

19. Partnership and Linkages

The International Co-operation in ICAR/DARE has been operating through the Memoranda of Understanding (MoUs) /Work Plans signed with the foreign countries/International organizations with ICAR/DARE as the Nodal Department and through the participation of the ICAR/DARE in the MoUs/Work Plans signed by the Department of Agriculture and Cooperation as the Nodal Department. Besides, Ministry of Science and Technology has developed programme of co-operation with various countries and international organizations in which the ICAR/DARE is the participating agency in the field of agricultural research. The Joint Commissions/Working Groups constituted by the Ministry of External Affairs and the Ministry of Commerce have component of agriculture/agricultural research in which DARE participates directly or through the Department of Agriculture and Cooperation (Appendix 12). The activities of the Division are mainly carried out under the Memorandum of Understanding (MoU) /Agreement/Work Plan signed with different international organizations/countries. The Department also organizes visits of foreign nationals under “*Ad hoc* category”, and it also receives proposals for customized training courses for foreign nationals.

Work Plan/Memorandum of Understanding

- Work Plan between ICAR and ICARDA was signed on 13 January 2011.
- Memorandum of Understanding was signed between ICAR and CIMMYT on 5 October 2011 to set up Borlaug Institute for South Asia (BISA).



The Director General, CIMMYT, Dr Thomas A. Lumpkin and the Secretary, DARE and Director General, ICAR, Dr S. Ayyappan exchanging signed MoU at New Delhi

- The ICAR-ICRAF collaborative agroforestry research Work Plan for 2011–15 was signed on 14 November 2011.
- A Memorandum of Understanding was signed between the Indian Council of Agricultural

Research (ICAR) and Ethiopian Institute of Agricultural Research (EIAR) for cooperation in the field of agricultural research and education on 12 December 2011 at Addis Ababa, Ethiopia.

Collaborative projects

Following projects were approved for implementation.

- Twinning of Laboratories between Freidrich-Loeffler- Institute (FLI), Institute of Bacterial Infections and Zoonoses, Jena, Germany (the parent laboratory) and NRC on Equines, Hisar (the candidate laboratory). The proposed collaboration will provide an opportunity to develop project with the another country laboratory working on the same field: Glanders, an important equine disease that needs to be studied to develop diagnostic. The proposal of the National Research Centre Equines is technically sound and should be pursued in OIE-Twinning mode.
- Twinning of Laboratories between Animal Health Institute, United Kingdom (the parent laboratory) and the National Research Centre on Equines, Hisar (the candidate laboratory). The proposed collaboration will provide an opportunity to bring in more expertise and technical acumen in the area of Equine Influenza. It will also help in capacity building and providing simultaneously technological inputs for control of Equine influenza in the country and its neighbours. The proposal of the National Research Centre for Equines is technically sound and should be pursued in OIE-Twinning mode.
- Collaborative project entitled “Novel vaccine against Haemorrhagic Septicaemia (HS) in cattle and buffalo” by the Indian Veterinary Research Institute, Izatnagar (Uttar Pradesh) with Moredun Research Institute, United Kingdom University of Glasgow, Inocul 8 and GAL V. The objective of the project is to develop novel vaccine against HS in cattle and buffalo.

Fund release to CG institutes

- India is a donor member to the CGIAR and contributes US\$ 0.75 million annually under the unrestricted funding to CG Institutes.

India's membership contribution to International organizations

- Payment of US \$ 9,395.64 as India's contribution to Asia Pacific Association of Agricultural Research Institutions (APAARI) for 2011.



- Payment of US\$ 604.36 as India's balance contribution to Asia Pacific Association of Agricultural Research Institutions for 2011.
- Payment of India's contribution of Euro 240 to International Society for Horticultural Science (ISHS), Belgium, for 2011 (01 January to 31 December 2011).
- Payment of India's contribution of US \$ 60,000 to the Network of Aquaculture Centres in Asia-Pacific (NACA), Bangkok, Thailand, for 2011-2012.
- Payment of membership fee of Swiss franc (CHF) 5,126 to the International Seed Testing Association, Switzerland, on behalf of Seed Test Laboratory, Indian Agricultural Research Institute, New Delhi.

Central Agricultural University

The Central Agricultural University Act empowered CAU, Imphal, to establish need-based Agricultural Education Institutions in the North-Eastern Hills Region of India covering 6 States (7 campuses) offering 7 undergraduate (UG) and 25 postgraduate (PG) degree programmes. The intake capacity of all UG programmes is 318. During 2011, 156 students passed out from different colleges viz. College of Agriculture, Imphal (40), College of Veterinary and Animal Health, Aizawl (24), College of Horticulture and Forestry, Pashighat (8), College of Fisheries, Agartala (20), and PG studies, Barapani (45) offers 25 PG programmes with intake capacity of 141; 88 students were admitted and 39 students passed out. In Junior Research Fellowship exams conducted by the ICAR, 26 students secured JRF for postgraduate education. The Central Agricultural University has secured second position in the country amongst the 48 Agricultural Universities. The 30 students from CAU have secured seats in the National institutes, deemed universities and SAU's for their PG degree on the basis of their ranking in the competitive examinations. The CAU has carried out 53 intramural research projects, 22 AICRPs, 8 Network research projects and 35 externally funded projects to address the local problems in agriculture and allied sectors. The University developed CAU-R1 variety of rice and produced 800 quintals of seed under participatory programme which was made available to farmers. The packaging technology for orchids was standardized, and orchids can be maintained for 21 days with this packaging. The efforts were made to develop pineapple powder retaining its aroma, and first batch of the product has been produced. Standardization of perfect technology is in progress.

Training programmes

The Education Division, ICAR, has nominated foreign students, 66 for Ph.D., 131 for M.Sc./M.V.Sc. and 35 for B.Sc./B.V.Sc. for pursuing UG, PG and Doctoral programmes in various Agricultural Universities/ICAR Deemed Universities under the India-Africa Forum Summit, 2008, Indo-Afghanistan

Fellowship programme, and Nepal-Aid-Fund and self finance scheme. A total of 32 training programmes were also organized in the ICAR Institutes for foreign nationals during 2011-12.

Consultancies

- Dr K.K. Sharma, Network Coordinator, All India Network Project of Pesticide Residues, IARI, New Delhi was appointed as a FAO/TCDC consultant for 42 days.
- Dr Suresh Pal, Principal Scientist, IARI, New Delhi was appointed for consultancy on 'ASTI Survey of Agricultural R&D Investments in India' for the IFPRI, Washington DC, USA.
- Dr Ravishankar C.N. Principal Scientist, Dr C.O. Mohan, Scientist and G. Omanakuttan Nair, Technical Officer, CIFT, Kochi provided technical guidance to M/s Harizon Fisheries Private Ltd, Maldives.
- Dr Anjani Kumar, Principal Scientist, NCAP, Pusa, New Delhi, was appointed for consultancy on 'Structural Transformation in Indian Dairy Sector' for the IFPRI, USA.
- Dr R.V. Nair, Principal Scientist and Head, CPCRI, Kasaragod, was appointed to Sri Lanka for 41 days as a Consultant to Develop a Resistant Breeding Programme against Phytoplasma Caused Leaf Wilt in Coconut for Coconut Research Board, Sri Lanka.
- Dr R.J. Rabindra, Director, National Bureau of Agriculturally Important Insects, Bengaluru, was appointed to FAO, Bangkok, Thailand, as an expert of Biological Control of black-head Caterpillar in Coconut trees for 10 days.
- Dr P. Routray, Sr Scientist, CIFA, Bhubaneswar was appointed to provide consultancy services in the field of induced breeding and hatchery management under the FAO project TCP/NEP/3303 in Kathmandu, Nepal, for four weeks.
- Dr D.K. Ghosh, Sr Scientist (Virology), NRCC, Nagpur was appointed to provide consultancy services to FAO as TCDC consultant in Kathmandu, Nepal, for 30 days.
- Dr P.K. Mehar, Sr Scientist, CIFA, Bhubaneswar was appointed to provide technical consultancy services in the field of fish seed production and quality control under the project 'Improving National Corp Seed Production System in Nepal', under the FAOTCP project (TCP/NEP/3303) in Kathmandu, Nepal.
- Dr Anil Pal, Head, IASRI, New Delhi. was appointed at Food and Agriculture Organization, Sri Lanka, for imparting consultancy on 'Feasibility Study on the Use of GIS/Remote Sensing for the Census of Agriculture'.

International Conferences/Workshops

- International Conference on Frontiers in Reproductive Biotechnology and 21st Annual Meeting of the Indian Society for the Study of

Reproduction and Fertility (ISSRF) from 9 to 11 February 2011 at the National Dairy Research Institute, Karnal (Haryana).

- International Conference on Tropical Island Ecosystem: Issues related to Livehood, Sustainable Development and Climate Change in collaboration with Andaman Science Association and A&N Administration from 23 to 26 March, 2011 (4 days) at the Central Agricultural Research Institute (CARI), Port Blair.
- The 8th International Symposium on Diseases in Asian Aquaculture (VIII DAA) from 21 to 25 November 2011 at College of Fisheries, Karnataka, Veterinary, Animal and Fisheries Sciences University, Mangalore.
- Global Conference on Augmenting Production and Utilization of Mango in Emerging Scenario of Biotic Stress from 23 to 24 June 2011 at the Central Institute for Subtropical Horticulture, Lucknow.
- WHO sponsored three-day workshop on Laboratory Biosafety and Biosecurity from 12 to 14 July, 2011 at the High Security Animal Disease Laboratory, IVRI, Anand Nagar, Bhopal.
- The 22nd NACA (Network of Aquaculture Centre in Asia Pacific) Governing Council Meeting at Kochi from 9 to 12 May 2011
- Consultation meeting on “Dairy Production, Processing Quality Control and Marketing System in SAARC Countries from 25 to 26 May 2011 at the National Dairy Research Institute, Karnal.
- Indo-Denmark Workshop on Genomic Selection in Cattle and Buffaloes from 11 to 12 April, 2011 at the National Agricultural Science Centre, Pusa, New Delhi.
- International Conference on Strategizing Agricultural Research for Development Learning from Experience of Fast Growing Economies at NASC Complex, New Delhi.
- The 25th Annual Convention of Indian Association of Veterinary Microbiologists, Immunologists and specialists in Infectious disease and International Conference on Energizing Animal Health for Better Livestock Production under WTO Regime from 9 to 11 June 2011 at the Veterinary College, Hebbal, Bengaluru.
- International Conference on Organic Agriculture held from 22 to 24 June 2011 at Patna, Bihar.
- Meeting of SAARC Nations’s Expert group on Building Climate Resilience for Food Security and Rural Livehood on 25 to 26 July 2011 at NASC Complex, New Delhi.
- World Cotton Research Conference-5 (WCRC-5) at Mumbai from 7 to 11 November 2011
- International Conference on Issues for Climate Change, Land use Diversification and Bipotechnological Tools for Livehood Security at Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, from 8 to 10 October, 2011.

- International Conference on “Innovative Approaches for Agricultural Knowledge Management System : Global Extension Experiences-Inaugural session at Vigyan Bhawan, New Delhi and Technical Session at National Agricultural Science Centre Complex, New Delhi, from 9 to 12 November, 2011
- International Green Technology Symposium was held from 31 October to 2 November, 2011 at Indore.

ICAR–Foreign Institutions Collaboration

IFPRI activities

- The 2020 International Conference on ‘Leveraging Agriculture for Improving Nutrition and Health’ was held from 10 to 12 February 2011 at New Delhi. Hon’ble Prime Minister of India, Dr Manmohan Singh inaugurated the conference which was attended by over 1,000 participants from 65 different countries. The message came from the conference is that accelerate research to better shape programmes and policies for leveraging agriculture for nutritional security.
- The Workshops on ‘Agri-services for Inclusive Rural Growth’ were organized in four locations, namely Bhopal, Hyderabad, Lucknow and New Delhi, in June 2011, to disseminate research outputs to the policy makers on the changing landscape of rural services. The workshops were attended by over 400 participants, including policy makers, policy advisers, policy researchers, government officials, representatives of corporate sector, civil society organization and media. It was that the modern input sector is coming up and transforming traditional input supply chain. It was concluded that polices can liberate the excluded poor from the poverty trap, and there is a need to ensure how can agri-services be transformed to serve this group.

World Agroforestry Centre (ICRAF) activities

- Organized India-ICRAF day during the 54th meeting of the Board of Trustees of the ICRAF at New Delhi on 14 November 2011 and signed the ICAR-ICRAF collaborative agroforestry research plan for the next five years (2011-15).
- Broadened the germplasm base of agroforestry species; Oil-palm, *Macadamia* nuts, *Faidherbia* and *Avocado*.
- Embarked on a billion tree plantation program with the MS Swaminathan Research Foundation.
- Demonstrated techniques to maximize on-farm productivity of trees; high density plantation of fruit trees (guava) and rejuvenation of old mango orchards.
- Implemented the methodology to benefit small holders through carbon sequestration and finance and orientated NARES on carbon finance mechanism.



- Contributed to the Chhattisgarh State Agroforestry Policy and to an International Agroforestry Policy.
- Organized a national level meeting in June 2011, its recommendations for increased agroforestry visibility in 12th Five-Year Plan and having a Mission on Agroforestry are being pursued.

CIMMYT activities

Launch of Borlaug Institute for South Asia: The Indian Council of Agricultural Research (ICAR) and International Maize and Wheat Improvement Centre (CIMMYT) signed an MoU on 5 October 2011 to set up Borlaug Institute for South Asia (BISA) with centers at Ludhiana in Punjab, Pusa in Bihar and Jabalpur in Madhya Pradesh. The MoU signing ceremony marked the official launch of BISA. Establishment of BISA in India will enable to harness the best of international science in meeting food security challenges and will become an agricultural hub for the South Asia region. The Institute will create state-of-the-art research facilities to support the maize and wheat R&D and broaden the range of varieties and tools available to farmers. It will also strengthen local crop breeding programmes to meet food production challenges.

Evaluation of elite wheat germplasm for terminal heat tolerance and rust resistance: The CIMMYT scientists are evaluating 106 entries of elite wheat germplasm for their tolerance/resistance to rusts and terminal heat at the three farms of the Borlaug Institute for South Asia (BISA) – Ladhawal in Ludhiana, Pusa in Bihar and Jabalpur in Madhya Pradesh. These lines have also been given as wheat nurseries for evaluation to Directorate of Wheat, Karnal.

Conservation agriculture roots in a Vertisol in Central India: For the first time, no-till wheat, maize, mustard and chickpea crops have been planted in a deep Vertisol (with residues of the previous crop) using a zero-till turbo planter. Nearly 150 acres of wheat, maize, mustard and chickpea crops have been planted in the Khamaria farm of the BISA at Lakhanwada in Manegaon. It is expected that more than 1,000 tonnes of breeder and foundation seed will be made available to the farming communities in neighbouring villages. Besides, the seed production of the locally best performing elite varieties on the BISA farm, the CIMMYT is also trying to develop a community-based seed production model on farmers' fields in more than 100 acres in Pusa, Samastipur, Sabour in Bihar and in Panagar in Jabalpur, Madhya Pradesh.

International Rice Research Institute activities

Activities of the Institute in India

- The IRRI-Board of Trustees Meeting was held in New Delhi from 12 to 14 October and the board unanimously elected Dr S. Ayyappan, Secretary (DARE) and DG (ICAR), as its new member of the Board.
- The ICAR-IRRI discussed future priorities and strategy for rice research in South Asia with

special reference to emerging challenges and opportunities on 4 April 2011 and subsequently ICAR joined as GRiSP (1st approved CRP in new CGIAR regime) partner during the year.

- **Germplasm exchange** – IRRI Genebank during 2011 released 1,924 samples for shipment to India. This is about 17% higher than annual average (1,640) since we started using the SMTA in 2007. Number of entries in the INGER nurseries is 674 this year.

Human resource development and capacity building

- Forty-eight on-the-job and short-term trainees from India were trained at the IRRI; 13 PhDs, 150 Certified Crop Advisers were produced during the period.
- More than 30,000 farmers extension workers were trained under Cereal Systems Initiatives in South Asia Project (CSISA). Numerous workshops on Conservation Agriculture, Communications and Data Management, Gender were also conducted. More than 100 internships provided to students of agricultural universities at CSISA hubs.
- Under Stress-tolerant Rice for Africa and South Asia (STRASA Phase I, 180 researchers and 3000 farmers were trained.

Technology development, evaluation and promotion

Under this, STRASA and CSISA are collaborative projects with the ICAR in India.

STRASA Project: Phase I of this project was concluded during the year and the achievements are mentioned below.

- Flood-tolerant rice varieties, Swarna Sub1 which was developed through ICAR-IRRI collaboration and was released in India in 2009 by the CRRI, Cuttack and the NDUAT, Kumarganj, Uttar Pradesh, was cultivated widely by the farmers of Uttar Pradesh, Bihar, Odisha and West Bengal owing to efforts of National Food Security Mission, bringing Green Revolution to eastern India and respective state governments. During *kharif* 2011 most of these states encountered flood. This variety showed spectacular performance at farmers' fields under flash flood condition in all states. It yielded 3.5 to 6.5 tonnes/ha under flood condition when other varieties were totally wiped out. Swarna Sub1 is expected to have reached approx. one million farmers in *kharif* 2011.
- Mr Bill Gates and his wife Mrs Melinda Gates interacted with the farmers and other partners of the STRASA and CSISA projects on 23 March 2011 at ICAR Research Complex for Eastern Region, Patna. They reviewed the progress of these projects.
- A meeting was organized by Department of Agriculture and Cooperation (DAC), Ministry of Agriculture on 30 April 2011 to discuss

cooperation between STRASA project and BGREI (Bringing Green Revolution to Eastern India) programme under the Chairmanship of Secretary Agriculture. It was attended by senior officials from Ministry of Agriculture, DDG-ICAR and STRASA-NARES partners. As a result of this meeting STRASA-NARES partners conducted very successful demonstrations of stress-tolerant rice varieties in approx. 2,000 ha area during *kharif* 2011.

Extension of CSISA Project Phase I : The CSISA is a collaborative project implemented by the ICAR-IRRI along with the CGIAR centres of CIMMYT, ILRI and IFPRI and is supported by BMGF and USAID.

- *Establishment of CSISA hubs:* The CSISA has established five hubs in India: (i) PAU, Ludhiana; (ii) CSSRI-Karnal; (iii) TNAU, Thanjavur; (iv) Begusarai, DMR complex Bihar; (v) KVK, Kushinager, eastern Uttar Pradesh and working close with NAREs partners. Also three Research Platforms: CSSRI, Karnal; ICAR Complex, Patna and TRRI, Adhutharai were established.
- *MoU with KVK:* CSISA has entered into an MoU with the KVKs to work on joint work plans for the demonstration and spreading of the key conservation agriculture technologies—This covers 55 KVKs and is targeted to double in the coming year.
- *Key technologies:* Through joint Work Plans with NAREs partners numerous adaptive research trials and demonstrations have been conducted. These have covered key Conservation Agriculture technologies and resulted in better water saving (up to 20%), residue management, reducing production cost, with no yield penalty, and it estimated about 100,000 farmers have been exposed to these said Conservation Agriculture technologies.
- *Genetic improvement:* Developing abiotic high-yielding and disease-resistant varieties and hybrids for rice, wheat and maize which are being evaluated in the CSISA research platforms.
- *Policy:* Supporting with details for policy intervention, especially in the areas of agri-mechanization in eastern India and southern India for zero tillage, laser land levellers.

ICAR-ICARDA activities

Barley varieties developed jointly by DWR and ICARDA : Three barley varieties have been developed from materials supplied by the ICARDA.

- UPB 1008 wheat is suitable for the North Hilly Zone under rainfed timely sown condition. It is best for the feed purpose and released in 2010.
- DWRB 73 wheat is suitable for the north-western plains zone, under irrigated timely sown conditions: Having superior malt-quality and released in 2010.



Mr Henri Carsalade, Chair, Board of Trustees, ICARDA, presenting coveted ICARDA-shield to Dr S. Ayyappan, Secretary, DARE and Director General, ICAR, for support and encouragement to ICARDA programmes in India

- PL 807 wheat is suitable for the irrigated timely sown condition for Punjab and is suitable for feed purpose and released in 2011.

Cactus as a multipurpose crop: Fifty accessions of multipurpose cactus have been introduced to Central Arid Zone Research Institute (CAZRI), India by the ICARDA for the purpose of fodder, feed, cosmetic products, medicinal source, organic dye, carbon sequestration, utilization in water conservation, bio-fencing and helping to stop soil erosion etc. These exotic accessions adapted well in arid environment of Rajasthan and are being multiplied to disseminate in larger areas. A two-day International Workshop on 'Cactus crop to improve the rural livelihoods and to adapt to climate change in the arid and semi-arid regions of India' jointly organized by the ICAR, ICARDA, FAO and National Rainfed Area Authority from 25 to 26 November 2011 at the NBPGR, New Delhi.

Improved lentil varieties selected by farmers: Under farmers' participation variety selection programme, on the basis of yield performance, in the farmers' fields, three lentil varieties (HUL 57, NDL 1 and Moitree) have been selected by farmers, in which two varieties, i.e. NDL 1 lentil and Moitree lentil were developed from ICARDA-supplied material. The programme is being implemented in Asom, Bihar, West Bengal and Uttar Pradesh in partnership with ICAR institutions, SAU's and NGOs. Among the varieties, NDL 1 lentil performed best giving 37% to 81% higher yield over local, both in Uttar Pradesh and Bihar, while Moitree gave 54% higher over local in West Bengal.

Biometric training organized: The ICARDA in collaboration with the Indian Institute of Pulses Research (IIPR), Kanpur, organized a six-day training course on 'Advanced biometrical techniques in crop improvement research' during 10-15 October 2011 at IIPR, Kanpur. Fifteen participants from Nepal, Bangladesh and India participated in this advance training. Besides biometrical techniques, use of ICARDA's online bio-computing facility, statistical design and analysis of varietal trials etc. were covered in this training.

International Livestock Research Institute activities

Crop residue-based feeding systems for increased milk production: As part of the Bill and Melinda Gates Foundation and USAID-funded Cereal Systems Initiative in South Asia, the International Livestock Research Institute (ILRI) has been collaborating with the NDRI and the Arpana Trust in Haryana and Bihar State Agricultural University and Primary Agricultural Co-operative Society Paschimi Sarai Ranjan in Bihar to increase productivity and profitability of dairy production through improved crop residue-based feeding systems. The research has included demonstration of nutritional value of traditionally under-utilized residue feeds (e.g. paddy straw in Haryana), development of locally appropriate concentrate feeds to supplement specific nutrient requirements of residue-based dairy rations and improvement of links to local concentrate producers and suppliers (e.g. feed mill in Karnal, producer associations in Bihar) and the formulation of targeted training modules to overcome the lack of basic knowledge among farmers on ruminant nutrition and feed quality. In Karnal, daily milk yield increased on average by 7%. The biggest effect of the improved

feeding regime was found among low yielding animals (5 to 8 litres of milk per day) where increase in milk production ranged from 8 to 12% per day. In Bihar, the increase in milk production ranged from 15% to 30% per day. In 2012 it is planned to scale out the successful pilot studies.

Economics of Foot-and-Mouth Disease: In collaboration with ILRI, NCAP, PD-FMD, PD-ADMAS, the Tamil Nadu Veterinary and Animal Sciences University and Gura Angav Dev Veterinary and Animal Sciences University carried out a study of the economic cost of Foot-and-Mouth Disease. By carrying out primary surveys in selected districts including districts covered by the National Control Programme on Foot-and-Mouth Disease Control the economic losses were estimated. In Andhra Pradesh alone the annual estimated loss was ₹ 1147.31 crore. Of this loss, 35%, 34%, 30% and 1% were due to loss of draught power, loss of milk production, cost of treatment and mortality respectively. Discussions are now underway to extent this research to a wider geographic area and to cover other diseases. ■