



## Human Resource Development: Activities, Achievements and Aspirations

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### SUMMARY

ICAR-National Rice Research Institute (NRRI) is a research and development institute, which is considered as knowledge repository in rice sciences. There are ample expertise and experiences available with NRRI scientists in science-led approach, which is to be disseminated to the future generations by providing training to post graduate and doctoral degree students and other stakeholders. As the training needs concerted and focused initiatives to enhance efficiency and effectiveness of each one through various training programmes, a HRD Cell was created at NRRI for strengthening and facilitating training and capacity building of the students/other stakeholders. The Institute offers research and training opportunities in various disciplines of agricultural sciences and also other subjects of life sciences. The programme of HRD in NRRI includes MSc/MTech/equivalent degree, PhD degree, training etc. Besides, there is an excellent opportunity for PG and PhD students to avail the fellowships from NRRI as IIRI is providing 25 scholarships to NRRI in a collaborative project mode. The regional station at Hazaribag also caters to such regional needs of guiding PhD and MSc students. During last 5 years it has trained 5000 persons on rice-based technologies and agri-entrepreneurship and guided 120 MSc and 30 PhD students. Additionally, NRRI attracted rice researchers from developing countries like, Nigeria, Tanzania and Niger to undertake training as post doc or visiting fellows. Finally, after completion of research from NRRI, the students are well placed in different national and international organizations. Overall, NRRI HRD is creating the next generation leaders in rice sciences to overcome the new challenges for agriculture in India.

### 1. INTRODUCTION

ICAR-National Rice Research Institute (NRRI) is a research and development institute involved in scientific innovations and technology development in rice sciences. There is ample expertise and experiences available with NRRI scientists in rice sciences, which should be disseminated by providing training and guidance to post graduate and doctoral degree students and also other stakeholders. As the training needs concerted and focused initiatives to enhance efficiency and effectiveness of each one through various training programmes, a HRD Cell was created at NRRI for strengthening and facilitating training and capacity building of the students/scientists to work in the emerging



areas of rice research guided by leading rice scientists. The objective of HRD programme is to develop a new generation of rice researchers for India and abroad. The program provides an excellent opportunity for students to work in the emerging areas of rice research in their post graduate and doctoral programme, guided by leading rice scientists. Besides, scientists interested to upgrade their knowledge in any specialized area are also given the opportunity to undertake training at NRRI.

The HRD Cell was created at this institute for strengthening and facilitating training and capacity building of the students in early 1950s. Further, the cell was strengthened with necessary staff required for effective functioning of this cell. The work related to human resource development at NRRI is administered by a HRD Cell. There is a Human Resource Development Committee consisting of all Heads of Divisions as members, one of them being nominated as Chairman by the Director, and an HRD Coordinator (a scientist of the Institute nominated by the Director), who acts as Member Secretary of the Committee. Besides, a Co-coordinator was also nominated by Director to help the Coordinator in HRD related works.

The HRD guideline was formulated in 2018 by the HRD Committee of the Institute is in full conformity with that of the ICAR. This guideline was approved by the competent authority for implementation in training and development of students in rice research which is available at NRRI website (<http://icar-nrri.in/>).

## 2. DISCIPLINES FOR HRD

The Institute offers research and training opportunities in the disciplines of Agricultural Chemistry, Agricultural Chemicals, Agricultural Economics, Agricultural Engineering, Agricultural Statistics, Agricultural Extension, Agronomy, Biochemistry, Biotechnology, Bioinformatics, Botany, Economic Botany, Entomology, Environmental Sciences, Fisheries, Food technology, Genetics, Genomics, Microbiology, Life Sciences, Molecular Breeding, Nematology, Plant Breeding, Plant Pathology, Plant Physiology, Seed Technology, Soil Microbiology, Soil Science, Zoology; and related disciplines covering various aspects of rice research. The Institute can include other disciplines, if deemed appropriate.

## 3. PROGRAMMES OF HRD

The important programmes implemented at NRRI are listed below.

### 3.1. MSc/MTech/equivalent degree

The students registered for MSc/MTech/equivalent degree in recognized educational organizations were allowed to undertake research in two sessions



i.e., during July-December (Session I) and January-June (Session II) every year. For every student an Advisory Committee consisting of the guide (Chairman of the Committee), one scientist from the same discipline and another from a related discipline (as deemed fit for the research work) is formed to guide and supervise the progress of research work.

### 3.2. *PhD degree*

The candidates working as Senior Research Fellows (SRFs) in the on-going externally aided research projects at NRRI pursued their PhD after completing course work from the university where he/she is registered as per provisions of ICAR-HRD Guidelines. Besides, the students awarded with fellowship from DBT/DST (eg. INSPIRE/CSIR or any other equivalent organization) are also eligible to carry out their PhD with due approval of the Director and endorsement of NRRI scientist as guide/supervisor. Since, there is a provision for the students to carry out their PhD who do not have any fellowship but have already qualified the entrance test (conducted by the universities) and completed six months course work, they were permitted to pursue for PhD research as honorary fellow. There is an Advisory Committee comprising the Guide (Chairman of the Advisory Committee), two scientists from the same discipline and another scientist from a discipline deemed fit for the research work. In case of co-guide system (as prevalent in some Universities), the Co-guide is included in the advisory committee.

### 3.3. *Training on rice sciences*

The Institute imparts training in various areas related to rice sciences. These trainings are categorized as summer training, foreign training, etc.

For summer internship students, they spend the summer, working at NRRI research laboratory to gain an understanding of rice research and experiences. This experience helps students in improving the most essential skills missing in their regular college curriculum and gives a great experience of a summer internship. The certification provided in the Summer Training Programs helps students to showcase their skills in their resume for their prospective recruiters in these fields. This also helps in improving their chances of getting admission in good colleges for higher studies.

Achievements of NRRI in emerging areas of rice sciences attracted a number of rice researchers from foreign countries to undertake training in some specialized areas to upgrade their knowledge and skills.

The Institute has Post Doctoral Fellow Programme and Training in some specialized areas. There is also a scope for rice researchers to upgrade their skills and expertise in any specialized subjects by undertaking training at NRRI. For example, NRRI showed its significant achievements in developing androgenic protocol in *indica* rice for production of Doubled Haploids having a good expertise in this technology. This technology was capitalized by



imparting training to the researchers from public/private sectors through available expertise.

### **3.4. NRRI-IRRI Students' Programme**

ICAR-NRRI and IRRI as leading global rice research organizations, provide an excellent opportunity for the students to carry out the post graduate and doctoral work under the guidance of leading scientists from NRRI and IRRI in world-class scientific environment. The overall objective of the India-IRRI collaborative capacity development program is to develop a new generation rice scientists and research leaders for India that addresses challenges and opportunities in rice agri-food systems development in Odisha. Therefore, IRRI provided an NRRI-IRRI scholars' programme for students to work on rice based systems research in Odisha, under the supervision of NRRI and IRRI scientists during 2018-2021. The scholars registered at an accredited university, with course work completed, and are ready to join to conduct research for completing their research at NRRI in India.

A total of 25 scholarships were planned in a project mode out of which 15 scholarships (5 scholarships per year for 3 years) are meant for Masters and 10 scholarships for PhD programmes. The amount of fellowship is INR 15,000/ month and INR 20,000/ month for MSc and PhD students, respectively. The duration of scholarship for MSc is maximum 9 months whereas maximum 2 years is restricted to the PhD student for completion of the research work. The research areas identified for MSc and PhD students are nutrient management, climate change adaptation and mitigation, agronomy, seed systems, plant breeding and varietal evaluation, geospatial analysis and yield modeling, land use-land cover mapping, extrapolation domains, crop insurance, impact assessment, knowledge management, innovations in extension, gender and youth research, entrepreneurship in agri-food systems. A joint committee was set up by the Director, NRRI comprising of NRRI and IRRI scientists to develop the guidelines and process of selection of the students and implementation of the programme. The fellowship programme has been implemented and currently 5 PhD students are availing fellowships for pursuing their research work in first batch. Subsequently, 3 PhD and 3 MSc students were selected in second batch for this fellowship program.

## **4. ACHIEVEMENTS OF THE HRD PROGRAMMES**

The achievements of HRD of NRRI were visible from the students' skill development in terms of PhD, MSc, summer training, etc. Besides, the resource generation over 5 years is also well focused.

### **4.1. PhD**

The PhD students who have registered in universities conducted their dissertation work at NRRI, Cuttack. A total of 82 students registered for PhD

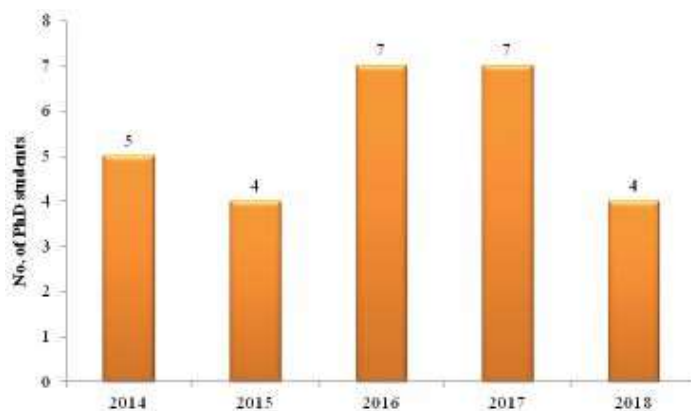


Fig.1. Number of students awarded PhD over the years.

from 2006 onwards out of which 27 students obtained PhD degree after successful completion of their dissertation at NRRI, Cuttack in last 5 years (Fig. 1); only 1 student was awarded PhD in 2019. Additionally, 54 students are continuing their dissertation program under the guidance of scientists, NRRI. The students' number for 5 years (2014-18) is taken in to consideration in division wise which showed maximum number of students (10) were awarded PhD under the guidance of scientists from Crop Improvement Division. Similarly, 8, 5 and 4 students completed their dissertation under the guidance of scientists from Crop Protection, Crop Production and Crop Physiology & Biochemistry, respectively (Fig. 2). The data showed that maximum number of students completed their PhD in Biotechnology since it is considered as an emerging area in recent past (Fig. 3).

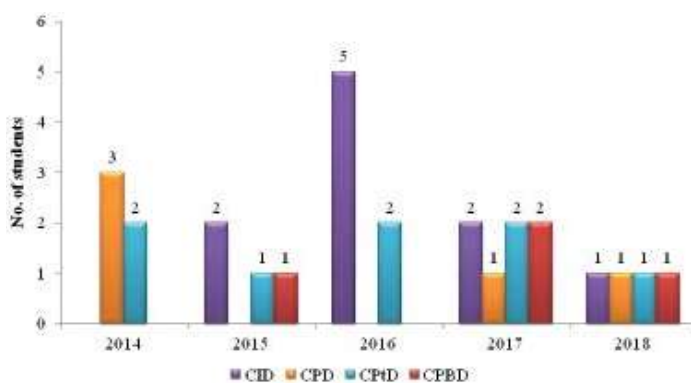


Fig. 2. Number of students obtained PhD degree in different Divisions of NRRI over the years.

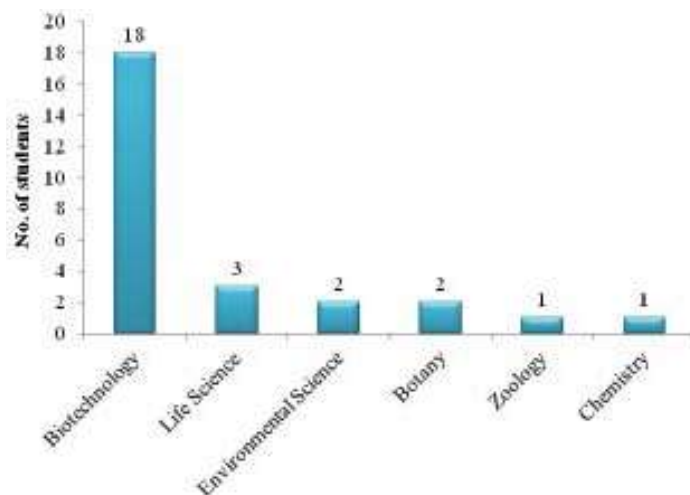


Fig. 3. Subject-wise list of students awarded PhD over last 5 years.

So far, five students obtained their PhD degree under registration with Vinoba Bhave University, Hazaribag after completing their research works under the guidance of Scientists at CRURRS, Hazaribag.

#### 4.2. MSc

The MSc students as part of fulfillment of their degree programme pursued research and thesis work for 6 months at NRRI, Cuttack. A total number of 118 students completed their MSc dissertation from 2014-2018 (Fig. 3). The maximum number of students carried out dissertation works in 2017 as there were a number MOUs signed between SAUs and NRRI. However, the student numbers were found to be low (19) in 2018 because the students of SAUs joined in mid-2017 and completed the dissertation in 2018.

The students number for 5 years (2014-18) is considered in division wise (Fig. 4). The number of students completed their MSc dissertation at NRRI from 2014 onwards were 118. In the last 5 years, 46 students performed their dissertation work under the guidance of scientists from Crop Improvement Division followed by 45 from Crop Production, 12 from Crop Protection, 9 from Crop Physiology and Biochemistry, 6 from Social Science Division (Fig. 5).

The data of the students in gender-wise showed the number of female students is significantly high over 5 years as compared to the male students. Highest number of female students (90.9%) performed their dissertation as against of male students (9.1%) in 2014. This indicates the interest of female students towards higher studies (Fig. 6).

During 2016-2018, eight MSc students of ICAR-IARI-Jharkhand completed their dissertation works under the guidance of Scientists at CRURRS, Hazaribag.

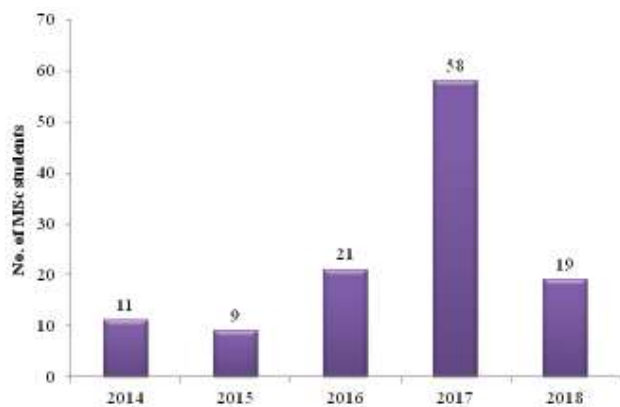


Fig. 4. Number of students completed MSc at NRRI over 5 years.

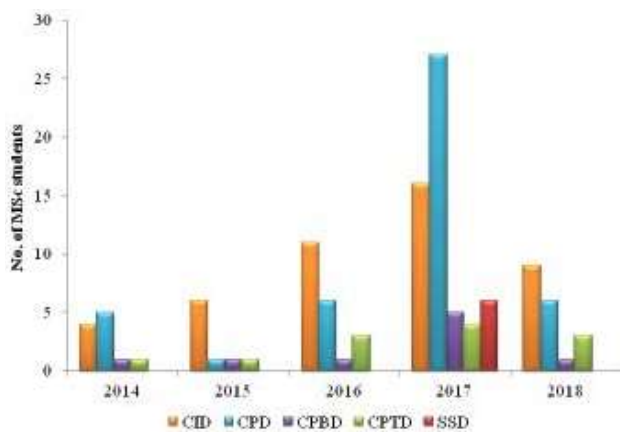


Fig. 5. Number of students obtained MSc degree in different Divisions of NRRI over 5 years.

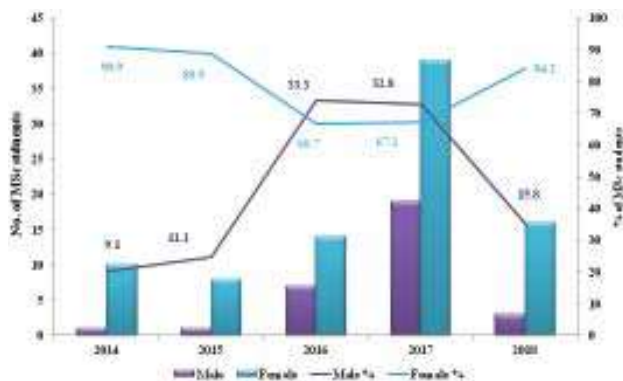


Fig. 6. Number of male and female MSc students completed dissertation over 5 years.



### 4.3. Summer training

A total number of 16 students were imparted training in different subjects at NRRI. It was also observed that maximum numbers of students are interested to undertake summer training in Biotechnology (Fig. 7).

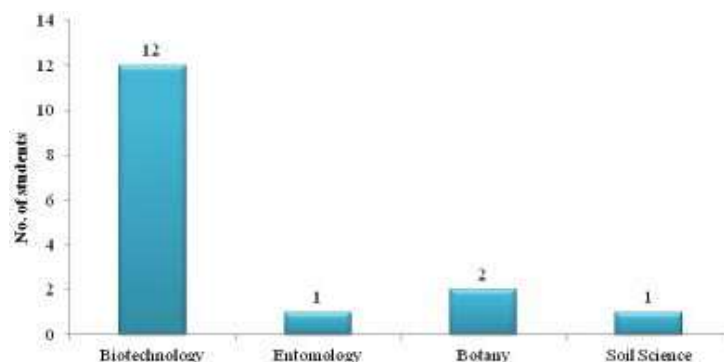


Fig. 7. Number of students undergone summer training at NRRI during 2018.

### 4.4. Foreign training

Five fellows from developing countries undertook training at NRRI during 2011-16. The details are depicted in Table 1.

**Table 1. Foreign researchers pursued training/PDF at ICAR-NRRI during 2011-2016.**

Country	Training / Fellow	Fellowship
Nigeria	Post Doctorate	DBT-TWAS fellowship
Tanzania	Visiting Fellow	DST- C.V. Raman International Fellowship for African researchers for visiting fellowship
Niger	Post Doc	DST- C.V. Raman International Fellowship for African researchers
Tanzania	Training	International Atomic Energy Agency (IAEA)
Tanzania	Training	International Atomic Energy Agency (IAEA)

### 4.5. Specialized training

The Doubled Haploid technology developed by NRRI attracted a number of researchers from public and private sectors to undertake training in this specialized area from 2014-18 by charging the fees fixed by NRRI. The details are given in Table 2.





**Table 2. Training imparted on specialized area (DH technology).**

Trainee	Institute	Year
Research associate	TIERRA Seed Science Pvt. Ltd., Hyderabad	2014
Associate Professor	IGKV, Raipur	2014
Senior breeder	PAU, Ludhiana	2015
Research Associate	IRRI, Hyderabad	2016
Scientist	M/S Bayer Seed Pvt. Ltd., Hyderabad	2017
Senior Scientist	ICAR-SBI, Coimbatore	2018

#### 4.6. Resource generation

As per HRD guidelines, the students were imparted training in various subjects by charging fees from which an amount of Rs. 20.05 lakh was generated which is considered in financial year wise (March-February). The highest amount (Rs. 6.2 lakh) was generated during 2016-17 followed by 2015-16 and 2017-18 (Fig. 8).

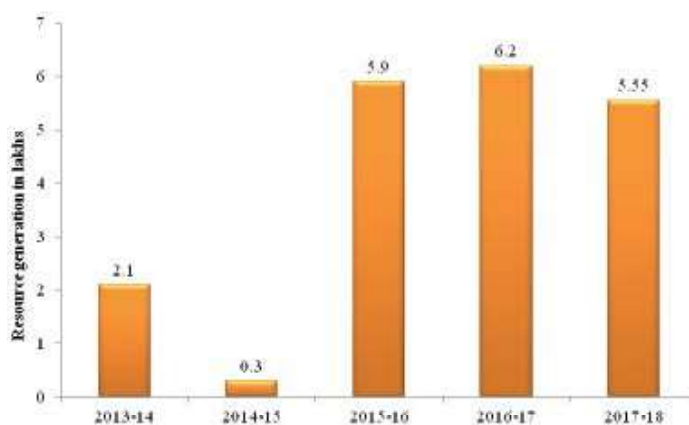


Fig. 8. Resource generation from students' training through HRD-NRRI over last 5 years.

## 5. IMPACTS

The students have been selected to work as Assistant Professors in various Universities after completion of their PhD from NRRI. Further, students are also working in different projects as Young Professionals, Senior Research Fellows and Research Associates in various ICAR and other institutes. Besides, some of the students were also awarded PDF in foreign countries. Similarly, the students who have completed their dissertation work in MSc have joined the PhD programme in various reputed institutes/universities. With regard to summer training, the certification provided in the Summer Training Programs

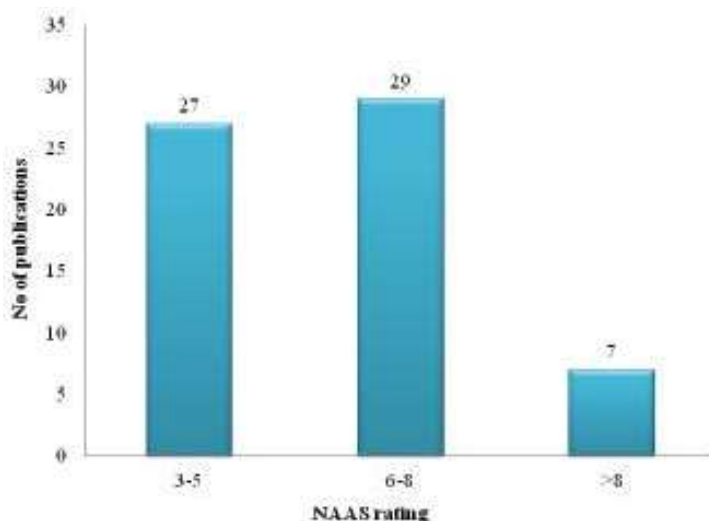


Fig. 9. Publications of PhD students with NAAS score

helped students to showcase their skills in their resume for their prospective recruiters in these fields. This also helped in getting admission in good colleges/ universities for higher studies.

The research work conducted at NRRI by the MSc and PhD students has resulted in good number of publications in national and international journal of repute. Sixty three articles were published out of which 7 articles showed >8 NAAS rating. Also, 29 articles have been published with NAAS score of 6-8 (Fig. 9). The average NASS score of the publications for 5 years was found to be 5.08.

## 6. ASPIRATIONS

The developments of linkages between institutes contribute to effective cooperation of research and development in different areas of rice research. Accordingly, MOUs signed between NRRI and other reputed institutes will be increased not only for students' admission but also for effective coordination in the research activities. Moreover, challenges of next few decades in terms of increasing rice production in India requires enhancement of skills particularly in data analysis, simulation models, bioinformatics analysis, genome editing, precision breeding, pest forecasting and modeling etc. Thus, HRD of NRRI will encourage in developing a platform for the interested students and rice researchers to undergo training in these areas for addressing the research problems pertinent to India particularly, the eastern India.



## 7. CONCLUSION

The Human Resource Development is one of the major components of skill enhancement for rice researchers and students to enrich their knowledge in rice sciences. HRD at NRRI has been active in signing MOUs with different public and private institutes/universities for taking students to pursue their MSc and PhD programmes. The number of summer trainings undergone by the students is also increasing over the years as well. Since, there are immense challenges ahead for agriculture in India, it is required to make the next generation ready to overcome these problems through science-led technologies. Therefore, HRD activities of NRRI is always proactive to acquaint the rice researchers and students with emerging technologies particularly in rice sciences to empower and equip them to ably address the ever growing food requirements of the country.\*