



RESEARCH ARTICLE

IARI: INDIA'S APEX INSTITUTE FOR AGRICULTURAL RESEARCH, EDUCATION AND EXTENSION

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ABSTRACT

The journey of Indian Agricultural Research Institute (IARI), popularly known as Pusa Institute, began in 1905 at Pusa (Bihar) with the generous grant of 30,000 pounds from an American philanthropist, Mr. Henry Phipps. The institute was then known as Agricultural Research Institute (ARI) which functioned with five departments, namely Agriculture, Cattle Breeding, Chemistry, Economic Botany and Mycology. Bacteriology unit was added in 1907. The name of ARI was changed to Imperial Institute of Agricultural Research in 1911 and, in 1919 it was renamed as Imperial Agricultural Research Institute. Following a devastating earth quake on 15th January 1934, the institute was shifted to Delhi on 29th July 1936. Post independence, the institute has been renamed as Indian Agricultural Research Institute (IARI). It attained the status of a Deemed University in the year 1958. The green revolution that brought smiles to millions of Indians bloomed from the fields of IARI with the development of famous wheat varieties which contributed an estimated one billion tones of addition production. As the Mother of several ICAR institutions, IARI continues to be the leading institution for agricultural research, education and extension in the country. The present campus of the Institute is spread over an area of about 500 hectares (approx. 1250 acres). Currently, the Institute has 20 divisions, 5 multi-disciplinary Centers situated in Delhi, 8 regional stations, 2 off-season nurseries, 3 All India coordinated research projects with headquarters at IARI and 10 national Centers functioning under the all India coordinated research projects. It has the sanctioned staff strength of 3540 comprising scientific, technical, administrative and supporting personnel. IARI is playing remarkable role in agricultural development in our country as mother institute of ICAR. Though there are many roles remaining to think and perform in recent days accordingly.

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INTRODUCTION

India's apex agricultural body is Indian Council of Agricultural Research (ICAR). ICAR is responsible for country's agricultural education, research, extension and management, where it is emphasizing more on agricultural research. For this purpose, there are many ICAR research institutes in our country. India as a seventh largest country on area basis and second largest population in the world, to feed the ever-increasing population, agriculture has immense importance in our country. Agriculture is the base of our country's economy, life, livelihood, culture-overall survival. Agriculture is the lifeline of this country. Whatway, the heart of our body through blood circulation providing food and oxygen to each and every cell of body, with similar importance, agriculture is providing food and other necessary needs of basic survival to each and every Indian. How much day agriculture is stable in our country, the country can face any kind of problem without much trouble. If agriculture is destroyed anyway in this country, the country will face biggest national disaster. Hence, protect agriculture in our country anyway would be the prime concern of every citizen of India. Whatever the earnings coming from industrial sector and service sector –is not sufficient enough to feed the ever-growing population of our country.

When the three pillars of development-agricultural sector, industrial sector and service sector will be strong, India will be an economically strong country automatically. Hence to develop our country from developing to developed country-agriculture plays as stepping stone, bed-rock, centre of all activities, base of survival and base of Indian civilization. Therefore, agricultural development is the prime importance in our country. In this respect, after independence major role is played by ICAR. Among the all ICAR institutes –Indian Agricultural Research Institute (IARI) is the mother institute. Making India a food deficit country to food surplus country through green revolution, IARI having a lion share role. Hence the main objective of this study/article to know IARI and its activities in a certain extent, that extent of knowledge about IARI is essential to all Indians. How to know IARI –there is no book completely on IARI or whatever the IARI website is available, that can not provide the information in a capsule form. Hence, it is the effort to provide knowledge about IARI in a nutshell as much as possible. **Area:** - The present campus of the Institute is spread over an area of about 500 hectares (approx. 1250 acres) and located about 8 km west of New Delhi Railway Station.

Present position:-Currently, the Institute has 20 divisions 5 multi-disciplinary Centers situated in Delhi, 8 regional stations, 2 off-season nurseries, 3



ICAR-Indian Agricultural Research Institute

All India coordinated research projects with headquarters at IARI and 10 national Centers functioning under the all India coordinated research projects. It has the sanctioned staff strength of 3540 comprising scientific, technical, administrative and supporting personnel.

Table 1. Divisions of IARI

Sl.	Name of Divisions	Sl.	Name of Divisions
1	Agricultural Chemicals	11	Food Science and Post-harvest Technology
2	Agricultural Economics	12	Fruits and Horticultural Technology
3	Agricultural Engineering	13	Genetics
4	Agricultural Extension	14	Microbiology
5	Agricultural Physics	15	Nematology
6	Agronomy	16	Plant Pathology
7	Bio-chemistry	17	Plant Physiology
8	Environmental Science	18	Seed Science and Technology
9	Entomology	19	Soil Science and Agricultural Chemistry
10	Floriculture & Landscaping	20	Vegetable Science

Table 2. Regional Stations of IARI

Sl.	Name of Regional Stations	State
1	Regional Station, Kalimpong	West Bengal
2	Regional Station, Karnal	Haryana
3	Regional Station, Indore	Madhya Pradesh
4	Regional Station, Katrain (Kullu Valley)	Himachal Pradesh
5	Regional Station, Pune	Maharashtra
6	Regional Station, Pusa	Bihar
7	Regional Station, Amartara Cottage, Shimla	Himachal Pradesh
8	Regional Station, (Wellington (Nilgiris)	Tamil Nadu

Two off-season Nursery

- Regional Center Aduthurai, Tamil Nadu
- Regional Center Dharwad, Karnataka

Mandate of IARI

- Basic, strategic and anticipatory research in field and horticultural crops.
- Research in frontier areas to develop resource use efficient integrated crop management technologies.
- Serve as centre for academic excellence in the areas of post-graduate and human resources development in agricultural science.
- Provide national leadership in agricultural research, education, extension and technology assessment and transfer.

Main Campus Infrastructure

Campus:-The present campus of the Institute is a self-contained sylvan complex spread over an area of about 500 hectares.

Weather:- The climate is sub-temperate and semi-arid. The mean maximum daily temperature ranges from 32.2°C to 40°C and the mean minimum temperature from 12.2°C to 27.5°C. About 500 mm of rainfall is received annually.

Major structures of IARI campus

- Staff Quarters
- Hostel
- Guest House

- Health Centre
- Sports Activity
- Auditorium
- Faculty Club

Staff Quarters:-The employees of the institute are allotted residences within the institute- are available in IARI, spread all over the institute with facilities like Mother Dairy, Safal vegetable store, Kendriye Bhandar and a small shopping complex.

Table 3. Evolution of IARI

Sl.	Events
1	Pusa is situated in Samastipur district of Bihar in the U shaped southwestern lap of river Burhi Gandak
2	On July 5, 1784, East India Copmany acquired land at Pusa
3	for Horse Breeding Stud Farm
4	In 1874, Stud Farm was closed due to epidemic gland disease of horse.
5	In 1902 plan mooted for Animal Husbandry, Dairy Development, Educational Institution and Agricultural Institute at Pusa.
6	On 26 December 1903, Government of India, took over all lands from Bengal Government and with the donation of 30,000 pounds by Mr. Henry Phipps, a US citizen,
7	On 1st April 1904 foundation of Agricultural Research Institute was laid by Lord Curzon, the Viceroy and governor General of India.
8	In 1905, five departments (Agriculture, Cattle Breeding, Chemistry, Economic Botany and Mycology) were started in the ARI.
9	In 1907, Bacteriology unit added to ARI.
10	The name of ARI changed to Imperial Institute of Agricultural Research in 1911
11	In 1919, it was renamed as Imperial Agricultural Research Institute.
12	On 15 January 1934 at 2.00 PM devastating earth quake damaged the main building of the institute i.e. Phipps Laboratory
13	on 29th July 1936, Institute was shifted to Delhi.
14	On 7th November 1936, new institute building was inaugurated at Delhi.
15	A small unit called Botanical sub-station was left over at pusa, Bihar.
16	In 1969, Botanical sub-station renamed as Regional Research Station
17	In 1975, Regional Research Station upgraded as IARI Regional Station, Pusa, Bihar.

Hostels:-IARI is a fully residential campus for the students. Institute has five hostels for Boys (Hemant, Vasant, Shishir, Grishm and Sharad), one for Girls (Varsha) and one Saraswati Apartment for married students. Facilities provided include TVs, indoor games, book shop, hair dressing saloon etc.

Guest House:- IARI has three Guest Houses, Ganga International Guest House, Dr Rajendra Prasad Farmer's Hostel and Sindhu Scientist Hostel situated in the campus. These Guest Houses are primarily meant for official guests of the IARI/ ICAR/participants of Seminars / Workshops/ Symposia / Conferences / Training Programmes Organised by the Institute as well as those sponsored by the ICAR.

Sports Activity:- Spacious playgrounds are provided near the student hostels and necessary facilities exist for outdoor games like cricket, football, hockey, volleyball, tennis, badminton and various athletic events. There are facilities also for indoor games like Chess, Carom and Table Tennis in each hostel. Various yoga classes are organized free of cost from time to time to make awareness in students and residents for fitness.

Auditorium:- Dr. B. P. Pal Auditorium:- The Auditorium is named after the ex-director of the institute Dr. B. P. Pal. It has a seating capacity of 350. Other facilities includes a Control Room, Rehearsal Room, Editing Room and A VIP Room. There is pantry available with direct access to the stage. Its free for IARI and ICAR institutional activities. Outsiders are charged INR 10000 per day with permission from the Director, IARI. There are 9 other auditoriums in different divisions of IARI.

Information:- Strengthen IARI Library to become the national agricultural library, fully equipped with electronic and other modern tools, connect it with libraries in SAUs, ICAR institutes and other

relevant centres, Build databases on agricultural research and share them with all bonafide user throughout the world.

Phytotron Facility:- The Institute established a National Phytotron Facility in 1997. This is the first facility of its kind in the country to study the live responses of plants under controlled conditions and the possible impact of climate change and greenhouse gases. It has a self-contained area of 2700 m², housing 22 growth chambers and 10 greenhouses.

ASRB Online Examination Centre:- ASRB Online Examination Centre at IARI has been established under the sub project "Developing, commissioning, operating and managing an online system for NET/ARS Preliminary Examination in ASRB, ICAR" of National Agricultural Innovation Project (NAIP) funded by World Bank. Under this project, a network of 23 Examinations Centre at various ICAR institutes and Data Centre at ASRB, New Delhi has been established to conduct National Eligibility Test (NET) and Agricultural Research Service (ARS) preliminary examinations in various disciplines of agriculture science.

Other Facilities available at IARI

National Microbial, Nematode and Insect Collections and Conservation Facilities:-The Institute realized the importance of diversity of biological forms and their importance in maintaining the ecological balance right from the inception of the Institute when it established Herbarium Cryptogamae Indiae Orientalis (HCIO) with more than 6000 specimens and a National Pusa Insect Collection in 1905 which has more than 5 lakh insect specimens.

Central Seed Testing Laboratory:-The Seed Testing Laboratory of the Institute has got the status of CSTL under the Ministry of Agriculture and serves as a Referral Laboratory for all the 96 seed testing labs located in different parts of the country.

Quality Seed Facility:-A Japan Grant Aid Project was launched at IARI to upgrade the facilities for seed research, processing and storage through infrastructure development.

Facility for Protective Agriculture:-The Institute also developed a big complex providing state of the art facility for protected horticulture under Indo- Israeli collaboration in the year 1998.

Pesticide Referral Laboratory:- National Pesticide Referral Laboratory was established under Team of Excellence, National Agricultural Technology Project in 2002. The establishment of this laboratory is a step towards global competitiveness in generating reliable data, ensuring quality produce.

CENTRAL LABORATORY FOR SOIL AND PLANT ANALYSIS (Division of Soil Science and Agricultural Chemistry):-Soil testing service in India began in 1955-56 with the soil testing laboratory at IARI as the hub to coordinate with all the other soil testing laboratories in the country. This laboratory, called as Central Laboratory for Soil and Plant Analysis, is well known among research and extension agencies, and farmers for its advanced facilities, reliability of analysis, and an efficient advisory service. The Laboratory offers soil, plant, manure and irrigation water analysis services to the farmers and other clients. A regular Advanced Level Training in Soil Testing, Plant Analysis and Water Quality Assessment is also imparted every year for the scientific and technical personnel associated with soil testing.

Water Technology Center:-The Water Technology Centre (WTC) is an inter-disciplinary facility for research, teaching, training and extension in agricultural water management. It was established in 1969 with the technical collaboration of University of California, Davis and partial financial support from the Ford Foundation (USA). Since then, the Centre has evolved into a unique institution, addressing a wide range of issues pertaining to water management at farm, large irrigation commands and watershed scales.

Seed production Unit (SPU):- Seed production Unit (SPU) was established in 1995 to ensure the quality seed security for increased productivity, quality and sustainability in agriculture. Seed is one of the most critical inputs for enhancing the productivity of crops and availability of quality seeds is backbone to ensure food security of the nation. Use of quality seeds alone could increase 15-20 per cent of the yield and under optimum management condition; the increase may touch upon upto 45 per cent.

International Collaborations: - IARI has different international collaborations with following organizations:

- Potash and Phosphate Institute of Canada (PPIC)
- United State Agency for International Development (USAID)
- International Development Research Centre (IDRC)
- Consultative Group on International Agricultural Research (CGIAR)
- International Maize and Wheat Improvement Centre (CIMMYT)

United Nations Environment Program Regional Research Centre for Asia and the Pacific (UNEP RRC.AP)

National Collaborations:- Some of the major national funded projects in operation are as follows:

- Department of Biotechnology: Ministry of Science and Technology (DBT)
- Department of Science and Technology, Govt. of India (DST)
- Indian Council of Agricultural Research (ICAR)
- Council of Scientific and Industrial Research (CSIR)
- NCPA
- CICR
- Ministry of Environment & Forest
- DOAC
- DRDE
- National Academy of Agricultural Science (NAAS)
- CPCB
- National Fund for Basic and Strategic Research in Agriculture (NFBSRA)
- National Agricultural Innovation Project (NAIP)
- AP Cess Fund

National Fellow Scheme of ICAR

Honours and Awards

- The Institute was awarded the First Prize for doing maximum writing work in Hindi for the year 2011-12 under the ICAR 'Rajrishi Tandon Rajbhasa Puraskar Yojna' and Second Prize for Institute's Annual Rajbhasa Patrika 'Pusa Surbhi' under 'Ganesh Shankar Vidhyarathi Hindi Krishi Patrika Puraskar Yojna' of ICAR for the year 2011-12.
- The Indian Agricultural Research Institute won the Sardar Patel Outstanding ICAR Institution Award for the year 2010 (jointly with TNAU, Coimbatore) for outstanding contribution in the field of agricultural research, education and extension.
- Indian Agricultural Research Institute was conferred the Environment Leadership Award of 'Agriculture Today, 2011' for its pioneering work on development of sustainable agriculture, protection of environment, mitigation and adaptation to climate change and environmental policy planning.
- The Indian Agricultural Research Institute received Quality Management System Standard Certificate, NS-EN ISO 9001:2008 / ISO 9001:2008 of KVQA for providing education, research and training in the field of agriculture.
- The Institute was given the Agriculture Leadership Award 2009 by a national agriculture magazine, "Agriculture Today" for helping the country attain and maintain self-sufficiency in food grains.

- The Institute's Krishi Vigyan Kendra at Shikohpur was given the ICAR Best KVK Award.

Schools of IARI:-The Indian Agricultural Research Institute is the country's premier national Institute for agricultural research, education and extension. It has the status of a 'Deemed-to-be-University' under the UGC Act of 1956, and awards M.Sc. and Ph.D. degrees in various agricultural disciplines. The growth of India's agriculture during the past nearly 100 years, is closely linked with the researches done and technologies generated by the Institute. The Green Revolution stemmed from the fields of IARI. Development of high yielding varieties of all major crops which occupy vast areas throughout the country, generation and standardization of their production, techniques, integrated pest management and integrated soil-water-nutrient management have been the hallmarks of the Institute's research.

The Indian Agricultural Research Institute concentrated mainly its activities on:

- School of Crop Improvement(includes-Genetics, Seed Science and Technology, Regional stations at Indore, wellington, Karnal, Pusa and Tutikandi)
- School of Plant Protection(includes- Plant Pathology, Nematology, Entomology, Agricultural Chemicals, Regional stations at Pune and Kalimpong)
- School of Basic Sciences(includes- Bio-chemistry, Plant Physiology)
- School of Natural Resource Management(includes- Agronomy, Agricultural Physics, Soil Science and Agricultural Chemistry, Microbiology, CESCRA, Agricultural Engineering, Water Technology Centre, Agricultural Knowledge Management Unit)
- School of Social Sciences(includes- Agricultural Economics and Agricultural Extension)
- School of Horticultural Science(includes- Fruits and Horticultural Technology, Floriculture & Landscaping, Vegetable Science, Food Science and Post-harvest Technology, Centre for Protected Cultivation Technology (CPCT), Regional stations at Amartara and Katrain)

Flagship Programmes of IARI (As on 21.08.2020)

- Improving Basmati Rice Varieties for domestic and export market
- Breeding vegetables and flowers for protected environment
- Diversification of rice-wheat cropping system for enhanced sustainability and profitability
- Precision farming for enhanced input use efficiency

Outreach Programmes of IARI (As on 22.08.2020)

- Strengthening of Wheat Programme in Eastern India (IARI Regional Station, Pusa, Bihar)
- Strengthening of Wheat Programme in Central India (IARI Regional Station, Indore)
- Strengthening extension education programme of developing innovative models and techniques for higher productivity and profitability in agriculture

Professional Societies at IARI

- Indian Society of Agricultural Science
- Indian Society of Agronomy
- Indian Society of Agro-Physics
- Indian Society of Extension Education
- Indian Society of Genetics & Plant Breeding
- Indian Society of Horticultural
- Indian Society of Plant Physiology
- Indian Society of Seed Technology
- Indian Society of Soil Science
- Indian Society of the Clay Minerals

- Society for Plant Physiology and Biochemistry
- Society for Community Mobilization and Sustainable Development (MOBILIZATION)

Post Graduate School:- "Our mission is to advance knowledge and understanding in the field of agriculture":- The Institute has also imparted training in specialized areas of agricultural sciences through training programmes funded by the ICAR, DBT, DST and other organizations. A large number of persons have received training at IARI in areas like agricultural physics, microbiology, molecular science, plant pathology, soil science, and water science and technology. The Institute has introduced Best Faculty Awards for excellence in teaching to the scientists of the Institute for their untiring efforts in improving the teaching in different subjects. The courses are regularly reviewed and updated and world class library and laboratory facilities are provided. These efforts are reflected in the success of IARI students who invariably comprise the bulk of the candidates selected through national competitions. *IARI students almost always occupy the top positions in merit lists.*

Table-4: Pass-out students of IARI

Sl.	Year	Contents	Number
1.	Upto 1957	Students awarded Associateship of IARI (Similar to M.Sc. degree)	903
2.	1958	IARI became a 'Deemed to-be University'	--
3.	Upto Feb. 2022	Students awarded M.Sc. degree	4618
4.	Upto Feb. 2022	Students awarded M.Tech. degree	84
5.	Upto Feb. 2022	Students awarded Ph.D. degree	5179
6.	Upto Feb. 2022	Foreign students awarded M.Sc./ M.Tech./ Ph.D. degree	496

PGS Administration:- Indian Agricultural Research Institute got the status of a "Deemed to be University" in 1958, under the University Grants Commission Act of 1956 and is authorised to award post graduate degrees of M.Sc./M.Tech. and Ph.D in the field of Agricultural Sciences. The academic activity at the Institute is regulated by the Academic Council with Director, IARI as its Chairperson and the Dean as Vice-Chairperson.

RESEARCH PART

OBJECTIVES OF RESEARCH:

- Emphasize utilization of global plant genetic resources to produce efficient, productive and stable genotypes of crops.
- Generate Knowledge related to the processes of production and productivity of agricultural crops.
- Develop and use systems approach to achieve greater understanding of the production systems.
- Pay greater attention to the problems of agriculture under unfavourable conditions.
- Foster excellence in agriculture related to basic and social sciences.
- Develop capabilities in post-harvest technology.
- Concentrate on new and emerging cutting edge technologies such as molecular biology and biotechnology.

IARI New Varieties:- Indian Agriculture Research Institute (IARI) has made significant contributions in the development of improved cultivars and their relevant production, protection and processing technologies in fourteen mandated crops, covering cereals, coarse millets, pulses, oilseeds, fodder, fibre and horticultural crops.

New wheat varieties developed by IARI, with higher yield potential and better resistance to rusts, are increasingly becoming popular with farmers of the country. Aromatic fine quality high-yielding rice variety, 'Pusa Basmai-1', 'Pusa 44', Hybrid rice, 'PRH- 10'. The recently released varieties like 'Pusa Sugandh-2' and 'Pusa Sugandh-3' and 'Pusa Sugandh-5', with improved productivity. Improved varieties of chickpea, pigeon pea and mungbean have also developed. Variety 'Pusa Bold', a mustard variety, was instrumental to the success of the Technology Mission on Oilseeds. More than 160 varieties of field and vegetable crops developed by IARI.

All India Coordinated Research Project on Nematodes in Cropping System:-

Plant parasitic nematodes present a formidable pest problem for different crops. The enormous economic damage to plants by their root feeding and interactions with other organisms renders the plants further vulnerable to other biotic and abiotic stresses. An urgent need was felt for initiating coordinated efforts at national level pertaining to nematode distribution, assessment of crop losses and for developing nematode management technologies. Therefore, the Department of Science and Technology, Government of India, initially launched the "All India Coordinated Research Project (AICRP) on nematode pests and their control" w.e.f. April 1, 1977 with 11 centers besides a Coordinating Cell at the Division of Nematology, I.A.R.I. The Project Coordinating Cell functions from Division of Nematology, I.A.R.I. Presently, the project has 18 cooperating centers located at different agro-climatic zones.

All India Network Project on Pesticide Residues (AINP-PR):- To ensure safe and judicious use of pesticides, the Indian Council of Agricultural Research (ICAR) initiated All India Coordinated Research Project (AICRP) on Pesticide Residues in 1984-85. It was later re-designated as the All India Network Project on Pesticide Residues (AINP-PR). Presently, there are 19 coordinated centres under the project including Project Coordinating Cell located at ICAR-Indian Agricultural Research Institute, New Delhi.

Table 5. Patents

No.	Inventor	Title
1	Lalit Kumar , B.S.Parmar	A process for the preparation of neem oil emulsion concentrate EW (emulsion oil in water)
2	Shashi Bala Singh, Gita Kulshrestha	A process of preparing a herbicidal composition against Phalaris minor from neem and the herbicidal composition prepared thereof
3	P. Dureja ,Tarun K. Chhatopadhyay	Improvement in/or relating to synthesis of 4-methyl 6 alkyl-2H pyran-2 ones as potential fungicides
4	Madhuban Gopal,Ram Niwas and others	A process for the detoxification of chlorpyrifos residues in drinking water
5	P. Dureja, R.S.Tanwar and S.K.Handa	Improvement in or relating to the preparation of powdered Azadirachtin A- rich concentrate from neem seed kernel
6	Suresh Walia, Vandana Sharma, Jitendra Kumar ,Balraj Singh Parmar	Improvement in/or relating to preparation of reduced azadirachtin (S) biopesticides
7	Prem Durja Sapna Johnson and Swaran Dhingra	Additives for improved photostability of Azadirachtin-A
8	Prem Dureja, S.S.Tomar	Improvement in/or relating to the preparation of thiophanate methyl
9	Brahma Dutta Kaushik	A process for the production of blue green algal biofertiliser

RESEARCH UNITS

Agricultural Knowledge Management Unit at ICAR-Indian Agricultural Research Institute:-The Agricultural Knowledge Management Unit (AKMU) was established by merging Bioinformatics Centre (BIC), Unit for Application of System Simulation (UASS) and Internet Facility (IF) of IARI in November 2003. Between 1989 and 2003, Bio-informatics Centre was

established as a part of Biotechnology Information System (BTIS) Network under the Department of Biotechnology (DBT), Government of India, to function as a computerized information base in different fields of agricultural sciences in general and Agricultural Biotechnology in particular.

Agricultural Technology Information Centre: ATIC of IARI, New Delhi was established in 1999 as a 'single window' delivery system for the technology, services and products of the Institute for the benefit of the farming community. ATIC provides farm advisory services and facilitate information-based decision making among farmers. Agricultural Technology Information Centre (ATIC) of IARI is effectively providing products, services and information to different stakeholders through single window delivery system. On an average about 12000 farmers/entrepreneurs/ development departments' officials, students, NGO representatives etc. from almost all the states of country are visiting ATIC for farm advisory, diagnostic services, purchase of technological inputs and trainings. Besides personal visit of farmers to the centre, farmers are also seeking farm advice through Pusa helpline (25841670 and kisan call centre 1551) and letters.

Centre for Agricultural Technology Assessment and Transfer:-To put the transfer of technology programme of the Institute at national level a separate Unit of Transfer of Technology (UTT) was established in 1984. Matching with a strong research tradition the Indian Agricultural Research Institute has been a pioneer in the transfer of new agricultural technologies to extension agencies and farmers in the country. The Institute has developed new extension approaches and strategies. Starting from Intensive cultivation scheme, the Institute had taken initiative in evolving projects like National Demonstration Project, Operational Research Project, Seed Village Scheme, Mini-Kit Programme, Small and Marginal Farmers Development Programme and others.

Centre for Protected Cultivation Technology (CPCT):-The Centre was established in the year 1998-99 as demonstration farm and commissioned as Indo-Israel project in January 2000 as a project undertaken jointly by the government of India, through Department of Agricultural Research & Education (DARE) & ICAR and the Government of the State of Israel, through the Centre of International Cooperation (MASHAV) & CINADCO. The project farm was aimed to demonstrate different technologies for intensive and commercially oriented peri-urban cultivation of horticulture crops for improved quality and productivity.

Farm Operation Service Unit:- FOSU was established in 1977 at IARI. Ornamental Horticulture and Landscaping unit (OHLU) is also merged with FOSU. The combined unit is known as Farm, Horticulture and Landscape Operation Service Unit (FHLOSU). The objective of this unit is to plan and provide various operational and machinery service to the IARI farm. There are two water storage tanks of 18 lakh gallon storage capacity of water for irrigation. There is a well equipped workshop at the unit to look after the day-to-day repair and maintenance of the imported and indigenous machines. Farm Operation Service Unit (FOSU) managed all field operations including field preparations to crop sowing, harvesting and threshing in 750 acres of IARI farm using indigenous and imported machines. For efficient distribution of irrigation water efforts were made to conserve water and apply judiciously. The Farm Operations Service Unit (FOSU), with close collaborative efforts of Divisions of Agronomy and Agricultural Engineering, is working on collections and transportation of crop residues and other biomass produced at the IARI experimental farms for preparing FYM. Weed control work at IARI farm by manual, chemical and mechanical weed control work done by FOSU. Cleanliness of all IARI farm by lifting biomass were also under taken by FOSU.

I.A.R.I. Regional Station, Kalimpong:- I.A.R.I. Regional Station, Kalimpong, is one of the oldest regional stations of Indian Agricultural Research Institute. It was set up as the Co-ordinated Plant Virus Research Scheme, I.A.R.I., Eastern Zone, Kalimpong in February 1956 in a rented house named "Churchill Ville" at L. B.

Road, Kalimpong. In 1967, it was renamed as Plant Virus Research Sub-station and subsequently as Plant Virus Research Station (PVRS) in the year 1969. On 11.10.1972, the property under the name "Alpine Estate" measuring an area of 3.145 acres at 8 1/2 Miles, Lower Reshi Road, Kalimpong was acquired for the purpose of PVRS. The possession of the acquired property was initiated on 12.2.1973 and completed by 23.11.1974. Consequently, PVRS was shifted from "Churchill Ville" to the acquired site in February, 1973 wherein it was rechristened as the I.A.R.I. Regional Station, Kalimpong in 1976. Amongst local populace, this establishment is known as the Plant Virus Office or the Virus Office. Prof. S. P. Raychaudhuri, who is regarded as the father of plant virology in India, was the founder Officer In-charge of this regional station. I.A.R.I. Regional Station, Kalimpong has taken a lead role in conducting research on virus and virus-like diseases affecting economically important plant species of Darjeeling and Sikkim hills. Since its inception in 1956, at least 25 virus and virus-like diseases of plants prevalent in this region were reported from this station. Of course, there was a period of comparative lull from mid-eighties to mid-nineties because the major establishment of this regional station was burnt down to ashes on December 15, 1987 due to Gorkhaland agitation. After construction of the new office-cum-laboratory building, research work has gained momentum.

Table-6: Evolution of Kalimpong Research Centre

Sl.	Events	Duration	Identity
1	Co-ordinated Plant Virus Research Scheme, I.A.R.I.,	February 1956	Rented house named "Churchill Ville"
2	renamed as Plant Virus Research Sub-station	1967	
3	Plant Virus Research Station (PVRS)	1969	
4	Acquired land for this station	11.10.1972	The property under the name "Alpine Estate"
5	The possession of the acquired property was initiated on	12.2.1973	
6	PVRS was shifted from "Churchill Ville"	February, 1973	To the acquired site, "Alpine Estate"
7	Completely acquired the property.	23.11.1974.	
8	rechristened as the I.A.R.I. Regional Station, Kalimpong	1976	The Plant Virus Office or the Virus Office.
9	Gorkhaland agitation	December 15, 1987 to Mid nineties	Burnt the office

IARI Regional Station, Karnal (Haryana):- An Outline: The Regional Station at Karnal established in 1923, is one of the first Stations of the Indian Agricultural Research Institute (IARI), New Delhi. This premier Agricultural Institute of the country has evolved a number of high yielding crop varieties. And this Station has been a major partner in spreading and sustaining the green revolution in the country through seeds of high yielding improved crop varieties. The mission of the station is to serve the Nation with High Quality Seeds and Planting Materials.

IARI Regional Station, Indore (Madhya Pradesh) :-ICAR-Indian Agricultural Research Institute, Regional station, Indore was established in October, 1951 as an aftermath of wheat rust epidemic during 1946-47 in Central India. It was established on the historical Institute of Plant Industry and started with just two hectares of land and meagre resources. The station was started under the coordinated wheat Rust Control Scheme operating under the leadership of Dr. B.P. Pal at IARI, New Delhi with the mandate of evolving rust resistant wheat varieties that can be successfully grown under limited inputs. The popular durum wheat in Central India was on the verge of extinction due to low yield and rust disease during 70s and 80s. The station did the pioneer work of durum wheat revival in central India during last two decades. Now it is internationally acclaimed as major research centre for durum wheat and rust diseases. The station has developed 26 improved wheat varieties including 12 of durum and 14 of bread wheat for different cultivation conditions.

Basic studies are being conducted on rust resistance, heat and drought tolerance, and wheat quality traits.

Regional Station Katrain (Kullu Valley) H.P.:-The credit for the country's achieving self sufficiency in the production of seeds of temperate vegetables goes largely to the IARI Regional Station at Katrain. The success achieved by the station in the development of a whole package of technology for vegetables and seed production is well known. A classic example is the successful seed production of late cauliflower (*Snowball*) for the first time in the country. At present, the seeds of 60 varieties in 26 vegetables are being produced at the station.

IARI Regional Station, Pune (Maharashtra):-Pioneer institute of India on plant virus diseases established in 1938 (as Plant Virus Research Laboratory) by Imperial Council of Agricultural Research, British India; the objective being coordinating all research works on virus diseases of plants of this region and the country. Considering its national importance, the station was handed over to Indian Agricultural Research Institute (IARI), New Delhi on 1 April, 1956 and renamed as IARI Regional Station, Pune. Office and laboratories of the station were shifted from Shivaji Nagar (Pune) to its 18 acre experimental farm at Aundh (Pune) on 16 February, 2014. The station is the only one of its kind engaged exclusively in research and extension on virus and virus like diseases of fruits and vegetables. The station has characterized many viral diseases and developed their diagnostic and management practices.

IARI Regional Station, Pusa (Bihar):-IARI Regional Station Pusa is situated in Samastipur district of Bihar in the U shaped southwestern lap of river Burhi Gandak. On July 5, 1784, East India Copmany acquired land at Pusa for Horse Breeding Stud Farm but after ninety years in 1874, Stud Farm was closed due to epidemic gland disease. In 1902 plan mooted for Animal Husbandry, Dairy Development, Educational Institution and Agricultural Institute at Pusa. On 26 December 1903, Government of India, took over all lands from Bengal Government and with the donation of 30,000 pounds by Mr. Henry Phipps, a US citizen, Agricultural Research Institute (ARI) was established at Pusa. On 1st April 1904 foundation of Agricultural Research Institute was laid by Lord Curzon, the Viceroy and governor General of India. On 29th July 1936, Institute was shifted to Delhi. On 7th November 1936, new institute building was inaugurated at Delhi. A small unit called Botanical sub-station was left over at pusa, Bihar and in 1969, Botanical sub-station renamed as Regional Research Station and in 1975, Regional Research Station upgraded as IARI Regional Station, Pusa, Bihar.

Regional Station Amartara Cottage, Shimla (HP):-The IARI Regional Station in its present form was set up on 1st April, 2005 by amalgamating the two regional stations of IARI at Shimla in order to economize on avoidable overhead expenditure. The regional station is thus comprised of two centres viz Cereals Breeding Centre, Tutikandi and Horticulture Crops Research Centre, Dhanda. The administrative office and laboratories are located at the Amartara Campus. The recent activities of this station (1) research work with a scheme for Breeding Rusts Resistant Hill wheat (Barley was added later) varieties and (2) Collection, Maintenance and Assessment of Wild Germplasm of Pome and Stone Fruits.

Regional Station, Wellington (Nilgiris):-The station located in a breath holding picturesque valley of Wellington in the Nilgiri district of Tamil Nadu state in India was established during 1954 under "Coordinated Wheat Rust Control Scheme" of ICAR. This station was initially established on the land taken on lease from the defense ministry and later on it was decided at the highest level in the Prime Minister's secretariat to handed over the defense ministry land permanently to ICAR. Since 1988, the Nilgiri hills where this station is located, act as the main source of inoculum for stem and leaf rusts of wheat upto central India, control of the these pathogens at this source area is very important to prevent rust epiphytotics in target areas particularly peninsular and central India. Wellington was therefore created with a mandate to produce rust resistant varieties of wheat,

particularly of dicoccum wheat for widespread cultivation in south India in general and southern hills in particular to cut down the initial wheat rust inoculum that is wafted from southern Indian hills to peninsular and central India. The first dicoccum wheat in India named as NP 200 was developed here. This station played a very significant role in carrying forward the green revolution in India as seed of CIMMYT dwarf wheat varieties brought first time from Mexico was multiplied here in summer of 1962 and the same seed was used for laying out small scale demonstrations in 1962-63 rabi season at Delhi. Because of availability of rust inoculum and favorable climate for wheat cultivation throughout the year, the wheat scientists in India used Wellington centre to screen their materials for disease resistance, advancing generations, initial seed multiplication of important strains and for making fresh crosses. In due course of time, this station has therefore, blossomed into an excellent off - season nursery center for wheat and several other winter crops for the entire country. Famous international wheat scientists like Dr. Norman E. Borlaug, Dr. M. S. Swaminathan and others have been regular visitors to this station. Initially station had only 7.5 acres land, however 36.0 acres was later taken on lease from ministry of defence(now transferred permanently to ICAR).

Regional Center Aduthurai, Tamil Nadu:-Rice Breeding and Genetics Research Centre (RBGRC) of IARI is located inside the campus of Tamil Nadu Rice Research Institute (TRRI) at Aduthurai. Located in the Cauvery delta zone of Thanjavur district, Tamil Nadu, the Centre enjoys weather conditions that favor rice cultivation throughout the year. Cauvery delta is a fertile rice growing region of the Peninsular India, where traditional rice cultivation dates back to more than two millennia. Established in 1968 by Dr. M. S. Swaminathan, then Director of IARI to facilitate accelerated rice breeding programme of the institute, the Centre contributed immensely to the early success of green revolution in rice through the development of popular Pusa rice varieties. Coinciding the rabi season during which rice cultivation is not practiced in Northern India, the Centre offered a rapid generation advancement 'off-season' shuttle platform for the breeding materials developed at New Delhi. Besides, long-duration photosensitive rice varieties that do not flower at New Delhi conditions could be grown easily at Aduthurai. Although in the initial years, the Centre was functional as a breeding material shuttle system between IARI and Rice Research Station at Aduthurai, a permanent rice breeding center was established during 1981 under the Division of Genetics - a move that recognized the tangible role of shuttle breeding program in the years to come.

Regional Center Dharwad Karnataka:- Regional Research Center at Dharwad is an off-season nursery of the IARI for pulses and other major crops of national importance. It is functioning based on the Memorandum of Understanding with the University of Agricultural Sciences, Dharwad. The Centre has three important functions: i) generation advancement ii) disease screening and iii) generation of new crosses. Here chickpea, lentil, pea, cowpea, mungbean, urdbean, pigeonpea and also other crops of national importance such as maize, Pearl millet, soybean and rapeseed mustard can be successfully grown during off-season for advancing breeding generations. During kharif season (mid-July sowing) winter crops like chickpea, lentil, pea and rapeseed mustard can be successfully grown for generation advancement thereby reducing the cross-to-variety period by half. Besides, breeding generations and germplasm can be screened against major diseases such as powdery mildew in pea and mungbean; rust in maize, pearl millet, soybean and cowpea; and white rust in rapeseed mustard.

EDUCATION PART

Objectives of education

- Promote excellence, foster high standard and orient the educational programme towards future needs and opportunities.
- Strengthen physical, biological and social sciences in the curricular and add frontier areas.

- Provide opportunities for post-doctoral research, continuing education, faculty upgradation and development of human resources in new and cutting edge technology areas.
- Strengthen non-formal training to promote entrepreneurial skills and commercialization of agriculture.

Library Services of IARI:-Prof. M S SWAMINATHAN LIBRARY is one of the largest and the finest agrobiological libraries in South East Asia. The Library functions as the depository of Food and Agricultural Organization (FAO), IDRC and AVRDC publications and also as the National Depository for Consultant Group of International Agricultural Research (CGIAR) institutes publications. The library has student facility wing / reading halls having 15 PCs with Wi-Fi connectivity and internet and e-mail facility. The name of IARI LIBRARY has been changed to "Prof. M S SWAMINATHAN LIBRARY" as an honour to our most eminent scientist "Prof. M. S. Swaminathan". IARI Library was declared as an input center for National Agricultural Research Database (NARD) under AGRIS Project. CeRA (Consortium for eResources in Agriculture) Project of NAIP (World Bank)- Onle Access of Approx. 2380 e-Journals is provided on LAN to scientific community, Students and other users of the institute to create e-access culture among scientists / teachers in ICAR Institutes / Agricultural Universities.

Table 7: Library possessions and activities

No	Contents	Number of copies
1	Publications	3.75 lakh plus publications
2	Books / monographs / bulletins	1,32,000
3	Journals / reports	2,21,600
4	Post graduate theses	15,160
5	Hindi books	7,683
6	News letters	28,500
7	Online Journals available	24
8	Members (students, scientists and technical staffs)	2000
9	No. of visitors every year (approx.)	8,000
10	Subscribing no. of Foreign Periodicals	116
11	Subscribing no. of Indian journals	185
12	Advances & Annual Reviews	47
13	Serial subscribing no. of newsletters	650
14	Exchange relationship is maintained with no. of institutions globally and nationally	65
15	Exchange relationship is maintained globally and nationally by sending no. of annual reports, ICAR journals and society publications.	152

EXTENSION PART

Objectives of Extension

- Generate innovative extension models, dovetail them to developmental models, and disseminate them through regional stations, universities and state extension systems.
- Promote client oriented on-farm research and technology assessment, refinement and transfer through participatory approaches and by promoting the Institute-Village Linkage Programme.
- Foster development communication research and linkages with rural development programmes and strengthen micro-planning through inter departmental and participatory approaches.

Evolution of Division of Agricultural Extension in IARI:-IARI has pioneered rural development and extension of new agricultural technologies to the farmers since 1950s. With the objective of carrying the findings of research to the villages for the improvement of agriculture and efficient utilization of resources, the Institute launched a pioneering pilot scheme of 'Intensive Cultivation' in 19

Table-8: Directors of IARI Chronologically

No.	Name	Duration	No.	Name	Duration
1	Bernard Coventry	1904-1916	13	M.S. Swaminathan	1966-1972
2	E.J. Butler	1920	14	A.B. Joshi	1972-1977
3	William McRae	1929	15	H.K.Jain	1977-1984
4	W.H. Harrison	1929-1930	16	A.M. Michael	1986-1990
5	Bernard Keen	1930-1931	17	S.K.Sinha	1991-1994
6	William McRae	1931-1934	18	R.B. Singh	1995-1999
7	F.J.F. Shaw	1934-1935	19	Panjab Singh	2000-2002
8	B. Biswanath	1935-1944	20	S. Nagarajan	2002-2005
9	H.S. Pruthi	1944-1945	21	S.A. Patil	2006-2009
10	J.N. Mukherjee	1945-1950	22	H.S. Gupta	2009-2014
11	B.P.Pal	1950-1965	23	Trilochan Mohapatra	2015-2016
12	A.B. Joshi	1965-1966	24	Ashok Kumar Singh	2020-Onward

Table 9: Board of management of IARI

No.	Designation	Board Designation	No.	Designation	Board Designation
1	Director, IARI	Chairman	12	Head, Division of Vegetable Sciences	Member
2	Registrar and Joint Director (Admn.), IARI	Member -Secretary	13	National Director, NAIP (ICAR)	Member
3	Dean and Joint Director(Education), IARI	Member	14	Director, Animal Husbandry Division, Nimbkar Agricultural Research Institute, Phalton, Maharashtra	Member
4	Joint Director (Research), IARI	Member	15	Vice-Chancellor, Dr. Bala Saheb Sawant Konkan Krishi Vidyapeeth, Maharashtra	Member
5	Joint Director (Extension), IARI	Member	16	Agriculture Commissioner, Deptt. of Agril. Cooperation, Ministry of Agriculture, New delhi	Member
6	Project Director, WTC	Member	17	Development Commissioner, Delhi Administration, Govt. of NCT of Delhi	Member
7	Head, Division of Agricultural Engineering	Member	18	Director (Finance), ICAR	Member
8	Head, Regional Station, Indore	Member	19	Director, IVRI	Member
9	Head, Regional Station, Shimla	Member	20	ADG (FFC), ICAR	Member
10	Head, Division of Soil Science and Agricultural Chemistry	Member	21	Dr. K.V. Peter, Trissur, Kerala	Member
11	Head, Division of Plant Physiology	Member	22	Dr. S.S. Acharya, Udaipur, Rajasthan	Member

villages of the Union Territory of Delhi. It was planned to gradually saturate the villages with improved varieties of major crops while emphasizing proper land utilization. An Extension Center at Nangloi was established in 1955 on a patch of one acre land taken on lease from the Municipal Corporation of Delhi. In the wake of the 'Intensive Cultivation Scheme', various measures were taken to educate the farmers in the use of improved agricultural methods. Among these, the setting up of an Agricultural Museum was one of its important features. The extension activities of the Institute assumed a great significance by the end of the decade (1950- 59) of extension activity in the 19 villages of Delhi. The extension activities were strengthened in 1955-56 under the Second Five Year Plan, when students began to be admitted for the post-graduate training in Agricultural Extension leading to the diploma of Associateship, and subsequently to the M.Sc. and Ph.D. degrees of the Institute. Later on, considering the importance of extension education, the necessity of a fledglings Division of Agricultural Extension was realized. Accordingly, the Government of India eventually sanctioned the establishment of a separate Division of Agricultural Extension at the Institute as a scheme under the Third Five Year Plan. However, the implementation of this scheme was advanced to the Second Five Year Plan itself.

Division of Agricultural Extension:- The Division of Agricultural Extension came into being as an independent full-fledged division in 1960. Since then, it has been playing a pioneering role in the growth and development of extension science with specific reference to research, education and training in extension education. It grew leaps and bounds under the dynamic leaders. The Division has been providing the national leadership role in areas of teaching, research, training and transfer of technology in the discipline of agricultural extension. The mandate of the Division is to conduct basic and strategic research for serving as a national point for quality and standard in the discipline of Extension Education, serve as a centre for academic excellence and provide national leadership in agricultural extension.

The Division was recognised as Centre of Advanced Studies in Agricultural Extension (CAS) in 1994, which was renamed as Centre of Advanced Faculty Training (CAFT) in 2010 by the ICAR. The CAFT has been established to conduct trainings on frontier and emerging areas for the extension professionals of SAUs and ICAR institutes and to carry out strategic researches in the discipline. The Division also undertakes extension outreach activities.

KVK, Shikohpur:- To further the field extension activities in regions outside of Delhi, ICAR sanctioned the establishment of Krishi Vigyan Kendra (KVK) at Shikohpur, Gurgaon in the year 1984 under the administrative control of IARI, Pusa New Delhi. Shikohpur is about 50 Km. from IARI New Delhi and 15 Km. from district headquarters Gurgaon. This KVK played a vital role in providing linkage with the farmers, farm women and rural youth. In the recent years, it has been playing an important role in combating unemployment of rural youth through technological empowerment and improving the farmers' awareness and farm productivity through various TOT programmes. For speedy dissemination of technologies on the farmers' fields, the KVK organizes various extension activities in the villages and at K/K campus. The *Krishi Vigyan Patrika*, a quarterly newsletter in Hindi provides latest and newer technologies to the farmers at proper time to the farmers.

MANAGEMENT PART

CONCLUSION

IARI is playing remarkable role in agricultural development in our country as mother institute of ICAR. Though there are many roles remaining to think and perform in recent days. (1)More emphasis is to be given on marketing research. (2) Development of portal for dissemination of marketing information and marketing intelligence on national markets and international markets.(3)

More research, education and extension need is there to prevent food wastage.(4) Focus more on developing new way of irrigation considering depleting irrigation water sources as well as how to develop an irrigation infrastructure to everywhere of country, that plan and programme will be provided to Central Government. If irrigation is secured, cultivation is secured. (5) KVKs are playing an important role in rural agricultural development, hence how to establish more KVKs in rural areas, that things will be kept in mind. In this respect, IARI, ICAR and Ministry of Agriculture and Farmers Welfare jointly formulate an iron plan for future KVKs establishment. (6) IARI is the lighthouse agricultural knowledge. To spread the agricultural knowledge and agricultural development of our whole country integratedly, a sound post –graduate M.Sc (Agriculture) system must be introduced in IARI. The system will be like this-suppose in M.Sc (Ag.) programme in IARI total 36 seats are there. In Junior Research Fellowship (JRF) exam of ICAR who are qualifying either with scholarship or without scholarship, according to merit list –every State /UT highest ranked one student will get chance to study in IARI. If in IARI there are 72 seats, two students of each State/UT will get chance in IARI. If any State/UT having no qualified student, the vacant seats will be filled up according to the merit list of JRF without any discrimination. The whole process must follow the govt. of India reservation policy. For Ph. D. programme, whatever the present system is there, that is good enough. (7) More research, education and extension work should be done on post-harvest technologies and value addition for profit maximization. (8) Capture world market: - By focusing more on development of quality agricultural products, our country has profuse potentiality to be an agriculturally superpower country. Just like, we have developed AMUL brand. (9) Post-harvest mechanization: - Previously, our emphasis was seed to seed, now our emphasis will be seed to seed to ultimate consumer.

In this respect, it is needed to mechanize all activities after harvest of crop to reach to ultimate consumer's hand. (10) Equal emphasis on all agricultural enterprises. How to develop all agricultural enterprises and its advantages are taken that thing should be considered. Hence, more research, education and extension is needed by IARI. (11) Agricultural products are perishable in nature. Hence to set up sufficient no. of cold storage countrywide is needed. Still it is not possible. In this respect, using knowledge of Genetics for prolong shelf life of agricultural products, that research is to be done. (12) More research should be done on income generating units of small and marginal farmers. (13) More research, education and extension is needed on organic cultivation/organic farming. Pesticide residual effect is the cause of concern for environmental imbalance, health deterioration and export of agricultural products. Developed countries do not need amount of agricultural products but quality agricultural products, because human health is considered there most important ingredient for quality life.

“Most things, except agriculture, can wait.”-Jawaharlal Nehru

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