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**PART-I**  
**RULES AND REGULATIONS**

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# 1 The Institute

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## 1.1 Functions

**1.1.1** The Indian Agricultural Research Institute (IARI) is India's premier institution for agricultural research and education including extension education. Since 1958, it holds the status of a Deemed University under the University Grants Commission Act of 1956 and is authorized to award post-graduate degrees of Master of Science and Doctor of Philosophy in agricultural sciences and their related basic disciplines vide Govt. of India Notification No. F.24-44/58-U-S dated 22nd August, 1958 (reproduced below):

*Government of India,  
Ministry of Education,  
New Delhi 1, the 22<sup>nd</sup> August, 1958/31 Sravana,  
1880 Saka*

*No. F. 24-44/58-U-S.*

### *Notification*

*In exercise of the powers conferred by Section 3 of the University Grants Commission Act, 1956 (3 of 1956), the Central Government, on the advice of the University Grants Commission, hereby declares that the Indian Agricultural Research Institute, New Delhi which is an institution of higher education, shall be deemed to be a University for the purpose of the said act.*

*Sd/-  
N.S. Junankar  
Deputy Education Adviser*

**1.1.2** The primary functions of the Institute are: (i) To conduct basic and strategic research with a view to understanding the processes, in all their complexity, and to undertake need based research, that lead to crop improvement and sustained agricultural productivity in harmony with the environment, (ii) To serve as a center for academic

excellence in the area of post-graduate and human resources development in agricultural sciences, (iii) To provide national leadership in agricultural research, extension, and technology assessment and transfer by developing new concepts and approaches and serving as a national referral point for quality and standards, and (iv) To develop information system, add value to information, share the information nationally and internationally, and serve as a national agricultural library and database.

## 1.2 Origin, Growth and Development

**1.2.1** The Institute was originally established as Agricultural Research Institute and College by the Government of India in 1905 at a village called Pusa in North Bihar. The establishment was greatly helped by an American philanthropist Mr. Henry Phipps, after whom the main building in Pusa was named. After the devastating earthquake of Bihar in 1934, the Institute was shifted to its present site in New Delhi in 1936. This is why it is also popularly known as the "Pusa Institute". The Institute has inherited a great tradition of agricultural research and training at the post-graduate level. Since its early days at Pusa, the Institute has done pioneering work in the various fields of agricultural sciences. In 1923, it started a two-year formal training course leading to the Diploma in Associateship of IARI, which was recognized equivalent to the M.Sc. degree of the Indian universities vide O.M. No. F. 17-13/49- T dated 8<sup>th</sup> October, 1949 [(received under the Ministry of Agriculture letter No. 1147 Institute/49 dated 14<sup>th</sup> November, 1949 [copy placed at Annexure-I)]. Till 1955, the Institute awarded 903 Associateships in different disciplines. In 1958 the Institute was accorded the status of a Deemed to be University. At that time students were admitted only in six disciplines. Gradually more disciplines

were introduced and presently IARI admits M.Sc. students in 23 disciplines, M.Tech. in one discipline and Ph.D. in 22 disciplines.

Many pathbreaking contributions were made by the Institute during the pre-independence era.

Special mention may be made of the outstanding wheat varieties bred by Albert Howard and his wife Gabrielle which became famous as the “Pusa Wheats” both in India and abroad. Howard and later F.J.F. Shaw were responsible for the evolution of improved varieties of many other crops. The contributions of E.J. Butler in the field of fungi and fungal diseases of crops, and of H.M. Lefroy and T.B. Fletcher in Entomology were most outstanding. So were the contributions of J.W. Leather in Agricultural Chemistry. The famous “CO” varieties of sugarcane, which helped in revolutionising the sugar industry in India, were developed by C.A. Barber and T.S. Venkataraman at the Sugarcane Breeding Station (now Sugarcane Breeding Institute) at Coimbatore, which until 1950 was a part of this Institute.

**1.2.2** In independent India, the Institute has expanded in scope, activities, research facilities and scientific personnel. The Institute has eight regional stations located at Indore, Kalimpong, Karnal, Katrain, Pune, Pusa, Shimla and Wellington, two regional centres at Aduthurai and Dharwad, and a KVK at Shikohpur.

The teaching disciplines at IARI have been broadly classified and structured in five schools. The principal research themes of various Schools are as follows:

## **School of crop improvement**

### **Genetics**

The Division of Genetics, which was known as the Division of Botany until 1966, contributed significantly to the development of a highly competent and trained manpower base of the country through its post-graduate programme. The advanced training programme intensified with the setting up of the Post Graduate School at IARI in 1958, which confers M.Sc. and Ph.D. degrees.

The post-graduate students’ research constitutes an integral part of the overall research output of the Division and many of the contributions emanating from students’ research have been valuable in terms of quality and practical utility. Genetic improvement of various crops, methodologies for efficient selection, genetic basis of the traits of economic importance and genetics in the model organism *Drosophila* are some of the major themes of research. In addition, molecular approaches, especially the use of molecular markers in crop improvement and diversity analysis are being employed in the Division.

### **Horticulture**

The Division of Horticulture was constituted in the year 1956 for more intensive research on fruits and vegetables by strengthening the groups which existed on these crops in the Division of Botany. The Division of Horticulture in the consequent years saw a further expansion with the formation of the follow up three Divisions:

***Fruits and Horticultural Technology:*** Involved in the development of improved varieties of fruits through introduction and breeding, and in evolving improved techniques of propagation and cultivation of some of the major fruits in the sub-tropical region particularly mango, citrus, grapes and guava.

***Floriculture and Landscaping:*** The Division has been a centre for evolution of improved varieties of roses and ornamental plants like gladioli, marigold, etc.

***Vegetable Science:*** The Division has seen the development of a wide array of improved varieties in cauliflower, cabbage, turnip, radish, carrot, garden peas, French bean, cowpea, tomato, brinjal, onion, cucumber, musk melon, water melon, bottlegourd, bittergourd, spinach, and *methi*. These vegetable varieties are today cultivated not only in India but also in countries like Australia.

For teaching purpose, however, there is only one discipline of Horticulture spread over these three divisions, in which, M.Sc. and Ph.D. degrees are awarded.

## **Post Harvest Technology**

Initially, the Division of Post Harvest Technology started as a Fruit and Vegetable Preservation Section of the Division of Horticulture. With the splitting of the Division of Horticulture in 1970, it became a Unit of the Division of Fruits and Horticultural Technology. The Division of Fruits and Horticultural Technology was divided and a new Division of Post Harvest Technology (PHT) with a multi-disciplinary approach was established on 5<sup>th</sup> February, 2002 during the IX Plan period. The mandate of the Division comprises post harvest loss reduction, value addition and export promotion of horticultural crops, cereals, pulses and oilseeds.

PHT has emerged as one of the frontier areas of research having multidisciplinary approach in which studies are conducted on the major thrust areas, namely, production, post harvest handling, processing and marketing of horticultural and arable crops. The Division also imparts post-graduate education and training for human resource development, and provides advisory and consultancy services on handling, packaging, storage and processing technology in addition to dissemination of information for transfer of technologies developed in the Division.

## **Seed Science and Technology**

With the release of maize hybrids in India during early 1960s, a Seed Testing Section was established in the Division of Genetics which blossomed into the Division of Seed Technology in the year 1968.

The Division was renamed as the Division of Seed Science and Technology in 1984. The Division and IARI Regional Station, Karnal are closely associated in post-graduate teaching and research in the area of seed science and technology.

The Division started a P.G. Diploma course for in-service candidates in 1978 which was terminated in 1980. The regular M.Sc. course in Seed Science and Technology was started in 1983 on the persistent demand from the industry. The Ph.D. course was started in 1994.

## **School of resource management**

### **Agricultural Engineering**

The Division of Agricultural Engineering was established in 1945 with an objective to improve and devise efficient and affordable tools for various farm operations.

The degree programmes in the discipline of Agricultural Engineering were initiated in 1967. The course contents were designed with a view to equipping the students with the knowledge of a wide array of topics ranging from pure mathematics, electronics and physics to soil science and agriculture, and are periodically updated.

### **Agricultural Physics**

The Division of Agricultural Physics was created in 1962 by separating it from the Division of Soil Science and Agricultural Chemistry. The teaching activities were also initiated in the same year in the discipline of Agricultural Physics.

Research work at post-graduate level in the discipline of Agricultural Physics has been carried out on application of remote sensing in agriculture, soil physical conditions in relation to plant growth, agrometeorology and in biophysical processes. The courses in the discipline have been developed comprehensively to give basic concepts as well as advanced knowledge to the students.

### **Agronomy**

Initially, this Division was set up in the form of a Farm Office in 1936. With the efforts of workers like Dr. C.H. Parr, it was established as a full-fledged Division in 1945. There are two major thrust areas of research, *viz.*, crop husbandry and resource management. Within these two major fields, the main research areas are: cropping system, fertilizer management, water management, weed science, dryland farming and conservation agriculture. The Division has ample facilities for field and laboratory research.

The students' research is being carried out within the mandate of the Division. The significant achievements of the students' research include relay cropping on multiple cropping concepts, use of slow release nitrogenous fertilizers, nitrogen

economy through legumes, agronomy of dwarf wheats, improved techniques of dryland farming, water and weed management in different crops and cropping systems, conservation agriculture, etc.

### **Environmental Sciences**

The Division of Environmental Sciences was established on 1<sup>st</sup> January, 1993. M.Sc. degree programme in Environmental Sciences started from 1992 with the help of the teaching faculty drawn from other related disciplines. Ph.D. programme commenced from 1994. The Division has a mandate to conduct applied and strategic research on resource management with sustainable agricultural productivity and environment.

### **Microbiology**

The Division of Microbiology was established in 1961 with a view to exploring alternative sources of soil fertility build-up depending more on renewable sources rather than non-renewable sources.

The initial work was related to organic matter decomposition and recycling of organic wastes, phosphate solubilisation by bacteria and fungi, symbiotic nitrogen fixation by *Rhizobium* and asymbiotic nitrogen fixation by *Azotobacter*, *Azospirillum* and blue-green algae. Currently, advanced tools and biotechnological applications are incorporated into precision based resource management for improving crop production.

Teaching programmes were initiated in 1963. The course contents encompass the basic aspects of soil microbiology, algology and agricultural bacteriology.

### **Soil Science and Agricultural Chemistry**

The Division of Soil Science and Agricultural Chemistry is one of the original five sections of the then Agricultural Research Institute and College established at Pusa, Bihar. The Division was established with the main objective of carrying out re-search on basic and applied aspects of the physical, chemical and biological properties of soils, fertilizers and manures, interactions with soil and plant, improvement in soil fertility, and advice to the farmers on fertilizer recommendations based

on soil tests. Laboratories of this Division are adequately equipped with modern scientific instruments.

### **Water Technology Centre**

The year 1970 saw the development of the Water Technology Centre (WTC) as the major response to the challenges of reducing water resources. It conducts research leading to more efficient management of irrigation water. The Institute received valuable grants from the Ford Foundation for the establishment of this Centre.

An M.Sc. degree programme in Water Science and Technology based at WTC was started in 1996. From the academic session 2003-2004, a Ph.D. degree programme was also started. The faculty of the discipline has been drawn from other related fields like Agricultural Engineering, Soil Science, Agronomy, Plant Physiology and Agricultural Physics.

### **School of crop protection**

#### **Agricultural Chemicals**

It was realised in 1960s that in order to increase the production of food, Indian agriculture would have to receive increasing support from a wide group of chemicals encompassing not only fertilizers but also pesticides of various kinds for the control of diseases, insects and pests. IARI responded to this challenge by creating a separate Division of Agricultural Chemicals in November 1966 with the major responsibility for the synthesis of pesticides, synergists and chemical formulations. The research in this Division has particularly paid attention to the development of new agricultural chemicals. A comprehensive syllabus and expert guidance by the faculty have led to major research contributions by the students, some of which have been patented and commercially exploited.

The Division has produced some pioneering re-search work on neem extracts which has been ac-claimed widely.

#### **Entomology**

Entomology was one of the first disciplines to be organised at the Institute with its setting up at



Pusa, Bihar in 1905. From the very first days of its establishment, the Division of Entomology has been concerned with the investigations, which would help to reduce the losses caused by a wide range of insect pests to Indian agriculture. The Division started with the building up of an exhaustive collection of the insect fauna of the country both for the purpose of identification and the study of their biology. The Division has been awarding post-graduate degrees in the discipline since 1960s.

### **Nematology**

IARI's research programme on parasitic nematodes was initiated in 1962 and it was decided to intensify it by setting up a separate Division in November, 1966.

The Division has been concerned with basic and applied research on parasitic nematodes of agricultural interest with special emphasis on the occurrence and distribution of important nematode species, their host range, bionomics and pathogenicity, identification of disease complexes and above all their control.

The Institute has been a major centre for systematic studies on economically important groups of plant parasitic nematodes. The faculty members specialise in nematode biosystematics and physiological studies and use of safe bioagents for nematode management. The Division also has a national nematode collection, which has been recognised as the world's major collection of its kind.

### **Plant Pathology**

IARI's contributions have laid a strong foundation for plant pathological research in the country. India has been able to protect the genetic potential for high yields created in the recent years only because of the excellent support provided by the plant pathologists by way of incorporating a high degree of disease resistance in the improved varieties. The Division of Plant Pathology has its origin in the section of Mycology in 1905.

The main objective of the Division is to generate data pertaining to the identification/detection of plant pathogens (fungi, bacteria,

mycoplasma, viruses, viroids) and their management. The programme includes diseases of economically important agricultural/horticultural crops and emphasises the areas of molecular characterization of plant pathogens, distribution of races/ virulences/ genotypes, resistant sources, epidemiology, disease forecasting, assessment of losses, apoplastic/ symplastic movement of chemicals, interaction amongst chemicals, resistant mutants, development of detection kits for plant pathogens with the use of ELISA, dot blot, etc., cloning of pathogenic species specific genes, transfer useful genes to host plants, tissue culture, physiology of host-pathogen interaction and taxonomy of plant pathogens.

The Division started its teaching programme in 1958 when IARI became a Deemed University.

### **School of social sciences**

#### **Agricultural Economics**

In order to develop more intensive research programmes in Agricultural Economics, the Division was created in 1960 by transferring the units which earlier formed a part of the Division of Agronomy. Since its inception the Division is actively engaged in activities which have interested not only the agricultural economists but also the policy makers and administrators. The teaching activities were also initiated since its creation. The students of the Division go through a rigorous course work to equip themselves with the basic as well as the advanced concepts of agricultural economics to undertake the research work.

The present scenario has changed with a different set of problems and challenges in agricultural economics, globalisation, liberalisation, emergence of new trade relations and trade blocks and increasing role of private sectors. Environmental concerns have been incorporated in the educational programme. This has caused reorientation of the programme in Agricultural Economics.

#### **Agricultural Extension**

The Division of Agricultural Extension offers teaching programmes leading to M.Sc. and Ph.D.

in Agricultural Extension since 1960. Since its inception the Division has played a leadership role for different agricultural universities and research institutes located not only in India but also in Asia. The Division has a strong and well trained faculty and modern facilities for undertaking teaching and research functions. The students are trained to take up professional positions in extension education, communication and management in public and private institutions. Facilities are available in the specialised areas of agricultural management and agricultural communication.

## **School of basic sciences**

### **Biochemistry**

The Division of Biochemistry has its roots in the Division of Soil Science and Agricultural Chemistry. It was created in the year 1966 to carry out research in biochemical science. The teaching programmes in the discipline of Biochemistry started in 1967. The students are trained in the areas of plant biochemistry, nutritional biochemistry and plant molecular biology. The students are also provided training in advanced molecular and biochemical techniques.

### **Molecular Biology and Biotechnology**

The National Research Centre on Plant Biotechnology established in 1985, is playing an important role since its inception in the development of human resources. The NRC on Plant Biotechnology has excellent facilities for carrying out advanced research in plant biotechnology.

The Centre is well equipped to carry out advanced research in the field of molecular biology and biotechnology. Following are the facilities which are usually used by graduate students for their research work: ultracentrifuges, high pressure liquid chromatography, PCR machine, biolistic gun, DNA sequencing apparatus, nucleic acid hybridization sonicator and monitor for radioisotopes, separate common facility labs for radio-isotopes work and DNA sequencing, tissue culture and genetic transformation.

### **Plant Physiology**

In 1940, one of the two posts of Assistant Economic Botanist was earmarked for a Plant Physiologist. In 1966, the Division of Plant Physiology was established at IARI. Prior to this, plant physiology had a modest infrastructure. Nevertheless, during this period significant research outputs, especially in the areas of stress physiology nitrogen metabolism, post harvest physiology and aspects of physiological basis of crop productivity, were generated which are internationally recognized and have relevance to crop improvement programme even in the present times. At present, the Division is equipped with all the modern instruments, and research work is being carried out on physiological and molecular aspects of source-sink relationship, abiotic stress, post harvest physiology and global climate change.

**The following teaching programmes have been developed in association with the other sister in-stitutes of ICAR located in the IARI Campus:**

### **Agricultural Statistics**

Since October 1964, courses leading to M.Sc. and Ph.D. degrees in Agricultural Statistics were started at the Post Graduate School of IARI in collaboration with the neighbouring Indian Agricultural Statistics Research Institute (IASRI). Earlier certificate courses in statistics were awarded by IASRI.

### **Computer Application**

Identifying the growing importance and application of computers, the post-graduate course (M.Sc.) in the discipline of Computer Application in Agriculture was started in September 1985 in association with the Indian Agricultural Statistics Research Institute. The course was later renamed as Computer Application.

The course contents of the discipline are comprehensively designed to cater to the present and future needs.

The IASRI offers all the modern computing facilities (more than 100), Internet, E-mail, etc. to the students. Besides these, the Institute has software packages like SAS, SPSS, STATISTICA,

GENSTAT, GLIM, MATLAB, SUDDAN, software development tools and indigenous softwares developed by in-house scientists.

### **Bioinformatics**

*M.Sc. degree programme introduced from the Academic Session 2011-12.*

Bioinformatics is conceptualizing biology in terms of molecules (in the sense of Physical Chemistry) and applying “informatics techniques” (derived from disciplines such as applied mathematics, computer science and statistics) to understand and organize the information associated with these molecules, on a large scale. It integrates the advances in the areas of Computer Science, Information Technology and Biology to unravel complex biological phenomena. Bioinformatics is used for the creation and advancement of databases, algorithms, computational and statistical techniques to solve problems arising from the management and analysis of large scale biological data.

*AIMS of Bioinformatics*

- To organize data in a way that allows researches to access existing information and to submit new entries as they are produced.
- To develop tools and resources that aid in the analysis of data. Development of such resources dictates expertise in computational theory, as well as thorough understanding of biology.
- To use computational tools to analyze the data and interpret the results in a biologically meaningful manner.

### **Plant Genetic Resources**

The possibilities of genetic improvement of various crop plants through systematic evaluation and upgrading of the germplasm resources of the country were clearly brought out by students' research; and some of the basic studies, besides proposing and testing newer concepts, have provided support for the development of improved technologies for crop improvement. Keeping this in view, a new M.Sc. degree programme was started

in Plant Genetic Resources in the academic year 1997-98 and a Ph.D. degree programme in the academic year 2004-2005 at the National Bureau of Plant Genetic Resources (NBPGR) located in the IARI campus. These courses have been based on a similar degree programme being offered by Birmingham University in U.K. The courses of PGR include the components of genetics, statistics, horticulture and other related disciplines. This programme has evoked a good initial response.

### **Laboratories**

Along with general divisional laboratory facilities, the Institute takes pride in having developed sophisticated specialised laboratories to undertake research in all the areas of agricultural sciences.

### **Nuclear Research Laboratory**

The Nuclear Research Laboratory (NRL) was established in 1969. Development of management practices for optimising the use of fertilizers, micronutrients, water and pesticides, development of ground water resources, soil-plant-nutrient system analysis, radionuclide transfer from soils to crops, studies on clay-organic complexes, characterisation of ultra structures of biological materials, development of techniques for non-destructive determination of oil in oilseeds, analysis of biotic and abiotic stresses, and preservation and disinfection of food products are the main areas of work undertaken at NRL.

### **Water Technology Centre**

The Institute established the Water Technology Centre (WTC) in 1970. At this Centre, excellent infrastructure has been provided for research on all aspects dealing with water technology. The laboratory is equipped to design appropriate structures for farm irrigation, water conveyance and control, develop suitable techniques for use of saline water for irrigation, computer-based procedure for calculation of water balance in crop root zone, conduct studies on agricultural land drainage, and analyse physiological basis of drought resistance in crops and irrigation management.



## **Phytotron Facility**

The Institute has established the National Phytotron Facility (NPF) with the assistance of the Department of Science and Technology, Indian Council of Agricultural Research, FAO and United Nations Development Programme. The facility provides a battery of plant growth chambers with environmental controls which are proving useful in developing our understanding of the complicated interactions of physico-chemical environments and living systems, specially the plants and their pathogens. This is the first facility of its kind in the country to study the life responses under controlled conditions and the possible impact of climate change and greenhouse gases. These studies will help in developing varieties of crops suitable for different agroclimatic zones. Ten glasshouses with computerised controls are attached with the facility. These growth chambers have more than 250 permutations and combinations of photoperiod, temperature, lighting, humidity and carbon dioxide concentrations.

## **Advanced Centre for Plant Virology**

In 1988, the Institute created an Advanced Centre for Plant Virology with the assistance of Indian Council of Agricultural Research, United Nations Development Programme, and FAO for generating basic knowledge on economically important plant viruses and virus like pathogens to help in their effective management and also to train young scientists in various areas of advanced virology. The Centre is identified as a lead centre for plant virology, not only in the country, but also in the region. It plays an important role in identifying viruses, supplying diagnostic reagents and training. The Centre has well equipped laboratories for work on electron microscopy, purification, production of polyclonal and monoclonal antibodies, cloning of viral genomes, use of radioactive and non-radioactive probes, electrophoresis, sequencing, use of PCR in disease diagnosis, tissue culture and plant transformation.

## **Microbial and Insect Conservation Facilities**

The Institute realised the importance of diversity of biological forms and their importance

in maintaining the ecological balance right from its inception when it established *Herbarium Cryptogamae Indae Orientalis* in 1905. Since then the Institute has developed a National Culture Collection of fungi, a National Insect Collection which has more than 4 lakh insect collections, a National Collection of Nematodes, and a National Facility of Blue Green Algae and *Azolla*.

## **Central Seed Testing Laboratory (CSTL)**

The Seed Testing Laboratory of the Institute has got the status of CSTL under the Ministry of Agriculture, and serves as the Referral Laboratory for all the 96 seed testing labs located in different parts of the country. Regular training courses for the personnel of the State Seed Testing Labs are being organised.

## **Quality Seed Facility**

A Japan Grant Aid Project has been launched at IARI to upgrade the facilities for seed research, processing and storage through infrastructure development, highly sophisticated equipment and state of the art technology in Seed Science and Technology. This National Facility is envisaged to provide medium term storage for 4.5 tonnes of authentic seed samples of all released varieties (approx. 3500) from the National Agricultural Research System. Storage facilities for 160 tonnes of Nucleus and Breeder seed will be availed by IARI, SAUs and ICAR institutes for need-based buffer stocking which will help avert high seed insecurity in the country and in the South Asia region. The facilities also help in developing a 'Centre of Excellence in Seed Science and Technology' to meet the challenges of emerging research requirements and development of human resources in this critical sector. In addition, the Centre is expected to act as a catalyst in fostering scientific linkages among the developing countries.

## **Other Laboratories and Instrumentation Facilities**

The Institute has also developed specialised laboratories for work on agricultural chemicals, nematology, fungal pathology, insect pathology and physiology, post-harvest technology, etc.

The Institute is equipped with sophisticated instrumentation facilities such as: X-ray Diffraction, NMR Spectrometer, Amino Acid Analysers, Ultracentrifuges, Electron Microscopes, Gamma Ray Spectrometer, Infrared Spectrometer, <sup>15</sup>N Emission Analyser, Electrophoretic Apparatuses, Walk-in-Growth Chambers, PCRs, Bioreactors, Biolistic Particle Delivery System, Differential Thermal Analysers, GCMS, Gas Chromatograph, Auto-Nitrogen Analysers, Scintillation and GM Counters, Atomic Absorption Spectrophotometers, UV Spectrometer, Tritium Enrichment Plant, Gamma Irradiation Chamber, HPLCs, Refrigerated Shakers, Electroporator, and MICROVAX II Computers.

### **Experimental Farm**

IARI has an area of 500 ha, out of which 280 ha are cultivated and 220 ha are under roads and buildings of the IARI estate. Nearly 85 per cent of the total area is irrigated and the rest is available for rainfed dryland research on different crops. About 15 ha area of the land has been given over to the National Agricultural Sciences Centre of ICAR and to three other adjoining ICAR setups. Thus, there is a pressure for land resource for field experiments of nearly 500 scientists working in the Institute. Excellent facilities for field experimentation exist and are managed by the Farm Operation and Service Unit (FOSU) of the Institute.

### **Protected Agriculture**

To meet the research and technology development needs of protected agriculture, specially horticulture, vegetable seed production and nursery production, about 10 ha area of the farm is being put under veritable types of temperature, humidity and fertigation controlled glass and plastic houses. An IARI-Israel cooperative programme on protected agriculture has been started to complete and further strengthen these facilities.

### **Coordinated Research**

The concept of Coordinated Research Project started from IARI. The Institute also serves as the

headquarters of a number of All India Coordinated Research Projects. The All India Soil and Land Use Survey and the Division of Plant Introduction, which were part of the Institute, have now been set up as independent institutions under the Indian Council of Agricultural Research. The Directorate of Wheat Research, Karnal, Directorate of Maize Research, New Delhi and Directorate of Floriculture Research, New Delhi have also emerged out of IARI.

### **1.3 Post-Graduate Education**

**1.3.1** Since its early years, the Institute has flourished as a centre for imparting post-graduate training to officers of the State Departments of Agriculture as also other candidates, so as to equip them for manning important positions in the fields of research, teaching, and extension. In 1923, the training programme was placed on an organised footing and two-year courses of specialised post-graduate training leading to the Associateship of the Institute (Assoc. IARI) were organised in different major fields of agricultural science. This programme was reviewed comprehensively in 1945 and a regular programme of instruction and examination, including lectures, practical work and field investigation was introduced. These diploma courses were replaced by post-graduate courses leading to the M.Sc. and Ph.D. degrees of the Institute in 1958 when it was given the status of a “Deemed University” under the University Grants Commission Act of 1956. With regard to educational standards and quality, the Institute ranks among the best institutions of post-graduate education in the world. A unique feature of the system of instruction at the Institute, which is largely modeled on the course-credit system obtaining in many universities of the USA, is that research, teaching and extension are fully integrated and the programme of instruction is broad-based so as to give the student a mastery not only in his/her major field of specialisation but also in the supporting minor fields. Currently, instruction leading to the post-graduate degrees of the Institute is organised in 24 disciplines, viz. Agricultural Chemicals, Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Physics, Agricultural Statistics,

Agronomy, Biochemistry, Bioinformatics, Computer Application, Entomology, Environmental Sciences, Genetics, Horticulture, Microbiology, Molecular Biology and Biotechnology, Nematology, Plant Genetic Resources, Plant Pathology, Plant Physiology, Post Harvest Technology, Soil Science and Agricultural Chemistry, Seed Science and Technology, and Water Science and Technology. The education programmes in the field of Agricultural Statistics and Computer Application are organised in collaboration with IASRI while Plant Genetic Resources with NBPGR (both of the Indian Council of Agricultural Research). The Institute played a notable role in the development and upgradation of the faculty in the newly set up Agricultural Universities when it collaborated with the USAID. Under this programme, selected members of faculty from Agricultural Universities did their course work in universities of the USA and completed their research work and degree requirements at IARI. A fruitful phase of bilateral cooperation was also completed in collaboration with the International Rice Research Institute, Philippines whereby both Indian and foreign students completed their course work at IARI and the research work at IRRI for the award of the IARI degree.

**1.3.2** Till the 48<sup>th</sup> Convocation of the PG School held on 13<sup>th</sup> February, 2010, 4077 Ph.D. and 3138 M.Sc. degrees had been awarded to students. The post-graduate students (presently numbering about 770 including a number of female students) come from all over India and from several foreign countries such as Afghanistan, United Arab Emirates, Republic of Egypt, Bangladesh, Cyprus, Ethiopia, Indonesia, Guyana, Iran, Iraq, Jordan, People's Democratic Republic of Yemen, Kenya, Malaysia, Malawi, Mauritius, Myanmar, Nepal, Nigeria, Sierra Leone, Philippines, Singapore, Sri Lanka, Syria, Thailand, Trinidad, USA, Vietnam, etc. There are seven large hostels, complete with spacious dining and common rooms, separately for male and female students and for married students, a gymnasium and a play field. Alumni of the Institute are now occupying positions of

responsibility in the various agricultural universities and other offices of high esteem in the country as well as abroad.

## **1.4 Location and Campus**

**1.4.1** The Institute is located about 23 km north of the Indira Gandhi International Airport and 5 and 8 km, respectively, west of the New Delhi and the Old Delhi railway stations on a self-contained 500 hectares campus of its own, at a latitude of 28.04° N and longitude of 77.12° E, and at an elevation of 228 meters (750 ft.) above mean sea level. The climate of Delhi is semi-arid, sub-tropical with hot summers and cool winters. The mean monthly maximum and minimum temperatures during the year range from 21.3°C to 40.5°C and 7.3°C to 28.7°C, respectively. The annual normal rainfall is 708 mm, of which, on an average, 597 mm (84%) is received from June to September and 85 mm (12%) during the winter months, i.e., November to March.

**1.4.2** In addition to the library, laboratories and the offices, residential accommodation is also provided on the campus. The amenities on the campus include a medical dispensary, a shopping complex, two government higher secondary schools (one for boys and another for girls), a nursery school run by the Nehru Experimental Centre, provisions store, a Post Office and a nationalised bank. The Indian Agricultural Statistics Research Institute (IASRI), National Bureau of Plant Genetic Resources (NBPGR), National Research Centre on Plant Biotechnology (NRCPB), National Research Centre for Integrated Pest Management (NCIPM), Directorate of Floricultural Research (DFR), Directorate of Maize Research (DMR), National Centre for Agricultural Economics and Policy Research (NCAP), National Agricultural Sciences Centre (NASC) of the Indian Council of Agricultural Research (ICAR), National Physical Laboratory (NPL) under the Council of Scientific and Industrial Research (CSIR), Institute of Hotel Management, Catering and Nutrition, and National Seeds Corporation are located adjacent to the Institute.