11. Agricultural Human Resource Development

Education Division undertakes planning, development, coordination and quality assurance in higher agricultural education in the country and, thus, strives for maintaining and upgrading quality and relevance of higher agricultural education through partnership and efforts of the components of the ICAR—Agricultural Universities (AUs) System, comprising State Agricultural Universities (SAUs), Deemed-to-be universities (DUs), Central Agricultural University (CAU) and Central Universities (CUs) with agriculture faculty. The Division has a National Academy of Agricultural Research Management (NAARM) at Hyderabad that facilitates capacity-building of the National Agricultural Research System (NARS) in research and education policy, planning and management.

STRENGTHENING AND DEVELOPMENT OF AGRICULTURAL UNIVERSITIES

For development and strengthening of undergraduate and postgraduate programmes financial and professional support of Rs 10,345.00 lakh was allocated to SAUs, DUs, CUs. This included special grant of Rs 2,500.00 lakh (out of Rs100 crore special grant to PAU, Ludhiana).

Niche Area of Excellence: There are 28 niche areas of excellence functioning in the country. Fourteen have been added during the year. Significant achievements include arsenic toxicity management, resource conservation technologies, management of acidic soils, organic agriculture, integrated pest management, biofuel production and improvement, quality fish production, hi-tech horticulture, genetic engineering for drought resistance, production of medicinal and aromatic plants/products, immuno-diagnostics, buffalo genomics, protected floriculture, neutraceuticals, functional fermented dairy products including biotics, improving water productivity and production of bioagents.

Experiential Learning: Experience-based or "experiential" programmes seek behavioral change in students/learners. Experiential learning is "learning from experience" which is learner-centered and allows participants to manage and share responsibilities. With this objective including skill-oriented hands-on-training, 45 units in 43 universities have been established under experiential learning programme. At present, 183 experiential learning units are functional in 43 AUs with a total allocation of Rs 7,406 lakh. They provide a broad spectrum of skill- and experience-oriented exposures to undergraduate students in particular and trainings to clientele including para-professionals and farmers in general.

Emeritus Scientist Scheme: Twenty-one Emeritus Scientists have been selected in 2007. Significant achievements are: developing package and standards for commercial tulips production in Kashmir Valley, development of biopesticide formulations, management of mildew diseases in maize, generation of phytopathological database for central India, development of molecular protocols for clearing wheat grains under sanitary and phytosanitary regulations for Karnal Bunt, phyto-remediation of heavy metal accumulation in rhizosphere, identification of new markers for protein synthesis in ruminants and induced breeding in major carps.

CAPACITY DEVELOPMENT

State Agricultural Universities

Banaras Hindu University, Varanasi: Four post graduate diploma courses have been added at the south campus of the university. Also new facility with construction for Mushroom Production

and Economic Pest Management Centre has been created.

Indira Gandhi Krishi Vishwa Vidyalaya, Raipur: Faculty of Veterinary Sciences and Animal Husbandry, Durg, has started Ph.D. programme in Animal Nutrition and Livestock Production and Management. Establishment of two new colleges one in Agriculture at Kawardha and the other in Agricultural Engineering at Mungeli has been initiated. Two new girls hostels, one at CARS, Bilaspur, and another at CARS, Jagdalpur, have been established.

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur: Its Jabalpur college is ideal for focusing research on domestication, cultivation, processing and quality evaluation of medicinal and aromatic plants. Its herbal garden comprises 1,100 plant species belonging to 450 genera. This garden is serving as center for education, demonstration, reference for entrepreneurs engaged in the pharmaceutical preparations and trade in the Indian System of Medicine. Commercial cultivation programme of more than twenty medicinal and aromatic plants has been undertaken in 75 hectares. The Post Graduate Programmes in Medicinal and Aromatic Plants and Crop and Herbal Physiology have been started in the university. A resource book on Medicinal and aromatic plants has also been compiled and published. Several varieties have been developed/released including Jawahar Kapas 35 in cotton; JKM-189 in pigeon pea; JGK-2; JAKI 9218, Jawahar Gram Kabuli 3 (JGK 19) and JGK 2 in chickpea.

Teaching Veterinary Clinical Service Complex has empowered the veterinarians at JNKVV, Jabalpur

The University is empowering veterinarians with modern diagnostic and farming skills through Teaching Veterinary Clinical Service Complex (TVCSC).

Maharana Pratap University of Agriculture and Technology, Udaipur: This is the first University in the country in adopting revised curriculum for Under Graduate education based on IV Deans Committee Report. This has resulted in better filling of all seats in Home Science where earlier seats used to remain vacant.

Girls' hostel Ganga constructed at MPUAT, Udaipur

Its Textile and Apparel Designing facility has won appreciation. Apparel Production Management Laboratory has started providing industrial training in software and garment designing using automatic machines for cutting-and-stitching.

Industrial training in software and garment designing using automatic machines has been started at MPUAT, Udaipur

A modern girls' hostel named 'Ganga' has been constructed. The hostel has internet and semi-automatic laundry facility.

The university has latest infrastructure in the

areas of Hi-tech Horticulture, Biotechnology, Food and Processing Engineering, IPM, and that has renewed interest of students from Kuwait and other Middle-East and African countries.

This university is also the first in the country to introduce scheme of Adjunct Professor under which eminent educationist is honoured and invited to be the Professor in the University. The University has upgraded its connectivity from 512 kbps to 2 Mbps and Video Conferencing facilities linking its KVKs to main campus at Udaipur have been established. The university has also created models for technology and economic empowerment of farming community.

Marathwada Agricultural University, Parbhani: Five colleges, one Agricultural Biotechnology College at Latur and four non-grant private colleges (one for agriculture, two for horticulture and one for food technology at Aurangabad)—have been started. Niche Area of Excellence project "Development of Agro-based Nutraceuticals for Health Security" is being implemented and under Experiential Learning, facilities have been set up for hands-on-training on preparation of ice-cream, paneer and shrikhand.

Navsari Agricultural University, Navsari: Two new courses/programmes, Masters in Plant Biotechnology and Ph.D. in Agro-forestry and Ecology, have been started. The programmes under Niche Area of Excellence include tomato ketchup processing plant and a fruit juice processing and packaging each of 5 MT capacity, have been commissioned. Under Experiential learning programmes High-tech Horticulture unit and Commercial biofertilizer production unit have been developed for experiential learning.

Orissa University of Agriculture and Technology, Orissa: An advanced Analytical Laboratory and a Central Laboratory have been developed and made operational at the university. Management of acidic soil for sustainable crop production – Niche Area of Excellence project has been completed successfully. Extensive field studies were conducted at seven acidic areas of Orissa and increase in productivity of both *kharif* and *rabi* crops was observed. Two 50-seated Girls' Hostels have been constructed and that are fully occupied.

Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut: Under the Niche Area of Excellence scheme, Isolation, characterization, production and dissemination of bio-agents scheme, regular collection of pests from the field and isolation of bio-agents were carried out. Experiential Learning Projects and setting-up of hands-on-training have been accomplished on 'Model agro processing system for horticultural produce' and 'Doorstep Clinical Services on Demand'.

Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu: In Agriculture stream, 2 Masters and 3 Doctoral degree programmes and in veterinary stream 10 Masters and 5 Doctoral programmes have been introduced.

Major facilities developed include Library building, Veterinary referral hospital-cum-clinic complex, Class Rooms and Examination Hall complex and also new girls' hostel at R.S. Pura. Under Niche Area of Excellence, new varieties of Basmati Rice, Toria and Raya have been submitted for release and for E-learning, a studio has been established.

Tamil Nadu Agricultural University, Coimbatore: Undergraduate syllabus has been improvised to include nanotechnology, electronics bioinformatics, mathematics, agribusiness management and IPR management.

The Directorate of Students' Welfare, provides career-counseling and Overseas Employment Unit through which students get overseas employment and also directed for higher education abroad. TNAU graduates excel in All-India Competitive Examinations like JRF/SRF, ARS, Civil Services. The university has well developed latest infrastructure for internet browsing, library, video conferencing etc.

Tamil Nadu Veterinary and Animal Sciences University, Chennai: Some of the highlights of the university are as follows:

- Bachelor of Technology (B.Tech), Food Processing Programme with 4 years duration with intake capacity of 20 students has been introduced.
- Two Post Graduate Diploma courses, viz. Companion Animal Practice and Veterinary Laboratory Diagnosis for one year duration with admission strength of six students each have been introduced for B.V.Sc. graduates.
- Niche Area of Excellence in Animal Biotechnology was supported by the ICAR on "Molecular diagnostics for emerging avian viral diseases and their immunopathogenesis". Under the project, fourteen nucleotide sequences of ICP4 and repeat sequence genes for MDV field isolates have been submitted to GenBank.
- In Experiential learning the following schemes have been implemented: Model Turkey Post Harvest Technology Unit at Poultry Research Station, Nandanam, Feed Manufacturing Technology at VC&RI, Namakkal, Commercial Pig Rearing at VC&RI, Namakkal and Unit on Seafood Processing and Value Addition at FC&RI, Thoothukudi.

University of Agricultural Sciences, Bangalore: Its College of Agriculture, Hassan,

has started functioning from its new campus and the university has started Diploma in Baking Technology from academic year 2006–07. Under Experiential learning project two polyhouses have been established for production of high value crops and under the Niche Area of Excellence, the integrated centre for drought research has undertaken genetic engineering for developing crop plants resistant to abiotic stresses.

Sugarcane variety 'CoVC 2003-165', resistant to wolly aphid, has been identified and registered. IPM strategies for management of Red Headed Caterpillar in groundnut have been developed and field-validated. Biofuel Park has been established at Hassan centre. Sports and Games team has bagged Team Championship Trophy in Athletics and Overall Champions Trophy in the 8th All-India inter Agricultural University, Ludhiana, for the second time.

PROMOTION OF EXCELLENCE AND HRD

ICAR National Professor Scheme: There are ten positions of such chairs. Out of these five have been filled up till date, 2 National Professors have been selected this year. Major achievements under the scheme are as follows.

- "Pant– ICAR Subsoiler-cum-Differential Rate Fertilizer Applicator" was designed and developed. The patent application for the machine has already been filed and it is to be evaluated under different agroclimates, crops and soil types.
- In rice and wheat, real time synchronization of nitrogen (N) applications with crop demand has been achieved through a combination of preventive and corrective N-management strategies. In-season estimated yield (INSEY) defined as NDVI divided by number of days after transplanting or sowing for wheat was highly correlated with actual grain yield, thereby suggesting that 'Green Seeker', that assesses extent of greenness, can be usefully employed to work out need-based fertilizer N doses.
- Design of single factor and multi-factor experiments have led to identification of fractional factorial designs for asymmetrical factorials and supersaturated designs (SSDs). Software has been developed for generation of Hadamard matrices. The software also describes the method by which a Hadamard matrix is generated. This software is an on-line generation of the Hadamard matrix and is the first of its kind. A Statistical Package for Repeated Measurements Designs (SPRMD) and an input data management module have also been developed.
- Impact of agriculture policy, technology, institutions and trade on agriculture growth, farm income, sustainability and rural poverty has been studied. During early 1980s, magnitude of public investment was 3.51% of GDP of agricultural sector and slightly more investment came from private sources, primarily farmers themselves. Level of public investment has declined year after year and recent level of public investment is less than three-fourth of the level attained during 1980–81. After 1995, level of public investment remained below 2% of GDP of agriculture. There has been a decline in public sector investments after 1981–85 that coincided with increase in subsidies. During 1985–86 to 1989–90, magnitude of public investments declined to 2.96% and level of subsidies increased to 4.96%. This trend is continuing since then. Subsidies provided by Central government like fertilizer have been highly skewed as the use of such inputs is very low in low productivity states and high in the high productivity states.

ICAR National Fellow Scheme: There are presently 20 ICAR National Fellows working on a variety of research projects in the country. Their projects include (i) enhancement of efficiency of *Trichogramma* spp. (ii) developing regional plans for managing poor quality irrigation waters, (iii) quantitative trait loci and marker assisted selection in indigenous breeds of cattle and buffaloes, (iv) development of Elisa-based immuno-diagnostics for classical swine fever, (v) exploitation of metabolic diversity for isolation of genes involved in lipid biosynthesis, (vi) technologies for using modified atmosphere gases to extend shelf-life of tropical fruits and vegetables for export, (vii) sustainability of watersheds in rainfed regions of peninsular India using GIS and remote sensing, (viii) senescence: mechanism in crops in relation to abiotic stresses, sink strength and their interaction, (ix) effect of rising atmospheric CO_2 on photosynthesis and productivity of crop plants, (x) molecular characterization of Indian maize landraces and allele mining for argonomically important traits, (xi) improvement of strain of *Chaetomium globosum*, a potential antagonist of fungal plant pathogens and developing molecular markers for its identification, (xii) textile articles through processing of wool with silk waste and cotton to create entrepreneurial skills in rural women, (xiii) Genome analysis of indigenous breeds of cattle, buffalo and goats, (xiv) Study of gene interactions in developing *Drosophila* embryo, (xv) Identification and quantification of phosphotase hydrolysable organic Phosphorus sources for plant nutrition and refinement of a

non-destructive technique for phosphatase estimation, (xvi) Decontamination of pesticide residues from edible commodities, (xvii) Returns to livestock research and development in India: implications for growth, equity and sustainability, (xviii) Assessing soil quality key indicators for development of soil quality index using latest approaches under predominant management practices in rainfed agro-ecology, (xix) Development of technology of seed production and culture of feather back, *Notoprerus chitala* and two medium carps, *Labeo gonious and L. fimbriatus* for diversification of freshwater aquaculture, and (*xx*) Efficient design of experiments for quality agricultural research.

MANPOWER DEVELOPMENT

All-India Admissions and Fellowships

All-India Competitive Examinations for Admissions to UG: For admissions to 15% seats in eleven subjects of Under Graduate Programmes, 12th All-India Competitive Examinations including award of National Talent Scholarships (NTS) were conducted on 21 April, 2007. In this examination, 20,267 candidates appeared and 1,332 were finally admitted in 45 Universities through counseling. All the candidates who joined any university falling outside their state of domicile were awarded National Talent Scholarship (NTS) of Rs 1,000 month.

All-India Competitive Examinations for Admissions to PG: For admissions to 25% seats in P.G. programmes at 51 Universities, including award of Junior Research Fellowships, examinations were held on 19 May, 2007. A total of 11,257 candidates appeared in the examination and admissions were granted to 1,552 candidates. Also, 470 Junior Research Fellowships (JRF) were awarded to meritorious candidates.

Merit-cum-Means Scholarship (MCM): This scholarship is granted to students of economically weaker sections of the society to undertake U.G. studies in agriculture and allied science subjects in SAUs, ICAR DUs, CAU and CUs with agricultural faculty. Maximum 7% students from one University are awarded the Scholarship. The amount has been increased from Rs 170/month to Rs 500/month.

Internship Assistance: This assistance is being given to all final year students of B.V.Sc & A.H. programme during their Internship at Rs 400/month besides Rs 400 for undertaking to-and-fro journey to place of internship for 6 months.

Junior Research Fellowships (JRFs): There are in total 475 Fellowships in 19 subject groups (90 subjects). The amount is Rs 5,760/month for non-veterinary and Rs 8,000/month for veterinary students to pursue PG degree programme. Besides, a contingency grant of Rs 6,000/year is payable to all awardees

All-India Competitive Examination for award of Senior Research Fellowship for Ph.D.: ICAR SRF examination was held on 28 October, 2007 at 7 centres in the country. Based on the results, a total of 202 fellowships in 13 major subject groups and 56 sub-subjects have been awarded.

Admission of Foreign Students: During the first-half of the year 2007–2008, 147 students from 17 countries have been granted admissions. Students came from Nepal, Afghanistan, Bhutan, Kenya, Ethiopia, Libya, Guyana, Sri Lanka, Iran, Oman, Mozambique, Egypt, Namibia, Vietnam, Bangladesh, Mauritius and Fiji. Maximum candidates came from Ethiopia (43 nos.).

Summer/Winter Schools and Short Courses: To provide continuing education and training in highly specialized subjects to teaching faculty, 82 Summer and Winter Schools and Short Courses of 10 to 21 day duration were supported for organization at ICAR Institutes and State Agricultural Universities.

Centres of Advanced Studies: The 31 Centres of Advanced Studies (CAS), offer facilities for continuing capacity-building of faculty engaged in teaching at UG and PG levels. Total of 65 training programmes have been approved for 2,000 scientists/faculty.

QUALITY ASSURANCE AND REFORMS

Norms, Course Curricula and Syllabi Revision for UG & PG: The Norms, Standards, Academic Regulations and UG Curricula and Syllabi report submitted by the Fourth Deans' Committee on Agricultural Education in India, has been approved for implementation in all Agricultural Universities. For improving quality and ensuring uniformity, the committee has recommended norms and standards of departments, faculty positions and minimum infrastructure for UG and academic regulations for UG and PG programmes. It has also suggested examination reforms at UG and PG level for improving quality of research work, and restructuring of Under Graduate programmes for increased practical and practice contents. Experiential learning has been recommended in the new curriculum. Several agricultural Universities have already adopted the revised curricula and syllabi. Also, a National Core Group appointed by the ICAR, has initiated the revision of Masters and doctoral course curricula and syllabi.

Accreditation: Fourteen agricultural universities have so far been accredited. During the year, Peer Review Teams (PRTs) constituted by the ICAR for accreditation submitted their reports after visiting four agricultural universities, viz. RAU-

Bikaner, OUAT- Bhubaneshwar, NDRI- Karnal and IARI- New Delhi. Another PRT visited and submitted its reports for extension of accreditation period of four agricultural universities: CCSHAU-Hisar, ANGRAU- Hyderabad, TANUVAS–Chennai and TNAU- Coimbatore.

INDO-US AGRICULTURAL KNOWLEDGE INITIATIVE (AKI)

AKI intends to promote agricultural education, research, service and linkages in the areas of *(i)* Education, learning resources, curriculum development and training; *(ii)* Food processing and use of byproducts and biofuels; *(iii)* Biotechnology, and *(iv)* Water management.

Thirteen Borlaug Fellows were selected from National Agricultural Research System for training, and their host institutions in the USA have been identified. Also, nominations for Cochran Fellowship Programme have been communicated to the USDA and two joint workshops were organized in India. As an outcome of Borlaug Fellow visit, a laboratory model for ethanol production from cellulosic biomass (e.g. paddy straw) is being established at the Central Institute of Post-Harvest Engineering and Technology, Ludhiana. The Fifth Meeting of Indo-US AKI Board was held in Washington DC on June 14-15, 2007 in which the progress was reviewed and joint deliverables were identified.

Collaborative projects in function under the AKI

- Water Harvesting for Groundwater Recharge and Bio-drainage for Salinity Control
- Sustainable Water Resource Management: US-India Collaborative Research and Education
- On Farm Water Management for Rainfed Agriculture on Benchmark Watersheds in Five Diverse Eco-regions of India
- Information and Communications Technologies for Capacity Building in Water Management: US-India Collaborative Extension/Outreach and Distance Education
- Pigeonpea Genomics Initiative
- Capacity Building for Risk Analysis and Modeling to Promote Trade
- Capacity Building for Intellectual Property Protection and Technology Licensing in Agriculture

NATIONAL ACADEMY OF AGRICULTURAL RESEARCH MANAGEMENT

Various types of programmes are organized by the Academy.

Various programmes organized by the academy

Type of programme	Programmes (Nos.)	Participants (Nos.)
Foundation Course for Agricultural Research Service (FOCARS)	1	78
Foundation Course for AOs and FAOs	1	21
Refresher Courses/ Summer/Winter Schools (21 days)	13	251
Senior Programmes Workshops	21 9	340 368
Executive Development Programmes	2	36
Off-campus programmes	14	386
International Programmes	1	67
Total	62	1547

Training: Major emphasis during the year was on need-based twenty-one days programmes. Thirteen programmes were organized to cater to career advancement requirement of 251 NARS scientists, in addition to equipping them with knowledge and skills in a wide range of topics. The details are as follows.

The Foundation Course for Agricultural Research Service (FOCARS), which is basic induction training for newly recruited scientists to agricultural research service, with four months duration was organized in three phases. The other programmes conducted by NAARM were:

- Advances in Educational Technology
- Computer-based Multimedia Presentation (Sponsored by NICHE Area of Excellence in Educational Technology (ICAR)
- FDP on Advances in Educational Technology (Sponsored by NICHE Area of Excellence in Educational Technology (ICAR)
- GIS Based Decision Support Systems for Sustainable Agriculture
- Summer School on Advances in Agricultural Research Project Management
- Summer School on Participatory Video Production for Decision and Empowerment
- Summer School on Optimizing Learning Teaching in SAU System
- Summer School on GIS Based Decision Support Systems for Sustainable Agriculture
- Summer School on Advances in Agribusiness and Information Technology
- Winter School on Team Building and Interpersonal Relationship for Agricultural Research Scientists and Teachers
- Information Technology in Agriculture for Effective Decision Support

- The Academy helped the National Biodiversity Authority in developing the guidelines for International Collaborative Research Projects involving transfer or exchange of biological resources. The guidelines, with suitable modifications, were eventually notified. A book on "Regulatory and Operational Mechanisms Related to Agro-biodiversity" has also been brought out that is being used as a resource material.
- A book on "Developing Winning Proposals in Agricultural Research" was published, and is being used as resource material for capacity building of NARS scientists in these areas.
- Application of GRAM GIS in micro-level planning and development for sustainable agriculture has been streamlined.
- Methodological protocol was finalized for assessing the impact of fisheries research in India under the Network Project on Impact Assessment of Fisheries Research in India.
- Issues and implications pertaining to agricultural higher education in India under GATTS have been identified.
- Appropriate strategy for promotion of bio-fuels in Andhra Pradesh has been developed.
- An on-line Delphi process has been developed to seek experts' opinions on issues of topical interest.

- Winter School on Personality Development and Self-Motivation for Enhanced Performance of Agricultural Scientists and Teachers

Research and consultancy: The NAARM is also mandated to undertake research studies on management problems faced by agricultural research and educational institutions in the NARS. These studies are generally of short duration in nature and are meant not only to serve as technical backstopping for different training programmes organized by the Academy but also to provide policy support to NARS in specialized areas of agricultural research and education management. At present, the Academy has 13 on-going research projects, ten of which are institute (NAARM) funded and remaining three are external funded projects. During this period, nine projects were successfully completed.

On competitive grounds, the United Nations Conference on Trade and Development (UNCTAD) has sanctioned a project on "Study on Socio-economic Implications of GI Registration for Agricultural and Non-agricultural Commodities/ Products" to the Academy. Under this project, the geographical indications would be identified in three geographical regions covering twelve states of India.

Policy support: The NAARM is recognized as the focal point for initiating activities under NAIP. A Help Desk has been created at the NAARM for facilitating concept note and proposal writing under the key components of the NAIP.

❑