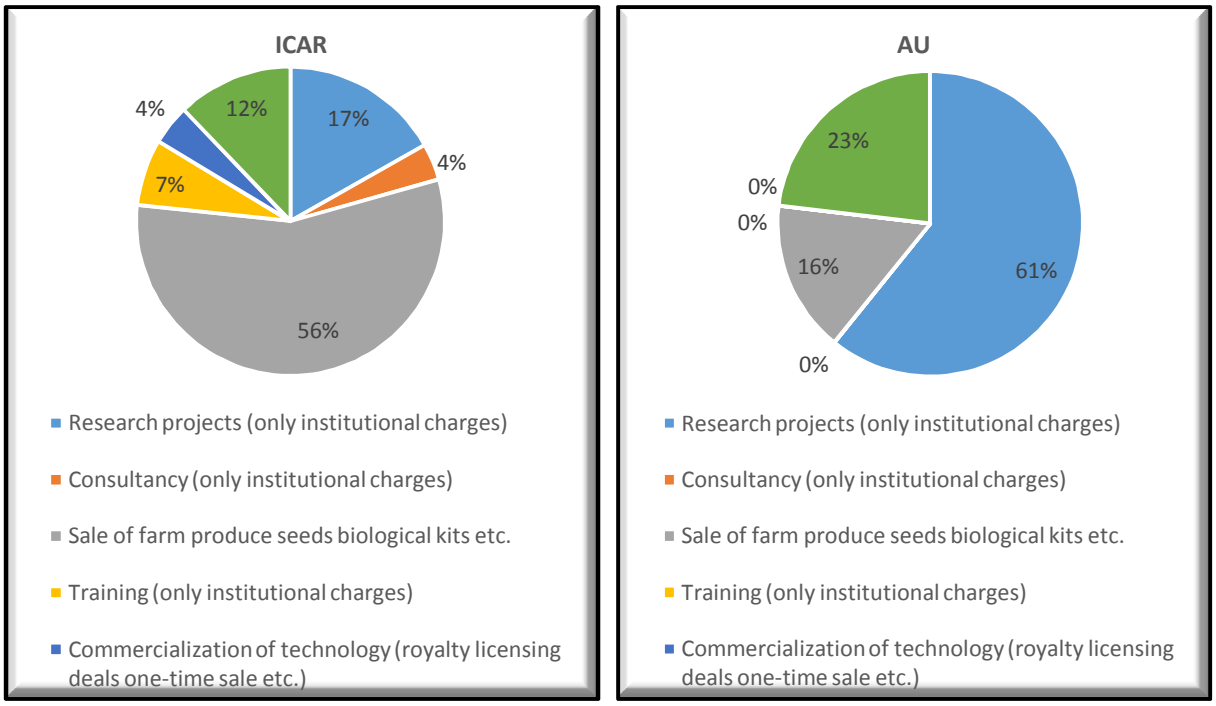
The share of internally generated income was only 1 percent in 1995-2003 and 6 percent in case of SAUs (Pal *et al,* 2012).

In Lakhs of INR



Source: ASTI Survey, 2014-15; n: ICAR=71; AUs=19

Figure 11a.Revenue Generation by FTE Researchers in Public Agricultural R&D Institutions

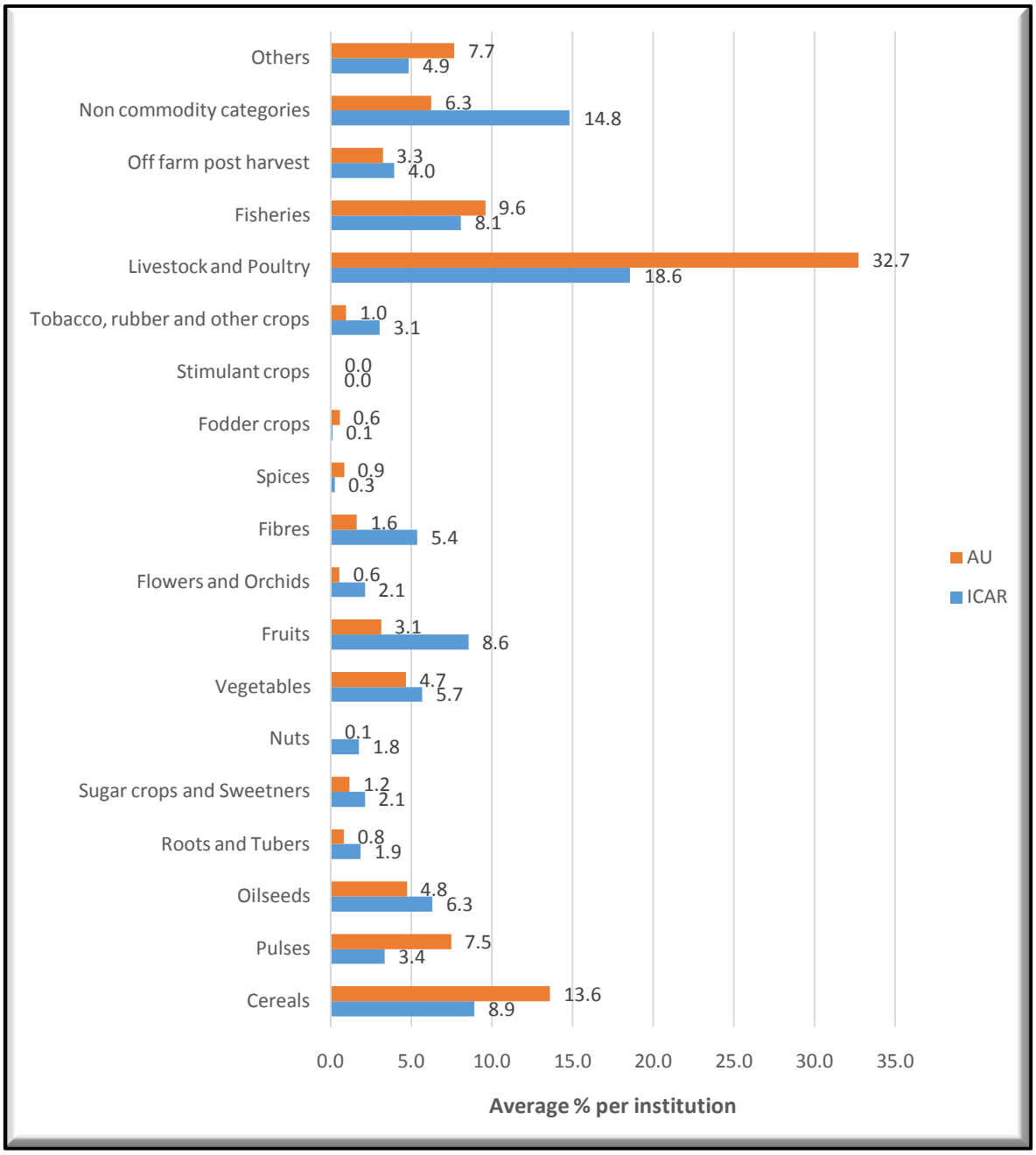


Source: ASTI Survey, 2014-15; n: ICAR=71; AUs=19

Figure 11b. Share of Revenue Generation through Various Sources by FTE Researchers in Public Agricultural R&D Institutions

3.4 Research Focus in Public Agricultural R&D Institutions

3.4.1 Time Allocation of Researchers by Commodity in Public Agricultural R&D Institutions, 2013-14



Source: ASTI Survey, 2014-15; n: ICAR=57; AUs=17

Figure 12a.Time Allocation of Researchers by Commodity in Public Agricultural R&D Institutions

The time allocation of researchers among crops and research themes reflects the priority of research (Bientema et al. 2008). Figure 12a shows the commodity wise time allocation of researchers.

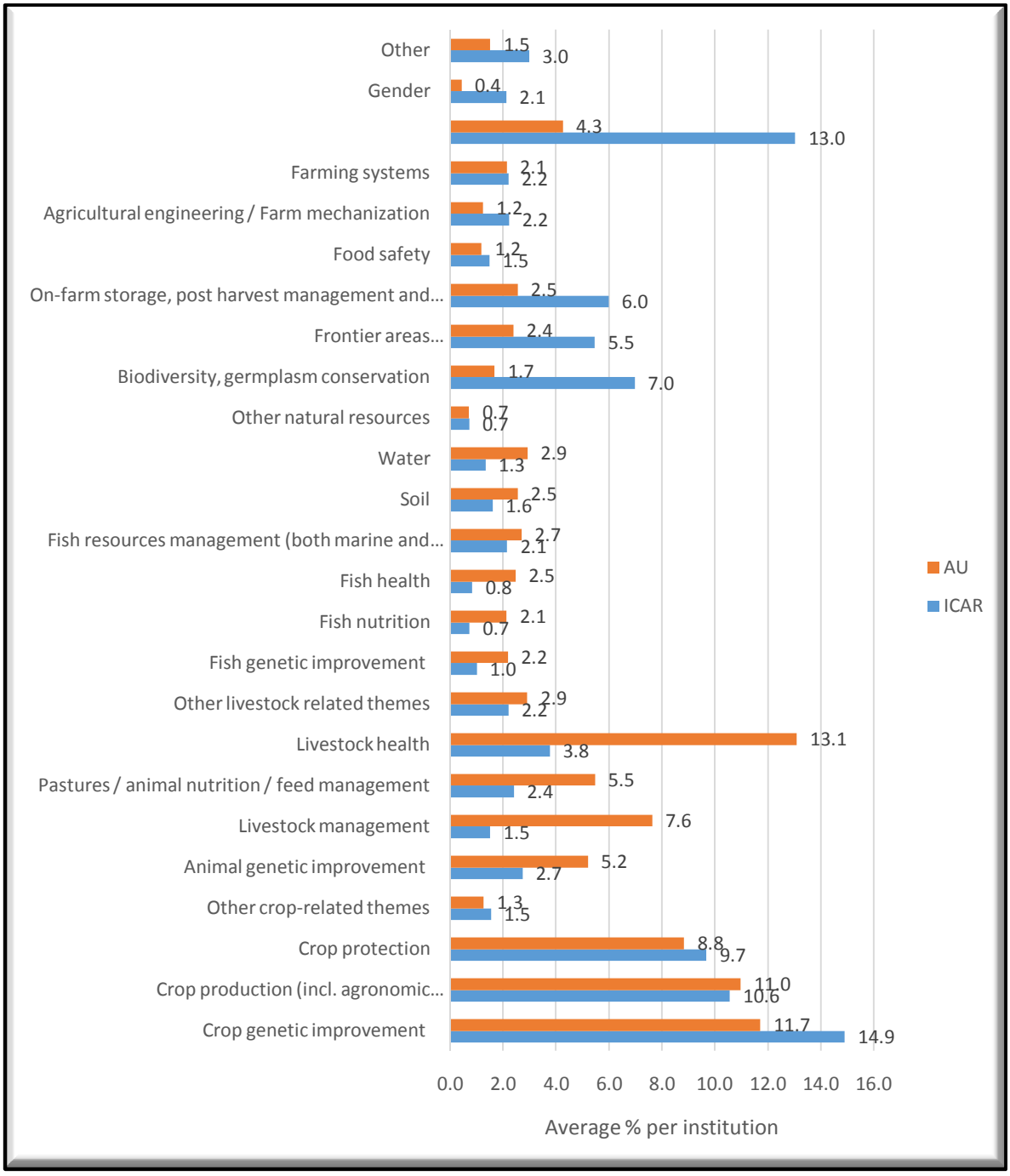
Researchers devoted more time on agricultural crops (49.7%), including horticultural crops followed by livestock and poultry (18.6%), non-commodity categories (14.8%)and fisheries (8.1%) in ICAR institutes. Among agricultural crops, they devoted more time on cereals (8.9%), followed by fruits (8.6%), oilseeds (6.3%), vegetables (5.7%), fibres (5.4%) and pulses (3.4%). They devoted relatively lesser share of their time on other crops, viz. tobacco, rubber and other crops (3.1%), sugarcane and other sweeteners, and flowers and orchids (2.1% each), roots and tubers (1.9%), nuts (1.8%) and spices (0.3%).

ICAR researchers devoted considerable time on research in non-commodity categories such as natural sources, social sciences, frontier sciences, etc. as compared to AU researchers, as they had separate institutions working on these aspects.

Similarly in case of AUs, research faculty devoted more time on agricultural crops (40.4%), lesser than their counterparts in ICAR system followed by livestock and poultry (32.7%), fisheries (9.6%) and non-commodity categories (6.3%). Closer look at crop sector, it is understandable that AU researchers devoted more time on cereals (13.6%) and pulses (7.5%) than their colleagues in ICAR. This might be due to the fact that AUs spread across the country and they conduct research experiments on various types of pulses in different agro-climatic conditions suitable for them as well as depending on the consumption preferences and food habits of the respective state human population, whereas ICAR researchers conduct such research in their farm located in the particular location, besides through AICRP across designated locations in the country.

Relatively more share of time on research on livestock, poultry and fisheries might be due to the creation of several new universities separately for these faculties by many state governments during this period. Significantly, AU researchers devoted lesser time on non-commodity categories, as they do not have separate institution under their ambit to conduct research on these aspects though they conduct some research through their departments or centres on these themes in some universities.

3.4.2 Time Allocation of Agricultural Researchers by Thematic Area in Public Agricultural R&D Institutions, 2013-14



Source: ASTI Survey, 2014-15; n: ICAR=60; AUs=16

Figure 12b.Time Allocation of Researchers by Thematic Area in Public Agricultural R&D Institutions

The percentage time allocation across research thematic areas is shown in Figure 12b. Almost a similar kind of pattern is observed with respect to their time devoted on different thematic areas.

ICAR devoted slightly more time (14%) on research in the thematic areas of crop genetic improvement than AUs (11.7%). However, both ICAR and AU researchers devoted equal share of their time on crop production (10.6% and 11%) and crop protection (9.7% and 8.8% respectively). As understood, ICAR researchers spent considerable time on research on the aspects of biodiversity and germplasm conservation (7%), frontier areas (5.5%), food safety (1.5%), on-farm storage and post-harvest (6%) and farm mechanization (2.2%) and socio-economic research (13%) than their counterparts in AUs.

Lesser time is contributed by the AU researchers on frontier areas by the universities perhaps due to very few advanced research facilities. Similarly, AUs don't involve much in germplasm conservation and biodiversity and they are mostly governed or maintained by national facilities.

AUs work more on variety and breed improvements as mandated in their research for extension to the public stakeholders. Hence, more time is allocated on these aspects.

3.5 Research Outputs from Public Agricultural R&D Institutions

3.5.1 Development of new crop varieties, new animal / poultry / fish breeds, strains, lines, transgenics, new agricultural technologies and non-crop products by public agricultural R&D institutions

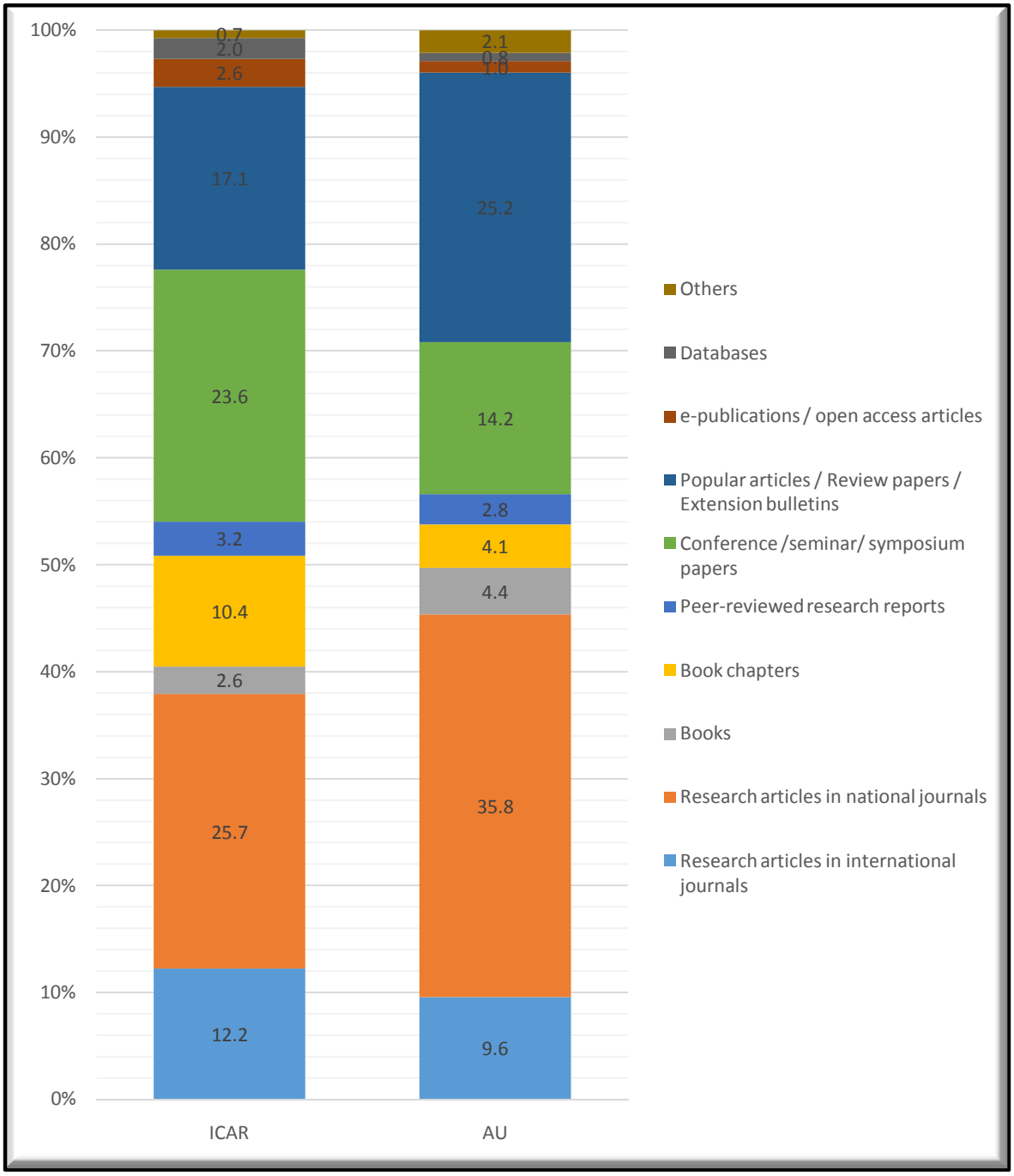
Table 5: Research Outputs of Public Agricultural R&D Institutions, 2009-14

Category	Number of Institutes Reported	No. of the developed products/ varieties/ breeds	
		Total	Average
ICAR			
Crops	22	339	15.41
Animals	9	40	4.44
Microbes/ Transgenics /Lines	6	90	15.00
Technologies/ Products	52	607	11.67
AUs			
Crops	08	161	20.1
Animals	08	19	2.4
Technologies/ Products	14	280	20

Source: ASTI survey, 2014-15

New crop varieties, new animal / poultry / fish breeds, strains, lines, transgenics, new agricultural technologies and non-crop products by ICAR are given in Table 5. It is one of the very important indicators of agricultural R&D outputs by the NARS system. 15.41 crop varieties, 4.44 animal/fish breeds and lines, 15.00 microbes/transgenics and about 11.67 technologies/ non-crop products were developed and released by an ICAR institute in respective Subject matter divisions (SMDs) during the period 2009-14. Similarly, in AUs 20.1 crop varieties, 2.4 animal/fish breeds and lines and 20 technologies/ non-crop products were released/ developed. In this survey information pertaining to registration of crop varieties under Protection of Plant Varieties and Farmer's Rights Authority (PPVFRA), germplasm deposition at concerned organizations like National Bureau for Animal Genetic Resources (NBAGR)/ National Bureau for Fish Genetic Resources (NBFGR), information on patents for the non-crop products and technologies developed by the institutions was also gathered for understanding the protection and reach to stake holders.

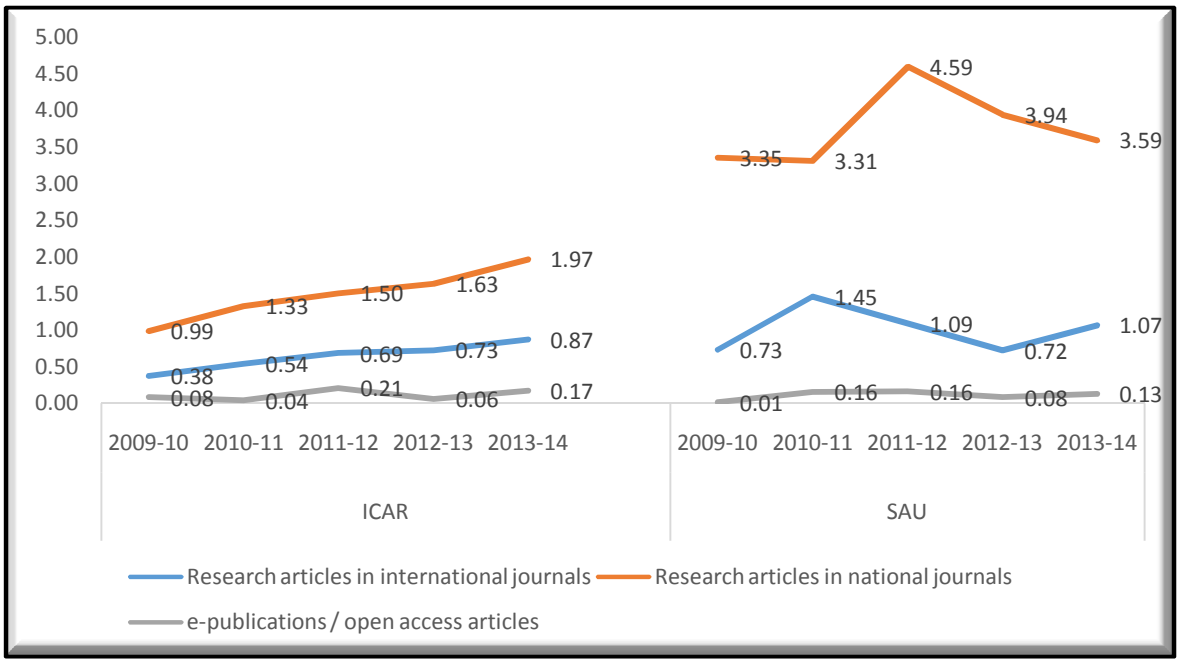
3.5.2 Publications by Researchers, 2009-10 to 2013-14



Source: ASTI Survey, 2014-15; n: ICAR=68; AUs=22
Note: Average of five years (2009-10 to 2013-14)

Figure 13a. Publications byFTE Researchers in Public Agricultural R &D Institutions

In ICAR, the share of publication as international journals, book chapters and conference seminar were more, comparedto their peers in AUs (Figure 13a). In AUs, major share of their publication was in national journals, followed by research articles in international journals, then popular articles/ review papers, book chapters and books which were observed to be increasing during the given period of 2009-10 to 2013-14.



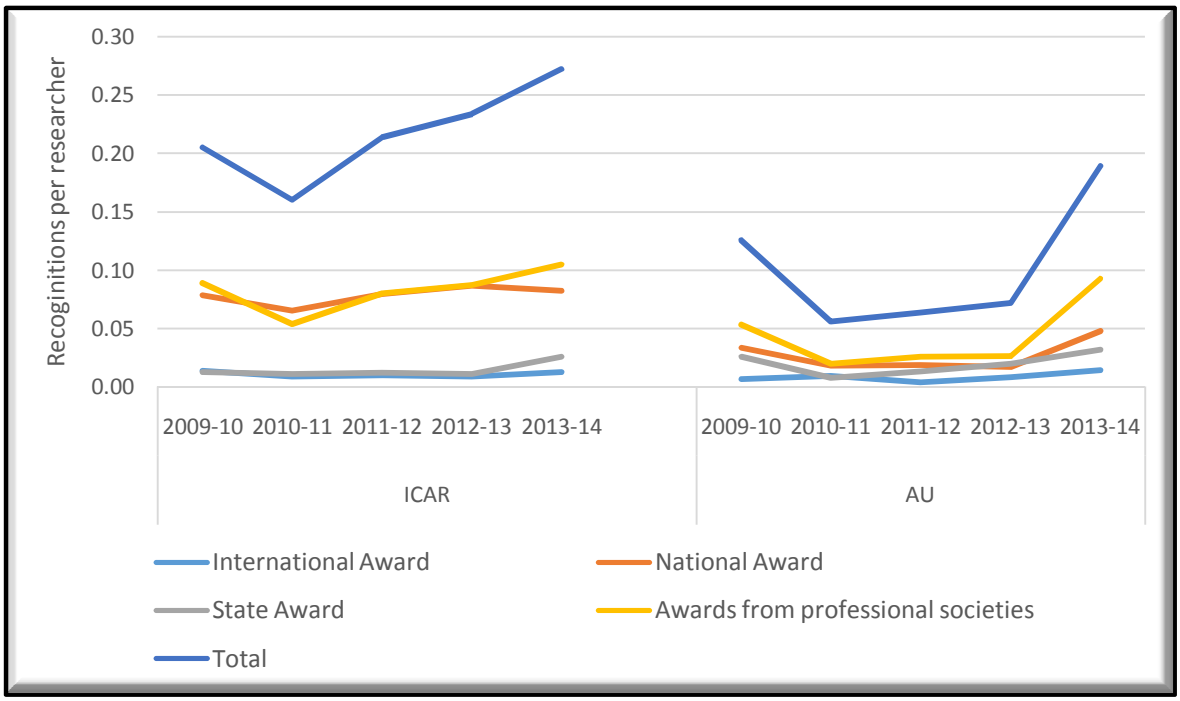
Source: ASTI Survey, 2014-15; n: ICAR=68; AUs=22
Note: Publication to researchers' ratio

Figure 13b.Productivity of FTE Researchers in Terms of Publications in Public Agricultural R&D Institutions

Productivity of researchers measured as publication per researcher is given in Figure 13b. Research publications in international and national journals and e-publications were used to as a measure of the productivity, which gives a more distinct contribution of FTE researchers towards the research activities. The other categories of publications may be more of researchers' interest in pursuing such publications.

The intensity of publication is increasing across all categories in ICAR. The trend in productivity of AU coincides with the support staff ration as well as their capacity building programme which is implied.

3.5.3 Recognitions and Awards received by Researchers (including Teachers, Extension Specialists and Institutes), 2009-10 To 2013-14

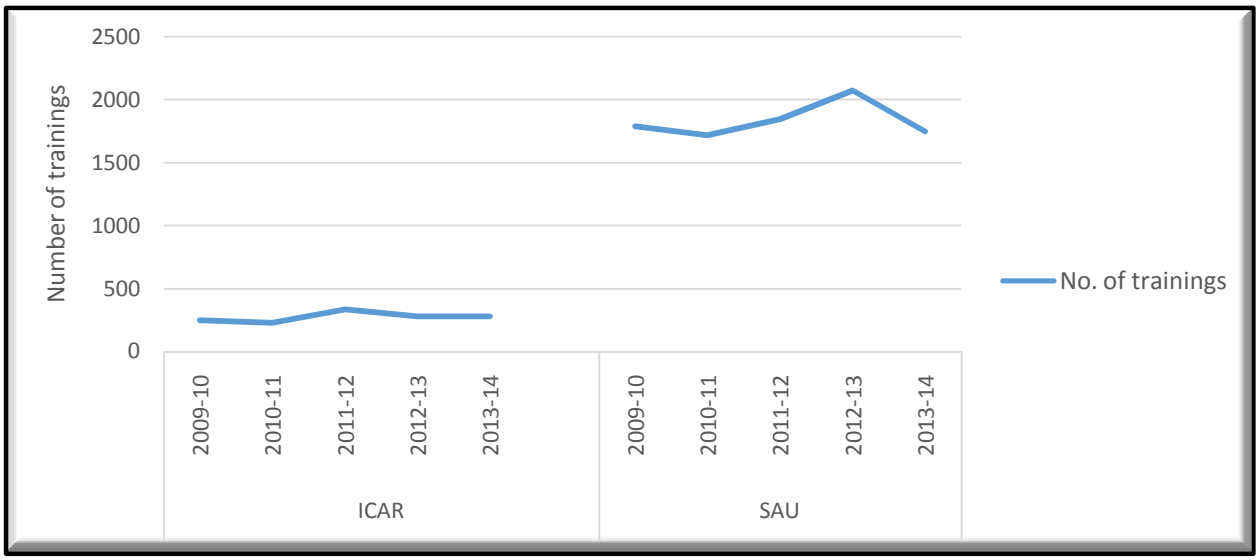


Source: ASTI Survey, 2014-15; n: ICAR=; AUs=

Figure 14.Recognitions and Awards received per FTE Researcher in Public Agricultural R&D Institutions

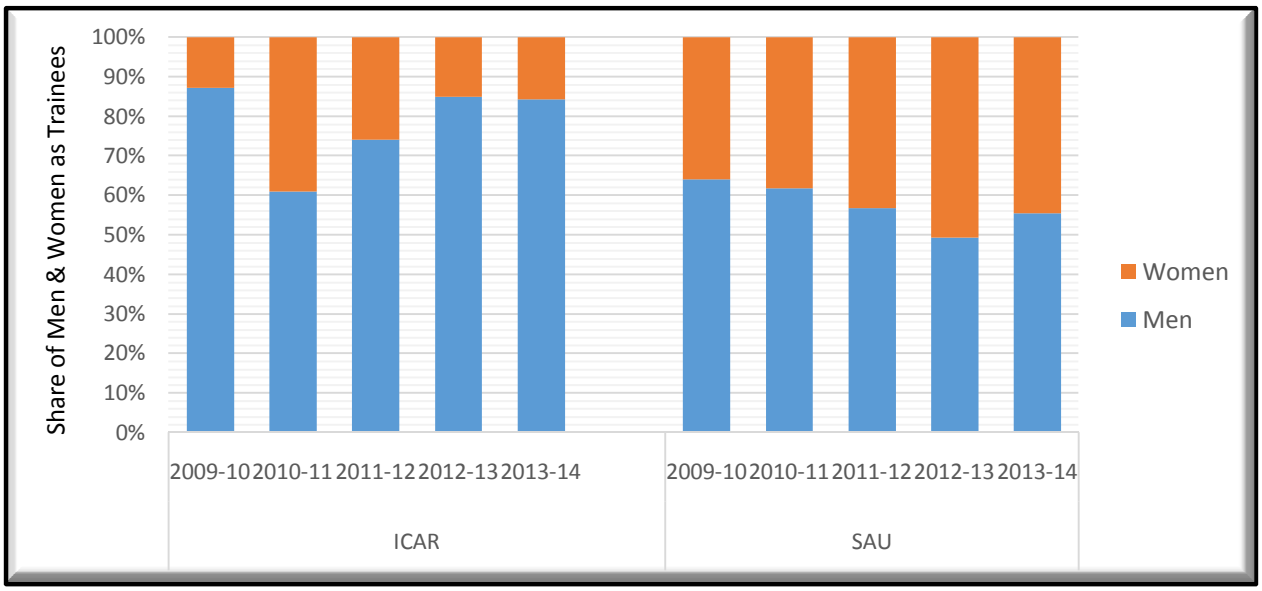
In ICAR, an increasing trend was seen towards the recognitions and awards. The maximum number of awards secured by the researchers was from the Professional Societies. National awards had been increasing, though a slight fall was observed in 2013-14. However, more number of scientists were found getting awards and recognition from international agencies as well as state governments. The award pattern in AUs was similar to ICAR, but trend followed its pattern similar to research projects and publications. There was significant rise in all categories of award in 2013-14, which might be due to better reporting by them, as compared to previous years.

3.5.4 Contribution of Researchers for Training for Farmers, Agri-preneurs and Self-Help Groups (Including KVK trainings)



Source: ASTI Survey, 2014-15; n: ICAR=75; AUs=25

Figure 15a.Training and Extension Activities carried out by Public Agricultural R & D Institutions



Source: ASTI Survey, 2014-15; n: ICAR=75; AUs=25

Figure 15b. Share of Men and Women as Trainees in the Training and Extension Activities carried out by Public Agricultural R & D Institutions

The number of trainings conducted by AUs (1748) was six times more than that of ICAR, because of the very nature of their mandates and related infrastructure such as university training centres and KVKs under their administrative control that train farmers. While the same in ICAR was lesser (280), because significant amount of their training programmes are conducted for trainers or middle level researchers and teachers.

Perusal on the share of trainees by gender, who attended the training programme and extension activities conducted by these institutions reveals that ICAR had been training less women trainees than AUs. This situation was because of the fact that most of the trainers, who were researchers, subject matter specialists of KVK and teaching faculty were men. It is also to mention with concern this share was continuously reducing, which needs to be reversed so that proper gender balance is maintained in the composition of trainees. This is important from the perspectives of policy direction by the GoI that separate programmes have to be pursued for women in agriculture alongside regular programmes. Hence, it is imperative on the part of ICAR to ensure more representation in all the training activities carried out by them.

Conversely, the share of women in the training and extension activities carried out by AUs as trainees or beneficiaries were significantly higher and almost closer half of them was found to be women in the period between 2009-10 and 2013-14. As understood, since their training programmes are mostly meant directly for the farmers and farming in our country, which is getting increasingly feminised, this share of women is higher in the training programmes conducted by AUs.

CHAPTER-IV

RECOMMENDATIONS FROM THE STUDY

The current study of ASTI in public agricultural R&D institutions has given insights into the existing provisions in the stipulated framework for agricultural R&D outputs in India. It gave an opportunity to look at the knowledge and resource gaps in the system. The futuristic propositions from this analysis are given as per the methodology taken up for the project as under the heads of human resources, financial resources, research focus and research outputs. The table presents the recommendations for both ICAR Institutions and Agricultural Universities as per the four designated indicators in ASTI as follows:

	ICAR	AUs
I. Human Resources		
i. Manpower	• Current efforts on manpower requirement should be continued in a phased manner.	• Shortfall in positions of faculty in AUs needs to be augmented.
ii. Study Leave Policy	• Current study leave policy should be continued.	• AUs warrant a more favourable study leave policy.
iii. Gender	• Need to develop adequate policy for recruitment such as special drive, choice of posting, preference for certain disciplines, etc. to attract more women researchers into ICAR.	• Need to develop adequate policy for recruitment such as special drive, choice of posting, preference for certain disciplines, etc. to attract more women researchers into AUs.
iv. Job Profile	• More time should be devoted on research by the scientists.	• Efforts should be made by the faculty to enhance their activities on extension.
II. Financial Resources		
i. Investments on R&D	• Investments on operating and programme costs should be enhanced to improve the research efficiency in ICAR.	• Investments on operating and programme costs should be enhanced to improve the research efficiency in AUs.
ii. Revenue generation	• Current revenue generation schemes through commercialization of research products, and through training and	• Policy and guidelines should be developed and put into operation in the AU system for streamlining revenue generation.

	consultancy services to other stakeholders should be promoted.	
III. Research Focus		
i. Thematic area focus	• Continue focus on issues of national importance particularly in areas of biodiversity conservation; Post harvest technology-storage and management; frontier areas to give stewardship of broad areas in agricultural research.	• More focus on applied research viz. varietal development and plant protection measures for adoption to the requirements of the state/region.
IV. Research Outputs		
i. Publications	• Encourage the current trend of increase of papers in peer-reviewed journals and open access periodicals.	• Faculty need to publish more on NAAS rated journals to improve their research productivity.

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Annexure - I

Survey Form for Government and Non-profit Organizations& Universities / Institutions of Higher Education

SECTION A: INSTITUTIONAL DETAILS (QUESTIONS A1 – A13)

A1. Name of Organization

A2. Address

A3. Telephone Number

A4. Fax Number

A5. Email Address

A6. Organization Website

A7. Supervising Agency (e.g. Ministry, Department, University, Parent Organization)

A8. Agency Type (please check one box only)	
Type x in the row that applies	
Government	
Non-profit	

A9. Year in which the organization became involved in agricultural research

Please provide your name and contact address so that we can follow up on potential data omissions and inconsistencies, should this be necessary

A10. Contact Name

A11. Contact email address

A12. Contact telephone number

A13. Contact fax number

SECTION B: HUMAN RESOURCES (QUESTIONS B1 – B10)

Note: For the purpose of this survey, research staff include individuals holding a research position (including long-term consultancies) with the restriction that the person should have at least a BSc degree or equivalent (i.e., at least three, but usually four years of full-time university training). Management positions, like (deputy) directors and heads of research programs, are also classified as research staff. Only staff on post should be reported (i.e., exclude staff on long-term unpaid leave, or positions approved but not filled).

B1. Researchers (including research managers) by highest education level, 2009-10 to 2013-14

Number (head count)

	2009-10	2010-11	2011-12	2012-13	2013-14
Doctorates					
Masters					
Bachelors					
TOTAL					

Note: If the degree-level equivalence is unclear, apply the following educational scale:
Doctorate is equivalent to more than 6 years full-time university education, including a doctorate thesis.
Master is equivalent to 5-6 years of full-time university education.
Bachelor is equivalent to at least 3 (but usually 4) years of full-time university education.

B2. Age distribution of researchers, 2013-14

Number (head count)

	<31	31-40	41-50	51-60	>60	Sum
Doctorates						
Masters						
Bachelors						
TOTAL						

Note: The sum of the number of researchers by age group must be equal to the number of researchers by degree level for 2012 provided in question B1.

B3 – Discipline-wise distribution of researchers, 2013-14			
S.No.	Discipline	Numbers (head count)	
		Male	Female
1	Agricultural Biotechnology		
2	Agricultural Entomology		
3	Agricultural Microbiology		
4	Economic Botany & Plant Genetic Resources		
5	Genetics & Plant Breeding		
6	Nematology		
7	Plant Biochemistry		
8	Plant Pathology		
9	Plant Physiology		
10	Seed Science & Technology		
11	Floriculture & Landscaping		
12	Fruit Science		
13	Spice, Plantation, Medicinal & Aromatic Plants		
14	Vegetable Science		
15	Animal Biochemistry		
16	Animal Biotechnology		
17	Animal Genetics & Breeding		
18	Animal Nutrition		
19	Animal Physiology		
20	Animal Reproduction & Gynaecology		
21	Dairy Chemistry		
22	Dairy Microbiology		
23	Dairy Technology		
24	Livestock Products Technology		
25	Livestock Production Management		
26	Poultry Science		
27	Veterinary Medicine		
28	Veterinary Microbiology		
29	Veterinary Parasitology		
30	Veterinary Pathology		
31	Veterinary Pharmacology		
32	Veterinary Public Health		
33	Veterinary Surgery		
34	Aquaculture		
35	Fisheries Resources Management		
36	Fish Processing Technology		
37	Fish Nutrition		

38	Fish Health		
39	Fish Genetics & Breeding		
40	Agricultural Chemicals		
41	Agricultural Meteorology		
42	Agroforestry		
43	Agronomy		
44	Environmental Science		
45	Soil Science		
46	Agribusiness Management		
47	Agricultural Economics		
48	Agricultural Extension		
49	Agricultural Statistics & Informatics		
50	Home Science		
51	Farm Machinery & Power		
52	Agricultural Structures & Environment Management		
53	Land & Water Management Engineering		
54	Agricultural Process Engineering		
55	Food Technology		
56	Veterinary Anatomy		
57	Others (Pl. specify the discipline)		

B4. Time allocation of researchers, 2013-14 (to be obtained from Director / Vice-Chancellors)	
Area	Percentage of time
Research	
Teaching	
Training	
Extension	
Administration / Management / Coordination	
Service functions	
Other	
TOTAL	**100%**

Note: Training denotes those given to the scientists and teachers of other organizations and agricultural development officials; Extension denotes those given to the farmers, agripreneurs and NGOs.

B5. Technical support staff by highest education level, 2009-10 to 2013-14					
Qualifications	*Number (head count)*				
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Doctorate in agriculture & allied sciences					
Master in agriculture & allied sciences					
Bachelor in agriculture & allied sciences					
Other degree / diploma					
Without degree / diploma					

Note: Technical support staff are defined as those staff members that directly support the design and conduct of agricultural research activities and have at least secondary education plus additional technical training (e.g., laboratory and field technicians and station managers).

B6. Administrative and financial support staff, 2009-10 to 2013-14					
	Number (head count)				
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Administrative and financial support staff					
Other support staff					
TOTAL					

Note: Administrative and financial support staff include personnel who carry out secretarial and administrative tasks (examples: assistants, superintendents, clerks, accountants, personnel assistants, secretaries). Other support staff include staff positions not classified in any of the above categories (examples: drivers and guards). Excluded are staff on long-term unpaid leave and positions that are approved, but not filled.

B7. Other support staff, 2009-10 to 2013-14					
Category	*Number (head count)*				
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Permanent					
Skilled					
Semi-skilled / Unskilled					
Contractual / Outsourcing					
Skilled					
Semi-skilled / Unskilled					

Note: Permanent staff include labourers, peons, farm workers, etc. Contractual staff include RA, SRF, etc.

B8. Total number of female researchers and female technical support staff, 2013-14		
	Number (head count)	
	Researchers	**Technicians**
Doctorates		
Masters		
Bachelors		
TOTAL		

Note: Excluded are staff on long-term unpaid leave and positions that are approved, but not filled.

B9. Age distribution of female researchers, 2013-14						
	Number (head count)					
	<31	**31-40**	**41-50**	**51-60**	**>60**	**Sum**
Female researchers						
TOTAL						

B10 - HRD programmes undergone by scientists (may be obtained from relevant year's Annual Reports)		
Year	No. of training undergone	
	National*	International#
2009-10		
2010-11		
2011-12		
2012-13		
2013-14		

* includes refresher courses / trainings sponsored by ICAR, DST, DBT, SAUs of 21 days duration.

includes advanced trainings of minimum 1 month duration sponsored by GoI or by other governments, with which GoI has MoU.

If you have comments or clarifications about the questions in section B, please provide them in the box below.

SECTION C: FINANCIAL RESOURCES (QUESTIONS C1 – C4)

C1. Financial year		
The financial year runs from		(mm-dd)
to		(mm-dd)

C2. Research expenditures by cost category, 2009-10 to 2013-14					
					(in thousands of Indian rupees)
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Salaries and benefits for all personnel					
Operating and program costs					
Capital investments					
TOTAL					

Note: Expenditures should include revenues from the government and other sources as listed in question C3. Report actual expenditure figures, not budgeted or projected expenditures for the following categories: Salaries include staff remuneration expenditures such as wages, pension plan contributions, insurance premiums, child education, and housing allowances. Also include labour cost of temporary staff like day labourers and long-term consultants. Operating and program expenditures include costs such as gasoline, electricity, stationery, books, agricultural inputs, staff training, travel, per diem expenses as well as running costs and maintenance of buildings, cars and equipment, furniture, computers, vehicles, land and buildings as well as depreciation costs (and interest charges) for past capital investments.

C3. Sources of research funding, 2009-10 to 2013-14					
					(in thousands of Indian rupees)
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Government (core funding)					
Government (other)					
Loans from development banks					
Bilateral and multilateral donors					
Sale of goods and services					
Other					
TOTAL					

Note: Report actual expenditure figures, not budgeted or projected expenditures. Report sources of funding for all salary, operational and capital expenditures reported in question C2. 1. The funds from 'Government (others)' denote funding for research projects from agencies like DST, DBT, MoE, other ministries, etc. Bilateral and multilateral donors also include grants from regional or international organizations and private foundations. Sale of goods and services includes earnings from contract research for public and private enterprises.

C4 – Resource generation by researchers, 2009-10 to 2013-14 *(in thousands of Indian rupees)*

Category	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Through research projects (only institutional charges)					
Through consultancy (only institutional charges)					
Through sale of farm produce, seeds, biological kits, etc.					
Through training (only institutional charges)					
Through commercialization of technology (royalty, licensing deals, one-time sale, etc.)					
Any other source					
TOTAL					

If you have comments about this section, please provide them in the box below.

SECTION D: RESEARCH FOCUS (QUESTIONS D1 – D3)

D1. Number of full time equivalent researchers assigned to formal research programs, 2013-14	
Name of research program	**Number of researchers associated with program**
Institute funded / University funded	
Externally funded / Funded from outside agency	

Note: Provide a list of your agency's formal research programs and a breakdown of full-time equivalent researchers assigned to each of these programs. Please feel free to add lines if needed.

D2 – Time allocation of agricultural researchers by commodity, 2013-14 (in percentages)		
	Commodity	Percentage
1.	**Cereals**	
	Rice	
	Wheat	
	Maize	
	Sorghum	
	Millet	
	Other cereals	
2.	**Pulses**	
	Dry beans	
	Dry broad beans	
	Dry peas	
	Chick peas	
	Dry Cow peas	
	Pigeon peas	
	Lentils	
	Other pulses	
3.	**Oilseeds**	
	Soybeans	
	Groundnuts in shell	
	Coconut	
	Castor beans	
	Sunflower seed	
	Rapeseed	
	Safflower seed	
	Gingelly / sesame seed	
	Mustard seed	
	Linseed	
	Oil palm	
4.	**Roots and tubers**	
	Potato	
	Sweet potato	
	Cassava	
	Yam	
5.	**Sugar crops & Sweeteners**	
	Sugarcane	
	Sugar beet	
	Honey	
6.	**Nuts**	

	Cashew nut	
	Arecanut	
7.	**Vegetables**	
	Cabbage	
	Spinach	
	Tomato	
	Brinjal	
	Cauliflower	
	Pumpkin	
	Cucumber & gherkins	
	Chillies & pepper	
	Onion	
	Garlic	
	Beans	
	Green peas	
	Carrots	
	Okra	
	Mushroom	
8.	**Fruits**	
	Banana	
	Oranges	
	Apple	
	Grapes	
	Mangoes	
	Pineapple	
	Dates	
	Other fruits	
9.	**Flowers & Orchids**	
10.	**Fibres**	
	Cotton lint	
	Jute	
	Coir	
	Greasy wool	
	Reelable cocoons	
11.	**Spices**	
	Pepper	
	Cinnamon	
	Nutmeg, mace & cardamoms	
	Cloves	
	Other	

12.	**Fodder crops**	
13.	**Stimulant crops**	
	Green coffee	
	Coca beans	
	Tea	
14.	**Tobacco, rubber & other crops**	
	Tobacco	
	Natural rubber	
	Natural gums	
	Other resins	
15.	**Livestock and poultry**	
	Cattle	
	Buffalo	
	Sheep	
	Goat	
	Pig	
	Other livestock (Equines, Yak, Mithun, Camel)	
	Poultry	
	Lab animals	
	Other animals (Silkworm, Honey bee, etc.)	
16.	**Fisheries**	
	Capture fishes	
	Culture fishes	
	Brackishwater fishes	
	Coldwater fishes	
	Ornamental fishes	
17.	**Off-farm postharvest**	
	Crop products processing	
	Horticultural products processing	
	Livestock products processing	
	Fish products processing	
18.	**Non-commodity categories**	
	Farm mechanization	
	Natural resources / Landuse planning	
	Socio-economics, Extension, Information science, Statistical aspects / modeling	
	Other categories	
	TOTAL	**100%**

Note: Provide a percentage of researchers' time allocated to the various crops and crop categories. See FAO (http://www.fao.org/es/faodef/faodefe.htm) for detailed crop lists under the specific categories.

D3 – Time allocation of agricultural researchers by thematic area, 2013-14 (in percentages)	
Theme	**Percentage**
Crop genetic improvement	
Crop production (incl. agronomic aspects, fertilizer research, INM, etc.)	
Crop protection	
Other crop-related themes	
Animal genetic improvement	
Livestock management	
Pastures / animal nutrition / feed management	
Livestock health	
Other livestock related themes	
Fish genetic improvement	
Fish nutrition	
Fish health	
Fish resources management (both marine and inland, incl. stock assessment)	
Soil	
Water	
Other natural resources	
Biodiversity, germplasm conservation	
Frontier areas (nanotechnology, biotechnology, etc.)	
On-farm storage, post harvest management and processing	
Food safety	
Agricultural engineering / Farm mechanization	
Farming systems	
Socio-economics and policy research, Extension, Information science, Statistics and modeling	
Gender	
Other	
TOTAL	**100%**

If you have comments about this section, please provide them in the box below.

SECTION E: AGRICULTURAL R&D OUTPUTS (QUESTIONS E1 – E6)

E1. Development of new crop varieties, including transgenics, 2009-10 to 2013-14				
Name of new crop variety that was registered and released during 2009-10 to 2013-14	**Crop type and traits***	**Year of notification**	**Year of release**	**Registered at PPV&FR Authority (Yes/No)**

Note: * For example, drought-tolerant wheat or transgenic cotton.
PPV&FR Authority stands for Protection of Plant Varieties and Farmers' Rights Authority. Please feel free to add more lines if needed.

E2. Development of new animal / poultry / fish breeds, strains, lines, transgenics, 2009-10 to 2013-14			
Name of new animal / poultry breeds, strains, lines, transgenics or new fish species developed / discovered; microbes, gene sequences, insects discovered during 2009-10 to 2013-14	**Type of breed / strain / line* or Type of fish (Food / ornamental)**	**Year of development / discovery**	**Germplasm registered at NBAGR / NBFGR (Yes/No)**

* could be milk or meat type in case of cattle; wool or meat type in sheep; layer or broiler or dual type in poultry; backyard or commercial type in case of all farm animals. Please feel free to add more lines if needed.

E3. Development of new agricultural technologies and non-crop products, 2009-10 to 2013-14				
Name of product / technology that were released during 2009-10 to 2013-14	**Type of product / technology**	**Year of release**	**Patented (yes/no)**	**User of technology (Men/Women/ Both/Industry/ Policy makers)**

Note: Please list all new non-crop products and technologies that were released during 2009-10 to 2013-14, including fertilizers, pesticides, agricultural machinery, etc. Please feel free to add more lines if needed.

E4 – Publications, 2009-10 to 2013-14					
Category	*Number*				
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Research articles in international journals					
Research articles in national journals					
Books					
Book chapters					
Peer-reviewed research reports					
Conference/seminar/symposium papers					
Popular articles / Review papers / Extension bulletins					
e-publications / open access articles					
Databases					
TOTAL					

E5 – Recognitions and awards received by researchers, teachers, extension specialists and institutes, 2009-10 to 2013-14					
Category	*Number (head count)*				
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
International award					
National award					
State award					
Awards from professional societies					
TOTAL					

E6 - Training for farmers, agri-preneurs and Self-help groups conducted (including KVK trainings)			
Year	No. of trainings	No. of beneficiaries	
		Men	Women
2009-10			
2010-11			
2011-12			
2012-13			
2013-14			

Note: Training includes field demonstration, field day, Farmers Field School, etc., besides classroom teachings

Annexure-II
List of Institutions selected for the ASTI survey

Category (i) Agencies that are primarily involved in research: 107

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
1	1522	Indian Agricultural Research Institute (IARI), New Delhi.	ICAR-Indian Agricultural Research Institute (ICAR-IARI), New Delhi.
2	1582	Indian Veterinary Research Institute, (IVRI), Bareilly.	ICAR-Indian Veterinary Research Institute, (ICAR-IVRI), Bareilly.
3	1584	National Dairy Research Institute (NDRI), Karnal.	ICAR-National Dairy Research Institute (ICAR-NDRI), Karnal.
4	1598	Central Institute of Fisheries Education (CIFE), Mumbai.	ICAR-Central Institute of Fisheries Education (ICAR-CIFE), Mumbai.
5	1561	Central Island Agricultural Research Institute (CIARI), Port Blair	ICAR-Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair
6	1562	Central Arid Zone Research Institute (CAZRI), Jodhpur.	ICAR-Central Arid Zone Research Institute (ICAR-CAZRI), Jodhpur.
7	1578	Central Avian Research Institute (CARI), Bareilly.	ICAR-Central Avian Research Institute (ICAR-CARI), Bareilly.
8	1595	Central Inland Fisheries Research Institute (CIFRI), Barrackpore.	ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI), Barrackpore.
9	1597	Central Institute of Brackishwater (CIBA) Aquaculture, Chennai.	ICAR-Central Institute of Brackishwater (ICAR-CIBA) Aquaculture, Chennai.
10	1579	Central Institute for Research on Buffaloes (CIRB), Hisar.	ICAR-Central Institute for Research on Buffaloes (ICAR-CIRB), Hisar.
11	1580	Central Institute for Research on Goats (CIRG), Mathura.	ICAR-Central Institute for Research on Goats (ICAR-CIRG), Mathura.

12	1548	Central Institute for Arid Horticulture (CIAH), Bikaner.	ICAR-Central Institute for Arid Horticulture (ICAR-CIAH), Bikaner.
13	1514	Central Institute for Cotton Research (CICR), Nagpur.	ICAR-Central Institute for Cotton Research (ICAR-CICR), Nagpur.
14	1599	Central Institute of Fisheries Technology (CIFT), Cochin.	ICAR-Central Institute of Fisheries Technology (ICAR-CIFT), Cochin.
15	1600	Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar.	ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA), Bhubaneswar.
16	1573	Central Institute of Agricultural Engineering (CIAE), Bhopal.	ICAR-Central Institute of Agricultural Engineering (ICAR-CIAE), Bhopal.
17	1574	Central Institute for Research on Cotton Technology (CIRCOT), Mumbai.	ICAR-Central Institute for Research on Cotton Technology (ICAR-CIRCOT), Mumbai.
18	1538	Central Institute for Subtropical Horticulture (CISH), Lucknow.	ICAR-Central Institute for Subtropical Horticulture (ICAR-CISH), Lucknow.
19	1540	Central Institute of Temperate Horticulture (CITH), Srinagar.	ICAR-Central Institute of Temperate Horticulture (ICAR-CITH), Srinagar.
20	1575	Central Institute of Post-Harvest Engineering & Technology (CIPHET), Ludhiana.	ICAR-Central Institute of Post-Harvest Engineering & Technology (ICAR-CIPHET), Ludhiana.
21	1596	Central Marine Fisheries Research Institute (CMFRI), Kochi.	ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI), Kochi.
22	1539	Central Plantation Crops Research Institute (CPCRI), Kasaragod.	ICAR-Central Plantation Crops Research Institute (ICAR-CPCRI), Kasaragod.
23	1541	Central Potato Research Institute (CPRI), Shimla.	ICAR-Central Potato Research Institute (ICAR-CPRI), Shimla.

24	1515	Central Research Institute for Jute & Allied Fibres (CRIJAF), Barrackpore.	ICAR-Central Research Institute for Jute & Allied Fibres (ICAR-CRIJAF), Barrackpore.
25	1563	Central Research Institute for Dryland Agriculture, (CRIDA), Hyderabad.	ICAR-Central Research Institute for Dryland Agriculture, (ICAR-CRIDA), Hyderabad.
26	1516	Central Rice Research Institute (CRRI), Cuttack.	ICAR-Central Rice Research Institute (ICAR-CRRI), Cuttack.
27	1581	Central Sheep & Wool Research Institute (CSWRI), Jaipur.	ICAR-Central Sheep & Wool Research Institute (ICAR-CSWRI), Jaipur.
28	1564	Central Soil & Water Conservation Research & Training Institute (CSWCRTI)	ICAR-Indian Institute of Soil & Water Conservation (ICAR-IISWC), Dehradun.
29	1517	Central Tobacco Research Institute (CTRI), Rajamundry.	ICAR-Central Tobacco Research Institute (ICAR-CTRI), Rajamundry.
30	1565	Central Soil Salinity Research Institute (CSSRI), Karnal.	ICAR-Central Soil Salinity Research Institute (ICAR-CSSRI), Karnal.
31	1542	Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram.	ICAR-Central Tuber Crops Research Institute (ICAR-CTCRI), Thiruvananthapuram.
32	1544	ICAR Research Complex for Eastern Region (ICAR-RCER), Patna.	ICAR Research Complex for Eastern Region (ICAR-RCER), Patna.
33	1566	ICAR Research Complex for NEH Region (ICAR-RCNEH), Umiam.	ICAR Research Complex for NEH Region (ICAR-RCNEH), Umiam.
34	1543	ICAR Research Complex for Goa (ICAR-RCG), Ela.	ICAR - Central Coastal Agricultural Research Institute (ICAR-CCARI), Ela.
35	1603	Indian Agricultural Statistics Research Institute, (IASRI), New Delhi.	ICAR -Indian Agricultural Statistics Research Institute, (ICAR-IASRI), New Delhi.

36	1523	Indian Grassland & Fodder Research Institute (IGFRI), Jhansi.	ICAR-Indian Grassland & Fodder Research Institute (ICAR-IGFRI), Jhansi.
37	3801	Indian Institute of Agricultural Biotechnology (IIAB), Ranchi	ICAR-Indian Institute of Agricultural Biotechnology (ICAR-IIAB), Ranchi
38	1545	Indian Institute of Horticultural Research (IIHR), Bengaluru.	ICAR-Indian Institute of Horticultural Research (ICAR-IIHR), Bengaluru.
39	1576	Indian Lac Research Institute (ILRI)-till 2007 Indian Institute of Natural Resins and Gums (IINRG), Ranchi.	ICAR-Indian Institute of Natural Resins and Gums (ICAR-IINRG), Ranchi.
40	1524	Indian Institute of Pulses Research, (IIPR), Kanpur.	ICAR-Indian Institute of Pulses Research, (ICAR-IIPR), Kanpur.
41	1567	Indian Institute of Soil Science (IISS), Bhopal.	ICAR-Indian Institute of Soil Science (ICAR-IISS), Bhopal.
42	1546	Indian Institute of Spices Research (IISR), Calicut.	ICAR-Indian Institute of Spices Research (ICAR-IISR), Calicut.
43	1525	Indian Institute of Sugarcane Research (IISuR), Lucknow.	ICAR-Indian Institute of Sugarcane Research (ICAR-IISuR), Lucknow.
44	1547	Indian Institute of Vegetable Research (IIVR), Varanasi.	ICAR-Indian Institute of Vegetable Research (ICAR-IIVR), Varanasi.
45	1605	National Academy of Agricultural Research Management (NAARM), Hyderabad.	ICAR-National Academy of Agricultural Research Management (ICAR-NAARM), Hyderabad.
46	3821	National Institute of Biotic Stress Management (NIBSM), Raipur.	ICAR-National Institute of Biotic Stress Management (ICAR-NIBSM), Raipur.
47	3822	National Institute of Abiotic Stress Management (NIASM), Baramati.	ICAR-National Institute of Abiotic Stress Management (ICAR-NIASM), Baramati.

48	1585	National Institute of Animal Nutrition & Physiology, (NIANP), Bengaluru.	ICAR-National Institute of Animal Nutrition & Physiology, (ICAR-NIANP), Bengaluru.
49	1577	National Institute of Research on Jute & Allied Fibre Technology (NIRJAFT), Kolkata.	ICAR-National Institute of Research on Jute & Allied Fibre Technology (ICAR-NIRJAFT), Kolkata.
50	3823	Project Directorate on Animal Disease Monitoring and Surveillance (PD ADMAS), Bangalore	ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (ICAR-NIVEDI), Bengaluru.
51	1534	Sugarcane Breeding Institute (SBI), Coimbatore.	ICAR-Sugarcane Breeding Institute (ICAR-SBI), Coimbatore.
52	1535	Vivekanand Parvatiya Krishi Anusandhan Sansthan (VPKAS), Almora.	ICAR-Vivekanand Parvatiya Krishi Anusandhan Sansthan (ICAR-VPKAS), Almora.
53		Project Directorate on Cattle (PDC), Meerut.	ICAR-Central Institute for Research on Cattle (ICAR-CIRC), Meerut.
54	1604	National Center for Agricultural Economics and Policy Research (NCAP), New Delhi.	ICAR-National Institute of Agricultural Economics & Policy Research (ICAR-NIAP), New Delhi.
55	1527	National Centre for Integrated Pest Management (NCIPM), New Delhi.	ICAR-National Centre for Integrated Pest Management, (ICAR-NCIPM), New Delhi.
56	1569	National Research Centre for Agroforestry (NRCAF), Jhansi.	ICAR-Central Agroforestry Research Institute (ICAR- CARI), Jhansi.
57	1549	National Research Centre for Banana (NRCB), Tiruchirapalli.	ICAR-National Research Centre for Banana, (ICAR-NRCB), Tiruchirapalli.
58	1551	National Research Centre for Citrus (NRCC), Nagpur.	ICAR-National Research Centre for Citrus (ICAR-NRCC), Nagpur.
59	1552	National Research Centre for Grapes (NRCG), Pune.	ICAR-National Research Centre for Grapes (ICAR-NRCG), Pune.

60	1553	National Research Centre for Litchi (NRCL), Muzaffarpur.	ICAR-National Research Centre for Litchi (ICAR-NRCL), Muzaffarpur.
61	1560	National Research Centre on Pomegranate (NRCP), Solapur.	ICAR-National Research Centre on Pomegranate (ICAR-NRCP), Solapur.
62	1586	National Research Centre on Camel (NRCC), Bikaner.	ICAR-National Research Centre on Camel (ICAR-NRCC), Bikaner.
63	1587	National Research Centre for Equines (NRCE), Hisar.	ICAR-National Research Centre for Equines (ICAR-NRCE), Hisar.
64	1588	National Research Centre on Meat (NRCM), Hyderabad.	ICAR-National Research Centre on Meat (ICAR-NRCM), Hyderabad.
65	1589	National Research Centre on Mithun (NRCM), Medziphema.	ICAR-National Research Centre on Mithun (ICAR-NRCM), Medziphema.
66	1558	National Research Centre for Orchids (NRCO), Gangtok.	ICAR-National Research Centre for Orchids (ICAR-NRCO), Gangtok.
67	1594	National Research Centre on Pig (NRCP), Guwahati.	ICAR-National Research Centre on Pig (ICAR-NRCP), Guwahati.
68	1531	National Research Centre on Plant Biotechnology (NRCPB), New Delhi.	ICAR-National Research Centre on Plant Biotechnology (ICAR-NRCPB), New Delhi.
69	1559	National Research Centre on Seed Spices (NRCSS), Ajmer.	ICAR-National Research Centre on Seed Spices (ICAR-NRCSS), Ajmer.
70	1590	National Research Centre on Yak (NRCY), Dirang.	ICAR-National Research Centre on Yak (ICAR-NRCY), Dirang.
71	1526	National Bureau of Plant Genetic Resources (NBPGR), New Delhi.	ICAR-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi.
72	1571	National Bureau of Agriculturally Important Microorganisms (NBAIM), Mau.	ICAR-National Bureau of Agriculturally Important Microorganisms (ICAR-NBAIM), Mau.

73	1533	National Bureau of Agriculturally Important Insects (NBAII)), Bengaluru	ICAR-National Bureau of Agricultural Insect Resources (ICAR-NBAIR), Bengaluru
74	1568	National Bureau of Soil Survey & Land Use Planning (NBSSLUP), Nagpur.	ICAR-National Bureau of Soil Survey & Land Use Planning (ICAR-NBSSLUP), Nagpur.
75	1583	National Bureau of Animal Genetic Resources (NBAGR), Karnal.	ICAR-National Bureau of Animal Genetic Resources (ICAR-NBAGR), Karnal.
76	1601	National Bureau of Fish Genetic Resources (NBFGR), Lucknow.	ICAR-National Bureau of Fish Genetic Resources (ICAR-NBFGR), Lucknow.
77	1519	Directorate of Maize Research (DMR), New Delhi.	ICAR-Indian Institute of Maize Research (ICAR-IIMR), New Delhi.
78	1520	Directorate of Rice Research (DRR), Hyderabad.	ICAR-Indian Institute of Rice Research (ICAR-IIRR), Hyderabad.
79	1521	Directorate of Wheat Research (DWR), Karnal.	ICAR-Indian Institute of Wheat & Barley Research (ICAR-IIWBR), Karnal.
80	1518	Directorate of Oilseeds Research (DOR), Hyderabad.	ICAR-Indian Institute of Oilseeds Research (ICAR-IIOR), Hyderabad.
81	1536	Directorate of Seed Research (DSR), Mau.	ICAR-Directorate of Seed Research (ICAR-DSR), Mau.
82	3827	Directorate of Sorghum Research (DSR), Hyderabad.	ICAR- Indian Institute of Millets Research (ICAR-IIMR), Hyderabad.
83	1528	National Research Centre for Groundnut (NRCG)-till 2009, Junagadh.	ICAR-Directorate of Groundnut Research (ICAR-DGR), Junagadh.
84	1530	National Research Centre for Soybean (NRCS), Indore.	ICAR-Directorate of Soybean Research (ICAR-DSoyR), Indore.
85	1532	National Research Centre on Rapeseed-	ICAR-Directorate of Rapeseed & Mustard Research (ICAR-DRMR),

		Mustard (NRCRM) , Bharatpur.	Bharatpur.
86	1554	National Research Centre on Mushroom till 2009 (NRCM), Solan.	ICAR-Directorate of Mushroom Research (ICAR-DMR), Solan.
87	1557	National Research Centre on Onion and Garlic till 2008 (NRCOG), Pune.	ICAR-Directorate of Onion and Garlic Research (ICAR-DOGR), Pune.
88	1550	National Research Centre for Cashew (NRCC), Puttur.	ICAR-Directorate of Cashew Research (ICAR-DCR), Puttur.
89	1556	Directorate of Oil Palm Research (DOPR), Pedavegi.	ICAR- Indian Institute of Oil Palm Research (ICAR-IIOPR), Pedavegi.
90	1555	Directorate of Medicinal & Aromatic Plants Research (DMAPR), Anand.	ICAR-Directorate of Medicinal & Aromatic Plants Research (ICAR-DMAPR), Anand.
91	3828	Directorate of Floricultural Research (DFR), New Delhi.	ICAR-Directorate of Floricultural Research (ICAR-DFR), New Delhi.
92	3829	Project Directorate for Farming Systems Research (PDFSR), Meerut.	ICAR- Indian Institute of Farming Systems Research (ICAR-IIFSR), Meerut.
93	1572	Directorate of Water Management (DWM), Bhubaneswar.	ICAR-Indian Institute of Water Management (ICAR-IIWM), Bhubaneswar.
94	1570	National Research Centre for Weed Science (NRCWS), Jabalpur.	ICAR-Directorate of Weed Science Research (ICAR-DWSR), Jabalpur.
95	1607	Project Directorate on Foot and Mouth Disease (PDFMD), Mukteswar.	ICAR-Project Directorate on Foot and Mouth Disease (ICAR-PDFMD), Mukteswar.
96	1593	Project Directorate on Poultry (PDP), Hyderabad.	ICAR-Directorate of Poultry Research (ICAR-DPR), Hyderabad.
97	3830	Directorate of Knowledge Management in Agriculture (DKMA), New Delhi.	ICAR-Directorate of Knowledge Management in Agriculture (ICAR-

			DKMA), New Delhi.
98	1602	Directorate of Coldwater Fisheries Research (DCFR), Bhimtal.	ICAR-Directorate of Coldwater Fisheries Research (ICAR-DCFR), Bhimtal.
99	1606	Directorate of Research on Women in Agriculture (DRWA), Bhubaneswar.	ICAR - Central Institute for Women in Agriculture (ICAR-CIWA), Bhubaneswar.
100	3831	Zonal Project Directorate, Zone I, ICAR, Ludhiana.	Zonal Project Directorate, Zone I, ICAR, Ludhiana.
101	3832	Zonal Project Directorate, Zone II, ICAR, Kolkata.	Zonal Project Directorate, Zone II, ICAR, Kolkata.
102	3833	Zonal Project Directorate, Zone III, ICAR, Umiam.	Zonal Project Directorate, Zone III, ICAR, Umiam.
103	3834	Zonal Project Directorate Zone IV, ICAR, Kanpur.	Zonal Project Directorate Zone IV, ICAR, Kanpur.
104	3835	Zonal Project Directorate, Zone V, ICAR, Hyderabad.	Zonal Project Directorate, Zone V, ICAR, Hyderabad.
105	3836	Zonal Project Directorate, Zone VI, ICAR, Jodhpur.	Zonal Project Directorate, Zone VI, ICAR, Jodhpur.
106	3837	Zonal Project Directorate, Zone VII,ICAR, Jabalpur.	Zonal Project Directorate, ZoneVII,ICAR, Jabalpur.
107	3838	Zonal Project Directorate, Zone VIII, ICAR, Bengaluru.	Zonal Project Directorate, Zone VIII, ICAR, Bengaluru.

Category (ii) Agencies that are involved in teaching (primarily) and research & extension: 68

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
1	3839	Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad	Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
2	3116	Agriculture University Jodhpur (AUJ), Mandor	Agriculture University Jodhpur (AUJ), Mandor
3	3117	Agriculture University, Kota	Agriculture University, Kota
4	1665	Anand Agricultural University (AAU), Anand	Anand Agricultural University (AAU), Anand
5	1623	Assam Agricultural University (AAU), Jorhat	Assam Agricultural University (AAU), Jorhat
6	1627	Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur	Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur
7	3118	Bihar Agricultural University (BAU), Sabour	Bihar Agricultural University (BAU), Sabour
8	1626	Birsa Agricultural University (BAU), Kanke	Birsa Agricultural University (BAU), Kanke
9	1628	Chandra Shekar Azad University of Agriculture & Technology, Kanpur	Chandra Shekar Azad University of Agriculture & Technology, Kanpur
10	1629	Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar	Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar
11	1654	CSK Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Palampur	CSK Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Palampur
12	1634	Dr Balasaheb Sawant Konkan Krishi Vidyapeeth (Dr.BSKKV), Dapoli	Dr Balasaheb Sawant Konkan Krishi Vidyapeeth (Dr.BSKKV), Dapoli

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
13	1641	Dr Panjabrao Deshmukh Krishi Vidyapeeth,(PDKV), Akola	Dr Panjabrao Deshmukh Krishi Vidyapeeth,(PDKV), Akola
14	1631	Govind Ballabh Pant University of Agriculture & Technology (GBPUAT), Pantnagar	Govind Ballabh Pant University of Agriculture & Technology (GBPUAT), Pantnagar
15	1632	Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur	Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur
16	1633	Jawaharlal Nehru Krishi Viswa Vidyalaya (JNKVV), Jabalpur	Jawaharlal Nehru Krishi Viswa Vidyalaya (JNKVV), Jabalpur
17	1664	Junagadh Agricultural University (JAU), Junagadh	Junagadh Agricultural University (JAU), Junagadh
18	1635	Kerala Agricultural University (KAU), Thrissur	Kerala Agricultural University (KAU), Thrissur
19	1642	Maharana Pratap University of Agriculture & Technology (MPUAT) , Udaipur	Maharana Pratap University of Agriculture & Technology (MPUAT) , Udaipur
20	1637	Mahatma Phule Krishi Vidyapeeth, (MPKV) Rahuri	Mahatma Phule Krishi Vidyapeeth, (MPKV) Rahuri
21	3119	Manyavar Shri Kanshiram Ji University of Agriculture and Technology (MSKUAT), Banda from 2010-14	Banda University of Agriculture and Technology, Banda
22	1638	Narendra Deva University of Agriculture & Technology (NDUAT), Faizabad	Narendra Deva University of Agriculture & Technology (NDUAT), Faizabad
23	1663	Navsari Agricultural University (NAU), Navsari	Navsari Agricultural University (NAU), Navsari
24	1639	Orissa University of Agriculture & Technology (OUAT), Bhubaneswar	Orissa University of Agriculture & Technology (OUAT), Bhubaneswar

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
25	1640	Punjab Agricultural University (PAU), Ludhiana	Punjab Agricultural University (PAU), Ludhiana
26	1644	Rajendra Agricultural University (RAU), Pusa	Rajendra Agricultural University (RAU), Pusa
27	1661	Rajmata Vijayaraje Scindia Krishi Vishvwa Vidhyalaya (RMSKVV), Gwalior	Rajmata Vijayaraje Scindia Krishi Vishvwa Vidhyalaya (RMSKVV), Gwalior
28	1653	Sardar Ballabh Bhai Patel Univ. of Agriculture & Technology (SBBPUAT), Meerut	Sardar Ballabh Bhai Patel Univ. of Agriculture & Technology (SBBPUAT), Meerut
29	1662	Sardarkrushinagar-Dantiwada Agricultural University (SDAU), Sardarkrushinagar	Sardarkrushinagar-Dantiwada Agricultural University (SDAU), Sardarkrushinagar
30	1645	Sher-e-Kashmir Univ of Agricultural Sciences & Technology of Jammu, (SKUAST-Jammu), Jammu	Sher-e-Kashmir Univ of Agricultural Sciences & Technology of Jammu, (SKUAST-Jammu), Jammu
31	1646	Sher-e-Kashmir Univ of Agricultural Sciences & Technology of Kashmir (SKAUST-Kashmir), Srinagar	Sher-e-Kashmir Univ of Agricultural Sciences & Technology of Kashmir (SKAUST-Kashmir), Srinagar
32	3120	Sri Karan Narendra Agriculture University (SKNAU), Jobner	Sri Karan Narendra Agriculture University (SKNAU), Jobner
33	1643	Swami Keshwanand Rajasthan Agricultural University (SKRAU), Bikaner	Swami Keshwanand Rajasthan Agricultural University (SKRAU), Bikaner
34	1647	Tamil Nadu Agricultural University (TNAU), Coimbatore	Tamil Nadu Agricultural University (TNAU), Coimbatore
35	1650	University of Agricultural Sciences (UAS), Dharwad	University of Agricultural Sciences (UAS), Dharwad

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
36	1649	University of Agricultural Sciences (UAS), Bengaluru	University of Agricultural Sciences (UAS), Bengaluru
37	3121	University of Agricultural and Horticultural Sciences (UAHS), Shimoga	University of Agricultural and Horticultural Sciences (UAHS), Shimoga
38	3123	University of Agricultural Sciences (UAS), Raichur	University of Agricultural Sciences (UAS), Raichur
39	1655	Uttar Banga Krishi Viswavidyalaya , (UBKV), Cooch Behar	Uttar Banga Krishi Viswavidyalaya , (UBKV), Cooch Behar
40	3843	Vasantrao Naik Marathwada Krishi Vidapeeth, (AnAU), Parbhani	Vasantrao Naik Marathwada Krishi Vidapeeth, (VNMKV), Parbhani
41	3124	Chhattisgarh Kamdhenu Vishwavidyalaya (CKV), Durg	Chhattisgarh Kamdhenu Vishwavidyalaya (CKV), Durg
42	1660	Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana	Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana
43	1659	Karnataka Veterinary, Animal & Fisheries Sciences University, (KVAFSU), Bidar	Karnataka Veterinary, Animal & Fisheries Sciences University, (KVAFSU), Bidar
44	3125	Kerala Veterinary and Animal Sciences University (KVASU), Wayanand	Kerala Veterinary and Animal Sciences University (KVASU), Wayanand
45	3126	Lala Lajpat Rai University of Veterinary & Animal Sciences (LRUVAS), Hisar	Lala Lajpat Rai University of Veterinary & Animal Sciences (LRUVAS), Hisar
46	1656	Maharashtra Animal & Fishery Sciences University (MAFSU), Nagpur	Maharashtra Animal & Fishery Sciences University (MAFSU), Nagpur
47	3127	Nanaji Deshmukh Pashu Chikitsa Vigyan Vishvavidyalaya (NDPCVV), Jabalpur	Nanaji Deshmukh Pashu Chikitsa Vigyan Vishvavidyalaya (NDPCVV), Jabalpur

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
48	1658	Rajasthan Univ. of Veterinary & Animal Sciences (RAJUVAS), Bikaner	Rajasthan Univ. of Veterinary & Animal Sciences (RAJUVAS), Bikaner
49	3128	Sri Venkateswara Veterinary University,(SVVU), Tirupati	Sri Venkateswara Veterinary University,(SVVU), Tirupati
50	1648	Tamil Nadu Veterinary & Animal Sciences University (TANUVAS), Chennai	Tamil Nadu Veterinary & Animal Sciences University (TANUVAS), Chennai
51	1657	UP Pandit Deen Dayal Upadhaya Pashu Chikitsa Vigyan Vishwa Vidhyalaya Evam Go Anusandhan Sansthan, Mathura	UP Pandit Deen Dayal Upadhaya Pashu Chikitsa Vigyan Vishwa Vidhyalaya Evam Go Anusandhan Sansthan, Mathura
52	1651	West Bengal University of Animal & Fishery Sciences (WBUAFS), Kolkata	West Bengal University of Animal & Fishery Sciences (WBUAFS), Kolkata
53	1652	Dr YS Parmar Univ of Horticulture & Forestry (Dr.YSPUHF), Solan	Dr YS Parmar Univ of Horticulture & Forestry (Dr.YSPUHF), Solan
54	1625	Dr YSR Horticultural University (Dr.YSRHU), Tadepalligudem	Dr YSR Horticultural University (Dr.YSRHU), Tadepalligudem
55	3130	University of Horticultural Sciences (UHS), Bagalkot	University of Horticultural Sciences (UHS), Bagalkot
56	3131	Uttarakhand University of Horticulture and Forestry (UUHF), Bharsar	Uttarakhand University of Horticulture and Forestry (UUHF), Bharsar
57	3132	Kerala University of Fisheries & Ocean Studies (KUFOS), Kochi	Kerala University of Fisheries & Ocean Studies (KUFOS), Kochi
58	3133	Tamil Nadu Fisheries University (TNFU), Nagapattinam	Tamil Nadu Fisheries University (TNFU), Nagapattinam
59	1630	Central Agricultural University (CAU), Imphal	Central Agricultural University (CAU), Imphal

S.No	DMP Agency No.	Old Name of Institute	Current/New Name of Institute
60	3134	Rani Laxmi Bai Central Agricultural University (RLBCAU), Jhansi	Rani Laxmi Bai Central Agricultural University (RLBCAU), Jhansi
61	3844	Aligarh Muslim University (AMU), Aligarh	Aligarh Muslim University (AMU), Aligarh
62	3845	Banaras Hindu University (BHU), Varanasi	Banaras Hindu University (BHU), Varanasi
63	3846	Visva-Bharati University (VBU), Shantiniketan	Visva-Bharati University (VBU), Shantiniketan
64	3847	Nagaland University, Lumani, Nagaland	Nagaland University, Lumani, Nagaland
65	1666	Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad	Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad
66	1669	TNAU- Pandit Jawaharlal Nehru College of Agriculture & Research Institute (PAJANCOA), Karaikal	TNAU- Pandit Jawaharlal Nehru College of Agriculture & Research Institute(PAJANCOA), Karaikal
67	3479	Apollo College of Veterinary Medicine, Jaipur	Apollo College of Veterinary Medicine, Jaipur
68	1681	Annamalai University – Faculty of Agriculture, Chidambaram	Annamalai University – Faculty of Agriculture, Chidambaram

Annexure-III

List of participating Institutions in the Brainstorming Meeting conducted at NAARM for pre-testing of ASTI survey forms:

Group	Institution	Section of the ASTI survey form
1	Central Institute for Cotton Research (CICR), Directorate of Oil Palm Research (DOPR), University of Agricultural Sciences (UAS)-Dharwad, Vasantrao Naik Marathwada Krishi Vidapeeth (VNMKV), Central Research Institute for Dryland Agriculture, (CRIDA)	B
2	Central Tobacco Research Institute (CTRI), National Bureau of Soil Survey & Land Use Planning (NBSSLUP), Karnataka Veterinary, Animal & Fisheries Sciences University, (KVAFSU), Pandit Jawaharlal Nehru College of Agriculture & Research Institute, (PAJANCOA), Directorate of Oilseeds Research (DOR)	C
3	Indian Institute of Horticultural Research (IIHR), National Institute of Animal Nutrition & Physiology (NIANP), University of Agricultural and Horticultural Sciences (UAHS), Maharashtra Animal & Fishery Sciences University (MAFSU), Directorate of Poultry Research (PDP)	D
4	Indian Agricultural Statistics Research Institute (IASRI), Tamil Nadu Agricultural University,(TNAU), Tamil Nadu Veterinary & Animal Sciences University, (TANUVAS), Dr.YSR Horticulture University (Dr.YSRHU), Zonal Project Director-Zone- V, Sri Venkateswara Veterinary University (SVVU), Acharya NG Ranga Agricultural University (ANGRAU)	E & F