



# DARE-ICAR Global Reach



Department of Agricultural Research and Education  
Indian Council of Agricultural Research  
Ministry of Agriculture & Farmers Welfare  
New Delhi





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# PREFACE

Department of Agricultural Research and Education (DARE) was created in the Ministry of Agriculture and Farmers Welfare, Govt. of India in the year 1973 and was mandated under the assigned business rules to address the international cooperation pertaining to all aspects of agricultural research and education. DARE has been implementing this largely through its premier autonomous organization, the Indian Council of Agricultural Research (ICAR). ICAR is the apex research organization of the National Agricultural Research and Education (NARES) system of the country with a high standing amongst international agricultural research organizations. Since its inception in 1929, the Council has been spearheading agricultural research, education and frontline extension activities for ensuring food and nutritional security, climate resilience and enhanced farmers' income in the country.

Indian agriculture represents a huge diversity of agro-climatic conditions. The country has been classified into 128 agro-climatic zones based on land use, soil type, irrigation, amount of rainfall received etc. In order to address the problems and capitalize on the prospects of each zone, ICAR conducts location and region-specific research and technology generation. ICAR technologies have significantly contributed to the country's food basket in the past leading to mitigation of deficiency and continue enabling food self-sufficiency sustainably. In the context of emerging challenges, the Council is committed to meeting the changing needs of all the stakeholders including farmers, students, industry, entrepreneurs and consumers at large. Many other countries have similar agro-climatic diversity as we have in India. Therefore, we feel that ICAR technologies can be shared to benefit other countries, as well. Besides, training programs organized by the Council can be customized for the needs of the farmers, students, scientists and other stakeholders from other countries.

Learning however is a two-way process. The experience, expertise and know-how available with other countries can be taken advantage of through appropriate mechanism based on mutual interest. Keeping this in view, DARE/ICAR has developed partnerships with regional organizations, country-specific

collaborations, and research and capacity building programs with Universities/Institutions of global repute. This document depicts these efforts focusing on recent activities highlighting other strengths in different areas pertaining to agriculture. I greatly appreciate the efforts put in by my colleagues in the Council in bringing out this document, which I am sure will go a long way in promoting international cooperation.



Place: New Delhi

Date: 15-04-2020

(**Trilochan Mohapatra**)  
Secretary, DARE and Director General, ICAR

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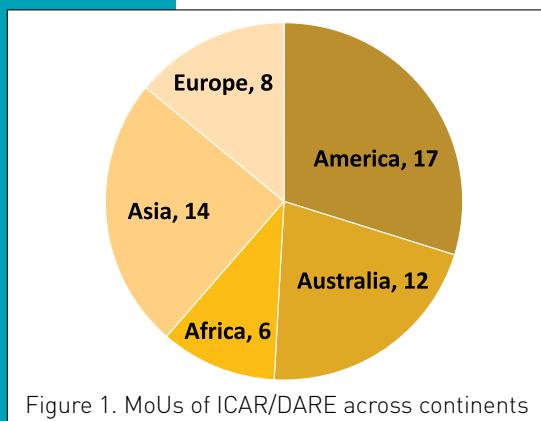
## Executive Summary

The Indian Council of Agricultural Research (ICAR) has international cooperation mechanisms under the provisions of Government of India, facilitated by the Department of Agricultural Research and Education (DARE) through MoUs/ Work Plans signed with various Countries/International Organisations/ reputed Foreign Universities and Institutions. So far, DARE/ICAR has entered into 61MoUs (Figure 1) with different countries/organisations for furthering collaborative research. Besides the above-mentioned modes which entail bilateral cooperation, DARE-ICAR also participates in multilateral cooperation under SAARC (South Asian Association for Regional Cooperation), ASEAN (Association of Southeast Asian Nations), BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation), BRICS (Brazil, Russia, India, China, South Africa), etc.

Collaborative research is also carried out through structured work plans (through additional 12 different MoUs operational currently) between ICAR and the CGIAR (Consultative Group on International Agricultural Research) Centres housed in ICAR's National Agricultural Science



Centre Complex in New Delhi. In addition, CABI (Centre for Agriculture and Biosciences International), FAO (Food and Agriculture Organization), AVRDC (World Vegetable Centre), NACA (Network of Aquaculture Centres in Asia-Pacific), APAARI (Asia-Pacific Association of Agriculture Research Institutions), UN-CAPSA (Centre for Alleviation of Poverty through Sustainable Agriculture), APCAEM (Asian and Pacific Centre for Agricultural Engineering and Machinery) and ISTA (International Seed Testing Association) are the other agencies with whom ICAR has meaningful collaborations.



The MoUs and Work Plans generally cover research in prioritized areas of agriculture and allied sector to address specific national problems, study visits and training of scientists, exchange of technical knowledge, supply of germplasm and capacity building. During the last five years, over 1688 Scientists/science leaders were deputed abroad under the foreign collaborative programmes.

One of the highlights of international collaboration in the field of agriculture was the signing of MOUs on 16th October 2016 during BRICS Summit hosted by India in Goa for the establishment of BRICS-Agriculture Research Platform with its coordination unit in India. This platform enables information and knowledge sharing between the BRICS nations.

Two other landmark achievements beyond borders being our strategic partnership in the establishment of Advanced Centre for Agricultural Research and Education (ACARE) in Myanmar and Afghan National Agricultural Science and Technology University (ANASTU) in Kandahar, Afghanistan. India assisted in the establishment of laboratories, and developed modules for faculty development and course curricula for agricultural sciences. These global footprints have proven India's strength in global working for human resource development and institution building. Besides, the DARE/ICAR has also aligned its programs for South-South Cooperation enabling international cooperation through India-Africa Forum and also ASEAN-India programs. In 2017, India hosted the ASEAN India Agriculture Ministers' Meeting in New Delhi where our Action Plan (2017-20) was agreed upon and signed for cooperation. In 2015, India hosted the India-Africa Forum Summit in New Delhi where several strategic partnerships for agriculture were established.

DARE/ICAR is an important and active partner in promoting collaboration in agricultural research and education in the SAARC region. For instance, the ICAR Institutes are involved in training and capacity building in the region in specified aspects of agriculture, dairy and fisheries. Besides, DARE/ICAR enables research collaboration through the Institutional mechanisms of BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) and G-20 nations through G-20 Meeting of Chief Agricultural Scientists (MACS).

In addition, ICAR promotes and DARE facilitates the process of research collaborations through foreign-aided R&D projects. At present there are about 54 foreign-aided collaboration projects. A half-yearly monitoring mechanism has been put in place to review the progress of such projects.

With a view to piloting a few transformative global strategies in India, ICAR had implemented the World Bank funded National Agriculture Innovation Project (NAIP, 2004-13) that gave useful results in term of modernizing our R&D infrastructure,

technology foresighting and enabling ecosystem for Agriculture Research and Development in the country. In 2018, another landmark project “National Higher Agricultural Education Project” has been implemented with the support of World Bank to strengthen and promote quality higher agricultural education in the country.

ICAR works closely with the Consultative Group on International Agricultural Research (CGIAR), which is an international R&D network having 15 Research Centres [Africa Rice Center (West Africa Rice Development Association, WARDA), Bioversity International, Center for International Forestry Research (CIFOR), International Center for Tropical Agriculture (CIAT), International Center for Agricultural Research in the Dry Areas (ICARDA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Food Policy Research Institute (IFPRI), International Institute of Tropical Agriculture (IITA), International Livestock Research Institute (ILRI), International Maize and Wheat Improvement Center (CIMMYT), International Potato Center (CIP), International Rice Research Institute (IRRI), International Water Management Institute (IWMI), World Agroforestry Centre (formerly International Centre for Research in Agroforestry, ICRAF), World Fish Center (earlier International Center for Living Aquatic Resources Management, ICLARM)]. India is a donor member of CGIAR System for decades and contributes substantially through CGIAR System Council mechanisms. Out of these 15 Centres, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has its headquarters at Hyderabad



in the State of Telangana, India. The remaining CGIAR research organizations have headquarters elsewhere, but have a strong presence in India in the form of a country or South Asia regional offices in India. Through mutual agreements and work plans, ICAR participates in global agricultural research that benefits Indian agriculture. The broad areas of research collaboration with CGIAR system involves: enhanced research cooperation in the areas of priority, germplasm supply and technology development to achieve targeted crop and animal productivity and quality in India, focussed strategies for joint efforts to address the issues like utilisation of rice fallows, rainfed/dryland agriculture and water management.

In the arena of human resource development, ICAR is the nodal



agency for admission of foreign students to Indian Institutions for agricultural education. To this effect, DARE/ICAR administers (i) India-Africa fellowship, (ii) India-Afghanistan fellowship, (iii) India-Nepal fellowship, (iv) SAARC PhD Scholarship in Agricultural Biotechnology and (v) Netaji Subhas Chandra Bose International fellowship for doctoral research.

In addition to these, DARE/ICAR has entered into several collaborations through country's bilateral arrangements to benefit from knowledge sharing and overall experience and exposure to the latest development of technology from/for various countries.

In short, the DARE-ICAR while involved in promoting agricultural research, education and extension at national level, it is also having its footprints beyond borders. Some of the salient and prospective collaborations at international level through bilateral/multilateral agreements and also through MoUs/Work Plans have been summarized in this document.







## 2018 Gene Stewardship Award

The Indian Council of Agricultural Research (ICAR) and associated institutions are granted the Borlaug Global Rust Gene Stewardship Award at the 2018 BGRI Technical Conference in Marrakech, Morocco, on April 14, 2018, in recognition of outstanding research and development.

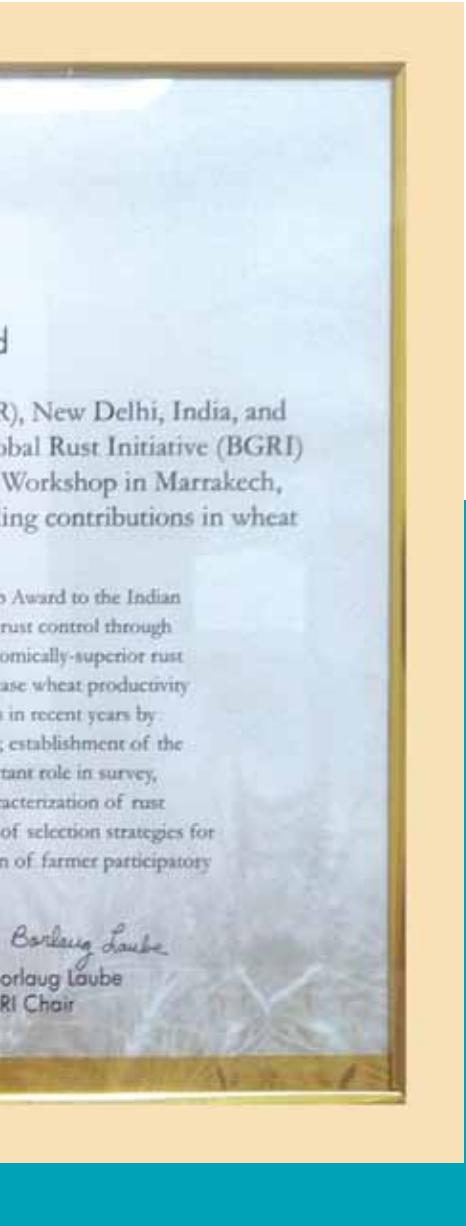
The reasons for granting the 2018 BGRI Gene Stewardship Award to the ICAR wheat team are: strong investment in and impact on wheat development, constant release, and dissemination of agronomically resistant wheat varieties; contributions to significantly increased wheat production on around 30 million hectares; avoidance of rust epidemics by replacing susceptible wheat varieties with resistant varieties; establishment of Regional Wheat Disease Monitoring Nursery and its important role in surveillance, and identification of new pathotypes; the characterization of resistance genes, their introgression, and management; use of durable rust resistance based on minor genes; the utilization of modern variety selection; and excellent international collaboration.

A handwritten signature of Ronnie Coffman, followed by his title.

Ronnie Coffman  
BGRI Vice-Chair

A handwritten signature of Jeanie B. Coffman, followed by her title.

Jeanie B. Coffman  
BGRI Vice-Chair



R), New Delhi, India, and  
Global Rust Initiative (BGRI)  
Workshop in Marrakech,  
in contributions in wheat

Award to the Indian  
rust control through  
economically-superior rust  
resistant wheat productivity  
in recent years by  
establishment of the  
important role in survey,  
characterization of rust  
and selection strategies for  
of farmer participatory

Borlaug Laube  
Borlaug Laube  
RI Chair

The Indian National Agricultural Research and Education Systems (NARES) is one of the largest in the world with respect to human resource, infrastructure, research, education and extension network. The Indian Council of Agricultural Research (ICAR) is the apex body of this National Agricultural Research and Education System and was established on 16 July 1929 as Imperial Council of Agricultural Research, which was renamed as Indian Council of Agricultural Research in 1948. ICAR operates under the guidance and governance of the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India. ICAR with its headquarters at New Delhi coordinates, guides and manages research, education and extension in agriculture and allied sector. It has a vast network of 102 research institutes including 4 Deemed to be Universities, 11 Agricultural Technology Application Research Institutes (ATARIs) and 70+ agricultural universities or universities with agriculture faculty and 717 farm science centres popularly known as Krishi Vigyan Kendras (KVK) spread across different agro-climatic zones of the country.



## Vision

Ensure food and income security for all, through technological innovations and sustainable agricultural production.

## Mission

Harness power of science and education with a human touch for higher and sustainable agricultural production.

## ICAR Today

1. Leads with distinction as one of the largest national agricultural research systems
2. Custodian of a huge collection of germplasms of plants, animals, fishes and microbes
3. Carries out basic and strategic research, and develops technologies for sustainable production systems, assured livelihood and income security
4. Provides science-based agro-technology advisory services to a large farming community
5. Supports agricultural education in the country through its deemed to be Universities and State Agricultural Universities on the pattern of University Grants Commission (UGC)
6. Provides evidence-based techno-economic recommendations to the Government of India for policy formulation for agricultural sector
7. Provides techno-economic and educational support to developing countries for increasing south-south cooperation



## ICAR 2050: Focus Areas of Research

1. Genetic potential improvement and value chains of agricultural commodities
2. Agricultural productivity, efficiency and profitability
3. Resilience to climate change, and abiotic and biotic stresses
4. Improve food, nutritional and health security
5. Risk management strategies in agriculture and allied sectors
6. Sustainability of natural resource base of agriculture
7. Valuation of ecosystem services
8. Agricultural markets, policies and institutions
9. Bio-security, especially emerging from cross-border vector-borne diseases
10. New educational and learning system and environments

## Mechanism for Facilitation

International cooperation in DARE-ICAR has been operating through the MoUs/Work Plans signed with various countries/ International Organizations/Foreign Universities and Institutes with DARE as the nodal Department after due clearances from other government of India ministries/departments (Ministry of External Affairs, Ministry of Home Affairs, Ministry of Commerce & Industry and Ministry of Environment, Forests and Climate Change depending on requirement). International cooperation of this kind is generally of bilateral nature wherein the MoUs are signed either between the Government of India (represented by DARE) and the Government of another country (represented by their department handling agriculture), or between the ICAR and another foreign autonomous body/Institute/University. DARE-ICAR also participates in the MoUs/Work Plans signed by the Department of Agriculture Cooperation & Farmers Welfare and Departments of Animal Husbandry Dairying and Fisheries, which often play the nodal role.

Further, the Ministry of Science and Technology, Govt. of India has several programmes of S&T cooperation with various countries and international organizations in which DARE-ICAR is the participating agency for agricultural research. At Inter-Government level, Joint Commissions/Working Groups constituted by the Ministry of External Affairs and the Ministry of Commerce do have component of agricultural research in which DARE-ICAR participates directly or through the Department of Agriculture Cooperation & Farmers Welfare and the Departments of Animal Husbandry Dairying and Fisheries.

DARE provides the governmental linkages for establishing international cooperation in agricultural R&D and education upon the technical recommendation from ICAR. Various international scholarships and fellowships are channelized through DARE for enabling foreign students to come and study in India and also for enabling our scientists for study and capacity building programs abroad.

At ICAR level, in order to facilitate the International Cooperation and to bridge the functionalities between DARE and ICAR, and eventually beyond Ministry level, the International Relations (IR) Division has been established in ICAR Headquarters in 2014 with the following mandate:

1. To reach beyond borders legitimately for Agri-R&D.
2. To do global technology foresighting and partnerships
3. To enable research proposals for foreign collaboration and funding.
4. To facilitate SMD/Institute interface with DARE as a single-window and vice versa.
5. To enable official expert visitors from foreign countries to ICAR Institutes, and from India to abroad

## Guidelines for Foreign Deputation and Global Partnership

DARE-ICAR guidelines for establishing foreign collaborations vide F.No. 290/ IR/Misc. Corr./2018 dt. 8<sup>th</sup> May, 2018 has been hosted in the DARE and ICAR websites. The IR Division of the Council further also enables and handholds all its Research Institutes and State/Central Agricultural Universities for establishing global partnerships. Likewise, if any international or global organizations and agencies are interested in collaboration in India for agricultural research and education, the International Relations (IR) division of ICAR enables and facilitates the same following the standard guidelines. Foreign students who are interested in taking admission to Indian Agricultural Universities for degree programs and foreign scientists for capacity building in India, the DARE-ICAR helps them through Indian Missions abroad in identifying the appropriate Universities, Institutes, etc.

In order to provide single window management system for quick processing foreign deputation of scientist/officers, the International Relations (IR) Division of ICAR in cooperation with International Cooperation (IC) Section of the Department of Agricultural Research and Education (DARE) has put in place a Foreign Visit Management System (<https://fvmis.icar.gov.in>). During the last three years (2017-19), a total of over 688 Scientists/science leaders were deputed abroad under various MoUs and agreements with foreign agencies/countries.

# Global Partnerships for Agri-R&D

## ICAR-CGIAR Research Collaboration

Consultative Group on International Agricultural Research (CGIAR), a global partnership that unites international organizations working on food and agriculture, is having close collaboration with Department of Agricultural Research & Education (DARE) and Indian Council of Agricultural Research (ICAR). It works through its 15 Research Centres. Out of these 15 Centres, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has its headquarter at Hyderabad in the State of Telangana, India. The remaining CGIAR research organizations have headquarters elsewhere, but 10 of them have their regional/country offices located in India. Secretary, DARE and Director General, ICAR is the Ex-Officio Vice-Chair of the Governing Board of ICRISAT and is currently also a member in the Board of Trustees of Bioversity International, ICARDA and IRRI.

India is a donor member of CGIAR System from decades and contributes substantially through Window-I and Window III of the CGIAR System. Presently, India is one of the voting members in the CGIAR System Council representing the South Asia Constituency of the Council along with other two alternate representatives from South Asia namely Bangladesh and Sri Lanka. Secretary DARE & Director General, ICAR is the official member in the CGIAR System Council from India.

DARE/ICAR works closely with 12 of the CG Centres through agreements/work plans with the approval of Government of India. These first agreements were signed with CIMMYT and IRRI in the year 1974 (Table 1). The broad areas of research collaboration with CGIAR system involves: enhanced cooperation in the areas of priority besides genetic improvement, germplasm supply, technology development to achieve targeted crop and animal productivity and quality in India, focused strategies for joint efforts to address the issues like utilization of rice fallows, agroforestry and watershed development, rainfed/dry land agriculture and water management, and fish breeding protocols.



**Table 1: Status of MoA /MoU and Work plan with CG Centres**

S.No.	Name of CG Centre	Agreement Date	Active Work Plan Period
1.	International Maize and Wheat Improvement Centre (CIMMYT), Mexico	15.03.1974	2018-2022
2.	International Rice Research Institute (IRRI), Philippines	15.03.1974	2017-2022
3.	International Potato Centre (CIP), Peru	17.11.1975	2018-2022
4.	International Research Centre for Semi-Arid Tropics (ICRISAT), India	15.07.1976	2019-2023
5.	World Agro-Forestry Centre (ICRAF), Kenya	31.10.1985	2016-2020
6.	International Centre for Agricultural Research in the Dry Areas (ICARDA), Beirut (Lebanon)	15.12.1986	2017-2022
7.	International Food Policy Research Institute (IFPRI), USA	01.08.1988	2020-2025
8.	World Fish Centre (WFC), Penang, Malaysia	15.07.1996	2019-2024
9.	Biodiversity International (BI), Rome, Italy	19.07.1996	2017-2021
10.	International Water Management Institute (IWMI), Sri Lanka	25.11.1996	2018-2022
11.	International Centre for Tropical Agriculture (CIAT), Columbia	17.06.1998	2017-2020
12.	International Livestock Research Institute (ILRI), Kenya	07.06.2004	2019-2022



This collaboration has paid rich dividends in the past. For instance, improved lines of wheat from CIMMYT and of rice from IRRI, which were rigorously evaluated by the Indian scientists at various locations in the country to identify best lines and develop crop management practices suitable to local conditions, contributed to India's Green Revolution. During 2019-20, the progress included release/identification of 35 varieties by ICAR developed through CGIAR partnership. Further, the partnership involved 153 KVks apart from several ICAR Institutes, benefitting over 3 lakh farmers. One of the major highlights was capacity building; the CGIAR Centres facilitated foreign deputation training of 74 ICAR scientists (60 short-term and 14 long-term) in different domains for enhanced skill.

There is a well-structured mechanism to review the progress. Progress presentations are made by the CGIAR centre representatives located at New Delhi once annually every year under the Chairmanship of Secretary, DARE and DG, ICAR in presence of all partners/collaborators from ICAR. The succeeding year work-plans are also discussed and finalized. This is the most productive and visible partnership with global centres of excellence in the field of agriculture that has been immensely beneficial to the country.





## SAARC Agricultural Collaboration

India has a strong presence in SAARC (South Asian Association for Regional Cooperation). India contributed to the establishment of SAARC-Agriculture Centre (SAC) located in Dhaka. Since its inception, DARE/ICAR is a permanent member of the Governing body of the SAC. In 2016, the then Hon'ble Minister of Agriculture and Farmers Welfare, Government of India Shri Radha Mohan Singh participated in the SAARC Agriculture Ministers' Meeting held at Dhaka, where India reaffirmed its position for cooperation in agriculture.

One of the major roles of India/ICAR has been capacity building of professionals from the SAARC Member States. A number of SAARC sponsored training programmes have been conducted successfully for promoting agricultural research cooperation through ICAR Institutes in the areas of aquaculture, saline soil reclamation, fish processing quality, climate smart agriculture technology, agroforestry, herd health management of dairy buffalo, advances in animal reproductive biotechnology, soil health, and field epidemiology in veterinary science. Over 100 agricultural professionals and scientists from different SAARC member countries have benefitted from these programmes. Some of the Indian Scientists are working as subject matter



Hon'ble Agriculture Minister of India in SAARC Agriculture Ministers Meeting in Dhaka

specialists in R&D and management of SAARC Agricultural Centre. In our efforts to promote cooperation in agricultural education, a SAARC PhD scholarship in Agricultural Biotechnology has been instituted by the SAC during 2018-19, and one student from Nepal has been admitted for the PhD program in ICAR-Indian Agricultural Research Institute, New Delhi. This year, the SAC has approved two more SAARC PhD Scholarship, one in Animal Science and the other in Fisheries that will be hosted by ICAR-Indian Veterinary Research Institute (Izatnagar) and ICAR-Central Institute for Fisheries Education (Mumbai), respectively.

Another milestone in this cooperation is the 'Seeds without Borders' initiative, a multiparty agreement between Cambodia, India, Bangladesh, Nepal, Myanmar, Sri Lanka, Thailand, Laos and Vietnam. This agreement has been expanded to include Bhutan last year and now covers five of the eight SAARC member nations. In India, this initiative is facilitated by ICAR and in the SAARC region, it is by ICRISAT and IRRI. In recognition to the significant contributions of India for agricultural growth and development in the SAARC region, ICAR was conferred a Certificate of Appreciation that was handed over in person by the Director of SAARC Agriculture Centre to the Director General of the Indian Council of Agricultural Research on 20<sup>th</sup> August, 2018 in New Delhi. Gracing the SAARC Charter Day on the 8<sup>th</sup> December, 2019 in Dhaka, the Director General, ICAR gave a Keynote Address on 'Agricultural Research for food and nutritional security in South Asia, where he elaborated on the regional challenges, India's experiences and success stories and opportunities for enhanced collaboration and cooperation among the SAARC member states.



SAARC Certificate of Appreciation to ICAR



Secretary, DARE in SAARC Charter day

## India-ASEAN Collaboration

India-ASEAN countries have 25 years of international cooperation. The Govt. of India has entrusted the working relationships on agriculture and forestry sector to the Department of Agricultural Research and Education (DARE). In agriculture and agroforestry sectors, we are cooperating with ASEAN by way of agreed projects such as Exchange of Farmers, ASEAN-India Fellowships for Higher Agricultural Education in India and ASEAN, Exchange of Agriculture Scientists, Empowerment of Women through Cooperatives, Training Course on Organic Certification for Fruits and Vegetables etc. These were further strengthened at the 4th ASEAN-India Ministerial Meeting on Agriculture held in January 2018 at New Delhi, with the endorsement of the Medium-Term Plan of Action for ASEAN-India Cooperation in Agriculture and Forestry for 2016-2020. In the S&T field, we have projects such as ASEAN-India S&T Digital Library, ASEAN-India Virtual Institute for Intellectual Property, ASEAN-India Collaborative R&D Project on Mariculture, Bio-mining and Bioremediation Technologies etc. DARE has consistently facilitated the working relations between India and ASEAN countries by enabling their visits, expert meetings and through regular participation in the Working Group and the Ministerial meetings. The 5<sup>th</sup> ASEAN-India Ministerial Meeting on Agriculture and Forestry that was held at Brunei Darussalam during 15-18 October, 2019 was attended by Hon'ble Minister of State, Shri Kailash Choudhary. The approved India-ASEAN Plan of Action 2016-2020 is currently under implementation and several training programmes have been specially designed to benefit the ASEAN Member States.





Shri Parshottam Rupala, Minister of State for Agriculture and Farmers' Welfare, Govt. of India in the BIMSTEC Agriculture Ministers Meeting in Myanmar



## BIMSTEC Cooperation

Agriculture is one of the fourteen areas of The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Cooperation since 2007. The sector is led by Myanmar. The sector deepens its cooperation among the Member States through BIMSTEC Experts Group Meeting on Agricultural Cooperation (EGMAC) and conduct of other businesses related to this sector. So far, six EG MAC, two Workshops on Good Agricultural Practices (GAP Phase I & II), and a Workshop on improving Agricultural Trade and Investment have been held. The Fourth BIMSTEC Meeting and the Expert Group on Agricultural Cooperation was held in Kathmandu, Nepal from 6-7 April, 2015, where India floated the concept notes on "South-South East Asian Diagnosis Network for Ensuring Bio-security and Bio-safety" covering the area of crop/animal/fisheries, and "Human Resources Development in Agriculture"



India hosted the International Seminar on Climate Smart Farming Systems for BIMSTEC Countries

The First BIMSTEC Ministerial Meeting on Agriculture (1<sup>st</sup> BAMM) was held at Nay Pyi Taw, Myanmar on the 12<sup>th</sup> July 2019 on the invitation of the Government of the Republic of the Union of Myanmar, where India delivered its Statement under the theme “Way Forward on BIMSTEC Agricultural Cooperation”. It was agreed that the meeting be convened once in two years. Meanwhile, DARE/ICAR has been participating in several of the workshops and secretarial meetings to deliver on the objectives of BIMSTEC Cooperation in Agriculture. Hon’ble Minister of State for Agriculture and Farmers’ Welfare Shri Parshottam Rupala ji participated in the first BIMSTEC Ministers Meeting on Agriculture in Myanmar on 12<sup>th</sup> June 2019 where it was agreed to hold an International Seminar on Climate Smart Farming Systems for the benefit of the BIMSTEC countries. ICAR organized the Seminar in New Delhi during 11-13 December, 2019 where 13 delegates from the BIMSTEC nations participated. During the program, India shared its experiences through specially designed lectures and field visits.

## G-20 Collaboration

The Group of Twenty (also known as G20) is an international forum of the Governments and central bank governors from 20 major economies. Five years ago, the G-20 platform realized the need for bringing the Chief Agricultural Scientists governing national level organizations in the G-20 nations to discuss and develop a road map for science-led development processes. Its fifth meeting i.e. 5<sup>th</sup> MACS held on 30-31 May, 2016 at Xi'an, China was attended by Dr. A.K. Singh, DDG (Agricultural Extension), ICAR. India also agreed to participate in the working group on Agriculture Technology Sharing (ATS) formed during the G20 Meeting of Agricultural Chief Scientists- 2016 (MACS-2016). In 2019, Dr. T. Mohapatra, Secretary, DARE & Director General, ICAR participated in the G-20 MACS event in Japan during 25-26 April, organized by the Agriculture, Forestry and Fisheries Research Council Secretariat, Ministry of Agriculture, Forestry and Fisheries of Japan. India’s successful demonstration of climate smart villages was presented, which attracted the attention of the member countries. Field visits provided opportunities to the member countries to learn ways and strategies for rapid regeneration of agriculture in tsunami affected areas in Japan. DARE/ICAR contributed to the technical aspects of joint statements as adopted by the G-20 nations.



Secretary, DARE & DG, ICAR Dr. T. Mohapatra in the G-20 MACS in Tokyo, Japan in 2019

Recently, in the 9<sup>th</sup> Meeting of G20 Agricultural Chief Scientists (MACS-G20) that was held at Al Khobar, Kingdom of Saudi Arabia during 17-19 February, 2020, Dr SK Ambast, from ICAR-National Institute of Biotic Stress Management, Raipur participated and suggested the need of regional cooperation among G20 nations in monitoring and forecasting transboundary insects/ pests movement using spatial techniques and information technology, which was later adopted in final draft communique of MACS.



Dr. S.K. Ambast, Jt. Director & Dean, ICAR-NIBSM, Raipur in G-20 MACS in Saudi Arabia in 2020

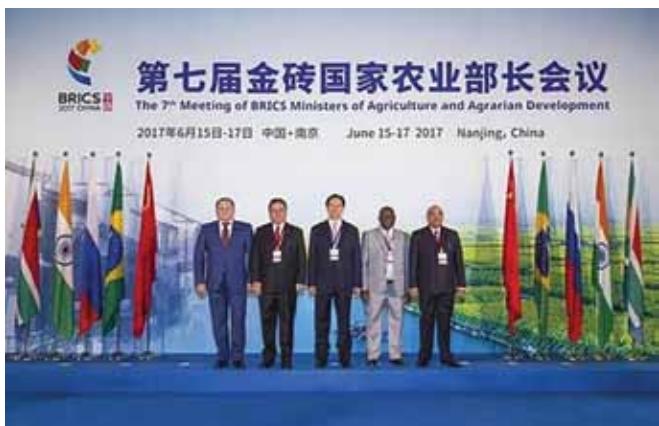


## BRICS (Brazil-Russia-India-China-South Africa) Collaboration

India is an active partner in the BRICS. While we have done several programmes for the BRICS, the expert consultation on climate smart agriculture organized during 2012, was a great success, where the idea was conceived for establishing a BRICS Agriculture Centre. In 2013, South Africa organized a Seminar on Climate Smart Agriculture where a 4-member delegation led by Dr. A. Arunachalam from ICAR participated and shared the Indian experiences. In 2015, the expert committee of BRICS agreed on establishing a virtual Agricultural Research Platform (ARP), with its secretariat in New Delhi managed by DARE. Eventually, the MoU for Establishment of BRICS-ARP was signed on 16th of October, 2016. The ex-post-facto cabinet approval was given by Govt. of India on the 2nd August, 2017. The BRICS-ARP is envisaged to be the natural global platform for science-led agriculture-based sustainable development for addressing the issues of world hunger, under-nutrition, poverty and inequality, particularly between farmers' and non-farmers' income, and enhancing agricultural trade, bio-security and climate resilient agriculture promote sustainable agricultural development and poverty alleviation through strategic cooperation in agriculture to provide food security in the BRICS member countries. Furthering our relationships, India has been consistent in participating in the Senior Officers meeting and in the Agricultural Ministers Meeting of BRICS countries hosted by China during 2017 and by Brazil in 2019 strengthening our cooperation.



India hosted the Expert Consultation for BRICS Agriculture Research Platform in 2016



Secretary (Agriculture), Govt. of India in the BRICS Agriculture Ministers' Meeting in China



Graduation Ceremony of ANASTU students at IARI

## Afghanistan Collaboration

ICAR is playing an important role in developing trained human resource for agricultural research in Afghanistan through partnership in establishing the Afghan National Agricultural Sciences and Technology University (ANASTU) in Kandahar with the support of the Ministry of External Affairs (MEA), Government of India through a bilateral cooperation programme. To this effect, a MoU was signed between ICAR and ANASTU on April 21, 2016. Through this cooperation, students of Afghanistan have had opportunity to study



MoU signed for establishing ANASTU

in the premier Indian Agricultural Research Institute (IARI), New Delhi. Under the Indian-Afghanistan Fellowship program, a total of 64 students have availed and benefitted from agricultural education during 2017-19. IARI supported the establishment of laboratories in ANASTU and developed course curricula for Masters' degree program in Agriculture. ICAR also designed capacity-building programs for the faculty of ANASTU exposing them to advances in agricultural science and technologies to help mentor the students thereof. So far, 3 batches of students have undergone their studies in India. IARI did organize Graduation Ceremonies for the successful students and issued Grade Cards enabling them to secure degree conferment from ANASTU.

## Myanmar Collaboration

A team led by Prof. M.S. Swaminathan visited Myanmar during July 23-27, 2011 to explore Indian cooperation in agriculture. Eventually, a MoU was signed between the Government of India and Myanmar on May 28, 2012



for setting-up of ACARE (Advanced Centre for Agricultural Research and Education). DARE/ICAR was entrusted to establish the Centre. After several rounds of discussion and detailed deliberations, an agreement was signed between MEA & DARE/ICAR on September 21, 2015. ICAR played a mentoring role in developing the centre, course curricula and also did a 21 days training programme for 15 faculty members of Yezin Agricultural University (YAU), Myanmar during May 31-June 20, 2016 in three different areas: Advances in molecular breeding of crop plants, post-harvest management and value addition of agri-produce, and Agriculture knowledge management through innovative communication interventions have been organized.

The postgraduate courses of YAU were revised as required and the courses with revised course curriculum are being offered from the academic session 2017-18 onwards. A revised Post Graduate Handbook of YAU has also been printed and was released by the Minister of Education, GOUM on the 2<sup>nd</sup> April, 2018 in the presence of the Ambassador of India to Myanmar. Three new postgraduate programmes (M.Sc. &



President of India dedicating ACARE to the People of Myanmar

Ph.D.) (Agricultural extension Education; Molecular Biology & Biotechnology; and Food Engineering & Technology) have been started from the academic session 2017-18. A dozen of the courses are being delivered by the IARI faculty from India since then as per the agreement. Also, requisite laboratory consumables (chemicals, glassware, plasticware, etc.) have been procured and supplied to enable hands-on laboratory practical work. Five copies each of relevant ICAR publications have also been given to the YAU for their archive. So far, four students from Myanmar joined M.Sc. programme during the academic session 2017-18 and two students joined during the academic session 2018-19 in various disciplines at IARI under ACARE programme. Further, four villages within a radius of 30 kms of ACARE have been adopted under Participatory Knowledge Management programme for demonstration of suitable production techniques. In 2018, the ACARE has been dedicated by the Hon'ble President of India to the people of Myanmar.



A Trainee Batch of ACARE Faculty in IARI, New Delhi

## India-Africa Cooperation

In the recent years, the South-South Cooperation (SSC) has emerged as a parallel mechanism to support the global quest for improved quality of life across the world. Over the last decade, sustained economic growth in emerging economies has fueled a shift in the global center of gravity from the North to the South. The South began looking beyond the North-South Cooperation (NSC) and Triangular Development Cooperation (TDC) - which was enabled by the Official Development Assistance (ODA) for development cooperation. This led to new development cooperation architecture with a considerable flow of resources within the Southern countries.

India-UN Development Partnership Fund, a dedicated facility within the United Nations Fund for South-South Cooperation established in 2017, has drawn the focus following the announcement by Prime Minister Narendra Modi with the launch of a US\$50 Million Commonwealth window. The Fund's new Commonwealth window aims to catalyze the achievement of the Sustainable Development Goals (SDGs) in developing countries of the Commonwealth. The countries supported by this fund are located in various parts of the world and include some of the most vulnerable Member States of the Commonwealth. This got impetus through the first and the third India-Africa Forum Summit (IAFS) held in the year 2008 and 2015,



China hosted the Global Group of Ministers meeting for South-South Cooperation in 2018

respectively in New Delhi. The Second India-Africa Forum Summit was held in the year 2011 at Addis Ababa, Ethiopia. Under the IAFS, special Agricultural scholarships are offered to African Students for duration of two years and three years to pursue Masters and Ph.D programmes in Agriculture and allied subjects, respectively. Candidate admitted under the programme is provided monthly fellowship, the air ticket and visa through the Indian Mission in the respective African Country. All foreign students are provided accommodation in the host-university campus. A total of 281 students have so far benefitted through this program since 2010. Presently, 63 students from the African Union are pursuing their studies in 17 different agricultural universities of India.

## Mekong-Ganga Cooperation

Mekong Ganga Cooperation (MGC) is an initiative by six countries – India, Cambodia, Lao PDR, Myanmar, Thailand and Vietnam for cooperation in tourism, culture, education, transport and communication. It was launched in the year 2000 in Vientiane, Lao PDR. Both Ganga and Mekong are civilization rivers, so the MCG initiative was to foster close contacts among people inhabiting these two major river basins. The grouping was also indicative of cultural and commercial linkages between India and Mekong Countries. The suggestion to set up this grouping was made by the then Thai Foreign Minister to EAM during his visit to India in July 2000. The then Minister of External Affairs, Government of India Shri Jaswant Singh welcomed the idea and suggested the names of the two rivers to be the title of the Cooperation initiative. A project on 'Identification and conservation of rice germplasm for nutritional and quality traits and enhancing profitability of rice production through mechanization and downstream processing' is now accepted by India, Vietnam and Lao PDR, and is under consideration.



## Nepal Cooperation

India-Nepal cooperation is historic and has been growing strong day-by-day, which is evident by the Work Plan for 2014-20 under Joint Agricultural Working Group that includes: Study visits/Trainings, Opening of National Agricultural Universities, Academic courses, Collaborative research; operation, maintenance and certification of sophisticated equipment, natural resource management, agri-business and capacity building through fellowships under Nepal-Aid Fund Scheme. Under this scheme, scholarships are being offered for Nepalese candidates for duration of four years to pursue B.Sc (Agriculture) and for duration of two years to pursue M.Sc (Agriculture) in Indian Universities and Institutions. So far, five in 2015-16 and ten in 2016-17 students completed their graduate/post-graduate courses from India. Ten students during 2017-18 and eight students during 2018-19 from Nepal have been admitted in M.Sc courses in Indian agricultural Universities. Furthering cooperation with Nepal, India has proposed to provide technical assistance in establishing a Deemed University for Agricultural Education on the patterns of the Indian Agricultural Research Institute, which is under active consideration by the Ministry of External Affairs, Govt. of India.



## Sri Lanka Collaboration

ICAR signed an MoU with Sri Lanka Council of Agricultural research and Policy in the Year 1998 and a work plan during 2017-2019 which is being extended for 2020. This bilateral cooperation enabled exchange visits in different areas, consultation from India, short-term training of Sri Lankan scientists in India, long-term training (M.Sc. and Ph.D.) in India, exchange of germplasm and technologies, and collaborative



research projects. Over 25 students have so far taken benefit through these programmes including one PhD student being hosted by ICAR-IARI, New Delhi. Further, one of the CGIAR Centres, the IWMI (International Water Management Institute) having its headquarter in Sri Lanka facilitates several agricultural programmes on water-specific issues in the South-Asia region including India.

## Asia-Pacific Association of Agriculture Research Institutions (APAARI), Thailand

ICAR is a member of the Asia-Pacific Association of Agriculture Research Institutions (APAARI) since 1990 and has been contributing annually. The mission of APAARI is to promote, coordinate and strengthen agriculture and agri-food research and innovation systems through partnerships and collaboration, capacity development and advocacy for sustainable development in Asia and the pacific. This network is strengthened whereby several ICAR Institutes are brought in to organize workshops and seminars. India is represented by DARE/ICAR in the Executive Council of APAARI. India holds the Vice-chair in the Executive Council of APAARI, since 2018. Every year, at least 5-10 ICAR scientists are hosted by APAARI for thematic trainings and consultative workshops.



## Network of Aquaculture Centres in Asia-Pacific (NACA), Thailand

Since 1992, DARE is the founder and donor member of the Network of Aquaculture Centres in Asia-Pacific (NACA), which is a consortium of 18 member countries of the Asia and Pacific region. It contributes annually and an action plan between ICAR and NACA is developed and reviewed every year. The ICAR-CIFA,





ICAR-NBFGR, Lucknow hosted the NACA Discussions in 2019

Bhubaneswar is one of the Regional Lead Centres of NACA. India has been one of the largest beneficiaries in terms of training of its personnel, strengthening of existing infrastructure, capacity building, skill upgradation, and technology transfer etc. Six scientists of ICAR-CIFA deputed to various international meeting/workshops. This is one platform where ICAR has been able to project its achievements and capabilities as a leader in the region. ICAR Representative is a prominent member in the Steering Committee of NACA that sets the research priorities. The ICAR-NACA Regional Expert Consultation meet on “Genetically Responsible Aquaculture: Sustainability of genetically fit bloodstock and seed of certified origin in Asia aquaculture” was conducted at ICAR-NBFGR, Lucknow during 26-27 February, 2019.

## Centre for Agriculture and Bioscience International (CABI), United Kingdom

DARE signed an MoA with CABI on the 22<sup>nd</sup> September, 2017 with the objective of collaboration and partnership in (a) Information management, (b) Smallholder farmer support, pest management & SPS, (c) Farmer and Extension service capacity building, (d) Tech transfer from India to other countries, (e) Research and capacity building on microbial resources in agriculture and other plant health science and (f) Continued collaboration with 2-way exchange of biocontrol agents. A work plan has also been signed in 2018 to implement a strategic research program on microbial taxonomy, diagnostics, biocontrol and



quarantine protocols. Two of the ICAR Bureaus namely ICAR-NBAIM (Mau) and ICAR-NBAIR (Bengaluru) are actively involved in these programs.

## World Vegetable Centre (AVRDC), Taiwan

ICAR has been working with AVRDC through projects for over a decade. However, it was only in 2019, the collaborative efforts have been institutionalized through a MoU. The work plan is now being prepared covering different aspects of vegetable research including application of molecular technologies for plant breeding in vegetable crops. It is envisaged that this collaboration will accelerate India's strength in vegetable cultivation by enhancement of productivity. Immediately after the MoU, the AVRDC shared its two top-performing dual purpose (fresh market and processing) tomato breeding lines with the ICAR. Earlier collaborations with AVRDC gave us leads in development of high-yielding and disease resistant vegetable crops in India. For instance, the `Arka Rakshak', multiple-resistant tomato variety with high yielding potential (90-100 t/ha) was developed by crossing one of ICAR's advanced breeding lines with an advanced breeding line sourced from the World Vegetable Center. This variety has transformed India's tomato scenario due to greater popularity amongst farmers.



ICAR-WorldVeg MoU inked on 30-10-2019

## Foreign-Aided/Collaborative Research

ICAR has 54 international collaborative research projects with different countries. Twenty-five projects are in animal science and fisheries sector, 22 projects are in crop husbandry including field crops and horticultural crops and 10 projects are in the natural resource management sector. Some of the major funding agencies include FAO, CSIRO (Australia), BBRC (UK), UNDP, USIEF, INRA, JIRCAS, USAID, CABI, AVRDC, DIFD and BMGF (USA). A few projects are funded by foreign universities viz., University of Newcastle (Australia), University of Western Sydney (Australia), University of Queensland (Australia), Griffith University (Australia), University of Edinburg, University of Nebraska (USA), Pennsylvania State University (USA), University of Nottingham, Norwegian University of Life Sciences, etc. Recently, the Council has got the support of three projects that are supported by Indo-Swiss and/or Indo-UK Funding Mechanisms. During 2019-20, ICAR has signed a MoU with Heinrich Heine University, Germany to undertake joint research for introducing genome edited traits for bacterial blight resistance into the Indian rice varieties.

One of the landmark projects is on next-generation breeding, genotyping and digitization approaches for improving the genetic gain in Indian staple crops supported by the Bill and Melinda Gates Foundation, USA that is being implemented by the ICAR Institutes with CGIAR collaboration. The collaborations in frontline research in animal sciences being bovine tuberculosis control, antimicrobial resistance, disease surveillance and molecular epidemiology, etc., and in NRM sector, most foreign-aided projects deal with climate resilience, drought resistant crops, water and nutrient use efficiency, etc.



## Germplasm Exchange

One of the important aspects of this global partnership is that India could harness the potentials of global germplasm. Through various MoUs and agreements, ICAR enabled exchange of over 1.75 lakhs of germplasm from different global partners during the last 5 years that helped in explorative and futuristic agricultural research in India. It may be noted that this exercise of germplasm exchange is as per the provisions of National Biodiversity Act 2002 and the Biological Diversity Rules, 2004 as notified by the Ministry of Environment, Forests and Climate Change, Govt. of India.

Through neighborhood partnership, we got about 127 accessions during 2015-19 from the SAARC nations, and exported 803 wheat accessions to SAARC nations, particularly Bangladesh for screening against blast diseases. In addition, as high as 27,79,878 samples were imported from the CGIAR nurseries for testing at different locations. All these helped in developing stress resistant, resilient and improved crop varieties. One of the notable example of ICAR's partnership in field crops is the landmark development of Swarna sub-1 rice that can tolerate complete submergence for two week due to flash flooding.

## HRD and Capacity Building

As the mandate of DARE-ICAR is on research and education in agriculture and allied fields, all the MoUs and Work Plans cover capacity building programmes

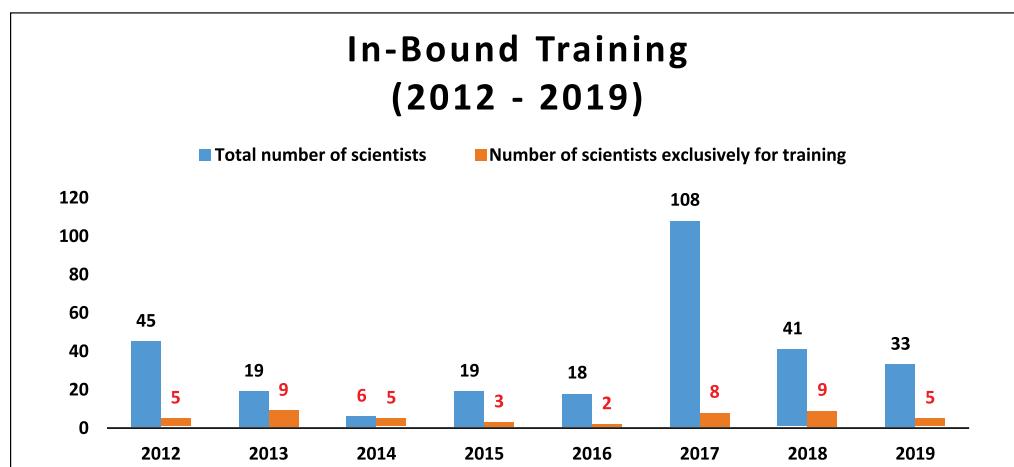


Figure 2. Foreign participants trained in India under various training programmes

## Out-Bound Training (2012 - 2019)

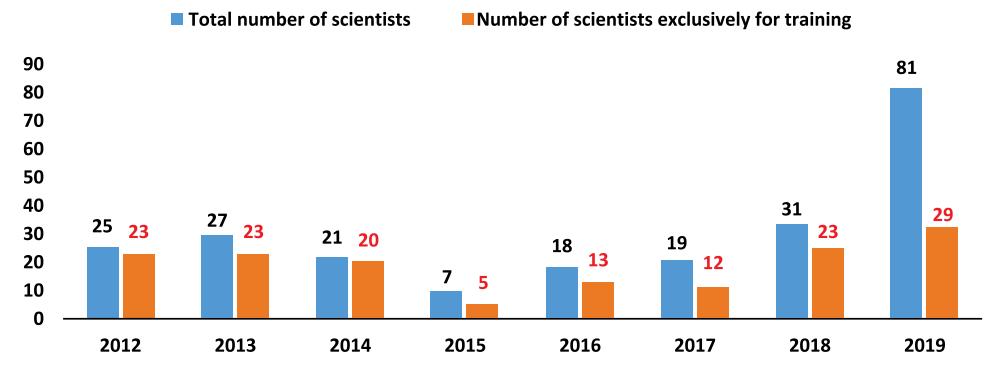


Figure 3. Indian participants trained abroad under various programmes

including study visits and training of scientists. This has enabled exchange of scientists between countries for training and visits. Year-wise details of scientists trained since 2012 is given in Figures 2 & 3. During the last 5 years (2014-2019), ICAR trained 219 foreign delegates in different specialized areas in agricultural research, and also deputed 156 ICAR scientists abroad for training.

### *Netaji Subhas ICAR International Fellowships*

In its continued efforts towards enhancing and sustaining the standards, quality and relevance of higher agricultural education in the country, the ICAR has instituted Netaji Subhas - ICAR International Fellowships with dual purpose of (i) human resource development in cutting edge technologies, and (ii) demonstrating the strength of Indian agricultural system abroad. The objective is to develop competent human resource that are trained in the identified best laboratories in the world (for Indian candidates) and similarly expose overseas candidates to the best Indian Agricultural Universities (AUs) in the ICAR-AU system in India for creating a pool of scientist-envoys for enhanced future cooperation. Thirty fellowships are annually awarded to both Indian as well as foreign candidates, irrespective of their numbers subject to total, for pursuing Ph.D. degree. So far, 208 candidates including 40 foreign students have availed this research fellowship in reputed universities abroad. Twenty-

nine more fellowships including 8 foreign students have been awarded for the year 2019-20. This effort is being supplemented by the National Higher Agricultural Education Project (NAHEP) supported by World Bank (2018-2024) which had several modules of capacity building of human resources of ICAR internationally.

### ***Study Visits Abroad for ICAR-Research Managers***

With a Training Policy in place, ICAR has conceptualized the Senior Executive Development Programme (SEDP) in collaboration with Academic Staff College of India (ASCI), Hyderabad and ICAR-National Academy for Agricultural Research Management (NAARM), Hyderabad. The programme has both domestic and international component that is envisaged to enhance leadership capabilities, competence, skills of senior research managers and officers of ICAR to improve their organizational capabilities that could be harnessed for the growth and development of the Council. Overall, 65 Seniors Officers in three batches during 2018-2020 were taken to leading institutions, organizations and universities in different countries like China, Denmark, The Netherlands, Switzerland, Australia, New Zealand, Malaysia and Thailand to see state-of-art laboratories and facilities, and also to understand the organization structure, nature and type of research management positions.

### ***The National Higher Agricultural Education Project***

This World Bank supported Project dwells upon Country Partnership Strategy and addresses the three engagement areas of integration, transformation and inclusion. These areas foresee increased agricultural productivity and support quality improvements of higher education to create a more skilled workforce that continuously improves the productivity of key sectors, including agriculture. The proposed Project is also a multi-Global Practice collaboration (Agriculture and Education) and is expected to support activities and results directly related to cross-cutting strategic areas of climate change, jobs and gender. One of the focus of this project is to foster a stronger innovation culture by twinning participating agricultural universities with other higher-performing centers of learning (both in India and



internationally) and strengthening University-private sector linkages to better orient student learning toward market-relevant skill sets. In this endeavour, ICAR could help depute 308 undergraduate students and 93 faculty from Indian agricultural universities to foreign universities and research organizations for exposure and strategic interaction with domain specialist abroad. At the same time, the NAHEP has facilitated increased collaboration between Indian Agricultural Universities and other universities globally to raise research quality and its linkage to educational quality and relevance.

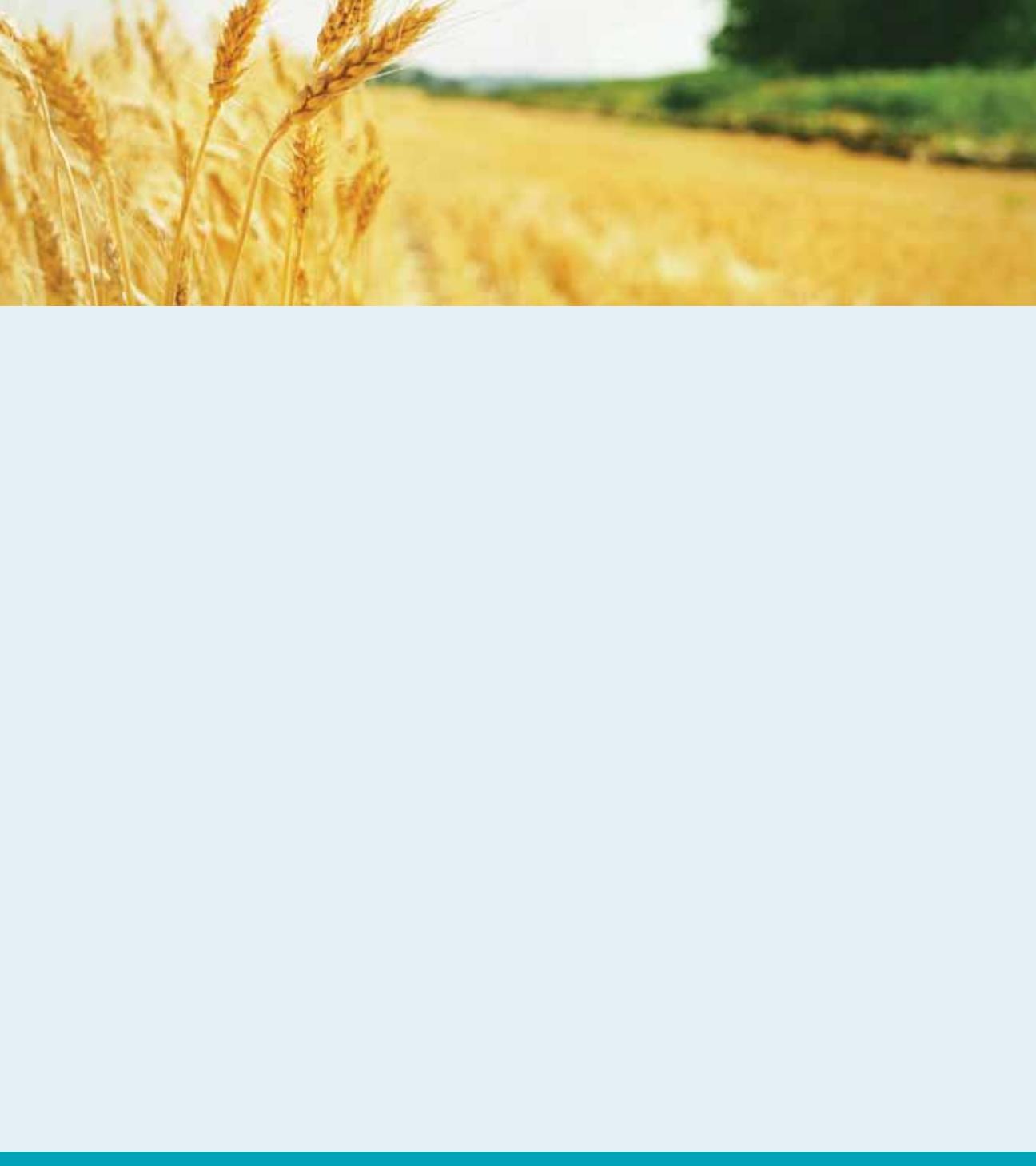
### ***ICAR's Capacity for International Training Programmes***

ICAR has excellent R&D facilities to impart training to students, farmers and scientists from across the world. Infrastructure in terms of laboratories, classrooms, farms and equipment of the highest standards are available in all the ICAR Institutes. Excellent boarding and lodging facilities are available for the participants. Some of the potential training areas for training have been indicated below:

1. Genomics, gene sequencing and functional genomics
2. Phenomics
3. Hi-tech Horticulture
4. Post-harvest technology
5. Climate resilient agriculture
6. Solarisation in agriculture
7. RS & GIS in agriculture
8. ICT and sensors in agriculture
9. Simulation and modelling, and decision support system in agriculture
10. Animal cloning and embryo technology
11. Stem cell therapy in animals
12. Induced breeding in fishes

Apart from these, areas and training modules could be customised as per requirements of the clients.





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