RAWE

Agricultural Education is an important tool in ensuring increased agricultural productivity, sustainability, environmental and ecological security, profitability, job security & equity. In India, **Randhawa Committee (1992)** recommended the **Rural Agriculture Work Experience (RAWE)** programme for imparting quality, practical and production oriented education for agriculture degree programme. **The World Bank (1975)** stated that there was little emphasis on curricula on preparing the agricultural graduates for better career in agriculture or agribusiness outside govt. jobs. Therefore, the agenda for the 21st century in agricultural education should be drawn on the basis of the challenges it has to meet in the near future. RAWE programme provides significant hands on experience in acquiring knowledge and skill.

WHAT IS RAWE:

RAWE (Rural Agricultural Work Experience) is a programme for imparting quality, practical and production oriented education for agriculture degree

IMPORTANCE:

- Preparing Agricultural Graduates for better career in agriculture/ agribusiness
- Preparing Agricultural Graduates to face the challenges by acquiring knowledge¬ & skill through hands on experience

OBJECTIVES:

• Understanding of rural life by students

• Familiarity with the socio-economic situation of village

• Opportunity for practical training

• Development of Communication skill in Transfer of Technology

• Understanding of technologies followed by farmers

• Preparation of production plan suitable for local situation

•Development of confidence and competency for facing problematic situation and finding solutions

THE PRESENT AGRICULTURAL RESEARCH SYSTEMS OF INDIA

India has one of the largest agricultural research systems in the world with the largest number of scientific personnel of any developing country except China. The research system includes approximately 30,000 scientists and more than 100,000 supporting staff actively engaged in research related to agriculture. Although the total number of scientists engaged in agricultural research in India looks very impressive, it compares less favourably with many developed countries.

The present agricultural research system comprises essentially two main streams, the ICAR at the national level and the Agricultural Universities at the State level. Besides, several other agencies such as General Universities, Scientific Organizations, and various Ministries/Departments at the Centre, as also Private or Voluntary Organizations participate directly or indirectly in research activities related to agriculture.

NATIONAL AGRICULTURAL RESEARCH SYSTEM

1. THE ICAR SYSTEM

2. THE AGRICULTURAL UNIVERSITIES SYSTEM

3. OTHER AGENCIES

4. LINKAGES AMONG THE SUB-SYSTEMS

5. INTERNATIONAL CO-OPERATION

1. THE ICAR SYSTEM

The ICAR has the following major objectives:

(i) to undertake, aid, promote and coordinate agricultural, animal husbandry and fisheries education, research, and its application;
(ii) to act as a clearing house of research and general information relating to agricultural and veterinary matters;
(iii) to maintain a research and reference library;
(iv) to do other things considered necessary to attain the above objectives; and
(v) to provide consultancy services in the fields of education, research and training in agriculture and allied sciences.

Among the major scientific organizations in the country, ICAR is unique in having concurrent responsibility for both research and education. As an apex body at the national level, ICAR is mainly responsible for the promotion and coordination of agricultural research in the various branches of agricultural and allied sciences in the country. In addition to its promoting and coordinating roles, ICAR is also directly involved in undertaking research at the national level, basic as well as applied, on diverse problems facing production of crops, animals, fisheries, etc., with the objective of evolving new production technologies suited to different agro-climatic conditions. Just as the University Grants Commission (UGC) plays a major role for the general education in the country, ICAR plays a similar role in the area of agricultural education. The Charter of the ICAR also includes extension education, which is carried out through a network of projects and other mechanisms.

Research Infrastructure of the ICAR

Although agriculture is a State subject, ICAR has established many Central Research Institutions over the years to meet the agricultural research needs of the country. These are essentially meant for:

(i) implementing research mandates extending beyond the administrative boundaries of the States;
(ii) pursuing basic research not undertaken by most Agricultural Universities;
(iii) evaluating research results through multi - locational testing; and
(iv) developing manpower for Agricultural Universities and other agricultural institutions.

A. Central Research Institutes: ICAR directly administers 65 research institutes in the areas of crop, animal and fishery sciences. They are:

(a) Research Management Academy: National Academy of Agricultural Research Management (NAARM) originally started as Central Staff College for Agriculture, at Hyderabad provides research management training to the agricultural scientists in the country. In addition, it organizes seminars, conferences and workshops, both national and international, based upon the scientific studies and reviews undertaken on the management problems encountered in the research system. It publishes training materials and functions as a repository of information in the field of agricultural research and education management. Besides meeting national needs as a premier management institution, the Academy has now developed an institutional capability to act as a Regional Training Centre in this part of the World.

(b) National Bureaux: In order to collect, conserve and initiate such measures as would lead to long-term productivity of basic resources like plants, animals, fish, soil, and water, ICAR has established six national bureaux. They are:

1. National Bureau of Plant Genetic Resources (NBPGR) at New Delhi undertakes research and coordinates activities in germplasm collection; introduction and exchange of seeds and plant materials; and characterization, documentation, maintenance, and conservation of genetic resources for utilization in crop management.

2. National Bureau of Soil Survey & Land Use Planning (NBSS&LUP) at Nagpur is engaged in the preparation of soil map of India; preparation of district level soil resource inventories; soil correlation and classification at national level; research in soil genesis and classification; imparting training in soil survey and mapping; soil taxonomy, land use planning, etc; and establishment of a soil data bank for use in agricultural research and extension.

3. National Bureau of Animal Genetic Resources (NBAGR) at Karnal is engaged in the collection, maintenance and conservation of animal genetic resources for utilization in livestock improvement.

4. National Bureau of Fish Genetic Resources (NBFGR) at Lucknow is engaged in the collection, conservation and efficient utilization of fish genetic resources.

5. **National Bureau of Agriculturally Important Micro Organisms (NBAIM)**, Mau Nath Bhanjan, Uttar Pradesh is engaged in collection, maintenance and utilization of micro organisms.

6. **National Bureau of Agriculturally Important Insects**, Bengaluru is engaged in the collection, characterization, documentation, conservation, exchange, research and utilization of agriculturally important insect resources (including mites, spiders and related arthropods) and insect derived resources for sustainable agriculture.

(c) Crop Science Institutes: There are sixteen crop science institutes carrying out basic and applied research on specific crops and transferring the results thereof. They are:

1. Indian Agricultural Research Institute (IARI) at New Delhi is the premier agricultural institution engaged in basic and applied research in crops, postgraduate education and training, extension education, and transfer of technology. It has a Deemed University status, and awards postgraduate degrees in various disciplines of crop science.

2. National Rice Research Institute (CRRI) at Cuttack is engaged in basic and applied research in all disciplines of rice culture; in the generation of information for planning adaptive research; and serves as a centre of information on all matters concerning rice production, protection and conservation.

3. **Central Research Institute for Jute and Allied Fibers (CRIJAF)** at Barrackpore is engaged in developing varieties of jute suitable for different jute growing areas; in developing appropriate crop management and crop protection technology including broad types of farm tools and implements for jute and allied fibers; and in the production of breeder and foundation seeds of jute.

4. Central Tobacco Research Institute (CTRI) at Rajahmundry is engaged in varietals improvement of FCV tobacco; in pest and disease management; in the improvement of curing technology; in the utilization of tobacco wastes; and in extension education.

5. Indian Grassland and Fodder Research Institute (IGFRI) at Jhansi carries out basic and applied research on grasses, grass lands and fodder crops including all aspects of forage seed production and its protection for producing high quality forage. It also attempts to develop and evaluate various crop/tree species combinations for silvipasture and agroforestry systems.

6. Sugarcane Breeding Institute (SBI) at Coimbatore is engaged in evaluating important sugarcane varieties for different agro-climatic regions in the country. It conducts research on breeding methodologies by taking advantage of its situational factor favourable for the flowering of sugarcane crop. It also imparts postgraduate training.

7. Indian Institute of Sugarcane Research (IISR) at Lucknow has the mandate to standardize the sugarcane production and protection technologies; to devise and develop prototype of machines and implements required to promote the interest of sugarcane cultivation for maximum economic benefits to the farmers; to provide advisory services; and to impart training in sugar crops and agro-techniques.

8. Central Institute of Cotton Research (CICR) at Nagpur is engaged in basic and applied research to improve cotton production; in the collection and conservation of germplasm for cotton improvement programmes; and in imparting training in advanced cotton protection technology.

9. Vivekananda Parvatiya Krishi Anusandhan Shala (VPKAS) at Almora is engaged in the development of improved high yielding and disease resistant varieties of different cereals,

millets, pulses, vegetables, and fodder crops grown in hills; collection, evaluation and maintenance of germplasm resources of hill crops and identification of suitable improved cropping systems for these areas; and conduct research on soil and water management problems and transfer research results for the benefit of farmers of hill areas.

10. Indian Institute of Seed Research (DSR), at Mau, U.P. Realizing the importance of seed, the Indian Council of Agricultural Research launched the All India Coordinated Research Project on seed the "National Seed Project" in 1979. Based on the over all progress and development of the National Seed Project and growing importance of seed in modern agriculture, the Indian Council of Agricultural Research has upgraded the Project Coordinator Unit of National Seed Project to the status of the Project Directorate in X Plan named as "Directorate of Seed Research". Directorate of Seed Research started operating since 31 December 2004.

11. Indian Institute of Oilseeds Research (IIOR) at Hydrabad formerly Directorate of Oilseeds Research was established on August 1, 1977 with the Headquarters at Rajendranagar, Hyderabad with Project Director as its administrative head with the assistance of seven Project Coordinators for groundnut, rapeseed-mustard, sesame & niger, linseed, castor, safflower and sunflower. Subsequently, groundnut and rapeseed-mustard were delinked from the Directorate with the establishment of National Research Centre for each of these crops during 1979 and 1993, respectively. In April 2000, the AICRP on sesame & niger and linseed have been separated from the administrative control of IIOR. With the upgradation of DOR to IIOR, sesame, niger and linseed has been added with the existing mandate crops such as castor, safflower and sunflower.

12. Indian Institute of Millet Research (IIMR), Hydrabad is a premier agricultural research institute engaged in basic and strategic research on sorghum and other millets under Indian Council of Agricultural Research (ICAR). IIMR coordinates and facilitates millets research at national level through All India Coordinated Research Projects on Sorghum, Pearl Millet and Small Millets and provides linkages with various national and international agencies.

13. **Indian Institute of Rice Research (IIRR)** at Hydrabad has mandate of basic and strategic research for enhancing rice productivity under irrigated ecosystem, multilocation testing, technologies dissemination, capacity building and establishing linkages.

14. **Indian Institute of Wheat and Barley Research (IIWBR)** at Karnal has mandate basic and strategic research on wheat and barley to improve productivity and quality, coordination and developmental of crop production and crop protection technologies for sustainable production, providing genetic diversity and accelerate the breeding cycle through klonopin 1mg price off-season facilities Surveillance and forewarning for management of rust diseases and dissemination of improved technologies, capacity building and development of linkages

15. Indian Institute of Maize Research (IIMR), at New Delhi conducts basic and strategic research for the enhancement of productivity and production of maize, including specialty corn, coordinates multi-disciplinary and multilocation research to identify appropriate technologies for varied agro-climatic conditions and disseminates improved technologies, capacity building and develops linkages.

16. Indian Institute of Pulses Research (IIPR) at Kanpur was established as national Institute by the Indian Council of Agricultural Research (ICAR) for basic, strategic and applied research

on major pulse crops. The Institute is involved in generation of basic information, development of high yielding varieties and appropriate production and protection technologies, production of breeder seeds, demonstration and transfer of technologies, and strategic coordination of pulses research through wide network of testing centres across the country.

(d) Horticulture and Plantation Crops Institutes: There are nine horticulture and plantation crops institutes conducting and coordinating research on the crops they deal with. They are:

1. Indian Institute of Horticultural Research (IIHR) at Bangalore has the mandate to conduct cytogenetical studies to improve horticultural crops; standardize propagation techniques; nutritional growth regulators in horticulture; physiology and biochemistry of flower and fruit development; control of weeds, viral, fungal and bacterial diseases, mites and pests; postharvest technology; design of tools and implements; and conservation of germplasm.
2. Central Institute of Horticulture for Northern Plains (CIHNP) at Lucknow is engaged in the investigation of major production problems of fruit and vegetable cultivation for the northern plains with special reference to mango.

3. Central Institute of Temperate Horticulture (CITH) at Srinagar has the mandate to carry out basic and applied research relating to temperate fruits and vegetables in the country.

4. Central Potato Research Institute (CPRI) at Shimla has the mandate to conduct and coordinate potato research in India; to serve as a centre of information on all aspects of potato research and development; and to produce breeder seed required by the country.

5. Central Tuber Crops Research Institute (CTCRI) at Trivandrum conducts and coordinates research on all tropical tuber crops other than potato, viz. cassava, sweet potato, amorphophallus, aroids, yams, arrowroot, etc.

6. Central Plantation Crops Research Institute (CPCRI) at Kasargod has the mandate to improve the genetic potential of plantation crops; conduct basic and applied research; serve as an information centre on all matters relating to these crops; and produce genetically superior planting materials.

7. **Central Citrus Research Institute (CCRI)** at Nagpur has mandate of crop improvement, crop protection, conservation and utilization of citrus genetic resources, training, quarantine, certification and supply of disease free planting material of citrus.

8. Indian Institute of Oil Palm Research (IIOPR), Pedavegi, West Godawari has been contributing by understanding the constraints affecting the production of oil palm in India and finding out solutions through intrinsic research initiatives.
9. Indian Institute of Spice Research (IISR), at Calicut conducts basic, applied and strategic research on genetic resource management, crop improvement, crop production and protection technologies for enhanced production of safe spices, ttransfer of technology, capacity building and impact assessment of technologies and coordinate research and validation of technologies under AICRP on Spices

(e) Resource Management Institutes: There are fourteen resource management institutes which are primarily responsible for undertaking research on soil and water conservation for optimizing production of crops under different conditions. They are:

1. Central Soil and Water Conservation Research and Training Institute (CSWCR&TI) at Dehradun has the mandate to study erosion problems, and conservation of land and water resources; evaluation of hydrological barriers and management of watersheds; identification of suitable plant materials for different land use; development of suitable technology for increasing production from arid lands; development of techniques for rainfed farming and efficient water management; imparting training to state and central officers in soil and water conservation; and monitoring of changes in environment affected by integrated water management.

2. Central Soil Salinity Research Institute (CSSRI) at Karnal has the mandate to collect information on the extent, characteristic, genesis, and classification of salt affected soils; study soil and water dynamics in irrigated agriculture; conduct detailed hydrological survey; evolve methods to check deterioration of water due to pollution, and utilization of different qualities for agricultural purposes; study salt tolerance for reclamation of salt affected land; and impart postgraduate education and training.

3. Central Arid Zone Research Institute (CAZRI) at Jodhpur has the mandate to evolve location specific technologies for optimizing production of arid lands based on ecological principles by judicious utilization of natural resources; and to train and to conduct workshops for adopting the new technologies.

4. Central Research Institute for Dryland Agriculture (CRIDA) at Hyderabad has the mandate to carry out basic research in conservation, management and utilization of natural resources in dryland ecosystem; to study the phenomenon governing crop growth and development under dryland conditions; to develop technology for exploitation of natural resources at farm level for increasing and stabilizing crop production in dryland; and also to act as a repository of knowledge on dryland farming in the country.

5. ICAR Research Complex for North-Eastern Hill Region (ICAR-NEH) at Shilling caters to the needs of agriculture, animal husbandry, fisheries, soil and water conservation, etc., for the hill areas of the north-eastern region with a major research focus on shifting cultivation, horticultural crops, pest management, livestock improvement, arid soil management, and postharvest technology.

6. ICAR- Central Coastal Agricultural Research Institute (CCARI) at Goa is engaged in research related to horticultural and other crops, livestock improvement, fisheries, etc. in the region.

7. Central Agricultural Research Institute (CARI) for Andaman and Nicobar Islands at Port Blair conducts research on high value cash and plantation crops; develops silvipastoral system and appropriate land use pattern through cropping systems; develops effective health coverage and livestock production systems; and conducts studies on capture and culture fisheries including coastal aquaculture.

8. Indian Institute of Soil Science (IISS) at Bhopal has the mandate to study the fundamental aspects of soils, particularly those that are basic to develop agricultural expertise and generate

information on various basic aspects of soil research; to collaborate with other organizations to identify gaps and provide direction for further research; and to have collaboration with similar international research institutions.

9. Indian Institute of Water Management (IIWM) at Bhuvneshwar has mandate to develop strategies for efficient management of on-farm water resources for sustainable agricultural productivity, coordinate research for generating location specific technologies for efficient use of water resources and provide training in agricultural water management.

10. Indian Institute of Farming Systems Research (IIFS) at Modipuram has mandate to undertake basic and strategic research in integrated farming system on production technologies for improving productivity and resource use efficiencies, to develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations, to undertake on-farm testing, verification and refinement of system-based farm production technologies, human resource development and capacity building in integrated farming system, to act as a repository of information on all aspects of farming systems research and development and to coordinate and monitor integrated farming systems research in the country.

11. National Institute of Abiotic Stress Management (NIASM) at Malegaon, Maharshtra, conducts basic and strategic research on management of abiotic stresses in crop plants, livestock, fishes and soil microorganisms, impart quality education in abiotic stress management and emerge as a Global Centre of Excellence, repository of information on abiotic stresses, mitigation strategies and acceptable policies for knowledge sharing and capacity building and develop linkages for holistic management of abiotic and biotic stress factors.

12. National Institute of Biotic Stress Management (NISBM) at Raipur has mandate of basic, strategic and adaptive research on biotic stresses in agriculture and development of quality human resources for academic excellence, linkage with various stakeholders for technology management and policy support research.

13. ICAR- Research Complex for Eastern Region (ICAR-RCER) at Patna has mandate of strategic and adaptive research for efficient integrated management of natural resources to enhance productivity of agricultural production systems in eastern region, transform low productivity-high potential eastern region into high productivity region for food, nutritional and livelihood security, utilization of seasonally waterlogged and perennial water bodies for multiple uses of water and promote network and consortia research in the eastern region.

14. National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) at Bengaluru has mandate of epidemiology, informatics and economics of animal diseases including zoonoses, surveillance, forecasting and forewarning for management of animal diseases including zoonoses and repository and capacity development.

(f) Technological Institutes: The technological and engineering problems in crop production and quality of commercial crops are handled by seven institutes. They are:

1. Central Institute of Agricultural Engineering (CIAE) at Bhopal has the mandate for research and development of improved farm equipment related to crop production; postharvest technology; development of energy resources and power units for agriculture; to liaise with industry for the manufacture of improved implements; and to train farmers on modern agricultural technology.

2. Central Institute for Research on Cotton Technology (CIRCT) at Bombay has the mandate to improve the production of quality cotton; and to find ways and means for better utilization of cotton and its by-products.

3. Central Research Institute for Jute and Allied Fiber Technology (CRIJAF) at Calcutta has the objectives of improvement of fiber quality; preparation of textiles by blending jute and other fibers; basic research on fibers and products; and transfer of technology for application in agriculture and industry.

4. National Institute of Natural Fibre Engineering and Technology (NINFET) at Kolkata conducts Basic and strategic research on processing all natural fibres and residues, development of new products and quality improvement; capacity building and entrepreneurship development.

4. Indian Institute of Natural Resins and Gums (IINRG), at Ranchi conducts research on lac production technologies and processing and value addition of natural resins (including lac), gums and gum-resins. Information dissemination, training and technology transfer to farmers, processors and entrepreneurs and tribal people on lac, gums and gum-resins for sustainable livelihood.

5. Central Institute of Postharvest Engineering and Technology (CIPHET) at Ludhiana undertakes research on various aspects of postharvest technology related to agricultural produce.

6. Indian Institute of Agricultural Biotechnology (IIAB) at Ranchi undertakes basic and strategic research in agricultural biotechnology and develops quality human resources for academic excellence in agricultural biotechnology and policy support. IIAB envisages meeting the growing demand of agricultural products and processes with faster pace by deploying cutting edge molecular tools and techniques.

7. **National Institute for Plant Biotechnology (NRCPB)** at New Delhi is a premiere research institution of the Indian Council of Agricultural Research (ICAR). The institute was founded in 1985 as the 'Biotechnology Centre' of Indian Agricultural Research Institute (IARI) and was upgraded to National Institute for Plant biotechnology.

(g) Animal Science Institutes: Ten animal science institutes have the mandate of breeding animals for higher productivity and suggest better management practices. They are:

1. Indian Veterinary Research Institute (IVRI) at Izatnagar, a Deemed University, has its objectives to conduct basic and applied research on all aspects of livestock health, production, and nutrition; and impart postgraduate education in veterinary sciences and animal husbandry.
2. National Dairy Research Institute (NDRI) at Karnal, a Deemed University, has the mandate to meet the manpower needs for research, teaching, and dairy development through undergraduate and postgraduate instructional programmes; study of dairy production, milk and

milk processing, dairy economics and management; and conduct of transfer of technology programmes.

3. Central Sheep and Wool Research Institute (CSWRI) at Avikanagar has the mandate to improve productivity of indigenous breeds of sheep through selection or cross breeding, superior exotic breeds well adapted to the tropical conditions to improve the carpet, wool and meat production.

4. Central Institute for Research on Goats (CIRG) at Makhdoom undertakes research for developing superior strains of goats for high productivity of meat, milk and fiber; to develop package of practices for feeding, management, and disease cover; and to study various aspects of goat meat, milk and pashmina.

5. Central Avian Research Institute (CARI) at Izatnagar has the objectives to develop avian species of economic importance with their optimum productivity; to conserve, evolve and improve indigenous and exotic germplasm; to impart training at various levels; to transfer the technology developed; and to undertake studies on various aspects of management to evolve environmental and ecological factors of postharvest technology.

6. Central Institute for Research on Buffaloes (CIRB) at Hissar carries out research on all aspects of buffalo production; co-ordinates research on buffalo in the country; functions as a clearing house of information on all aspects of buffalo development; establishes a nucleus breeding herd of important buffalo breeds for genetic studies on improvement of milk, meat, and draught potential; builds up adequate germplasm of improved breeds; and organizes training programmes in buffalo management.

7. National Institute of Animal Genetics (NIAG) at Karnal provides scientific support to the NBAGR and takes up research work of very fundamental nature not ordinarily taken up at the existing ICAR Institutes and Agricultural Universities.

8. National Institute of Animal Nutrition and Physiology (NIANP) at Bangalore conducts research related to nutritional and physiological aspects of livestock and management.

9. National Institute of High Security Animal Diseases (NIHSAD) at Bhopal is a premier institute of India for research on exotic and emerging pathogens of animals. NIHSAD came into existence on 8th Aug., 2014 as an independent institute under ICAR from its original status as High Security Animal Disease Laboratory (HSADL), a regional station of Indian Veterinary Research Institute (IVRI), Izatnagar. The institute has contributed significantly by detecting many animal diseases of exotic origin and preventing them from entering our country.

10. Central Institute for Research on Cattle (CIRC), at Meerut, U.P. undertakes research, coordination and consultancy on the improvement of cattle by employing latest strategic breeding and reproductive tools and works closely with universities and other specialist institutes. Since its establishment, the CIRC has played a vital role in the country's cattle improvement programmes and in pursuit of research.

(h) Fisheries Institutes: Six fisheries institutes conduct studies for assessing the production of fish, conduct training programmes and undertake research. They are:

1. Central Inland Capture Fisheries Research Institute (CICFRI) at Barrackpore has the mandate to develop systems for monitoring of fish population in rivers, fresh water reservoirs,

estuaries, and to study factors influencing these population and systems for optimum exploitation; and to conduct postgraduate and specialized training and extension programmes.
2. Central Marine Fisheries Research Institute (CMFRI) at Cochin conducts research for assessing and monitoring exploitable marine fishery resources for rational exploitation and conservation; to assess the exploited and under-exploited fishery resources; to understand the fluctuation in abundance of marine fishery resources; to develop suitable mariculture technology for fun fish and shell fish in open seas; and to conduct transfer of technology and postgraduate and specialized short-term training programmes.

3. Central Institute of Fisheries Education (CIFE) at Bombay has the Deemed University status. It conducts undergraduate and postgraduate degree programmes in fishery sciences; undertakes research in basic disciplines related to fish and conducts short-term and long-term training programmes for different disciplines of fishery sciences.

4. Central Institute of Fisheries Technology, (CIFT) at Cochin conducts research for the improvement of indigenous crafts and gears, and develops suitable designs for them; develops technologies for handling, processing, preservation, product development, quality control, packaging and transportation of fish and fishery products; and conducts transfer of technology and training programmes in fishery technology.

5. Central Institute of Brackish water Aquaculture (CIBA) at Madras conducts multidisciplinary, mission-oriented applied research to develop appropriate technologies for the aquaculture organisms in the estuaries, brackish water and salt intrusion areas; and to provide an information base for sustained growth and accelerated development of these fisheries through training, education and research linkages.

6. Central Institute of Freshwater Aquaculture (CIFA) at Dhauli conducts research for developing low input aqua-farming to benefit small and marginal farmers and also system of industrialized aquaculture for entrepreneurs; to improve existing technologies for carps and air-breathing fish culture, and develop culture technology for cat fish, freshwater prawns and mussels; to increase freshwater fish production through genetic upgrading, increased pond productivity and evolution of cheap and balanced diet; to conduct nutritional and disease aspects of fish culture; and to conduct postgraduate education and training programmes.

(i) Social Science Institutes: Three institutes come under this category. They are:

1. Indian Agricultural Statistics Research Institute (IASRI) at New Delhi conducts research in experimental design, surveys, statistical genetics, computer and data processing; imparts postgraduate courses for training professional statisticians; and provides advisory and consultancy services to agricultural scientists in the country.

2. National Institute of Agricultural Economics and Policy Research (NAIP) at New Delhi has the objectives to undertake research related to the economic aspects of agricultural production process including the associated policy issues. Application of principles of economics in planning and evaluation of agricultural R&D and policy research to promote science-led agricultural and rural development have been the main goals of ICAR-NIAP. The Institute is committed to provide a leadership role in strengthening agricultural policy research, undertaking empirically sound policy research, and providing knowledge-based input for policy decisions.

3. Central institute for Women in Agriculture (CIWA) at Bhuvneshwar is engaged in research on gender issues in agriculture and allied field, gender equitable agricultural policies and gender sensitive agricultural sector responses and coordinate research in home science.

The individual institutes, under the supervision of a Director, are organized into well-defined divisions. On technical matters, they are assisted by scientific bodies like the Research Advisory Committee (RAC) represented by external experts, with Director as a member, and headed by an eminent person; and the Staff Research Council (SRC) which is represented by the institute scientists and headed by the Director. They meet once in a year and is charged with the responsibility to provide broad policy guidelines, and to plan, monitor, and evaluate research projects. All institutes have Management Committees except those with Deemed University status which have Management Boards. These Committees represented by the research and developmental personnel under the chairmanship of the Director, assist the institutes on broad policy formulation and financial matters. Once in five years, the performance of each institute is evaluated through a system of Achievement Audit Committees known as Quinquennial Review Teams. These teams, through a peer group review, play an important role in projecting the institutes' programmes in accordance with national policies and priorities. Besides, the Directors' Conferences, held regularly in the headquarters under the chairmanship of the Director General, consider problems common to the institutes.

B. Project Directorates: to undertake some research besides playing such national service roles like maintenance and supply of germplasm, organizing off-season nursery to promote and speed up research interests, monitoring pests and diseases, forecasting and issuing clearly warning about the pests and diseases outbreak, and performing such duties as a lead centre in relation to their respective subject matter, and so on. There are now thirteen of them under operation. They are:

1.	Directorate of Groundnut Research, Junagarh
2.	Directorate of Soybean Research, Indore
3.	Directorate of Rapeseed & Mustard Research, Bharatpur
4.	Directorate of Mushroom Research, Solan
5.	Directorate on Onion and Garlic Research, Pune
6.	Directorate of Cashew Research, Puttur
7.	Directorate of Medicinal and Aromatic Plants Research, Anand
8.	Directorate of Floricultural Research, Pune, Maharashtra
9.	Directorate of Weed Research, Jabalpur
10.	Project Directorate on Foot & Mouth Disease, Mukteshwar
11.	Directorate of Poultry Research, Hyderabad
12.	Directorate of Knowledge Management in Agriculture (DKMA), New Delhi
13.	Directorate of Cold Water Fisheries Research, Bhimtal, Nainital

C. National Research Centres: The National Commission on Agriculture recommended setting up of `Centres of Fundamental Research' headed by eminent scientists in particular areas. Consequently, the ICAR conceived the idea of setting up a number of National Research Centres (NRCs). The concept of NRCs revolves around the need for concentrated attention with a mission approach by a team of scientists from different disciplines. They work under a senior leader on selected topics which have direct or indirect relevance to resolving national problems in a particular crop or commodity or a problem area of research. These centres are

designed to concentrate on those crops and commodities not well served by the research institutes. Unlike the institutes, these centres do not have divisional set-up for individual disciplines nor have regional stations. They feed the national network of research with new materials, technology and information for subsequent adoption in the different production-oriented research programmes.

S.No.	National Research Centres
1.	National Research Centre for Banana, Trichi
2.	National Research Centre for Grapes, Pune
3.	National Research Centre for Litchi, Muzaffarpur
4.	National Research Centre for Pomegranate, Solapur
5.	National Research Centre on Camel, Bikaner
6.	National Research Centre on Equines, Hisar
7.	National Research Centre on Meat, Hyderabad
8.	National Research Centre on Mithun, Medziphema, Nagaland
9.	National Research Centre on Orchids, Pakyong, Sikkim
10.	National Research Centre on Pig, Guwahati
11.	National Research Centre on Seed Spices, Ajmer
12.	National Research Centre on Yak, West Kemang
13.	National Centre for Integrated Pest Management, New Delhi
14.	Mahatma Gandhi Integrated Farming Research Institute ,Motihari

D. Research Schemes/Projects: In addition to its institute-based research, ICAR promotes research schemes/projects in agriculture and allied areas to resolve location-specific problems. It is involved in a cooperative endeavour with other research organizations in carrying out multidisciplinary research programmes. Such promotional schemes fall under the following categories.

E. All India Coordinated Research Projects (AICRPs): These projects have been essentially conceived as an instrument to mobilize available scientific resources to find effective solutions for the national problems of agricultural production through inter-institutional interactions. The projects are developed as multidisciplinary and problem-oriented projects with major emphasis on multi-locational testing of new materials/production systems. They provide opportunities for scientists working on similar problems in different institutions to come together, discuss and exchange ideas, information, and materials for mutual benefit. They also provide them with facilities for multi-locational testing of improved technologies developed by various subsystems in different agro-climatic regions. The projects constitute an effective national grid of coordinated experiments by integrating different institutions and disciplines.

The All India Maize Improvement Project, launched by the ICAR in 1957 to improve maize production using hybrids, was the forerunner of this approach. Its remarkable success led to the extension of this approach to all the major crops and other areas like animal science, fisheries, soils, agricultural engineering, horticulture, etc. Subsequently, many such coordinated projects were initiated. Each project is generally sanctioned for a period of 5 years and is headed by a full-time Project Coordinator with a Coordinating Unit to assist him. These Units are located either in the ICAR Institutes or the Agricultural Universities depending upon the location of the project. They are responsible for all the technical, financial and administrative matters as well as for organizing regular workshops. The technical programmes

of the individual projects are carried out by many cooperating centres located in the participating institutions. Regular workshops, either annual or biennial, are organized by the individual projects in which the technical programmes are finalized. The Project Coordinator is guided and serviced on all matters by the concerned Assistant Director General in the ICAR headquarters.

The expenditure on these projects has increased steadily and the complement of staff, determined on the basis of the technical work assigned and the nature of operation, are provided by the participating institutions, but paid for by the ICAR. The expenditure is shared by the ICAR and the collaborating institutions on 75:25 bases.

A high degree of accountability, based on continuous monitoring, is a noteworthy feature of these projects. Outstanding achievements have been made through these projects, and the development of such an approach has been a source of inspiration to many developing countries. The list of All India Coordinated Research Projects, Network Projects is given below:

All India Coordinated Research Projects

1.	AICRP on Nematodes, New Delhi
2.	AICRP on Maize, New Delhi
3.	AICRP Rice, Hyderabad
4.	AICRP on Chickpea, Kanpur
5.	AICRP on MULLARP, Kanpur
6.	AICRP on Pigeon Pea, Kanpur
7.	AICRP on Arid Legumes, Kanpur
8.	AICRP on Wheat & Barley Improvement Project, Karnal
9.	AICRP Sorghum, Hyderabad
10.	AICRP on Pearl Millets, Jodhpur
11.	AICRP on Small Millets, Bangalore
12.	AICRP on Sugarcane, Lucknow
13.	AICRP on Cotton, Coimbatore
14.	AICRP on Groundnut, Junagarh
15.	AICRP on Soybean, Indore

16.	AICRP on Rapeseed & Mustard, Bharatpur
17.	AICRP on Sunflower, Safflower, Castor, Hyderabad
18.	AICRP on Linseed, Kanpur
19.	AICRP on Sesame and Niger, Jabalpur
20.	AICRP on IPM and Biocontrol, Bangalore
21.	AICRP on Honey Bee Research & Training, Hisar
22.	AICRP -NSP(Crops), Mau
23.	AICRP on Forage Crops, Jhansi
24.	AICRP on Fruits, Bangaluru
25.	AICRP Arid Zone Fruits, Bikaner
26.	AICRP Mushroom, Solan
27.	AICRP Vegetables including NSP vegetable, Varanasi
28	AICRP Potato, Shimla
29.	AICRP Tuber Crops, Thiruvananthapuram
30.	AICRP Palms, Kasaragod
31.	AICRP Cashew, Puttur
32.	AICRP Spices, Calicut
33.	AICRP on Medicinal and Aromatic Plants including Betel vine, Anand
34.	AICRP on Floriculture, New Delhi
35.	AICRP in Micro Secondary & Pollutant Elements in Soils and Plants, Bhopal
36.	lAICRP on Soil Test with Crop Response, Bhopal
37.	AICRP on Long Term Fertilizer Experiments, Bhopal
38.	AICRP on Salt Affected Soils & Use of Saline Water in Agriculture, Karnal

39.	AICRP on Water Management Research, Bhubaneshwar
40.	AICRP on Ground Water Utilisation, Bhubaneshwar
41.	AICRP Dryland Agriculture, Hyderabad
42.	AICRP on Agrometeorology, Hyderabad including Network on Impact adaptation & Vulnerability of Indian Agri. to Climate Change
43.	AICRP Integrated Farming System Research, Modipuram including Network Organic Farming
44.	AICRP Weed Control, Jabalpur
45.	AICRP on Agroforestry, Jhansi
46.	AICRP on Farm Implements & Machinery, Bhopal
47.	All India Coordinated Research Project on Ergonomics and Safety in Agriculture
48.	AICRP on Energy in Agriculture and Agro Based Indus.,Bhopal
49.	AICRP on Utilization of Animal Energy (UAE), Bhopal
50.	AICRP on Plasticulture Engineering and Technologies, Ludhiana
51.	AICRP on PHT, Ludhiana
52.	AICRP on Goat Improvement, Mathura
53.	AICRP- Improvement of Feed Sources & Nutrient Utilisation for raising animal production, Bangalore
54.	AICRP on Cattle Research, Meerut
55.	AICRP on Poultry, Hyderabad
56.	AICRP-Pig, Izzatnagar
57.	AICRP Foot and Mouth Disease, Mukteshwar
58.	AICRP ADMAS, Bangalore
59.	AICRP on Home Science, Bhubaneshwar

Network Projects

1.	All India Network Project on Pesticides Residues, New Delhi
2.	All India Network Project on Underutilised Crops, New Delhi
3.	All India Network Project on Tobacco, Rajahmundry
4.	All India Network Project on Soil Arthropod Pests, Durgapura
5.	Network on Agricultural Acarology, Bangalore
6.	Network on Economic Ornithology, Hyderabad
7.	All India Network Project on Rodent Control, Jodhpur
8.	All India Network Project on Jute and Allied Fibres, Barrackpore
9.	Network project on Improvement of Onion & Garlic, Pune
10.	Network Bio-fertilizers, Bhopal
11.	Network Project on Harvest & Post Harvest and Value Addition to Natural Resins & Gums, Ranchi
12.	Network project on Animal Genetic Resources, Karnal
13.	Network Project on R&D Support for Process Upgradation of Indigenous Milk products for industrial application Karnal
14.	Network Programme on Sheep Improvement, Avikanagar
15.	Network Project on Buffaloes Improvement, Hisar
16.	Network on Gastro Intestinal Parasitism, Izatnagar
17.	Network on Haemorrhagic Septicaemia, Izatnagar
18.	Network Programme Blue Tongue Disease, Izatnagar
19.	Network Project on Conservation of Lac Insect Genetic Resources, Ranchi
20.	Network Project on Agricultural Bioinformatics and Computational Biology, New Delhi

Other Projects

1.	Technology Mission on Cotton (CICR, Nagpur)
2.	Technology Mission on Jute (CRIJAF, Barrackpore)
3.	Continuation, Strengthening and Establishment of Krishi Vigyan Kendras
4.	Strengthening & Development of Higher Agricultural Education in India, New Delhi
5.	Central Agricultural University, Imphal
6.	Strengthening and Modernization of ICAR Headquarters
7.	Intellectual Property Management & Transfer/Commercialisation of Agricultural Technology (Upscaling of existing component IPR HQ)
8.	Indo US Knowledge Initiative
9.	National Agricultural Innovative Project, New Delhi
10.	National Fund for Basic and Strategic Research, New Delhi

THE AGRICULTURAL UNIVERSITIES SYSTEM

As agriculture is a State subject, the responsibilities for research, education and extension rest with the State Governments. Prior to 1960, agricultural research in the States, essentially on local problems, was carried out by the State Departments of Agriculture supported by Agricultural Colleges. Afterwards, research and education have been transferred to the Agricultural Universities, and the State Departments of Agriculture organize extension services. The Universities are supported by their respective State Governments. ICAR provides financial support and assists their research and education programmes.

The University Education Commission (1949) recommended the setting up of `Rural Universities'. This was endorsed by the two Joint Indo-American Teams in 1955 and in 1959, as well as the Ford Foundation Study Team in 1959. In 1960, the Agricultural Universities Committee under the Chairmanship of Dr. Ralph W. Cummings prepared certain guidelines for the establishment of Agricultural Universities in different States, and the ICAR gave necessary support. The first Agricultural University was established at Pant Nagar in Uttar Pradesh (Nowadays in Uttarakhand) in 1960, patterned on the Land-Grant System of the United States. The Second Education Commission (1964-66) recommended at least one Agricultural University in each State, and ICAR prepared a Model Act in 1966. All the States have now at least one Agricultural University each. Though the Model Act specifies that only one University shall be established in each State, which was later endorsed by the National Commission on Agriculture, many States have established multiple Universities to meet regional needs. Some Agricultural Universities, as in Maharashtra State, have affiliated colleges. This goes against the provisions of the Act. In 1978, a Review Committee appointed by the ICAR reviewed the functioning of each Agricultural University and made a number of recommendations. In 1988, the USAID evaluated the impact of Agricultural Universities and made several suggestions for improvement.

Agricultural Universities are autonomous institutions established by an Act of State Legislature. Although the administrative structure differs somewhat from State to State, the general outlines are similar. As Chancellor, the State Governor is the nominal head of the University. In some States, the Agriculture Minister acts as the Pro-Chancellor. The Vice-Chancellor is the Chief Executive of the University. In some States, more than one University has been established through a Common Act; their activities are coordinated through a State level Agricultural Research and Education Coordination Committee. Of the all Agricultural Universities in the country, some of them are mono-campus while the others are multi-campus Universities. The number of campuses in each University varies from 1 to 6.

Although a number of Indian universities offer agricultural education, the Indian Council of Agricultural Research (ICAR), the main regulator of agricultural education, recognizes three "Central Agricultural Universities", four Deemed Universities, 64 "State Agricultural Universities" as of December 2019.

The state with the most agricultural universities in India is Uttar Pradesh with a total of eight agricultural universities (one central university, one deemed university and six state universities) and two central universities with agriculture faculty. There are no agricultural universities in Arunachal Pradesh, Goa, Meghalaya, Mizoram, Nagaland, Sikkim or Tripura, nor on any of the union territories, except Delhi.

S. No.	Central Agricultural Universities
1.	Central Agricultural University, Imphal (Manipur)
2.	Rani Lakshmi Bai Central Agricultural University, Jhansi (UP)
3.	Dr. Rajendra Prasad Central Agriculture University, Samastipur (Bihar)

S. No.	Central Universities with Agriculture Faculty
1.	Banaras Hindu University, Varanasi (U.P.)
2.	Aligarh Muslim University, Aligarh (U.P.)
3.	Vishwa Bharti, Shantiniketan, West Bengal
4.	Nagaland University, Medizipherma, Nagaland

S. No.	Deemed universities
1.	ICAR- Indian Agricultural Research Institute, New Delhi
2.	ICAR- National Dairy Research Institute, Karnal (Haryana)
3.	ICAR- Indian Veterinary Research Institute, Izatnagar, Bareily (U.P.)
4.	ICAR- Central Institute of Fisheries Education, Mumbai

S. No.	State Agricultural Universities
Andhra Pradesh	
1.	Acharya N. G. Ranga Agricultural University, Guntur
2.	Dr. Y.S.R. Horticultural University, Tadepalligudem
3.	Sri Venkateswara Veterinary University, Tirupati
Assam	
4.	Assam Agricultural University, Jorhat
Bihar	

5.	Bihar Agricultural University, Bhagalpur
6.	Bihar Animal Sciences University, Patna
Chhattisgarh	
7.	Indira Gandhi Krishi Vishwavidyalaya, Raipur
8.	Chhattisgarh Kamdhenu Vishwavidyalaya, Durg
Gujarat	
9.	Anand Agricultural University, Anand
10.	Junagadh Agricultural University, Junagadh
11.	Kamdhenu University, Gandhinagar
12.	Navsari Agricultural University, Navsari
13.	Sardarkrushinagar Dantiwada Agricultural University, Banaskantha
Haryana	
14.	Chaudhary Charan Singh Haryana Agricultural University, Hissar
15.	Lala Lajpat Rai University of Veterinary and Animal Sciences, Hissar
16.	Maharana Pratap Horticultural University, Karnal
Himachal Pradesh	
17.	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur
18.	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan
Jammu and Kashmir	
19.	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu
20.	Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar
Jharkhand	
21.	Birsa Agricultural University, Kanke
Karnataka	
22.	Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar
23.	University of Agricultural and Horticultural Sciences, Shimoga
24.	University of Agricultural Sciences, Bangalore
25.	University of Agricultural Sciences, Dharwad
26.	University of Agricultural Sciences, Raichur
27.	University of Horticultural Sciences, Bagalkot
Kerela	
28.	Kerala Agricultural University, Thrissur
29.	Kerala University of Fisheries and Ocean Studies, Kochi
30.	Kerala Veterinary and Animal Sciences University,Wayanad
Madhya Pradesh	
31.	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur
32.	Nanaji Deshmukh Veterinary Science University, Jabalpur
33.	Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior
Maharashtra	
34.	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli
35.	Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
36.	Maharashtra Animal and Fishery Sciences University,Nagpur

37.	Mahatma Phule Krishi Vidyapeeth, Rahuri
38.	Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani
Odhisha	
39.	Odisha University of Agriculture and Technology, Bhubaneswar
Punjab	
40.	Punjab Agricultural University, Ludhiana
41.	Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana
Rajasthan	
42.	Agriculture University, Jodhpur
43.	Agriculture University, Kota
44.	Maharana Pratap University of Agriculture and Technology, Udaipur
45.	Rajasthan University of Veterinary and Animal Sciences, Bikaner
46.	Sri Karan Narendra Agriculture University, Jobner
47.	Swami Keshwanand Rajasthan Agricultural University, Bikaner
Tamil Nadu	
48.	Tamil Nadu Agricultural University, Coimbatore
49.	Tamil Nadu Fisheries University, Nagapattinam
50.	Tamil Nadu Veterinary and Animal Sciences University, Chennai
Telangana	
51.	P.V. Narasimha Rao Telangana Veterinary University, Hyderabad
52.	Professor Jayashankar Telangana State Agricultural University, Hyderabad
53	Sri Konda Laxman Telangana State Horticultural University, Hyderabad
Uttar Pradesh	
54.	Banda University of Agriculture and Technology, Banda
55.	Chandra Shekhar Azad University of Agriculture and Technology, Kanpur
56.	Narendra Deva University of Agriculture and Technology, Faizabad
57.	Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut
58.	Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad
59.	U.P. Pt. Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Ansundhan Sansthan, Mathura
Uttarakhand	
60.	G. B. Pant University of Agriculture and Technology, Pantnagar
61.	Veer Chandra Singh Garhwali Uttarakhand University of Horticulture & Forestry, Pauri Garhwal
West Bengal	
62.	Bidhan Chandra Krishi Viswavidyalaya, Mohanpur
63.	Uttar Banga Krishi Viswavidyalaya, Cooch Behar
64.	West Bengal University of Animal and Fishery Sciences, Kolkatta

Research infrastructure: Basically, the research infrastructure consists of an experiment station at the main campus and a number of research stations and substations located in different parts of the State. There are numbers of research stations belonging SAUs, working on location-specific problems. Generally, the research programmes are headed by the Directors of Research, who are assisted by the Associate Directors of Research located at the regional

research stations within the State. Some Agricultural Universities have established Advanced Centres by combining related subjects in areas such as plant protection, genetics and plant breeding, agricultural engineering, agricultural economics, water technology, etc.

Research planning, monitoring and evaluation: Agricultural Universities have State-wide responsibility for research in agriculture. In those States where, more than one University is there, the research responsibilities are shared on the regional basis. To ensure relevant research planning, their efficient implementation and proper evaluation, each Agricultural University has a Research Council or a Research Advisory Committee as an apex body for policy formulation and coordination of research activities. This body, chaired by the Vice-Chancellor comprises Director of Research, Director of Extension Education, Deans of constituent colleges, representatives of State Departments and farmers. It reviews periodically the overall status of research activities in the University, and determines their priorities and future direction. Research is organized under;

(i) University research;
(ii) Postgraduate student research; and
(iii) Coordinated research programmes.

The Director of Research, who is the overall in-charge of research, prepares an annual plan indicating the main thrusts of research within the broad directions given by the Research Advisory Committee. The Directorate of Research is responsible for research review and evaluation, and timely publication of research results and reports. By and large, the individual scientists formulate research projects which are then scrutinized by the concerned Department Head, examined at the Faculty/Departmental level and finally approved by the University Research Advisory Committee. Thereafter, the Director of Research and Department Heads provide funds and facilities to the scientists. In respect of research done by teachers and postgraduate students, the Director of Research acts in coordination with the Deans/Principals of the respective colleges.

Special mechanisms exist for the planning, monitoring, and evaluation of ICAR supported programmes in the Agricultural Universities. In the case of Coordinated Projects, the University scientists work in close cooperation with others from the ICAR Institutes and other Universities through the mechanism of All India Workshops conducted periodically. Ad hoc research schemes formulated by the University scientists are first scrutinized by the Scientific Panels and approved by the ICAR. These schemes are continuously monitored and evaluated by the ICAR in collaboration with the University. In the case of NARP, the programmes formulated at Zonal Research and Extension Advisory Committee meetings are constantly monitored and reviewed by the University concerned, the ICAR, and the World Bank Missions.

In most Agricultural Universities, the Research Evaluation Committees attended by the scientists and extension subject matter specialists provide the much needed in-house review mechanism within the Universities to examine the findings and data support emerging from various research projects. Only when the results are substantiated from trials, both on the experimental farms and farmers' fields, recommendations are made for large-scale implementation.

3. OTHER AGENCIES

A. General Universities: Many General Universities with well-developed faculties in agriculture, or strong departments engaged in areas such as genetics, plant physiology, mycology, entomology, biochemistry, economics, chemistry, marine biology, home science, etc. have made distinctive contributions to agricultural research in the country. Besides, the Central Universities like the Banaras Hindu University, Shanti Niketan, etc. have Institutes/Schools of Agricultural Sciences which are engaged in research in agriculture and allied areas, some of which are supported by the ICAR.

B. Scientific Organizations: Many other scientific organizations either directly undertake research, or sponsor and support programmes related to agriculture. The Council of Scientific and Industrial Research (CSIR), through its network of National Laboratories, provides research support in areas like processing of agricultural products, recycling of agricultural wastes, development of various agro-chemicals, etc. The Indian Council of Medical Research's (ICMR) research on the nutritional qualities of various agricultural produce including toxicity and occupational health of agricultural workers have greatly helped the ICAR in planning its research programmes. Some of the areas in which the Bhabha Atomic Research Centre (BARC) is actively engaged are the development of newer varieties of crops and preservation of agricultural produce. The Indian Space Research Organization (ISRO) is helping the research system to assess India's soil and water resources.

Technological institutions like IIT, Kharagpur, are active in the fields of agricultural engineering, soil and water management, and agronomy. The Department of Science and Technology (DST) promotes research on genetic engineering, post harvest technology, and areas of basic sciences supportive to agriculture. The Department of Non-Conventional Energy Sources works on the utilization of solar and wind energies and biogas for agricultural purposes. The Department of Meteorology is actively engaged in research on crop weather forecasting. The Department of Ocean Development is involved in assessing the fishery resources in the country and promotes research in the area of fisheries.

In addition, institutions like the National Dairy Development Board (NDDB) under the Agriculture Ministry; various Commodity Boards like Silk, Coffee, Rubber, Tea, and Cardamon Boards under the Commerce Ministry; and the Forest Research Institute and Wasteland Development Board under the Ministry of Forestry and Environment help in strengthening the agricultural research system in the country.

C. Private Sector: In mid 1960s, several private companies started programmes mainly to develop hybrid maize, sorghum and bajra. Research on vegetables started in late 1960s. Private sector research is confined mainly to breeding crop hybrids, certain plantation crops, agro-chemicals, poultry, and agricultural machinery.

Private sector research in seed industry has grown very rapidly. Several private companies are now engaged in the production of hybrid seeds of a variety of crops like cotton, sorghum, bajra, maize, vegetables, redgram, rice, etc., and a small seed export industry has also emerged. Many private companies undertaking plant breeding research, and several others are involved in plant protection research. Besides their own research stations, these companies conduct experiments on farmers' fields. They test the bio-efficiency of insecticides and herbicides that are new to India as well as synthesize new compounds. Private research in poultry sector is also there. Although Government introduced exotic birds in commercial poultry industry, they were

popularized by the private sector and many companies are now actively engaged in it. Many other large industrial concerns are engaged in research on shrimps and shrimp feed.

Some private companies undertake major research and development programmes for the improvement of tractors and irrigation pumps. Research on tractors seems to be primarily aimed at improving quality, fuel efficiency and engine durability. Some companies are now moving into agricultural implements. Research in pump industry is aimed at increasing the efficiency of pumps through improved design and better materials. Some companies are even experimenting with non-conventional sources of power. Historically, private companies in the processing and plantation sector have been a very important source of new agricultural technology. Some of the prominent ones include Indian Sugar Mills Association, Southern Planters Association, Textile Mills Association, Silk Industry, etc. Some large firms are involved in research on animal nutrition, plant growth regulators, biotechnology like tissue culture in cardamom, sugarcane, coconut and tea, biofertilizers, etc. Research in the area of tree farming including in vitro culture and tree breeding is also receiving attention of private firms.

4. LINKAGES AMONG THE SUB-SYSTEMS

Strong working relationships and complementarily in research efforts amongst the components of the research system is necessary in order to optimize resources and check avoidable duplication. The ICAR, as the coordinating agency at the national level, has established close working relationships with the Agricultural Universities and other agencies involved directly or indirectly in agricultural research through formal arrangements and informal exchanges.

At the policy making level, the Vice-Chancellors of Agricultural Universities are represented in the Governing Body, and in the Norms and Accreditation Committee of the ICAR. The senior level research managers of the ICAR, in turn, are represented in the Management Boards of these Universities. The Regional Committees of the ICAR provide an important forum for the scientists from these two agencies to come together and look at the regional research needs. Through Interdisciplinary Scientific Panels of the ICAR, the experts from the Agricultural Universities play a critical role in selecting research programmes at the national level as well as at the regional level. More importantly, various research schemes of the ICAR like the AICRPs, NARP, and ad hoc research schemes provide opportunities for the two subsystems to work jointly on problems of national as well as regional relevance.

As far as the General Universities are concerned, they participate in research activities under different types of research schemes and projects financed by different agencies. Through the AICRPs and ad hoc research schemes, these Universities have established linkages with the ICAR and Agricultural Universities subsystems. Joint programmes in specific areas like plant physiology, biological nitrogen fixation, etc. have been taken up by the ICAR with scientists working in these Universities. ICAR has also established close linkages with various scientific organizations like CSIR, ICMR, ISRO, BARC, etc. through Joint Panels. Problems of mutual interest have brought the ICAR closer to various Departments and Ministries at the Centre to find solutions through collaborative research efforts.

5. INTERNATIONAL CO-OPERATION

International cooperation has played a significant role in developing and strengthening the research system in India. Many developed countries like USA, UK, USSR, Canada, Australia,

Japan, several European countries; Charitable Institutions, etc.; Rockefeller and Ford Foundations; various International Agencies like FAO, UNDP, UNESCO, World Bank, etc.; and the International Agricultural Research Centres under the Consultative Group on International Agricultural Research (CGIAR) System have contributed extensively to the cause of agricultural research in India. Spectacular achievements in increasing the food production have raised the country's image considerably, and the bilateral arrangements have changed from the erstwhile donor-done status to relationship of equal partnership in research. The reciprocity and mutuality of interests with the less developed and as well as the technologically advanced countries are the essence of international co-operation.

The Government has authorized ICAR, assisted by the DARE, to enter into bilateral cooperative agreements with several countries and agencies. The mode of collaboration normally follows the pattern of:

(a) exchange of germplasm of plant and animal origin;

(b) exchange of scientific and technical information;

(c) visits of scientists and experts;

(d) training of scientists; and

(e) infrastructure development.

Some of the major avenues of international collaboration are:

(i) Bilateral co-operation at the Government level;
(ii) Bilateral co-operation between ICAR and counterpart foreign institutes;
(iii) Interaction with Agricultural Research Centres under the CGIAR System;
(iv) Foreign-aided projects funded by USDA (erstwhile PL-480 projects), Ford Foundation, IDRC, UNDP, World Bank, and USAID;
(v) Science and Technology Initiative signed by the late Prime Minister Indira Gandhi and the US President Ronald Reagan;
(vi) Participation in the regional projects under ESCAP and SAARC programmes; and
(vii) Consultancy and training in the field of agricultural research in developing countries.

International collaboration has provided a mechanism to draw upon the global stock of knowledge, scientific talent and material, and for institution building to address many of the research needs in the country. The agricultural research system in India has reached a stage in its development where it could take a more active role in joint research with foreign scientists as equal partners as well as in training scientists from other countries.

GLOBAL AGRICULTURAL RESEARCH SYSTEM

It is system that supports and funds to carry out research to develop agriculture and its related aspects to reduce hunger and poverty in the world. The Consultative Group on International Agricultural Research (CGIAR) is a part of Global Agricultural Research System

CGIAR (The Consultative Group on International Agricultural Research)

The Consultative Group on International Agricultural Research (CGIAR) was established in 1971.

The Consultative Group on International Agricultural Research (CGIAR) is an association of public and private members that support and fund a number of International Agricultural Research Centres (IARCs) that carry out research to reduce hunger and poverty.

The Consultative Group on International Agricultural Research (CGIAR) is a global partnership that unites organizations engaged in research for sustainable development with the funders of this work.

The funders include developing and industrialized country governments, foundations, and international and regional organizations. The work they support is carried out by 15 members of the Consortium of International Agricultural Research Centres, in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia, and the private sectors.

The Vision:

To reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership.

The Objectives:

 Food for People: Create and accelerate sustainable increases in the productivity and production of healthy food by and for the poor.

 Environment for People: Conserve, enhance and sustainable use natural resources and biodiversity to improve the livelihoods of the poor in response to climate change and other factors.

 Policies for People: Promote policy and institutional change that will stimulate agricultural growth and equity to benefit the poor, especially rural women and other disadvantaged groups.

A long-standing strategic partnership

The Consultative Group on International Agricultural Research (CGIAR), established in 1971, is a strategic partnership of diverse donors that support 15 international Centres, working in collaboration with many hundreds of government and civil society organizations as well as private businesses around the world. CGIAR donors include both developing and industrialized countries, international and regional organizations and private foundations.

Guided by a vision of reduced poverty and hunger, improved human health and nutrition, and greater ecosystem resilience, brought about through high-quality international agricultural research, partnership and leadership, the CGIAR applies cutting-edge science to foster

sustainable agricultural growth that benefits the poor. The new crop varieties, knowledge and other products resulting from the CGIAR's collaborative research are made widely available to individuals and organizations working for sustainable agricultural development throughout the world.

Eleven of the CGIAR Centres maintain international gene banks. These preserve and make readily available a wide array of plant genetic resources, which form the basis of global food security.

In addition, the CGIAR implements several innovative Challenge Programs, which are designed to address global or regional issues of vital importance. Implemented through broad-based research partnerships, these programs apply knowledge, technology and other resources to solve problems such as micronutrient deficiencies, which afflict more than three billion people worldwide; water scarcity, which already affects a third of the world's population; and climate change, which poses a dire threat to rural livelihoods across the developing world.

A New CGIAR

In December 2009 the CGIAR adopted a new institutional model designed to improve its delivery of research results in a rapidly changing external environment. The reforms should give rise to a more results-oriented research agenda, to clearer accountability across the CGIAR and to streamlined governance and programs.

The new model consists of a balanced partnership between donors and researchers. A new CGIAR Fund will improve the quality and quantity of funding by harmonizing donor contributions, while a new Consortium will unite the Centres under a legal entity that provides the Fund with a single entry point for contracting Centres and other partners to conduct research.

Shifting to a more programmatic approach, the CGIAR Centres will operate within a Strategy and Results Framework, aimed at strengthening collaboration for greater efficiency and development impact. A portfolio of ―Mega Programs‖ will be developed, providing CGIAR scientists and partners with new means to deliver international public goods that address major global issues in development.

An Independent Science and Partnership Council (ISPC) will provide the CGIAR with critical advice and expertise.

The new CGIAR will foster stronger and more dynamic partnerships, which generate high-quality research outputs while strengthening national research institutions. Stakeholders, including donors, partners and beneficiaries, will provide input into the design of the Strategy and Mega Programs. The Global Conference on Agricultural Research for Development (GCARD) represents a key opportunity for engaging end users, including farmers, forest and fishing communities, and National Agricultural Research Systems (NARS), in the development of new research programs.

Benefits for the poor and the planet

International agricultural research has a strong record of delivering results that help confront the central development and environmental challenges of our time. The science developed by CGIAR supported Centres and their partners has delivered significant gains in terms of reduced

hunger and improved incomes for smallholder farmers across much of the developing world. The objectives of CGIAR research are much broader than improving agricultural productivity alone, encompassing a range of initiatives related to water, biodiversity, forests, fisheries and land conservation. It has advanced sustainable management and conservation practices, thereby protecting millions of hectares of forest and grasslands, safeguarding biodiversity, and preventing land degradation.

The CGIAR Genebanks

CGIAR scientists play major roles in collecting, characterizing and conserving plant genetic resources. Eleven Centres together maintain over 650,000 samples of crop, forage and agroforestry genetic resources in the public domain.

INTERNATIONAL AGRICULTURAL RESEARCH CENTRES (15 centres supported by the Consultative Group on International Agricultural Research (CGIAR)

1. CIAT (INTERNATIONAL CENTRE FOR TROPICAL AGRICULTURE)

2. CIFOR (CENTRE FOR INTERNATIONAL FORESTRY RESEARCH)

3. CIMMYT (INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTRE "CIMMYT" derives from the Spanish version of our name: Centro Internacional de Mejoramiento de Maíz y Trigo)

4. CIP (INTERNATIONAL POTATO CENTRE) it is known by its Spanish acronym, CIP means CENTRO INTERNACIONAL DE LA PAPA)

5. ICARDA (INTERNATIONAL CENTRE FOR AGRICULTURAL RESEARCH IN THE DRY AREAS)

6. ICRISAT (INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS)

7. IFPRI (INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE)

8. IITA (INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE)

9. ILRI (INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE)

10. BIOVERSITY INTERNATIONAL

11. IRRI (INTERNATIONAL RICE RESEARCH INSTITUTE)

12. IWMI (INTERNATIONAL WATER MANAGEMENT INSTITUTE)

13. WORLD AGROFORESTRY CENTRE

14. WFC (WORLD FISH CENTRE)

15. AFRICA RICE CENTRE (Africa Rice)

1. CIAT - INTERNATIONAL CENTRE FOR TROPICAL AGRICULTURE www.ciat.cgiar.org Centro Internacional de Agricultura Tropical

Headquarters: A.A. 6713, Cali, Colombia

CIAT is an agricultural research institution. They focus on scientific solutions to hunger in the tropics. They believe that eco-efficient agriculture—developing sustainable methods of food production—are the best way to eradicate hunger and improve livelihoods in the region.

CIAT is also about partnerships. By working together with likeminded organizations they ensure that they have a far-reaching and long-lasting impact. CIAT cooperates with many national and international institutions in developing and industrialized countries. Their relationships with them not only function on a one-to-one basis but also take the form of networks and consortia.

CIAT is a leading not-for-profit organization and has been helping smallholders grow more food and earn more money for 40 years. Established in 1970, as one of the four original research centres in the Consultative Group of International Agricultural Research (CGIAR), CIAT now works in more than 50 countries worldwide.

CIAT‘s headquarters, at the 500-hectare Agronatura Science Park near Cali, in southwest Colombia, employs some of the best scientists in the world. Their experts in regional offices in Africa and Asia enable them to reach poor farmers swiftly and effectively.

2. CIFOR - CENTRE FOR INTERNATIONAL FORESTRY RESEARCH www.cifor.cgiar.org

Headquarters: P.O. Box. 6596, JKPWB, Jakarta, Indonesia

The Centre for International Forestry Research is a nonprofit, global facility dedicated to advancing human wellbeing, environmental conservation and equity. Centre conducts research that enables more informed and equitable decision making about the use and management of forests in less developed countries.

Centre‘s research and expert analysis help policy makers and practitioners shape effective policy, improve the management of tropical forests and address the needs and perspectives of people who depend on forests for their livelihoods. The multidisciplinary approach of centre considers the underlying drivers of deforestation and degradation which often lie outside the forestry sector: forces such as agriculture, infrastructure development, trade and investment policies and law enforcement.

CIFOR’s vision: CIFOR‘s vision is of a world in which forests remain high on the world‘s political agenda and people recognise the real value of forests for maintaining livelihoods and ecosystems services. In CIFOR‘s vision, decision-making that affects forests is based on solid science and principles of good governance, and reflects the perspectives of developing countries and forest dependent people.

3. CIMMYT - INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTRE http://www.cimmyt.org/ (The abbreviation "CIMMYT" derives from the Spanish version of our name: Centro Internacional de Mejoramiento de Maíz y Trigo)

Headquarters: Apdo. Postal 6-641, 06600, Mexico, D.F., Mexico

CIMMYT is a non-profit research and training centre headquartered in Mexico

Mission: To sustainably increase the productivity of maize and wheat systems to ensure global food security and reduce poverty

Vision and strategic goal: CIMMYT works with and brings together public research and extension organizations, private companies, advanced research institutes, NGOs, and farmer associations in countries worldwide, working pragmatically and apolitically to fight hunger and poverty. The Centre applies the best science to develop and freely share:

 High-yielding, stress tolerant maize and wheat varieties.

 Large, unique collections of maize and wheat genetic resources.

 Productivity-enhancing, resource-conserving farming practices. Training and information relating to the above.

Through these activities and outputs, CIMMYT works to foster global and local food security, helping farmers meet rapidly rising demand from expanding populations and affluence, while addressing the emerging challenges of global climate change and resource degradation and scarcities.

Origin: CIMMYT grew out of a pilot program in Mexico in 1943, sponsored by the Government of Mexico and the Rockefeller Foundation. The project developed into an innovative, sustained collaboration with Mexican and international researchers. It established international networks to test experimental varieties. Under the leadership of late wheat scientist Dr. Norman E. Borlaug, the team developed shorter wheat varieties that put more energy into grain production, responded better to fertilizer than older varieties, grew well at different latitudes, and were resistant to the devastating wheat disease known as stem rust. By the late 1950s, Mexico was self-sufficient in wheat production. Mexico‘s success inspired project researchers to become fierce and effective advocates for the Mexican innovation model in other countries.

Around 1965, South Asian cereal production was in dire straights. Population was outstripping wheat and rice production, and more than 10 million tons of grains were regularly being imported to make up for the deficits. Hunger was widespread, and government leaders in Pakistan (which then included East Pakistan, now Bangladesh) and India were desperate to improve national cereal production. The following year, CIMMYT was established as an international centre with its headquarters in Mexico. In 1967 India imported 18,000 tons of seed of the improved Mexican wheat varieties, and Pakistan soon began to use them. During 1967-71, the two countries doubled their wheat production.

The successes of the new crop varieties, along with improved management practices like the use of fertilizer, sparked the widespread adoption of improved varieties and farming techniques in the developing world—a phenomenon that came to be called the "Green Revolution." The social and economic benefits of this movement were recognized worldwide when the Nobel Peace Prize was awarded to Norman Borlaug in 1970. The following year, a small cadre of development organizations, national sponsors, and private foundations organized the Consultative Group on

International Agricultural Research (CGIAR) to spread the impact of research to more crops and nations. CIMMYT was one of the first international research centres to be supported through the CGIAR.

Why do maize and wheat matter?

 Seventy percent of the world‘s poorest people live in the countryside. Many depend on farming, especially of maize and wheat, for food and income.

 According to FAO, maize and wheat account for about 40% of the world‘s food and 25% of calories consumed in developing countries. Millions of people—including poor people in urban areas—get more than half of their daily calories from maize and wheat alone.

 Maize and wheat occupy almost 200 million hectares in developing countries. We must grow these crops in environmentally responsible ways, or the results could be devastating.

 To meet the need for food, developing countries will need 368 million additional tons of maize and wheat by 2020

4. CIP - INTERNATIONAL POTATO CENTRE (It is known by its Spanish acronym, (CIP means CENTRO INTERNACIONAL DE LA PAPA) http://www.cipotato.org/

Headquarters: P.O. Box 1558, Lima, Peru

The International Potato Centre (known by its Spanish acronym, CIP) seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweet potato, other root and tuber crops, and on the improved management of natural resources in the Andes and other mountain areas.

CIP headquarters are in La Molina, outside of Lima, Peru‘s capital, in an irrigated coastal valley. CIP also has experimental stations in Huancayo in the high Andes and in San Ramón on the eastern, rainforest-covered slopes, taking advantage of Peru‘s varied geography and climate. The Centre has another high Andes experiment station in Quito, Ecuador, and a worldwide network of regional offices and collaborators.

CIP has recruited an international team of scientists from 25 countries, supported by nationally recruited staff. In its first year of operation, CIP was funded by five donors. Today, the Centre‘s budget is underwritten by more than 40 donors.

CIP is a member of the Alliance of the 15 centres of the Consultative Group on International Agricultural Research (CGIAR) and so receives its principal funding from the 58 governments, private foundations and international and regional organizations that constitute the CGIAR.

Mission of CIP

The International Potato Centre (CIP) seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweet potato, and other root and tuber crops and on the improved management of natural resources in the Andes and other mountain areas.

CIP is part of the global agricultural research network known as the Consultative Group on International Agricultural Research (CGIAR).

CIP contributes to the CGIAR in a limited research area defined by commodities (potato, sweet potato, and Andean root and tuber crops) and ecoregions, in CIP‘s case the Andes. CIP, in close association with national research systems, selects priority activities within these major work areas. These priorities are continually refined against changes in the way crops are grown, as well as changes in science and in national programs.

Increasingly, CIP employs its expertise in convening global research initiatives that involve a range of institutions that can contribute to the Centre‘s objectives. As opportunities arise, research is conducted in partner and client institutions around the world.

CIP statement on Partnership with the Private Sector

CIP works with hundreds of partners and constantly seeks new partnerships to seek complementary skills and opportunities, access the most advanced technologies, and broaden the reach and impact of research-for-development activities. This document outlines the principles, benefits, and safeguards that guide CIP‘s partnerships with the private sector. It provides a definition of private partners and offers clear guidelines for working with them to staff, donors, existing and potential partners, and other interested parties.

5. ICARDA- INTERNATIONAL CENTRE FOR AGRICULTURAL RESEARCH IN THE DRY AREAS http://www.icarda.cgiar.org/Facelift.htm

Headquarters: P.O. Box. 5466, Aleppo, Syria

History: In 1972, the CGIAR commissioned a team of experts to study the potential threats of food shortages and loss of natural resources in the dry areas. The team recommended that an internationally supported, research centre be set up to serve developing countries with large dry areas. The proposed centre would focus on sub-tropical (temperate) zones. ICARDA‘s founding charter was signed in 1975, with three United Nations agencies (the Food and Agriculture Organization, the UN Development Program and the World Bank) as co-sponsors, and Canada's International Development Research Centre as the executing agency. The government of Syria provided a 948-hectare site the following year, and operations began in 1977.

ICARDA’s headquarters, Tel Hadya, on the outskirts of the historic city of Aleppo, is an ideal site, for many reasons. Biophysical conditions – topography, soils, rainfall – are typical of the world‘s non-tropical dry areas, ICARDA primary mandate area. It also lies in the heart of the Fertile Crescent, where agriculture began 10,000 years ago, and where many of the world‘s most important crops originated or were first domesticated. Plant genetic diversity in the region is almost unique – and this diversity allows scientists to uncover new genes that control vital traits such as drought tolerance, disease resistance or grain quality

Vision is to improve livelihoods of the resource-poor in the dry areas.

Mission: To contribute to the improvement of livelihoods of the resource-poor in dry areas by enhancing food security and alleviating poverty through research and partnerships to achieve sustainable increases in agricultural productivity and income, while ensuring the efficient and more equitable use and conservation of natural resources.

Mandate: ICARDA has a global mandate for the improvement of barley, lentil and faba bean and serves the non-tropical dry areas for the improvement of on-farm water-use efficiency, rangeland and small-ruminant production. In the Central and West Asia and North Africa (CWANA) region, ICARDA contributes to the improvement of bread and durum wheat, Kabuli chickpea, pasture and forage legumes and associated farming systems. It also works on improved land management, diversification of production systems, and value-added crop and livestock products. Social, economic and policy research is an integral component of

ICARDA's research to better target poverty and to enhance the uptake and maximize impact of the research outputs.

6. ICRISAT - INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS http://www.icrisat.org/

Headquarters: Pattancheru 502 324, Andhra Pradesh, India

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centres supported by the Consultative Group on International Agricultural Research (CGIAR). Covering 6.5 million square kilometres of land in 55 countries, the semi-arid tropics have over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger and a degraded environment through better agriculture.

The semi-arid regions (dry tropics) covering 55 countries of sub- Saharan Africa and Asia and inhabited by more than 800 million people, are the poorest places on earth. These regions are most vulnerable to climate change with very little rainfall, degraded soils and poor social infrastructure. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is the only research Centre in the world serving the semi-arid tropics, together with its partners.

ICRISAT is supported by the Consultative Group on International Agricultural Research (CGIAR). ICRISAT conducts research on five highly nutritious, drought-tolerant crops - chickpea, pigeonpea, pearl millet, sorghum and groundnut.

Vision and mission: ICRISAT‘s vision is the improved well-being of the poor people of the dry tropics. Towards this, ICRISAT seeks to reduce poverty, increase agricultural productivity, enhance food and nutritional security and protect the environment of the dry tropics. ICRISAT‘s research is guided by science with a human face and propelled by strategic partnerships. By putting a human face to science, ICRISAT dedicates its work to the poorest of the poor.

Global research themes:

Agro-ecosystem development focuses on improving rural livelihoods, attaining food security and sustainable natural resource management. Crop improvement and management develops better crop varieties, environment-friendly and cost-effective pest management practices, efficient seed systems, and diversified uses of dryland crops. Harnessing biotechnology for the poor complements crop improvement by applying the new science of genomics, genetic engineering and bioinformatics.

Institutions, Markets, Policy and Impacts helps formulate pro-poor policies and guides investments towards improved food security, livelihood resilience, poverty reduction and sustainable environment of the dry tropics.

Location: ICRISAT‘s headquarters is located in Pattancheru, near Hyderabad, Andhra Pradesh in south central India. We also have six locations in sub-Saharan Africa. Our presence in this continent is anchored by two regional hubs in Nairobi, Kenya and Niamey, Niger, complemented by four country offices.

Management: ICRISAT is headed by a Director General and assisted by a Deputy Director General - Research and other members of the Management Group composed of the Directors of Finance, Human Resources and Operations, Resource Planning and Marketing, Communication and the African regional hubs.

ICRISAT is decentralized and its two regional hubs in sub-Saharan Africa are headed by Directors who are supported by Assistant Directors and Country Representatives. A diverse and experienced Governing Board provides strategic guidance, sets policies and oversees ICRISAT‘s management.

New horizons of research: Over the years, ICRISAT has been transformed into a global centre of scientific excellence dedicated to serve poor communities of the semi-arid tropics. As ICRISAT pursues new horizons of excellence, it conducts research on strategic areas like climate change, bioenergy, agricultural diversification and linking farmers with markets.

7. IFPRI - INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE http://www.ifpri.org/

Headquarters: 2033 K Street, Washington, DC., USA

IFPRI is an international agricultural research centre founded in the early 1970s to improve the understanding of national agricultural and food policies to promote the adoption of innovations in agricultural technology. Additionally, IFPRI was meant to shed more light on the role of agricultural and rural development in the broader development pathway of a country. According to its website, IFPRI "seeks sustainable solutions for ending hunger and poverty."

IFPRI is part of a network of international research institutes funded in part by the Consultative Group on International Agricultural Research (CGIAR), which in turn is funded by governments, private businesses and foundations, and the World Bank.

The International Food Policy Research Institute (IFPRI) seeks sustainable solutions for ending hunger and poverty. IFPRI is one of 15 centres supported by the Consultative Group on International Agricultural Research (CGIAR), an alliance of 64 governments, private foundations, and international and regional organizations.

Mission: To Provide Policy Solutions That Reduce Poverty and End Hunger and Malnutrition

This mission flows from the CGIAR mission: "To achieve sustainable food security and reduce poverty in developing countries through scientific research and research-related activities in the fields of agriculture, livestock, forestry, fisheries, policy, and natural resources management."

Two key premises underlie IFPRI's mission:

1. Sound and appropriate local, national, and international public policies are essential to achieving sustainable food security and nutritional improvement.

2. Research and the dissemination of its results are critical inputs into the process of raising the quality of food policy debate and formulating sound and appropriate policies.

IFPRI's mission focuses on:

 Identifying and analyzing alternative international, national, and local policies in support of improved food security and nutrition, emphasizing low-income countries and poor people and the sound management of the natural resource base that supports agriculture;

 Contributing to capacity strengthening of people and institutions in developing countries that conduct research on food, agriculture, and nutrition policies; and

 Actively engaging in policy communications, making research results available to all those in a position to apply or use them, and carrying out dialogues with those users to link research and policy action.

IFPRI places priority on activities that benefit the greatest number of poor people in greatest need in the developing world. In carrying out its activities, IFPRI seeks to focus on vulnerable groups, as influenced by class, religion, ethnicity, agro ecological location, and gender.

IFPRI is committed to providing global food policy knowledge as an international public good; that is, it provides knowledge relevant to decision makers both inside and outside the countries in which it undertakes research. New knowledge on how to improve the food security of low-income people in developing countries is expected to result in large social benefits, but in most instances the private sector is unlikely to carry out research to generate such knowledge. IFPRI views both public organizations and the private sector in food systems as objects of study and as partners.

Research Areas: IFPRI's institutional strategy rests on three pillars: research, capacity strengthening, and policy communication.

Research topics have included low crop and animal productivity, and environmental degradation, water management, fragile lands, property rights, collective action, sustainable intensification of agricultural production, the impact of climate change on poor farmers, the problems and opportunities of biotechnology, food security, micronutrient malnutrition, microfinance programs, urban food security, gender and development, and resource allocation within households.

IFPRI also analyzes agricultural market reforms, trade policy, World Trade Organization negotiations in the context of agriculture, institutional effectiveness, crop and income diversification, post harvest activity, and agro industry.

The institute is involved in measuring the Millennium Development Goals project and supports governments in the formulation and implementation of development strategies.

Further work includes research on agricultural innovation systems and the role of capacity strengthening in agricultural development.

8. IITA - INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE http://www.iita.org/

Headquarters: Oyo Road, PMB 5320, Ibadan, Nigeria

International Institute of Tropical Agriculture (IITA) is Africa's leading research partner in finding solutions for hunger, malnutrition, and poverty. IITA‘s award-winning research for development (R4D) addresses the development needs of sub-Saharan Africa. IITA works with partners to enhance crop quality and productivity reduce producer and consumer risks and generate wealth from agriculture. IITA is nonprofit organization founded in 1967, governed by a Board of Trustees, and supported by several countries. IITA works on cowpea, soybean, banana/plantain, yam, cassava, and maize.

Research-for-development platform: IITA‘s mission is to enhance food security and improve livelihoods in Africa through research for development (R4D). IITA uses the R4D model in setting a research course that addresses major development problems in Africa rather than simply contributing to scientific knowledge. It has proven to be an effective mechanism for agricultural research development. We and our partners have delivered about 70% of the international research impact in sun-Saharan Africa in the last three decades.

The R4D model is unique in that

1. It focuses on long-term development needs to guide our research design and choice of partners

2. It incorporates two critical elements absent in traditional models: a mid-process initial research outcome and an explicit EXIT strategy for IITA.

R4D model

 Development needs: Identifies societal, producer, and consumer needs that require addressing. Guarantees research relevance.

 Research: Specifies research problems that can be addressed by IITA with advanced research institutes and national partners. The design demands envisioning the potential impact.

 Research impact: Defines scalable research outcomes and any advocacy activities required. A successful outcome entices partners to adoption.

 Exit: Once the outcome is embraced by national/regional partners, IITA exits implementation and changes role to monitoring the research outcomes in the subsequent stages of development outputs and outcomes.

 Success/Development impact: Ex-post evaluations are carried out and compared to baseline information to measure the impact on the ultimate beneficiaries.

 Further work: Development impact creates new challenges which are referred back to development needs.

Innovative partnerships: In response to specific development needs, IITA works with research and development partners (research, development and extension actors, farmer organizations, NGOs, the private sector, and governments) to deliver research outputs that are achieving an initial outcome. IITA then uses this research outcome to excite and attract more partners who will ultimately take charge of the upscaling and outscaling of the technologies by broadening participation and increasing the chances of success and ultimate development impact.

In particular, IITA is committed to forging closer links with ARIs, NARES, and the private sector that are eager to contribute to high-quality R4D, commercialization, and market development activities in technical assistance (TA).

9. ILRI - INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE http://www.ilri.org/

Headquarters: P.O. Box. 30709, Nairobi, Kenya

The International Livestock Research Institute (ILRI) works at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development. ILRI works in Africa, South and Southeast Asia, and China. ILRI is a non-profit-making and non-governmental organization with headquarters in Nairobi, Kenya, and a second principal campus in Addis Ababa, Ethiopia. We employ over 700 staff from about 40 countries. About 80 staffs are recruited through international competitions and represent some 30 disciplines. Around 600 staff members are nationally recruited, largely from Kenya and Ethiopia.

ILRI envisions a world made better for poor people in developing countries by improving agricultural systems in which livestock are important.

ILRI's mission is to work at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development for poor livestock keepers and their communities.

ILRI works in partnerships and alliances with other organizations, national and international, in livestock research, training and information. ILRI works in all tropical developing regions of Africa and Asia.

ILRI is a member of the Consortium of CGIAR centres that conducts food and environmental research to help alleviate poverty and increase food security while protecting the natural resource base.

ILRI works on: ILRI's research is directed to address seven global livestock challenges. :

 Vaccine and diagnostic technologies for orphan animal diseases

 Animal genetic resources

 Climate change- adaptation and mitigation

 Emerging diseases

 SPS and market access within border market opportunities for the poor

 Sustainable intensification in smallholder crop-livestock systems Vulnerability of marginal systems and people

ILRI is not a university nor a training college and therefore guards against providing courses which could be offered by other institutions. The strength and advantage that ILRI presents for learning is its strong research base. Training at ILRI stresses practical work (both in the field and laboratory), team/group work, experiential learning, and personal development. ILRI offers individual and group training courses. Both are aimed at largely building the capacity of

individuals. Some of the group training may be in an organizational context but this is not very systematic. However, there are also some recent capacity building activities within projects that are meant to enhance ILRI‘s ability to strengthen both institutional as well as individual capacities.

10. BIOVERSITY INTERNATIONAL http://www.bioversityinternational.org/

Headquarters: are in Maccarese, Italy, just outside Rome

Bioversity International is the world's leading organization dedicated to agricultural biodiversity research to improve people's lives through:

 Better nutrition, especially in developing countries Sustainable farming practices, to secure our future food supplies

 Conservation and use, to ensure that everyone can grow the food they need Funding for Bioversity comes from statutory donors and foundations, which support us directly and through their contributions to the Consultative Group on International Agricultural Research. Bioversity is also supported by a registered charity in the United Kingdom, and in the United States by a Foundation that has 501(c)(3) status.

Bioversity's headquarters are in Maccarese, Italy, just outside Rome, where we work closely with UN Agencies such as FAO, IFAD and WFP. However, the vast majority of our staff works from 20 offices that cover the regions of the world. In addition, we are pleased to host some system-wide activities on behalf of the CGIAR.

How IBPGR became IPGRI became Bioversity: Bioversity was originally established as the International Board for Plant Genetic Resources (IBPGR) in 1974.

IBPGR was launched in response to growing awareness of genetic erosion and the rapid loss of crop biodiversity. Its original mission was to coordinate an international plant genetic resources programme. This included emergency collecting missions as well as building and expanding national, regional and international gene banks. The Food and Agriculture Organization of the United Nations (FAO) acted as the IBPGR secretariat.

In October 1991, IBPGR became the International Plant Genetic Resources Institute (IPGRI) and in January 1994 IPGRI began independent operation as one of the centres of the Consultative Group on International Agricultural Research (CGIAR). At the request of the CGIAR, in 1994 IPGRI took over the governance and administration of the International Network for the Improvement of Banana and Plantain (INIBAP).

The organization‘s focus has changed over time. From the emergency conservation of crop genetic resources in gene banks, it moved into research to conserve crop biodiversity through the sustainable use of genetic resources.

Harnessing genetic diversity to reach development goals and the conservation and use of forest genetic resources also became key areas of work.

In 2006, IPGRI and INIBAP became a single organization and subsequently changed their operating name to Bioversity International. The new name reflects an expanded vision of its role in the area of biodiversity research for development.

11. IRRI - INTERNATIONAL RICE RESEARCH INSTITUTE http://irri.org/

Headquarters: DAPO Box 7777, Metro Manila 1301 Philippines

The International Rice Research Institute (IRRI) is an autonomous, non-profit, agricultural research and training organization. Its main goal is to find sustainable ways to improve the well being of present and future generations of poor rice farmers and consumers while at the same time protecting the natural environment.

IRRI was established in 1959 with support from the Ford and Rockefeller Foundation and the Philippine Government. It is Asia's largest non-profit agricultural research centre.

Most of IRRI‘s research is done in cooperation with the national agricultural research and development institutions, farming communities, and other organizations of the world‘s rice producing nations.

Its research activities began in 1962 and are now estimated to have touched the lives of almost half the world‘s population. The IRRI played a major role in sparking the Green Revolution on the field of rice when it developed its first new variety of Rice grassy stunt virus resistant rice in the 1960s. The Institute has a collection of 100,000 rice cultivars.

The Institute‘s research headquarters includes laboratories and training facilities on a 252 - hectare experimental farm on the lower campus of the University of Philippines in Los Banos Laguna, about 60 kilometres south of the Philippine capital, Manila. In addition to rice research, IRRI is also very active in local communities providing educational scholarships; organizing income-generating training activities and arranging other community projects that will help improve living conditions in the poor communities that neighbour the Institute.

IRRI was established to help poor rice farmers in developing countries grow more rice on less land using less water, less labour, and fewer chemical inputs. By helping to greatly boost production and ease the use of farm chemicals during its first 40 years, IRRI clearly showed the importance of rice and agricultural research in helping poor nations develop. The Institute‘s importance has been further reinforced by the private sector‘s traditional lack of interest in rice research.

12. IWMI - INTERNATIONAL WATER MANAGEMENT INSTITUTE http://www.iwmi.cgiar.org/

Headquarters: Colombo, Sri Lanka

IWMI is one of 15 International research centres supported by the network of 60 governments, private foundations and international and regional organizations collectively known as the Consultative Group on International Agricultural Research (CGIAR). It is a non-profit organization with a staff of 350 and offices in over 10 countries across Asia and Africa and Headquarters in Colombo, Sri Lanka.

IWMI's Mission is to improve the management of land and water resources for food, livelihoods and the environment.

IWMI's Vision, reflected in the Strategic Plan is water for a food-secure world.

IWMI targets water and land management challenges faced by poor communities in the developing world/or in developing countries and through this contributes towards the achievement of the UN Millennium Development Goals of reducing poverty, hunger and maintaining a sustainable environment. These are also the goals of the CGIR.

Research is the core activity of IWMI. The research agenda is organized around four priority Themes including Water Availability and Access; Productive Water Use; Water Quality, Health and Environment and Water and Society. Cross cutting activities in all themes include, assessment of land and water productivity and their relationship to poverty, identification of interventions that improve productivity as well as access to and sustainability of natural resources, assessment of the impacts of interventions on productivity, livelihoods, health and environmental sustainability.

IWMI works through collaborative research with many partners in the North and South and targets policy makers, development agencies, individual farmers and private sector organizations.

13. WORLD AGROFORESTRY CENTRE http://www.worldagroforestrycentre.org/

Headquarters: United Nations Avenue, Gigiri, PO Box 30677, Nairobi, 00100, Kenya

The World Agroforestry Centre is part of the alliance of the Consultative Group on International Agricultural Research (CGIAR) centres dedicated to generating and applying the best available knowledge to stimulate agricultural growth, raise farmers‘ incomes, and protect the environment.

The Centre’s vision is a rural transformation in the developing world as smallholder households strategically increase their use of trees in agricultural landscapes to improve their food security, nutrition, income, health, shelter, energy resources and environmental sustainability.

The Centre’s mission is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes, and use its research to advance policies and practices that benefit the poor and the environment.

The World Agroforestry Centre is guided by the broad development challenges pursued by the CGIAR. These include poverty alleviation that entails enhanced food security and health, improved productivity with lower environmental and social costs, and resilience in the face of climate change and other external shocks.

Headquartered in Nairobi, Kenya, the centre operates five regional offices located in India, Indonesia, Kenya, Malawi and Mali and conduct research in eighteen other countries around the developing world.

World Agroforestry Centre receives funding from over 50 different investors; including governments, private foundations, international organizations and regional development banks. World Agroforestry Centre‘s work is conducted with partners from a range of scientific and development

Policies and Guidelines: The World Agroforestry Centre's polices effectively raise the awareness of staff with regards to certain issues, explain and provide a systematic approach to complex and emerging issues; apply a coherent, institutional wide approach; take appropriate action through best practices; provide a mechanism to hold the Centre and staff accountable

for certain activities; and provide a shield against legal action. At present, we have the following policies in place.

Research Ethics: The pursuit of our mission requires carrying out research that involves people and the environment, and this has consequences both directly through the research activity and indirectly through the results. We therefore have ethical considerations to take into account when planning and implementing research. This policy sets out the principles and standards the World Agroforestry Centre has adopted to guide our work.

Intellectual property: The pursuit of our mission requires generating data and knowledge products of many types, including: books, papers and briefs, databases, maps, models, software and data archives. All of these are essentially international public goods. They also represent intellectual property (IP) that has to be managed and disseminated if they are to lead to changes in the lives of the rural poor. This document sets out the guiding principles we have adopted.

Invasive alien species: This policy is intended to guide World Agroforestry Centre researchers on invasive species to prevent, avoid and mitigate the negative effects to biodiversity and human enterprise of their introduction, both intentional and unintentional.

Genetic recourses: World Agroforestry Centre researchers are working with germplasm from a wide range of tree species, the majority of which are indigenous. In addition, the Centre also maintains a significant collection of germplasm materials, which is managed through its Genetic Resources Unit. Because the germplasm work is carried out largely with farmers and partner organizations, this document outlines the principles and protocols that will guide our researchers.

About agroforestry: Trees play a crucial role in almost all terrestrial ecosystems and provide a range of products and services to rural and urban people. As natural vegetation is cleared for agriculture and other types of development, the benefits that trees provide are best sustained by integrating trees into agriculturally productive landscapes - a practice known as agroforestry.

Farmers have practiced agroforestry for years. Agroforestry focuses on the wide range of working trees grown on farms and in rural landscapes. Among these are fertilizer trees for land regeneration, soil health and food security; fruit trees for nutrition; fodder trees that improve smallholder livestock production; timber and fuel wood trees for shelter and energy; medicinal trees to combat disease; and trees that produce gums, resins or latex products. Many of these trees are multipurpose, providing a range of benefits.

Agroforestry provides many livelihood and environmental benefits, including:

 Enriching the asset base of poor households with farm-grown trees.

 Enhancing soil fertility and livestock productivity on farms.

 Linking poor households to markets for high-value fruits, oils, cash crops and medicines.

 Balancing improved productivity with the sustainable management of natural resources.

 Maintaining or enhancing the supply of environmental services in agricultural landscapes for water, soil health, carbon sequestration and biodiversity.

14. WORLD FISH CENTRE http://www.worldfishcentre.org/wfcms/HQ/Default.aspx

Headquarters: Penang, Malaysia.

World fish centre began in 1977 as the International Centre for Living Aquatic Resources Management (ICLARM) based in the Philippines. In 2000 they shortened centre‘s name to The World Fish Centre and established new headquarters in Penang, Malaysia.

Mission: Mission is to reduce poverty and hunger by improving fisheries and aquaculture. Began in 1977 as the International Centre for Living Aquatic Resources Management (ICLARM) based in the Philippines. In 2000, shortened name to The World Fish Centre and established new headquarters in Penang, Malaysia.

Work: World Fish exists to help eradicate hunger and poverty by harnessing the benefits of fisheries and aquaculture.

Carry out research-for-development with partners to make small scale fisheries more resilient and productive, and to support the adoption of sustainable aquaculture that specifically benefits the poor.

Key competencies are in Policy Economics and Social Sciences, Natural Resource Management, and Aquaculture and Genetic Improvement. This inter-linked set of disciplines work together to provide a wide range of research and analysis, some of which are summarized below:

Policy, Economics, and Social Sciences

 Connecting the fisheries and aquaculture sector to poverty reduction initiatives at local to global scales

 Social and economic analysis of the aquaculture and fisheries sectors

 Policy and institutional analysis for the improved governance of aquatic resources

 Assessing the potential impacts of climate change on fisheries, and adaptive measures that can be taken

 Human health consequences of fisheries, reducing risks, and fisheries options that benefit health-impaired populations (HIV/AIDS and malaria)

 Working with communities to manage fisheries

Natural Resources Management

 Integrated assessment and management of small-scale fisheries

 Design and management of global information systems on aquatic resources (Fish Base, Reef Base)

 Post-disaster livelihood recovery in fisheries-dependent regions

 Assessment of impacts of built structures on aquatic resources in river basins

 Analysis of external drivers such as climate change on livelihoods of fishery-dependent households

Aquaculture and Genetic Improvement

 Methods for breeding improved fish strains for aquaculture

 Aquaculture technologies for the poor, including women and the landless

 Integrating aquaculture with terrestrial small-scale agriculture

 Strategies and options for aquaculture production and national action plans

 Connecting small-scale producers to markets

 Technologies that improve water productivity while protecting environmental flows

15. AFRICA RICE CENTRE (Africa Rice) http://www.warda.cgiar.org/

Headquarters: Africa Rice temporary headquarters is based in Cotonou, Benin

The Africa Rice Centre (Africa Rice) is a leading pan-African research organization with a mission to contribute to poverty alleviation and food security in Africa through research, development and partnership activities. It is one of the 15 international agricultural research Centres supported by the Consultative Group on International Agricultural Research (CGIAR). It is also an autonomous intergovernmental research association of African member countries.

The Centre was created in 1971 by 11 African countries. Today its membership comprises 24 countries, covering West, Central, East and North African regions, namely Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of Congo, Egypt, Gabon, the Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Madagascar, Mali, Mauritania, Niger, Nigeria, Republic of Congo, Senegal, Sierra Leone, Togo and Uganda.

Recognizing the strategic importance of rice for Africa and the effective geographic expansion of the Centre – which was constituted as the **West Africa Rice Development Association** (WARDA) in 1971 – its Council of Ministers took a historic decision in September 2009 to officially change its name to ―Africa Rice Centre (Africa Rice) and to no longer refer to it as WARDA.

Its mission is to contribute to poverty alleviation and food security in Africa, through research, development and partnership activities aimed at increasing the productivity and profitability of the rice sector in ways that ensure the sustainability of the farming environment.

The modus operandi of the Centre is partnership at all levels. Its research and development activities are conducted in collaboration with various stakeholders—primarily the National Agricultural Research Systems (NARS), academic institutions, advanced research institutions, farmers' organizations, non-governmental organizations, and donors—for the benefit of African farmers, mostly small-scale producers, as well as the millions of African families for whom rice means food.

The Centre hosts the African Rice Initiative (ARI), the Regional rice Research and Development Network for West and Central Africa (ROCARIZ), and the Inland Valley Consortium (IVC).

Africa Rice temporary headquarters is based in Cotonou, Benin; research staffs are also based in Senegal, Nigeria, Tanzania and Côte d'Ivoire.

OTHER INTERNATIONAL CENTRES

Earlier discussed 15 international centres are attached with Consultative Group on International Agricultural Research (CGIAR). Following (serial No 16 to 36) are some more international centres which are not directly attached with CGIAR but working in different fields.

16. ICLARM - INTERNATIONAL CENTRE FOR LIVING AQUATIC RESOURCES MANAGEMENT www.iclarm.org

Headquarters: 11960, Bayan Lepas, P.O. Box. 500, GPO 10670, Penang, Malaysia

Focus: To improve the production and management of aquatic resources, for sustainable benefits to present and future generations of low-income producers and consumers in developing countries, through international multidisciplinary research in partnership with national agricultural research systems. The declining state and threatened sustainability of fisheries due to over fishing exacerbated with poverty and pollution, and the potential for increase in aquaculture production, call for research which includes understanding of the dynamics of coastal and coral reef resource systems and of integrated agriculture-aquaculture systems, investigating alternative management schemes in these systems, and improving the productivity of key species.

17. AVRDC - ASIAN VEGETABLE RESEARCH AND DEVELOPMENT CENTRE www.netra.avrdc.org.tw/docs/intro.html

Headquarters: P.O. Box. 42, Shanhua, Tainan 741, Taiwan

Focus: To enhance the nutritional well being and raise the incomes of poor people in the rural and urban areas of developing countries through improved methods of vegetable production, marketing and distribution, which take into account the need to preserve the quality of the environment.

Training / Fellowships: Training in vegetable research and development, and IPM

18. CATIE - CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSENANZA (Centre for Research and Learning in Tropical Agronomy) www.catie.ac.cr

Headquarters: P.O. Box. 7170, Turrialba, Costa Rica

Focus: To promote and stimulate research and technical cooperation in animal, plant and forest production, with the objective of providing alternatives for satisfying the needs of the American tropics, especially the countries of the Central American isthmus and the Caribbean.

Training / Fellowships: Training is a part of the commitment of CATIE to the development of agriculture and renewable natural resources of the member countries and orientates its action towards the requirement of national and regional institutions. Collaborative M. Sc and Ph.D. programmes are offered with the U.S., U.K. and German Universities.

19. IBSRAM - INTERNATIONAL BOARD FOR SOIL RESEARCH AND MANAGEMENT www.ibsram.org

Headquarters: P.O. Box. 9-109, Bangkok, Thailand

Focus: To assist and speed applications of soil science in the interest of increasing sustainable food production in developing countries.

20. ICIPE - INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY www.icipe.org

Headquarters: Nairobi, Kenya

Focus: The mandate of ICIPE is to (I) research in integrated control methodologies for crop and livestock insect pests and for insect vectors of tropical diseases and (ii) strengthen the technological capacities of the developing countries in insect science and its application through training and collaborative work.

21. IFDC - INTERNATIONAL FERTILIZER DEVELOPMENT CENTRE www.ifdc.org

Headquarters: P.O. Box. 2040, Muscle Shoals, Alabama, 35662 USA

Focus: To help the developing countries solve their food-deficit problems by focusing on the development of fertilizers and fertilizer practices to meet the special needs of their tropical and subtropical climates and soils.

Training / Fellowships: Training on knowledge of Fertilizer industry in developing the skill of managers and professionals

22. CARDI - CARIBBEAN AGRICULTURAL RESEARCHES AND DEVELOPMENT INSTITUTE www.cardi.org

Headquarters: University Campus, St. Augustine, Trinidad, and West Indies

Focus: To accelerate sustainable agricultural development through strategic management of those processes that generate, transfer, adapt and commercialize appropriate technology, which will improve the social and economic well being of Caribbean peoples.

23. TSBFP - TROPICAL SOIL BIOLOGY AND FERTILITY PROGRAM

Headquarters: Nairobi, Kenya

Focus: To contribute to human welfare and the conservation of the environment in the tropics by developing improved practices for sustaining tropical soil fertility through the management of biological processes and organic resources, in combination with judicious use of inorganic inputs.

24. ICIMD - INTERNATIONAL CENTRE FOR INTEGRATED MOUNTAIN DEVELOPMENT www.icimod.org

Headquarters: 4/80, Jawalakhel, G.P.O. Box. 3226, Kathmandu, Nepal

Focus: To help promote development of an economic and environmentally sound mountain ecosystem and to improve the living standards of mountain populations. It works mainly at the

interface between research and development and acts as a facilitator for generating new mountain specific knowledge of relevance to mountain development.

25. CABI - CAB INTERNATIONAL www.cabi.org

Headquarters: Newsworthy Way, Wallingford, Oxon 8DE, UK

Focus: To collect, analyze and disseminate information on agriculture, forestry, the management of natural resources and related science including human nutrition and health.

26. ACIAR - AUSTRALIAN CENTRE FOR INTERNATIONAL AGRICULTURAL RESEARCH www.aciar.gov.au

Headquarters: Traeger Court, Fern hill Park, Bruce ACT 2617, Australia

Focus: ACIAR directs it to mobilize Australia's research capacity to help solve agricultural research problems of developing countries. Thus, the Centre allocates about three-quarters of its research and development budget to promoting bilateral development-related research collaboration between Australia and individual developing countries. The remaining quarter provides Australia's contribution to the institutes of the international agricultural research system.

Training / Fellowship: ACIAR awards 10 fellowships each year to developing country scientist involved in ACIAR Projects to undertake Master or Ph.D. training at Australian Universities.

27. CLIMA- THE COOPERATIVE RESEARCH CENTRE FOR LEGUMES IN MEDITERRANEAN AGRICULTURE www.general.uwa.edu.au/u/climaweb/

Headquarters: The University of Western Australia, Ned lands, Perth, WA 6907

Focus: It focuses on legumes for sustainable agriculture in the Mediterranean climate of southern Australia. Research and training cover a wide range of disciplines, genetic engineering of legumes and bacteria to assessment of farmer attitudes about risk and a new species.

28. ILRI - INTERNATIONAL INSTITUTE FOR LAND RECLAMATION AND IMPROVEMENT www.ilri.nl

Headquarters: Wageningen, Netherlands

Focus: To undertake applied research on the sustainable development of irrigated agriculture. To hold annual, post-graduate training courses on irrigation, drainage and related subjects. To provide technical support and specialists advisory services to irrigation and drainage projects abroad.

29. WB - THE WORLD BANK www.worldbank.org

Headquarters: 1818 h Street, NW, Washington DC.

Focus: To fight poverty with passion and professionalism lasting results and to help people help themselves and their environment by providing resources, sharing knowledge, building capacity and forging partnership in the public and private sector.

30. CIDA - CANADIAN INTERNATIONAL DEVELOPMENT AGENCY www.cida.gc.ca

Headquarters: 200 Promenade du Portage, Hull, Quebec, KIA 0G4, Canada

Focus: It supports sustainable development activities in order to reduce poverty and to contribute to a more secure, equitable and prosperous world.

31. JIRCAS - JAPAN INTERNATIONAL RESEARCH CENTRE FOR AGRICULTURAL SCIENCES www.jircas.affrc.go.jp

Headquarters: Tsukuba, Japan

Focus: To promote the advancement of agriculture, forestry, and fisheries in developing regions of the world through integrated collaborative research programmes. The new research strategy is to develop production and utilization systems in sustainable agriculture, forestry and fisheries in harmony with the environment by conducting research on such topics. To rehabilitate, maintain and improve the utilization of natural resources, with emphasis placed on tropical forest and coastal eco-systems.

32. CIRDAP - CENTRE ON INTEGRATED RURAL DEVELOPMENT FOR ASIA AND THE PACIFIC www.cirdap.org.sg

Headquarters: Dhaka, Bangladesh

Focus: To assist national action, to promote regional cooperation, to act as a servicing institution for its member countries for promotion of integrated rural development through research, action research, pilot project, training and information dissemination. Amelioration of rural poverty in the Asia-Pacific region has been the prime concern of CIRDAP. The programme priority of CIRDAP is set under 4 areas of concern; agrarian development, institutional / infrastructure development, resource development including human resources and employment.

33. ODI - THE OVERSEAS DEVELOPMENT INSTITUTE odi@odi.org.uk

Headquarters: 111, Westminster Bridge Road, London SE2 7 JD, UK.

Focus: Our mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. We do this by locking together high-quality applied research, practical policy advice, and policy-focused dissemination and debate. We work with partners in the public and private sectors, in both developing and developed countries.

Training / Fellowships: The ODI Fellowship Scheme places up to twenty young economists a year on attachment to the governments of developing countries. There are currently 40 Fellows working in 17 countries in Africa, the Caribbean and the Pacific.

34. IIED - INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT www.iied.org

Headquarters: 3 Endsleigh Street, London WC1H ODD, UK.

Focus: IIED aims to provide expertise and leadership in researching and achieving sustainable development at local, national, regional and global levels. In alliance with others we seek to help shape a future that ends global poverty and delivers and sustains efficient and equitable management of the world's natural resources

35. IDRC - INTERNATIONAL DEVELOPMENT RESEARCH CENTRE www.idrc.org

Headquarters: Canada

Focus: To help communities in the developing world finds solutions to social, economic and environmental problems through research.

36. FAO- FOOD AND AGRICULTURE ORGANIZATION www.fao.org

Headquarters: Viale delle Tesme di Caracalla, 00100, Rome Italy

Focus: To raise levels of nutrition and pursuit of food security and standard of living, to improve agricultural productivity and to better the condition of rural population.

KVK (KRISHI VIGYAN KENDRA)

A **Krishi Vigyan Kendra** (KVK) is an agricultural extension center in India. The name means "farm science center". Usually associated with a local agricultural university, these centers serve as the ultimate link between the Indian Council of Agricultural Research and farmers, and aim to apply agricultural research in a practical, localized setting. All KVKs fall under the jurisdiction of one of the 11 Agricultural Technology Application Research Institutes (ATARIs) throughout India.

Krishi Vigyan Kendra is a district level farm science centre which can help in speedy transfer of technology to the farmer's field by building bridges between SAUs/ research institutes and the farmers.

KVK, is an integral part of the National Agricultural Research System (NARS), aims at assessment of location specific technology modules in agriculture and allied enterprises, through technology assessment, refinement and demonstrations.

The first KVK, on a pilot basis, was established at Puducherry (Pondicherry) on 21st of March 1974 under the administrative control of the Tamil Nadu Agricultural University, Coimbatore. At present there are 716 KVKs, out of which 498 are under State Agricultural Universities (SAU) and Central Agricultural University (CAU), 64 under ICAR Institutes, 105 under NGOs, 39 under State Governments, and the remaining under other educational institutions.

Maximum number of KVKs i.e., 26 are under NDUAT, Kumarganj, Ayodhya (U.P.) In Punjab there are 22 KVKs out which 21 are under SAU (PAU) and one under ICAR (CIPHET).

KVKs have been functioning as Knowledge and Resource Centre of agricultural technology supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district and are linking the NARS with extension system and farmers.

The KVKs are evolving as the future grass root level institutions for empowering the farming community. KVKs have made dent and has become part of decentralized planning and implementation instruments to achieve desired level of growth in agriculture and allied sector.

ACTIVITIES

KVK's provide several farm support activities like providing technology disseminatiom to farmers, training, awareness etc. To achieve the set objectives KVKs undertake following types of activities in the adopted villages:

1) Farm Adivisory Service
2) Training programme for different categories of people
3) Training programme for extension functionaries
4) Front Line Demonstration (Fill)
5) On Farm Testing (OFT)

MANDATES OF KVK

The mandate of KVK is Technology Assessment and Demonstration for its Application and Capacity Development. To implement the mandate effectively, the following activities are envisaged for each KVK.

- **On-farm testing** - to assess the location specificity of agricultural technologies under various farming systems.
- **Frontline demonstrations** - to establish production potential of technologies on the farmers' fields
- **Capacity development** - of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies
- **Multi- sector Support-**To work as Knowledge and Resource Centre of agricultural technologies for supporting initiatives of public, private and voluntary sectors in improving the agricultural economy of the district.
- **Advisory Services-** Provide farm advisories using ICT and other media means on varied subjects of interest to farmers.

In addition, KVK would produce quality technological products (seed, planting material, bio-agents, livestock) and make it available to farmers, organize frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programmes within the mandate of KVK.

KVKs	No. of KVKs
ATARI, Zone I, Ludhiana – 69 KVKs	

Himachal Pradesh	13
Jammu & Kashmir	21
Punjab	22
Uttarkhand	13
ATARI, Zone II, Jodhpur– 63 KVKs	
Delhi	01
Haryana	18
Rajasthan	44
ATARI, Zone III, Kanpur– 83 KVKs	
Uttar Pradesh	83
ATARI, Zone IV, Patna– 68 KVKs	
Bihar	44
Jharkhand	24
ATARI, Zone V, Kolkata– 59 KVKs	
A&N Island	03
Orissa	33
West Bengal	23
ATARI, Zone VI, Guwahati- 46 KVKs	
Assam	26
Arunachal Pradesh	16
Sikkim	04
ATARI, Zone VII, Barapani– 43 KVKs	
Manipur	10
Meghalaya	07
Mizoram	08
Nagaland	11
Tripura	07
ATARI, Zone VIII, Pune– 81 KVKs	
Maharashtra	49
Gujarat	30
Goa	02
ATARI, Zone IX, Jabalpur– 81 KVKs	

Chattigarh	28
Madhya Pradesh	53
ATARI, Zone X, Hyderabad– 75 KVKs	
Tamil Nadu	32
Pudducherry	03
Andhra Pradesh	24
Telangana	16
ATARI, Zone XI, Bengaluru– 48 KVKs	
Karnataka	33
Kerela	14
Lakshadweep	01
Total	**716**

KRISHI VIGYAN KENDRAS PORTAL

The Government has launched Krishi Vigyan Kendras (KVKs) Portal which will help in monitoring the functioning of KVKs at the National level and in providing timely information and advisory to the farmers.

Aim

The aim of the portal is to transfer the technologies developed by the agricultural scientists to the farmers in a fast and effective manner using web and mobile technology as well as to monitor the activities of Krishi Vigyan Kendras (KVKs).

Objectives

The objectives of the portal is

- To create a platform to monitor the various activities as well as resource utilization by various KVKs;
- To create a database of the various programmes organized by the KVKs along with their detailed information and learning resources;
- To help the farmers in resolving their queries using web and mobile technologies;
- To provide information about various facilities and activities performed by the KVKs and to provide linkage to other important information such as weather and market information.

DISTRICT AGRICULTURAL ADVISORY AND TRANSFER OF TECHNOLOGY CENTRES (DAATTCs)

Introduction

Believing in the concept that every research scientist should also be an extension worker in serving farmers, the University works in active association and close co-operation with farmers through frequent farmer-scientist interactions joint and diagnostic field visits enabled University scientists to earn good will confidence and credibility of farmers.

In order to reinforce and strengthen this mode of approach to solve many problems and complicated issues of farmers with ease, the University reorganized its extension activities by establishing the "District Agricultural Advisory and Transfer of Technology Centres" at all earstwhile 22 district head quarters of the State, barring Hyderabad urban district during 1998. Each DAATT Centre has 3 scientists having specialized in Crop production, Crop protection and Transfer of technology.

The results are highly fruitful, rewarding and up to the expectations and already the centres have received accolades from many people in the farming community. The “District Agricultural Advisory and Transfer of Technology Centres” (DAATTCs) evolved as ambassadors of the Professor Jayashankar Telangana State Agricultural University to transfer the new improved and advanced technologies in Agriculture and to communicate the update information to farming community.

The DAATTCs are playing a pivotal role in popularizing new varieties / hybrids in important crops like rice, redgram, groundnut, bengalgram, maize, sorghum, castor, bajra and ragi etc. through minikits/FLDs and also creating awareness about practical adoptability of latest technologies in above crops.

The DAATTCs were established and started functioning vide Proc.No.18930/Extn.I(1)/98, dt:2-11-1998 from 5-12-1998 in the premises of Agriculture Market Committees of respective districts.

Mandate

- To assess and refine the technologies generated by the research scientists and their suitability to different farming situations.
- To assess the potentials of the district by developing database in order to exploit district resources and develop action plans in cooperation with line departments.

- To conduct field diagnostic visits, identify the field problems and provide scientific solutions.
- To organize kisan melas in coordination with line departments.
- To extend scientific expertise to the line departments in conduct of training programmes to officials, farmers and input agencies.
- To establish linkages with research institutes and other district units.
- To assist and implement the RAWE programme and ABE programme for Agriculture, Home Science and Agribusiness students, respectively.
- To maintain a useful Information Centre.
- To supply need based scientific/popular information to the line departments on enterprises for their printing/multiplication and distribution to the farmers.
- To coordinate with All India Radio, Television and Print Media for transmission of needed agricultural information in the district.
- To implement any other extension programme that may be taken by the University, from time to time, in coordination with the line departments.
- DAATT Centre is an independent unit with senior member as Coordinator. The center is under the overall technical and administrative control of Associate Director of Research of the zone concerned who is in turn responsible to Director of Extension on extension activities of each district centre in his jurisdiction.