Sowing the seeds of rice science:

achievements and future directions for training at IRRI

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IRRI

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2012

IRRI

International Rice Research Institute

The International Rice Research Institute (IRRI) was established in 1960 by the Ford and Rockefeller Foundations with the help and approval of the Government of the Philippines. Today, IRRI is one of the 15 nonprofit international research centers supported by the Consultative Group on International Agricultural Research (www.cgiar.org).

IRRI receives support from the following CGIAR members: Asian Development Bank, Australia, Bangladesh, Canada, China, European Commission (EC), Food and Agriculture Organization (FAO), France, Germany, India, International Fund for Agricultural Development (IFAD), Iran, Japan, Korea, Norway, Philippines, Portugal, Rockefeller Foundation, Sweden, Switzerland, Syngenta Foundation for Sustainable Agriculture, Thailand, Turkey, UK, USA, and the World Bank.

In 2009, IRRI also received support from 5 PRIME, Bayer CropScience, Bill & Melinda Gates Foundation, Bioversity International, Care International, Challenge Programs (Generation, HarvestPlus, and Water & Food), Eiselen Foundation, FOSS, Gatsby Foundation, Global Crop Diversity Trust, Grand Challenges in Global Health project, International Atomic Energy Association (IAEA), International Fertilizer Industry Association (IFA), International Plant Nutrition Institute (IPNI), International Potash institute (IPI), International Fund for Agricultural Research (IFAR), Kellogg Foundation, Malaysian Agricultural Research and Development Institute (MARDI), Nunhems B.V., Pioneer Overseas Corporation, Plan International Vietnam, and World Vision, among others.

The responsibility for this publication rests solely with the International Rice Research Institute.

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Suggested citation: Molina IR, Castillo GT, Barker R, Castanar P, Magor N. 2012. Sowing the seeds of rice science: achievements and future directions for training at IRRI. Los Baños (Philippines): International Rice Research Institute. 66 p.

Editing: Bill Hardy
Cover design: Sherri Maigne Meneses
Page makeup and composition: Ariel Paelmo
Figures and illustrations: Ariel Paelmo

ISBN

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Abbreviations and acronyms

ASISOV	Agricultural Science Institute for Southern Coastal Central of Vietnam
BARD	Bangladesh Academy for Rural Development
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BRAC	Bangladesh Rural Advancement Committee
BRRI	Bangladesh Rice Research Institute
BSMRAU	Bangabandhu Sheikh Mujibur Rahman Agricultural University
CARDI	Cambodian Agricultural Research and Development Institute
CAS	Chinese Academy of Sciences
CCAP	Center for Chinese Agricultural Policy
CEAT	College of Engineering and Agro-Industrial Technology
CEGIS	Center for Environmental and Geographic Information Services
CEM	College of Economics and Management
CIAP	Cambodia-IRRI-Australia Project
CLRRI	Cuu Long Rice Research Institute
CLSU	Central Luzon State University
DDG	deputy director general
DG	director general
DoCP	Department of Crop Protection
DoSTE	Department of Science, Technology, and Environment
FCRI	Field Crops Research Institute
FSSR	farming systems socioeconomic research
GAUF	Gregorio Araneta University Foundation
GRiSP	Global Rice Science Partnership
HYVs	high-yielding varieties
INM	integrated nutrient management
IPB	Institute of Plant Breeding
IPMO	International Programs Management Office
IRRI	International Rice Research Institute
LIRRTP	Lao-IRRI Rice Research and Training Project
MS	Master of Science
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MARD	Ministry of Agriculture and Rural Development
MVs	modern varieties
NAEC	National Agriculture Extension Centre
NARES	national agricultural research and extension systems
NISF	National Institute for Soils and Fertilizer
OJT	on-the-job training

OSA	Office of Student Affairs
PAO	provincial agricultural offices
PhD	Doctor of Philosophy
PhilRice	Philippine Rice Research Institute
RDD	Research and Development Department
RDRS	Rangpur Dinajpur Rural Service
R&D	research and development
SDC	Swiss Agency for Development and Cooperation
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture
T3C	training and technology transfer course
TC	Training Center
UPD	University of the Philippines Diliman
UPLB	University of the Philippines Los Baños
VUSTA	Vietnam Union of Science and Technology Associations

Acknowledgments

The authors are grateful to Training Center (TC) staff members Priscilla Comia, Ma. Socorro Arboleda, and Anilyn Maningas for giving us access to the TC-OSA database; Bill Hardy for editing the manuscript; and Sherri Maigne Meneses for the cover design.

Sowing the Seeds of Rice Science: Achievements and Future Directions for Training at IRRI

Abstract

For almost 50 years, the International Rice Research Institute (IRRI) has been training rice scientists and extension workers across Asia. As of December 2010, a total of 11,599 trainees had benefited from the courses offered by IRRI, 10,031 in nondegree training and 1,568 in MS/PhD programs. Personnel trained at IRRI have made a critical contribution to the Green Revolution and to achieving food security in developing countries, particularly in Asia, where 90% of the world's rice is produced and consumed. Every national institute in Asia with a responsibility for rice-related research and extension has at least one IRRI-trained staff member.

However, too little attention has been given to assessing the impacts of IRRI training on national agricultural research and extension systems (NARES) and their future needs. In some countries, NARES face a dearth of agricultural scientists who will replace senior scientists who have reached retirement age and are not being replaced.

In this publication, we examine the many IRRI nondegree training programs, the participants, and their disciplines. The nondegree training courses have varied widely in number and content over time due to a shift in demand and funding availability. We have identified the trends over time from 1962 to 2010 in total numbers, numbers by country, and numbers by discipline. The participants have come mainly from Asian NARES. The proportion of female participants has risen to about 20%.

Our main focus, however, is on the IRRI MS/PhD program. We assess the past benefits and future needs of the program, focusing on 1996 to 2010. In particular, we emphasize the need for IRRI to maintain better contact with its alumni, many of whom have risen to important positions in the NARES.

Since the 1960s, the number of female scholars has risen sharply. In 2006-10, the numbers of male and female participants were essentially equal, 100 each. The demand for crop management, agronomy, and physiology as a major field was evident among male degree scholars while female degree scholars in general opted to major in socioeconomics and policy research. Also gaining importance over time are plant breeding, genetics, and transgenics as major fields of study for MS and PhD programs.

In summary, this study documents past trends and achievements of the training program. This will assist IRRI, donors, and NARES in planning future activities related to training and capacity building.

Keywords: training, NARES, impact, capacity building, IRRI

"A key to the success of agricultural research programs is the availability of well-trained and dedicated scientists."

M.S. Swaminathan, 1983

I. Introduction

Training of national scientists in different aspects of rice research and extension as well as in rice-based cropping systems is an integral part of the International Rice Research Institute's (IRRI) continuing research efforts (IRRI 1983). Since 1962, IRRI has been training rice scientists and extension workers across the world. The training of scientists from the national agricultural research and extension systems (NARES) complements and strengthens national capacity-building programs. Thousands of national system rice scientists from more than 100 countries around the world have benefited from the training courses offered by IRRI. Personnel trained at IRRI made a critical contribution to the Green Revolution and to achieving food security in developing countries, particularly in Asia, where 90% of the world's rice is produced and consumed. Several IRRI alumni have gone on to become high-ranking agricultural officials in their countries such as ministers, secretaries, and directors, as well as leading scientists and influential figures. Every national institute in Asia with a responsibility for rice-related research has at least one IRRI-trained staff member (Raab et al 1998, Shrestha et al 2002).

However, too little attention has been given to assessing the impacts of IRRI training on NARES and their future needs. Some countries' NARES have a dearth of rice scientists who will replace senior scientists reaching retirement age. This study provides recommendations to help IRRI, donors, and NARES to strengthen and plan their future activities in relation to training and capacity strengthening.

Below, we discuss the objectives and methods of the study. Sections II to IV discuss the degree and nondegree training programs as they have developed over the years. Section V presents the results of a survey of 50 former degree scholars. Section VI assesses the institutional impact of IRRI training based on five country-level case studies. Section VII presents conclusions.

Objectives

While providing information on nondegree training courses, our analysis focuses on training in research for scholars undertaking MS and PhD degrees. Typically, these scholars spent 1 to 2 years at IRRI or in field activities conducted with financial support and guidance of IRRI staff and they completed their thesis research and published findings. The presence of these young scholars has strengthened IRRI's research and professional linkages, typically involving the student's university advisor in guiding the research activities. The primary objective of this study is to assess the past benefits and future needs of the IRRI MS/PhD program. The specific objectives follow:

1. Rebuild the IRRI Training Center's Office of Student Affairs (OSA) database and examine the number of participants and types of training followed, identifying trends over time in total numbers, numbers by country, and numbers by gender.

2. Focusing on 1996-2006, conduct a case study of former MS/PhD scholars from Asia and Africa to evaluate the benefits gained and determine the future needs of the IRRI graduate degree program.
3. Assess the impact of IRRI training for selected Asian countries.

Data and methods

The study was divided into three levels of data collection and analysis. The first level of data was extracted from the IRRI Training Center Office of Student Affairs (TC-OSA) database. Records for the early 1960s to 1970s in particular were difficult to obtain. The Training Center acknowledges that training records were not systematically collected and stored into a central database. Data on IRRI training from 1962 to 2010 were gathered from the IRRI TC-OSA, International Programs Management Office (IPMO), and theses from the IRRI Library. Data were then verified and matched with those in the OSA database before they were processed and encoded to help rebuild the TC-OSA database.

The second level of data involved identifying scholars from the rebuilt OSA database who had completed their graduate degree programs. Data on gender, nationality, degree and specialization, research theme, the university where the degree was obtained, email, and contact addresses were obtained. To overcome the problems related to gaps in the records, we considered scholars only from 1996 to 2006, for whom a reasonably complete set of records was available. A total of 283 scholars from Asia and Africa were found to have completed their MS and PhD for this period. However, as the database is not used as an alumni database, the contact information reflected institution details at the time the scholar was at IRRI. Contact information from the TC database was not current. Thus, several IRRI internationally recruited staff were asked for updated contact details of their former degree scholars.

All degree scholars for whom an email address was found were sent a questionnaire. In addition, IRRI supervisors were also sought for addresses of former scholars. An Internet search was also conducted to supplement other methods to locate former scholars.

The third level of data collection involved a case study of MS and PhD scholars from Asia and Africa for 1996 to 2006. Using a pretested questionnaire, these scholars were surveyed to determine the impact of IRRI training on them and assess the future training needs of NARES. Those with email addresses were notified and requested to directly respond to the online survey launched in March 2010. A complete list of IRRI degree scholars with their last known address was also provided to IRRI Country Offices to help trace their whereabouts, particularly those without email addresses. Out of 283 scholars identified, three scholars had already died, bringing the total to 280. Of this number, only 190 scholars had contact information in a TC file. Many of the scholars' contact details, however, were no longer up-to-date or the details were already inactive. IPMO's help was sought to provide a few more email contacts other than those obtained directly from different IRRI divisions. An Internet search was also conducted. In the end, only 26% of those with known addresses participated in the survey, bringing the total number of respondents to 50.

II. Overview of IRRI training programs

The various professional advancement programs at IRRI are broadly categorized into two groups: (1) degree and (2) nondegree training programs.

Degree programs

IRRI degree programs provide opportunities to scientists to pursue an MS and PhD in an accredited university for coursework and conduct their thesis research at IRRI under the supervision of an internationally recruited staff (IRS) member.

The degree programs have three types of scholars. The first group refers to IRRI research scholars who come to IRRI to work for an MS or PhD with full support from IRRI for both coursework and a thesis. The second group refers to those who come with support for thesis-only research and are funded either from IRRI core funds or grant funds administered by IRRI. The third group is affiliate research scholars from developing countries who come to IRRI for MS or PhD thesis research only under the supervision of an IRRI scientist, with assured financial support from any sponsoring agency other than IRRI. There is no cost to IRRI. In fact, often overlooked is the fact that IRRI benefits from the input of the university student advisor also at no cost.

Nondegree programs

Nondegree programs include short courses and individualized or on-the-job (OJT) training. IRRI provides regular short training courses each year to cater to rice scientists, researchers, private individuals, and nongovernment personnel who are studying rice and rice-related topics and/or whose mandate is related to IRRI.

The IRRI OJT program provides highly focused nonacademic training opportunities for national scientists who come to IRRI to upgrade their research skills and knowledge on rice-related topics through appropriate and need-based hands-on training. Training activities in this mode range from several weeks to 1 year.

Nondegree interns, on the other hand, are scholars who come to IRRI for further hands-on experience. Their stay at IRRI is part of the requirements of their academic curriculum. They are supported by a grant or a sponsoring agency and they do not receive funding assistance from IRRI. Much like in the degree-training program, both professional on-the-job trainees and nondegree interns work closely with IRRI scientists in ongoing research activities. Research projects conducted are of interest to both IRRI and the participants' home institution or agency.

III. IRRI's global database from 1962 to 2010 (11,599 participants)

Fifty years of IRRI are not just about rice technology development and scientific know-how in rice production, but also about rice R&D capacity building through training and partnerships (Bernardo 2010). Training at IRRI is an institutional function and not only a department function. The IRRI TC facilitates and provides logistics and methods but the subject matter always belongs to the respective research areas. This is the reason training has never disappeared at IRRI. An analysis of IRRI's various training programs from 1962 to 2010 based on the TC-OSA database is presented below.

Number and type of IRRI training programs

IRRI's first director general, Robert F. Chandler, narrated that, during the first two years or so of IRRI's existence, the training program was confined to providing young scientists from rice-producing countries with experience in research in association with IRRI's senior scientists (Chandler 1982). The first research scholars arrived at IRRI in June 1962. From then on, IRRI has offered various training programs to cater to the needs of NARES. According to Barker and Dawe (2001):

"Today, it is impossible to go anywhere in the rice-growing world and not find people that have been to Los Baños. The house that Chandler built has rooms all over the rice-growing world. This is the legacy of Bob Chandler."

The massiveness of IRRI's training efforts is reflected in Table 1. A total of 11,599 participants availed of IRRI training from 1962 through 2010. About 14% benefited from degree training whereas 86% availed of nondegree training programs. A more detailed presentation by country and type of training can be found in Annex Table 1.

During the first five years of IRRI training programs, already 31 scientists from NARES had received MS and PhD scholarships. In succeeding years, IRRI opened up more degree training opportunities by accommodating affiliate research scholars and thesis-only scholars for both MS and PhD work. These scholars completed their coursework in accredited universities and conducted their thesis at IRRI under the supervision of IRRI scientists, who also served as a chairperson or member of the scholar's thesis committee. Over the years, IRRI's degree training programs expanded to include interns and fellows.

In addition to degree training programs, IRRI provided highly focused nonacademic training opportunities for national scientists. A total of 168 different training programs were conducted from 1962 to 2008. Training activities in this mode ranged from several weeks to one year. From an initial offering of two types of nondegree training programs (i.e.,

Table 1. Summary of total number of IRRI participants by type of training program, 1962 to 2010.

Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
MS	30	71	77	113	184	110	78	41	46	70	820
PhD	1	9	32	65	92	103	133	90	93	130	748
Subtotal	31	80	109	178	276	213	211	131	139	200	1,568
Fellow	0	0	0	0	0	0	0	0	1	22	23
Intern/OJT	57	106	110	190	215	162	236	208	186	207	1,677
Short course	10	220	312	947	1,605	1,325	929	540	1,679	764	8,331
Subtotal	67	326	422	1,137	1,820	1,487	1,165	748	1,866	993	10,031
Total	98	406	531	1,315	2,096	1,700	1,376	879	2,005	1,193	11,599[a]

[a]Excluding 6 affiliate BS students in 2006-10.

Table 2. Participation in nondegree training programs at IRRI by research theme, 1962 to 2008.

Research theme	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Crop management, agronomy, and physiology	10	200	233	530	727	220	130	66	230	61	2,377
Diseases and their management	–	–	–	–	1	28	26	34	22	–	111
Genetic resources	–	–	–	–	–	27	–	–	–	–	27
Genomics, bioinformatics, and molecular biology	–	–	–	–	–	11	46	34	77	–	168
Pests and their management	–	–	–	–	112	79	46	–	215	–	452
Plant breeding, genetics, and transgenics	–	–	16	208	223	181	22	69	124	133	976
Postharvest and mechanization	–	–	29	107	167	124	77	–	21	–	525
Socioeconomics and policy	–	–	–	–	99	142	133	13	–	27	414
Soils and nutrient management	–	–	–	–	–	59	30	70	121	–	280
Training and "knowledge management and sharing"	–	–	–	1	–	129	37	20	51	32	270
Water management	–	–	–	60	117	110	67	–	35	–	389
Experimental design, data management, and analysis	–	20	34	–	10	29	23	73	188	180	557
Communication and presentation skills	–	–	–	–	7	37	–	19	292	137	492
Others	–	–	–	–	23	34	107	26	67	38	295
Combination	–	–	–	41	119	113	185	116	236	186	996
All	10	220	312	947	1,605	1,323	929	540	1,679	764	8,329

on-the-job training and rice production training) between 1962 and 1965, the number of nondegree training courses generally increased up to 1981-85 to include short courses, OJT, and internship. There was a slight decrease in nondegree training courses after this period, when IRRI promoted in-country training in the 1990s to reduce the cost of training and increase efficiency and effectiveness. This enabled IRRI scientists and local partners to train more people in each country as well as adapt training courses and materials to local conditions. The trend picked up again in 2001-05. These nondegree training programs are classified into different research themes in Table 2. Annex Table 2 presents a detailed description of the nondegree training programs.

In general, many of IRRI's short-term group training courses were oriented toward research methodology and rice production technology and

included specialized courses on crop management, agronomy, and physiology; diseases and their management; pests and their management; postharvest and mechanization; and water management. In addition, the training curricula included socioeconomics and policy; training and knowledge management and sharing; English communication and presentation skills; scientific writing; data management and statistics; and geographic information systems. A majority of these courses were conducted only in some periods and they were replaced by more specialized training curricula. New training courses also evolved over time such as genetic resources; genomics; molecular biology; plant breeding, genetics, and transgenics; the women's leadership course, etc. In the period 2001-08, of the total of 2,443 trained personnel, 429 were in communication and presentation skills; 368 in experimental design, data management, and analysis; 261 in crop management, agronomy, and physiology; and 257 in plant breeding, genetics, and transgenics.

It is also interesting to note that the rice production training course that started in 1964 has been a regular training program at IRRI up to now[1] (Annex Table 2). Byrnes and Golden set up a program for IRRI's first rice production training course (Byrnes and Golden 1967), which became the basis for IRRI's Rice Production Training and Research Program (Chandler 1982). This program followed in the tradition of the Rockefeller Foundation's agricultural programs.

In the first half of the course, the trainees were involved fully in the grubby fieldwork of rice cultivation—from planting to harvesting (Borlaug and Dowswell 2001). Practical work was done in the morning and the afternoons were devoted to classroom studies, in which trainees were taught communication methods, particularly how to make the extension worker more effective in getting the farmer to move from the traditional to the modern way of growing rice (Byrnes and Golden 1967, Chandler 1982).

In the second part of the course, the trainees conducted applied research experiments in their home provinces and to help train a second group of Agricultural Productivity Commission employees who came to IRRI for a 6-month rice production course (Chandler 1982).

The trainees helped prepare the international nurseries that went out each year to national rice research programs in Asia and beyond (Borlaug and Dowswell 2001). In a personal communication with David Hopper, the authors quoted:

"The trainees became IRRI's best ambassadors to the farmer and the agricultural science community throughout the region. On the return of each to their home institutions, they brought back genetic material and the new practices to make this material more than double traditional 'best yields.' It was not just a revolution in rice production; for many in Asia, it was also a revolution in teaching applied agricultural practices."

[1]The course was adjusted from 6 months to 2 weeks. This training program actually stopped altogether in about 2005 and reinvented itself in a new form in 2007 as the Rice Research to Production Course. In addition, it will be re-emphasized in the future for both young scientists and extension leaders.

Learning to speak in a language that is understood by all is one of the challenges of working in a multicultural environment. When scholars, trainees, researchers, and co-workers have the ability to communicate successfully, the work environment is collectively enhanced. Furthermore, better oral communication skills create greater confidence, allowing speakers to be more articulate and accurate in sharing their ideas.

The development of communication skills is of utmost importance to developing the next generation of rice scientists who should all be skilled and confident in the design, conduct, and reporting of their research. Communication skills development will also help them become effective communicators in all aspects of their lives.

Trend in total number of participants

A majority of the training participants (72%) attended short-term group training courses while about 14% benefited from formal degree training courses (Tables 1 and 3). On-the-job trainees and interns also accounted for 14% of the total number of IRRI training participants. The rest were research fellows who came in more recent years.

Table 3 shows that more than 90% of IRRI training participants were from Asia (10,479), where 90% of the world's rice is produced and consumed, followed by Africa (534), Europe (227), North America (175), Latin America and the Caribbean (117), and Oceania (67).

In general, an increasing trend in the number of scientists who went to IRRI for training was observed from 1962-65 up to 1981-85. However, a downward trend was noted from 1996 through 2000 before it picked up again in 2000-05 at almost the same level as in 1981-85 (Fig. 1).

Number of participants by country

Almost all countries in the world with rice-related research and extension activities have sent at least one staff member to IRRI for training (Fig. 2). A detailed presentation of country-wise distribution of training participants by time period can be found in Annex Table 3, and by gender in Annex Tables 4 and 5. With IRRI's headquarters located in the Philippines, Filipinos took advantage of a sizable share of IRRI training opportunities, followed by scientists from India and Indonesia. It is also interesting to note that even at the height of the first Gulf war in the early 1990s, Iranian scientists came to IRRI for training.

Among African countries, a majority of the training participants were from Madagascar, Nigeria, and Tanzania. European trainees were mostly from Germany, The Netherlands, and United Kingdom. In North and Latin America, the U.S. and Cuba topped the number of participants who were sent to IRRI training, while, in Oceania, Fiji and Australia had the most IRRI trainees.

Number of participants by gender

Until recently, IRRI training programs have been basically male-dominated. A little over 20% of female scientists from NARES had the opportunity to undergo training in IRRI (Table 3). Asia has the highest number of male scientists who benefited from IRRI formal degree or nondegree and other need-based hands-on training programs.

Figure 3 shows the gap in access to training programs between male and female trainees. In general, male trainees prevailed over their female counterparts in terms of access to IRRI training opportunities. The gender disparity appeared to be wide beginning in the early 1960s and specifically in 1981-85, when access to training was at its highest

Table 3. Percentage of female participation by type of training and by region, 1962-2010.

Region	Type of training	Females	Males	Both	Percent females
Africa	MS	4	29	33	0.75
	PhD	2	19	21	0.37
	Intern/OJT	16	60	76	3.00
	Short course	46	358	404	8.61
	Subtotal	68	466	534	12.73
Asia	MS	174	553	727	1.66
	PhD	141	510	651	1.35
	Fellow	7	16	23	0.07
	Intern/OJT	317	1,081	1,398	3.03
	Short course	1,645	6,035	7,680	15.70
	Subtotal	2,284	8,195	10,479	21.80
Europe	MS	11	15	26	4.85
	PhD	6	27	33	2.64
	Intern/OJT	43	67	110	18.94
	Short course	24	34	58	10.57
	Subtotal	84	143	227	37.00
Latin America and Caribbean	MS	2	16	18	1.71
	PhD	0	3	3	0.00
	Intern/OJT	10	18	28	8.55
	Nondegree	9	59	68	7.69
	Subtotal	21	96	117	17.95
North America	MS	3	11	14	1.71
	PhD	8	28	36	4.57
	Intern/OJT	24	29	53	13.71
	Short course	23	49	72	13.14
	Subtotal	58	117	175	33.14
Oceania	MS	0	2	2	0.00
	PhD	1	3	4	1.49
	Intern/OJT	5	7	12	7.46
	Short course	8	41	49	11.94
	Subtotal	14	53	67	20.90
All regions	MS	194	626	820	1.67
	PhD	158	590	748	1.36
	Intern/OJT	415	1,262	1,677	3.58
	Short course	1,755	6,576	8,331	15.13
	Fellow	7	16	23	0.06
	Total	2,529	9,070	11,599	21.80

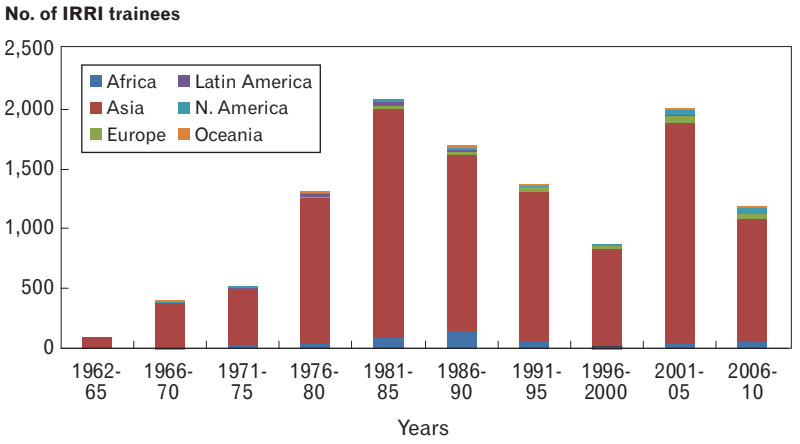

Fig. 1. Regional distribution of all IRRI training participants, 1962-2010.

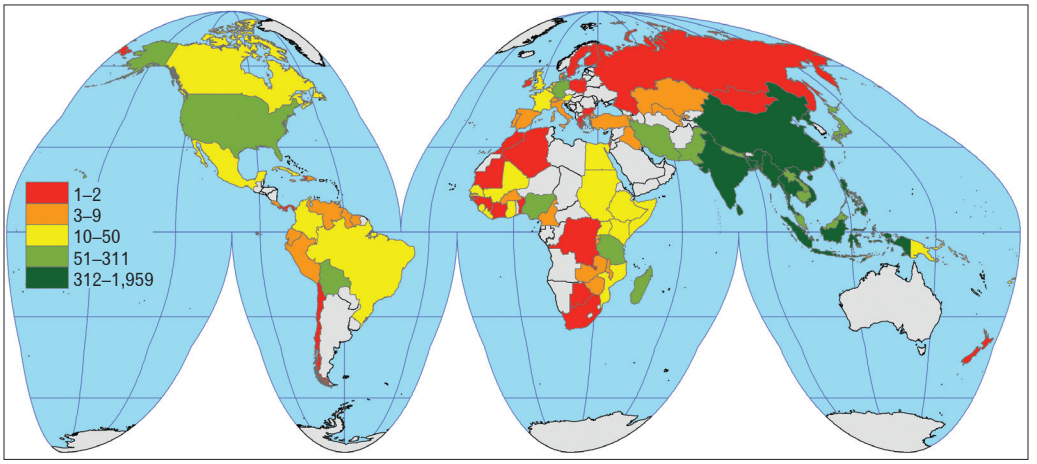

Fig. 2. Country-wise distribution of IRRI training participants, 1962-2010. (Map courtesy of IRRI GIS Lab.)

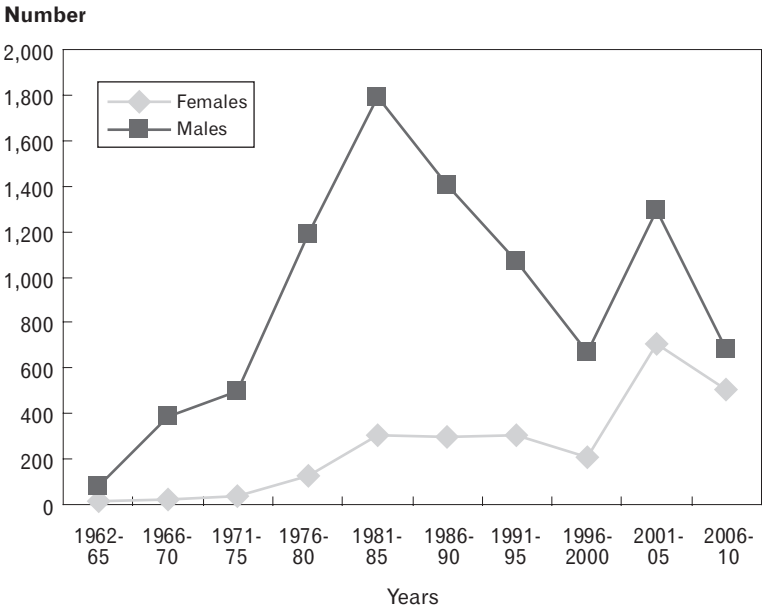

Fig. 3. Gap between male and female participation in all IRRI training programs, 1962 to 2010.

for male trainees. From 1996 onward, the gender gap in training opportunities has narrowed as more and more females attended IRRI training programs.

In recent years, IRRI has also focused on developing women leaders through training. Paris and Cabrera (2010) reported that, from 2002 to 2010, 160 women from 26 countries participated in the leadership training course for Asian and African women in agricultural R&D (Fig. 4). This leadership development program aims to develop the leadership skills of Asian and African women in agricultural R&D and extension to make them more effective agents of change in the agricultural sector. Interviews with women leadership training participants from 2002 on the outcomes of training on their personal and professional lives revealed that the training was very useful in boosting the morale of women, especially potential leaders. Some of the women leaders' responses are presented below:

"The training has made me competent in an assertive way and some colleagues are now jealous of me." (Bimala Sharma, Nepal)

"I am more confident and ready to accept challenges in [my] personal and professional life." (Abha Singh, India)

"My personality changed from being reserved and reluctant to being confident and open to new ideas." (Adela Voluntad, Philippines)

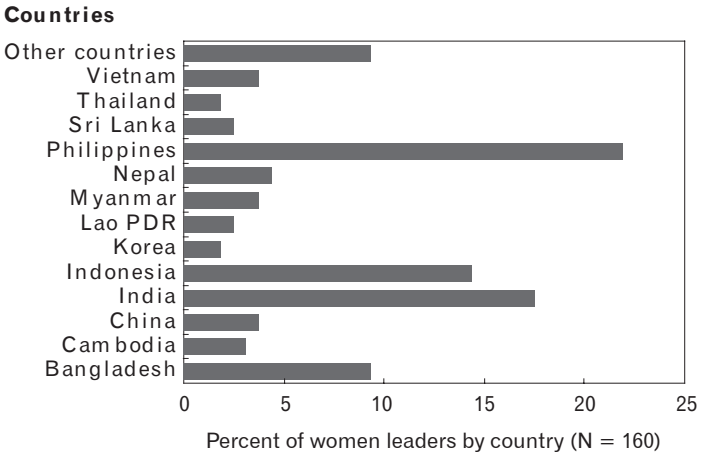

Fig. 4. Percent distribution of participants in the leadership course for Asian and African women in agricultural R&D, 2002 to 2010. Other countries include Burkina Faso, Mongolia, East Timor, Germany, Ghana, Japan, Kenya, Madagascar, Malaysia, Nigeria, Papua New Guinea, Solomon Islands, and Tanzania.
Source: Paris and Cabrera 2010.

"I am more motivated in my work and can serve as an example to other women that we can change the perceptions of women's role in the household, community, and in the world." (Lies Parede, Indonesia)

"I can now train other women specifically on the importance of personality development in the workplace." (Lina Chhay, Cambodia)

"I have now a better understanding of my personality, weaknesses, and my strengths and how I can improve on my weaknesses." (Lu Li, China)

"This course has helped a number of participants to become more assertive and less scared of speaking in public. It has also helped in realizing our strengths and overcoming our weaknesses and helped in networking." (V.L.V. Kameswari, India)

Table 4. Total number of IRRI degree scholars by gender, 1962-2010.

Gender	Years	MS	PhD	Both
Females	1962-65	1	1	2
	1966-70	6	0	6
	1971-75	7	2	9
	1976-80	14	8	22
	1981-85	31	12	43
	1986-90	25	15	40
	1991-95	24	26	50
	1996-2000	16	20	36
	2001-05	23	24	47
	2006-10	48	49	97
	Subtotal	195	157	352
Males	1962-65	29	0	29
	1966-70	65	9	74
	1971-75	70	30	100
	1976-80	99	57	156
	1981-85	153	80	233
	1986-90	85	88	173
	1991-95	54	106	160
	1996-2000	25	70	95
	2001-05	23	69	92
	2006-10	23	81	104
	Subtotal	626	590	1,216

IV. The graduate degree scholars, 1962 to 2010 (1,568 participants)

Degree scholars by gender

A total of 1,568 IRRI scholars completed their MS and PhD programs for the period 1962 to 2010 (Table 4). A little over 50% of the scholars obtained a master's degree and 48% completed a PhD. A majority of the graduate degree scholars were male (78%) and the rest were female (22%). Among all scholars, 40% were males finishing an MS, 38% were males finishing a PhD, 12% were females completing an MS, and 10% were females completing a PhD.

Figure 5 clearly shows an increasing trend in the number of female degree scholars from 1962-65 to 2006-10. Starting with only two degree scholars (1 MS and 1 PhD) in 1962-65, the number of female degree scholars rose significantly to 97 in the last period (Fig. 5A). In contrast, the trend in the number of male MS and PhD scholars appeared to follow a bell-shaped pattern. From a total of 29 male scholars in 1962-65, their number more than doubled in the succeeding 5-year period, and reached a peak of 233 scholars in 1981-85. After this period, the number of male scholars declined by almost 25%. This downward trend persisted until 2001-05, when only 92 male scholars were recorded. In the last period, a slight increase in the number of male scholars was observed. We further examined the trend in number of degree scholars by MS and PhD programs. Results are presented in Figure 5. There was clearly an increasing trend in the number of female degree scholars relative to their male counterparts. The number of male scholars at the MS level showed an increasing trend from 1962-65 to 1981-85 but declined significantly in subsequent periods (Fig. 5B). Almost the same pattern can be gleaned in the number of female scholars, except for 2006-10, when they exceeded by more than 50% the number of male scholars.

At the PhD level, the trend in number of male scholars steadily increased from the earliest period up to 1991-95 (Fig. 5C). Their number went down significantly by as much as 30% between 1996 and 2005. In the last period, the number of male scholars picked up again at 104. In contrast, the number of female PhD scholars has increased steadily throughout the years.

Age at completion of MS and PhD

We computed the age of scholars at the time of completing their masteral or

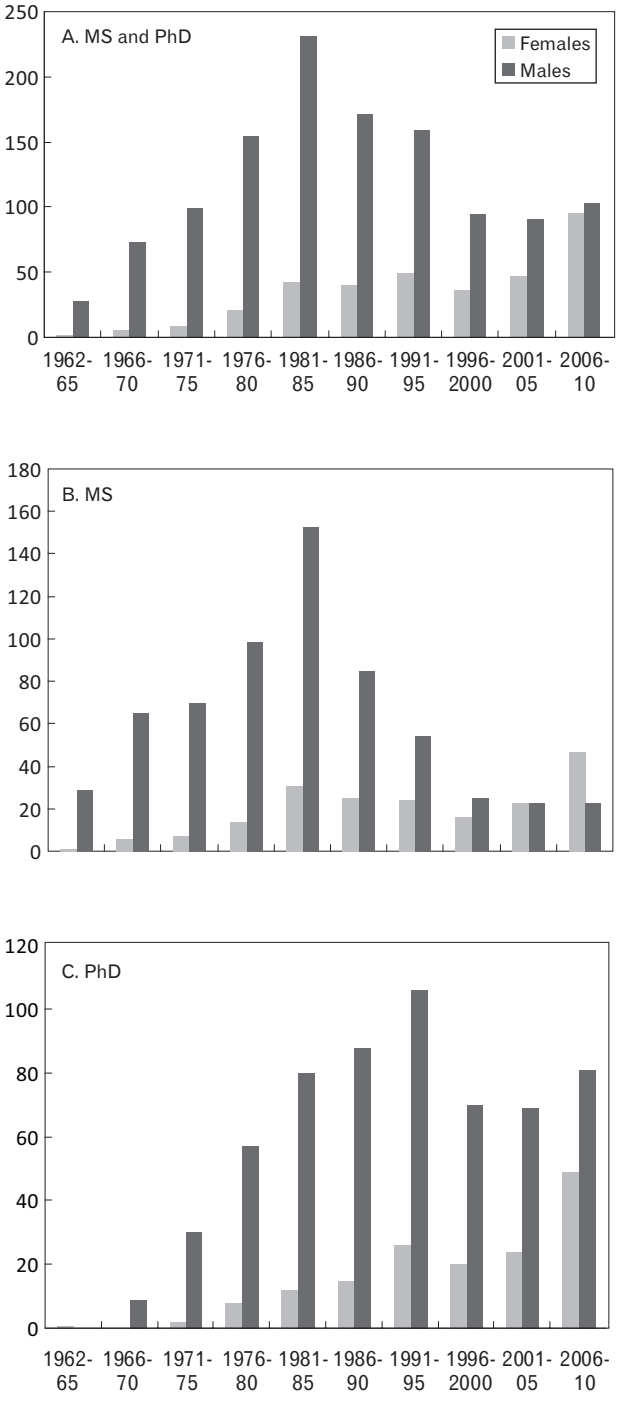

Fig. 5. Trend in number of IRRI degree scholars by degree and gender for (A) MS and PhD scholars, (B) MS scholars, and (C) PhD scholars, 1962-2010.

Table 5. Age of IRRI scholars at completion of degree by gender, 1962 to 2010.

Age	Females		Males	
	MS	PhD	MS	PhD
20–25	37	6	40	6
26–30	71	43	200	123
31–35	48	43	199	139
36–40	12	28	118	151
41–45	9	12	41	87
46–50	2	18	12	34
≥50	1	3	0	12
Mean	30.0	35.1	32.6	36.1

Table 6. Birth dates and ages of MS and PhD degree scholars, 1962-89.

Birth date	Age	MS		PhD	
		No.	Percent	No.	Percent
1924-35	>75	47	5.7	16	2.1
1936-40	70–74	90	11.0	34	4.5
1941-45	65–69	103	12.6	58	7.8
1946-50	60–64	132	16.1	94	12.6
1951-55	55–59	146	17.8	123	16.4
1956-60	50–54	88	10.7	118	15.8
1961-65	45–49	35	4.3	86	11.5
1966-70	40–44	35	4.3	43	5.7
1971-75	35–39	38	4.6	73	9.8
1976-80	30–34	43	5.2	39	5.2
1981-89	<29	31	3.8	21	2.8
No answer		79	9.6	59	7.9

doctoral degree programs in Tables 5 and 6. On average, female scholars were relatively younger when they completed their graduate degree programs than male scholars. A majority of the female scholars were between 26 and 30 years old when they received their MS and PhD, with a mean age of 30 and 35, respectively. Male scholars, on the other hand, were slightly older at a mean age of 32 and 36 upon completion of their MS and PhD, respectively.

Using the birth dates and ages of the IRRI MS scholars, the picture that emerges was that 45.4% of them had retired or passed away, 17.8% were preparing for retirement but still working, 23.9% or 196 were at the peak of their careers, while those 21 to 34 years old (9.0%) were in the build-up stage. This did not take into account those who had changed careers, stopped working, or had moved on. Twenty-four percent, a "liberal" estimate for those at the peak of their careers, is not a terribly encouraging situation for rice research, assuming all of them pursued this as their life's work. With respect to IRRI PhD scholars, 27.0% had retired, 16.4% were preparing to retire, 42.8% were at their "working peak," while 8.0% were in the build-up stage of their careers. Although this situation looks better than that of the MS scholars, it is not impressive in the global sense. We need more working lives in rice research and a promising pipeline of rice researchers in succession. It takes time to build a productive career; hence, efforts should be made now for the next 25 to 30 years ahead.

Field of specialization by degree and gender

In consultation with senior scientists from different disciplines at IRRI, we have come up with 12 major categories of field of specialization: 1 = crop management, agronomy, and physiology; 2 = diseases and their management; 3 = genetic resources; 4 = genomics, bioinformatics, and molecular biology; 5 = pests and their management; 6 = plant breeding, genetics, and transgenics; 7 = postharvest and mechanization; 8 = socioeconomics and policy; 9 = soils and nutrient management; 10 = training and "knowledge management and sharing"; 11 = water management; and 12 = GIS, statistics, meteorology, and chemistry. Figure 6 presents the different fields of specialization of IRRI scholars by gender.

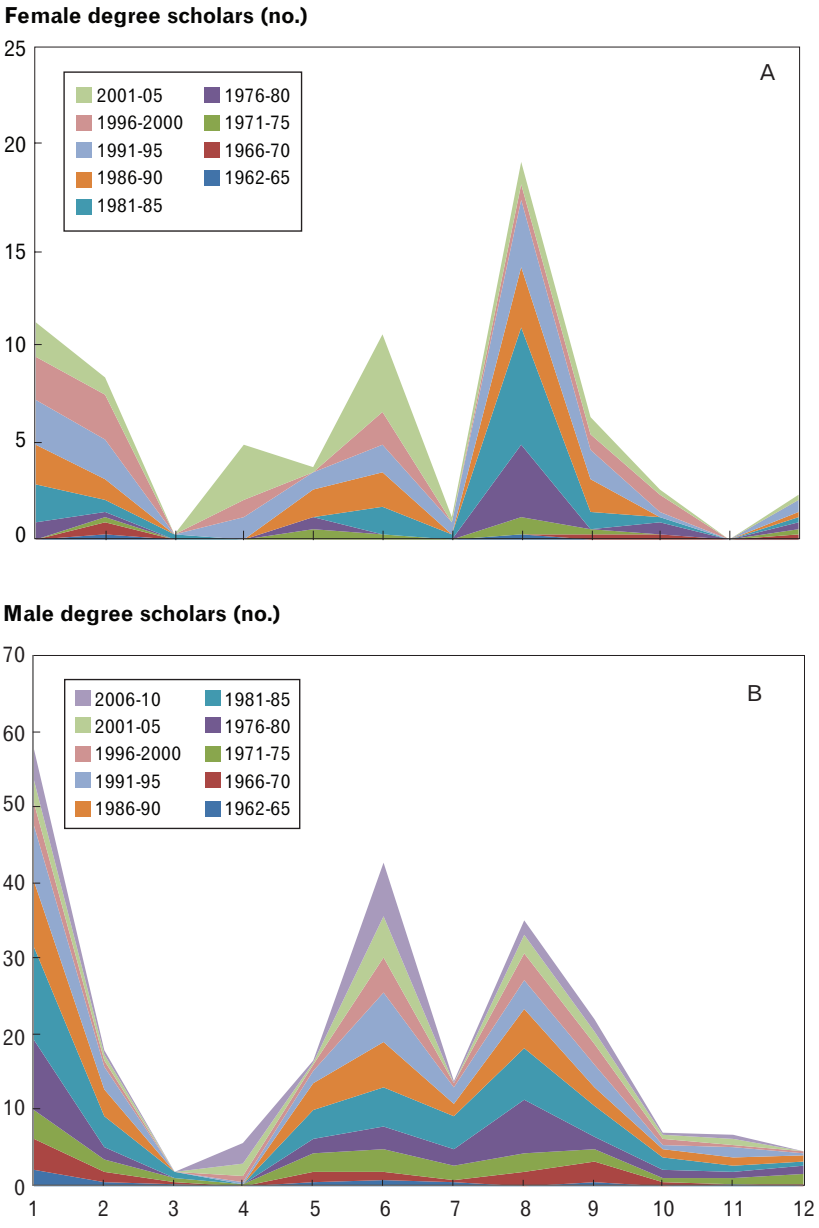

Fig. 6. Major field of specialization of female (A) and male (B) IRRI degree scholars, 1962-2010. 1 = crop management, agronomy, and physiology; 2 = diseases and their management; 3 = genetic resources; 4 = genomics, bioinformatics, and molecular biology; 5 = pests and their management; 6 = plant breeding, genetics, and transgenics; 7 = postharvest and mechanization; 8 = socioeconomics and policy; 9 = soils and nutrient management; 10 = training and "knowledge management and sharing"; 11 = water management; 12 = GIS, statistics, meteorology, and chemistry.

Among female degree scholars, socioeconomics and policy; plant breeding, genetics, and transgenics; and crop management, agronomy, and physiology ranked as the first, second, and third choice of major field. Also gaining importance over time are the areas of diseases and their management; genomics, bioinformatics, and molecular biology; and soils and nutrient management.

The exact opposite pattern in major field of specialization can be gleaned from among the male scholars. The three most studied fields among male scholars in order of importance were crop management, agronomy, and physiology; plant breeding, genetics, and transgenics; and socioeconomics and policy. Similarly, it seems that the fields of soils and nutrient management, and crop protection (diseases and insect pests) are gaining ground, with the other major fields of specialization becoming less and less prevalent among IRRI scholars.

Looking at trends in major fields, female scholars in the early years opted to specialize in the area of diseases and their management. From 1976 to 1995, female scholars generally tended to major in socioeconomics and policy. Toward the later period, female scholars explored other areas such as crop management, agronomy, and physiology; diseases and their management; genomics, bioinformatics, and molecular biology; and plant breeding, genetics, and transgenics. The latter recorded an increasing positive growth over time as a major field of study among female scholars. The trends in enrollment in crop management, agronomy, and physiology, and diseases and their management were steady in sharp contrast to socioeconomics and policy, which have been declining since 1996.

Among male scholars, there was a steady growth in the number of people specializing in plant breeding, genetics, and transgenics over time. It was interesting to note that socioeconomics and policy gained importance between 1976 and 1990. However, the trend in number of scholars specializing in socioeconomics and policy, and crop management, agronomy, and physiology continued to drop over time.

Regional location of universities attended by IRRI scholars

IRRI degree scholars attended various universities across regions for their MS and PhD programs and conducted their thesis work at IRRI. The universities in Asia and North America played an important role in shaping the graduate programs of many IRRI scholars (Table 7 and Fig. 7). Eighty percent of the scholars attended universities in Asia, followed by North America. However, since 1996, the number of scholars attending North American universities has dropped off sharply. The complete list of universities by country and region attended by IRRI scholars from 1962 to 2010 is presented in Annex Tables 6 and 7. The top universities reported were the following:

1. University of the Philippines Los Baños (UPLB), Philippines
2. Central Luzon State University, Philippines
3. Cornell University, USA
4. University of the Philippines Diliman, Philippines
5. University of California, USA, and Wageningen University, Netherlands
6. Indian Agricultural Research Institute, India
7. Asian Institute of Techonology, Thailand, and Bangladesh Agricultural University, Bangladesh
8. University of Hawaii, USA
9. Kasetsart University, Thailand
10. Oregon State University, USA, and Gregorio Araneta University Foundation, Philippines

Table 7. Regional location of universities attended by IRRI graduate degree scholars, 1962-2010.

Years	Regional location of universities							
	Africa	Asia	Europe	LAC	North America	Oceania	No data	Total
1962-65	0	28	0	0	2	0	1	31
1966-70	0	68	1	0	11	0	0	80
1971-75	0	81	2	0	25	1	0	109
1976-80	0	137	5	0	33	2	2	179
1981-85	4	207	16	0	38	3	8	276
1986-90	1	171	9	0	23	1	8	213
1991-95	1	151	15	1	24	7	11	210
1996-2000	1	112	9	0	2	7	0	131
2001-05	1	124	12	0	2	0	0	139
2006-10	0	177	5	0	6	5	7	200
Total	8	1,257	74	1	166	26	37	1,568
Percent	0.5	80.2	4.7	0.1	10.6	1.7	2.4	100.0

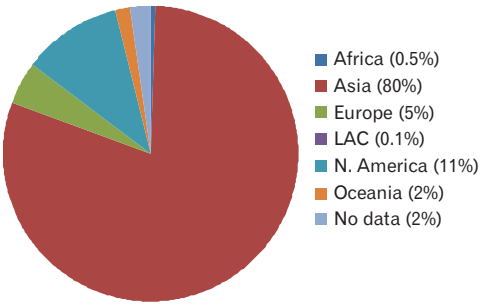

Fig. 7. Percent regional location of universities attended by IRRI degree scholars, 1962-2010. LAC = Latin America and the Caribbean.

The top ten countries with the highest number of IRRI degree scholars were the Philippines, Bangladesh, China, India, Thailand, Nepal, Vietnam, Indonesia, Sri Lanka, and South Korea (Table 8). Except for the Philippines and India, most IRRI degree scholars chose to enroll in foreign universities rather than in their own country universities and conducted their thesis work at IRRI under the supervision of IRRI senior scientists. Within Asia, Philippine universities enjoyed a sizable share, ranging from 38% to 96% of IRRI degree scholars' enrollment.

Table 8. University choice of IRRI MS/PhD scholars from the top ten countries with the highest number of IRRI scholars, 1962-2010.

Scholars' origin	No. reporting	Global share of universities (%)		Share of Philippine universities within Asia (%)
		Local	Foreign	
Philippines	287	78.0	22.0	94.9
Bangladesh	178	12.4	87.6	79.6
China	144	38.9	61.1	59.0
India	105	56.2	43.8	37.1
Thailand	102	15.7	84.3	82.8
Nepal	81	1.2	98.8	96.3
Vietnam	79	5.1	94.9	94.5
Indonesia	66	4.5	95.5	94.6
Sri Lanka	63	14.3	85.7	66.7
South Korea	49	22.4	77.6	76.1

IRRI scholars who rose to leadership positions

Many of IRRI's former degree scholars have risen to prominent positions. Among them are the 2010 IRRI Outstanding Alumni (Molina and Clayton 2010) (see photo):

- Dr. Jikun Huang, founder and director of the Center for Chinese Agricultural Policy (CCAP), Chinese Academy of Sciences, China.

From left to right: Dr. Phan Hieu Hien, Dr. Jikun Huang, University of the Philippines President Emerlinda Roman, Dr. Jose Hernandez, and Dr. Tin Htut.

- Dr. Phan Hieu Hien, affiliate researcher, Center for Agricultural Energy and Machinery, Nong Lam University, Vietnam.
- Dr. Jose Hernandez, professor and director, Crop Science Cluster, College of Agriculture, University of the Philippines Los Baños (UPLB), Philippines.
- Dr. Tin Htut, deputy director and head breeder, Rice Research Division, Department of Agricultural Research, Ministry of Agriculture and Irrigation, Myanmar.

Table 9 lists prominent alumni from selected Asian countries.

V: A case study of 50 degree scholars

This section presents the results of the survey of a subset of IRRI scholars from 1996 to 2006. A little over 25% of the total number of scholars who completed their graduate degree programs from 1996 to 2006 (or 50 respondents) participated in the online survey conducted in 2010. The procedure for selecting this number is described in Section I above under "Data and methods." This number was the basis of the more detailed analysis of the impact of IRRI training on NARES and their future training needs.

Gender and degree completed

Seventy percent of the respondents were males and 58% had a PhD (Table 10). Female scholars, on the other hand, had about the same proportion of MS and PhD holders.

Table 9. List of prominent IRRI alumni from selected Asian countries.[a]

Country/prominent alumni	Highest local position held
A. Philippines	
Agcaoili-Sombilla, Mercedita	Manager, RDD SEARCA
Aspiras, Ruben B.	Chancellor, UPLB
Bautista, Eulito U.	Deputy Executive Director, PhilRice
Cuyno, Rogelio V.	Chancellor, UP Mindanao
David, Cristina C.	Head, IRRI Social Sciences Division
Deomampo, Narciso R.	Dean, CEM, UPLB
Eugenio, Teofilo S.	Director, Maligaya Rice Research and Training Center
Hernandez, Jose E.	Director, IPB and Crop Science Cluster, UPLB
Lantin, Reynaldo M.	Dean CEAT, UPLB
Malabanan, Frisco	Undersecretary, Department of Agriculture
Navarro, Rex L.	Director, UPLB Institute of DevCom
Paris Jr., Tirso B.	Dean, CEM UPLB
Sebastian, Leocadio S.	Executive Director, PhilRice
Torres, Remegio D.	Team Leader of Consultants, Asian Development Bank
B. Bangladesh	
Ahmad, Munshi Siddique	Reputed scientist and rice breeder
Ahmed, Dilruba	Reputed researcher and Director, CEGIS
Akhanda, Md. Abdul Muttalib	Director, Bangladesh Academy for Rural Development
Alam, Mohammad Shamsul	Reputed researcher and Director, CEGIS
Alam, Shamsul	Reputed scientist
Baqui, Md. Abdul	Director General, BRRI
Bhuiyan, Nurul Islam	Reputed scientist and former DG, BRRI
Chaudhury, A.J.M. Enamul Huq	Director of Research, BRRI
Erfan Ali, Sk. Md.	Director General, Sugarcane Research Institute
Hamid, Abdul	Reputed scientist and former Dean of Agriculture and Professor, BSMRAU
Haq, Khondaker A.	Reputed scientist
Haque, M. Mahiul	Director General, BRRI
Islam, A.J.M. Azizul	Reputed scientist and DG, BRRI
Nur-E-Elahi, Md.	DG, BRRI
Rahim, Kamal	Director, BRRI
Salam, Md. Abdus	Director, BRRI, and consultant, BRAC
Samsuzzaman, Syed	Director, Natural Resources, RDRS, a leading NGO
Sharifullah, Abul Kalam	Director, Bangladesh Academy for Rural Development
Siddique, Shafiul Bashar	DG, BRRI
Talukder, Md. Shahid Ullah	Professor and Coordinator for Advanced Studies, Bangladesh Agricultural University
Ziauddin, Abu Taher Md.	Professor and Dean of Engineering, Bangladesh Agricultural University

Continued on next page

Table 9 continued.

Country/prominent alumni	Highest local position held
C. Vietnam	
Dam, Ngo Doan	DDG, FCRI, MARD
Don, Nguyen Manh	DG, Science, Technology & Economics, VUSTA
Du, Pham Van	DDG, DoCP, MARD
Hien, Bui Huy	DG, NISF, and Editor-in-chief, Agricultural Magazine, MARD
Hien, Phan Hieu	Affiliate researcher, Center for Agricultural Energy and Machinery, Nong Lam University
Hinh, Nguyen Tan	DDG, DoSTE, MARD
Hoa, Tran Thi Cuc	Head, Biotechnology Division, CLRRI, MARD
Hoe, Lai Dinh	DDG, ASISOV, MARD
Lang, Nguyen Thi	Head, Plant Genetic Resources Division, CLRRI, MARD
Phung, Mai Thanh	DDG, NAEC, MARD
Tam, Hoang Minh	DG, ASISOV, MARD
Trinh, Bui Xuan	Secretary to Prime Minister and DDG, Economic Department, Government Office
Thien, Tran Chi	Rector, Thai Nguyen Economic & Admin. Management University
Xuan, Vo Tong	Rector, An Giang University and IRRI BOT member
D. China	
Jikun, Huang	Founder and Director of the Center for Chinese Agricultural Policy (CCAP) of the Chinese Academy of Sciences (CAS)
Tang, Shengxiang	IRRI Liaison Scientist
Ye, Zhihua	DG & Professor, Institute of Quality Standards & Testing Technology for Agroproducts, CAAS
Zhang, Linxiu	Professor and Deputy Director of CCAP of CAS

[a]See full names of institutions in Abbreviationa and Acronyms on pages v and vi.

Table 10. Distribution of 50 IRRI scholars by gender and degree completed.

Gender	Degree completed	
	MS	PhD
Males	6	29
Females	7	8
Total	13	37

Gender and country of origin

The gender distribution by country of origin shows that male scholars from China (16), India (10), and Bangladesh (8) were more predominant than the ones from other Asian or African countries (Table 11). Among female scholars, the Philippines had the most respondents.

Field of specialization

Table 12 shows a wide range of disciplines in which both male and female scholars specialized. Foremost among male scholars were plant breeding, genetics, and transgenics as well as genomics, bioinformatics, and molecular biology and crop management,

Table 11. Gender distribution of 50 IRRI degree scholars and their country of residence upon admission at IRRI.

Country of residence	Males	Females	Total
Bangladesh	4	1	5
Cambodia	1	1	2
China	8	1	9
Ethiopia	1	–	1
Ghana	1	–	1
India	5	2	7
Indonesia	–	1	1
Iran	3	–	3
Japan	1	–	1
Lao PDR	1	–	1
Madagascar	1	–	1
Myanmar	2	–	2
Nepal	1	c	1
Philippines	3	7	10
South Korea	1	1	2
Tanzania	2	–	2
Vietnam	–	1	1
Total	35	15	50

Table 12. Distribution of 50 IRRI degree scholars by field of specialization.

Field of specialization	Males	Females	Total
Crop management, agronomy, and physiology	6	3	9
Diseases and their management	3	3	6
Genetic resources	1	1	2
Genomics, bioinformatics, and molecular biology	8	2	10
Plant breeding, genetics, and transgenics	10	2	12
Socioeconomics and policy	3	2	5
Soils and nutrient management	4	2	6
Total	35	15	50

agronomy, and physiology. Likewise, female scholars majored in crop management, agronomy, and physiology, and in diseases and their management. Plant breeding and crop management that used to be male-dominated fields are now considered as areas of specialization by female scholars.

Age at completion of MS and PhD

Almost the same trend was observed for the surveyed alumni. A majority of the scholars completed their MS between age 26 and 35 and the PhD program between age 36 and 40 (Table 13).

Location of universities where scholars obtained postgraduate degrees

Most of the scholars who went to IRRI for postgraduate degree training enrolled in Philippine universities (Table 14), notably, the University of the Philippines Los Baños. Other universities in China and India also figured prominently as a choice for higher degree training.

Post-IRRI employment

Most IRRI scholars, whether male or female, found employment in government and national rice research institutes in their own countries after completing their postgraduate training

Table 13. Age of 50 IRRI degree scholars at completion of MS and PhD degree.[a]

Age group	Percent of scholars in the age group	Completed MS within the age range	Completed PhD within the age range
< 25	2	2	0
26–30	24	8	16
31–35	24	8	16
36–40	26	6	20
41–45	18	2	16
≥46	6	0	6

[a]Mean age: 36, minimum age: 23, maximum age: 48.

Table 14. Country location of universities where the 50 IRRI degree scholars attended postgraduate studies.

University location	Degree		Total
	MS	PhD	
Bangladesh	–	1	1
China	–	7	7
India	–	7	7
Iran	–	2	2
Japan	–	1	1
Philippines	13	16	29
Australia	–	2	2
Netherlands	–	1	1
Total	13	37	50

Table 15. Distribution of 50 IRRI degree scholars by gender and type of institution where they are employed.

Institution type	Males	Females	Total
Government/national rice research institute	14	5	19
Nongovernment organization	3	1	4
Local university	6	4	10
Foreign university	3	1	4
International research center	6	3	9
Private company	3	1	4

at IRRI (Table 15). Some scholars opted to teach in local universities while others were hired as scientists or postdoctoral fellows in international research centers. A few others were posted in nongovernment organizations, foreign universities, and private companies.

Outcomes and impacts of IRRI training and learning

Publication after postgraduate degree training. Respondents were asked to enumerate their five most important publications and the results are presented in Table 16. More than 50% of the

Table 16. Ranking by 50 IRRI degree scholars of their five most important types of publications.

Type of publication	1st	2nd	3rd	4th	5th
Conference/ workshop proceedings	3	2	2	3	3
Refereed article in international journal	25	20	16	7	5
Refereed article in national journal	4	5	4	5	2
Book chapter	3	2	3	4	
Occasional paper/ monograph/ discussion paper	1	1	1		1
Annual report	1	1	1		
Newsletter		2			

respondents reported publishing in international refereed journals as an offshoot of their IRRI training. Others were able to publish in peer-reviewed national or local journals and some others authored papers in conference or workshop proceedings.

Perception of training effectiveness in terms of achieving personal, institutional, and broader goals. Many positive outcomes at a personal level and institutional level were rated "to a large extent" by the respondents (Table 17). The same was true for questions pertaining to wider IRRI goals, which were all rated "to a large extent" in enabling respondents to contribute to broader objectives.

It can be argued that respondents to questionnaire were likely to be positively disposed toward the training and learning experience they had experienced. However, other reports (Shrestha et al 2002, 2006) confirm these responses from NARES interviews as representative of those IRRI alumni who have remained with their NARES.

In many areas, the respondents rated "to a large extent" that their IRRI training helped them to get acquainted with IRRI scientists, employ improved

Table 17. Perceptions of 50 IRRI degree scholars about IRRI's training effectiveness in terms of achieving personal, institutional, and broader goals.

Questions	To a large extent	To some extent	Not at all
Which of the following resulted from your training at the personal level?			
Taking on new tasks with higher responsibility	40	9	1
Increased ability in research priority setting and problem orientation	47	3	–
More research output (innovations, publications) from your work	41	9	–
Increased participation in collaborative research activities	37	12	1
Encouraged to undertake further training and education	31	15	4
Increased skills in project planning and fund raising	31	13	6
How important was your training in enabling you to contribute to changes at the level of your institution?			
Incorporation into research networks	37	9	3
Improved priority setting	33	15	2
New interinstitutional linkages	35	13	2
Better access to information	42	7	1
Funding new projects	21	18	9
How important was your IRRI learning experience to enable you to contribute to the following broader objectives?			
New scientific knowledge	47	3	–
New work perspective	47	3	–
New technologies	42	8	–
Farmers/consumers benefited	29	21	–

tools and techniques, and improve their English communication and presentation skills as well as scientific writing skills (Table 18).

Constraints in the workplace

Scholars were asked if they had encountered any constraint or factor that prevented them from realizing their full potential at work after they returned to their home institution. Fifty-two percent of the returning scholars reported a number of constraints in the workplace but did not consider them to be too severe (Table 19). Among the most important constraints cited was the lack of an operating budget in conducting their research activities, followed by a lack of appropriate facilities and equipment and inadequate support from their superiors.

Steps that IRRI needs to take to strengthen and plan its future activities in relation to training and capacity strengthening of NARES

IRRI plays an important role in helping strengthen NARES capacity. NARES rely on IRRI not only for the provision of research opportunities, but also as an institution where NARES can work with and learn from highly experienced research scientists. Interestingly, there is still a high demand from NARES for IRRI publications aside from obtaining opportunities for further education and training (Table 20).

Those who have worked for an MS or PhD at IRRI are potentially very important to the Institute, for example, in helping to extend rice technologies and promote policies. Awarding outstanding IRRI alumni at the recent 3rd World

Table 18. Ranking by 50 IRRI degree scholars of the degree to which IRRI training has contributed to the different attributes.

Item	To a large extent	To some extent	Not at all	No answer
Acquaintance of peers/scientists	41	8	–	1
Earning awards/recognition	26	21	3	–
Employment of improved tools, technologies, techniques, etc.	40	9	–	1
Improved English communication and presentation skills	42	6	2	–
Invitation to IRRI-organized meetings	18	17	13	2
Job promotion/new career opportunities	27	19	3	1
Publication in peer-reviewed journals	25	20	3	2
Obtaining research grants	14	19	14	3
Improved scientific/ technical writing skills	42	8	–	–

Table 19. IRRI degree scholars' ranking of 50 reported constraints experienced in the workplace.[a]

Constraint	No. reporting	
	Severe	Not severe
Inadequate research skills	13	11
Lack of facilities/equipment	18	2
Lack of operating budget	16	3
Lack of access to up-to-date research information	16	6
Inadequate support of superior(s)	15	4
Concepts learned not adaptable to local conditions	6	18
Training not appropriate to present job	4	18
Other responsibilities (e.g., administrative)	14	7

[a]Only 22 out of 50 IRRI degree scholars reported having experienced constraints in the workplace. Some gave more than one answer.

Table 20. Ranking by 50 IRRI degree scholars of the steps that IRRI needs to take to strengthen and plan its future activities in relation to training and capacity strengthening of the NARES.

Steps	Highly important	Important	Somewhat important	Not important
Provision of research opportunities at IRRI	31	4	1	–
Support from former supervisor or mentor	21	5	–	–
Interaction with IRRI scientists	25	5	–	–
Availability of equipment, facilities, resources	26	5	3	–
Learning/working with experienced IRRI researchers	30	5	2	–
Availability of/access to IRRI publications	28	5	2	–
Further training and education opportunities	27	8	1	–

Table 21. Ranking by 50 IRRI degree scholars of NARES current capacity and demand for IRRI training/future training needs.

Item	NARES research capacity		Demand for IRRI training	
	Strong to very strong	Not so strong	Important to highly important	Less important
Crop management, agronomy, physiology	29	14	35	8
Diseases and their management	25	18	29	14
Genetic resources	23	20	35	8
Genomics, bioinformatics, and molecular biology	19	24	41	2
Pests and their management	26	17	35	8
Plant breeding, genetics, and transgenics	22	21	37	6
Postharvest and mechanization	15	28	29	14
Socioeconomics and policy	19	24	15	28
Training and "knowledge management and sharing"	21	22	41	2
Water management	17	26	35	8

Rice Congress in Hanoi, Vietnam, was an important step in recognizing the contribution that such alumni make to IRRI. Efforts should be made to maintain contact with a select few (e.g., providing a free copy of *Rice Today* or inviting them to IRRI-sponsored workshops), recognizing them as part of the extended IRRI family.

Future demand for IRRI training

Table 21 presents NARES demand for training. The NARES reported that they already have relatively strong to very strong capacities in conducting research in diseases and their management (25%), pests and their management (26%), and crop management, agronomy, and physiology (29%) but they are relatively weak in the area of postharvest and mechanization (15%).

There was a very strong demand for IRRI training on genomics, bioinformatics, and molecular biology; and plant breeding, genetics, and transgenics. NARES need to make a stronger effort to clearly articulate their research and training needs. This can improve the effectiveness of cooperation with IRRI.

VI. Impact of IRRI training on selected Asian countries

IRRI's efforts in research as well as in training are largely focused on trying to produce institutional impact (Raab et al 1998). IRRI can generate only knowledge and technology; it cannot generate higher incomes or feed people more adequately (IRRI 1996). Following Raab et al (1998), we looked at the institutional impact of IRRI's training on selected Asian countries based on the following questions:

- Has IRRI's training program contributed to the development of rice science and rice-related knowledge and technology?
- Has IRRI's training program contributed to the dissemination of rice-related knowledge and technology?

- Has the Institute's investment in training contributed to the development of national rice research systems?

Bangladesh (1964 to 2010)

One of IRRI's most significant contributions in Bangladesh was building its human scientific capacity through training. As early as the 1960s, training was one of the major activities of IRRI in Bangladesh. In 1964, the first batch of Bangladeshi scientists was sent to UPLB and to Texas A&M University for graduate degrees. Since then, there has been a regular flow of trainees.

Besides agricultural scientists, BRRI also sent senior agricultural scientists and planners on short-term training trips. Some of these trips involved visits to IRRI, which led to firsthand experiences with developed techniques, and to the Philippines or Japan to see how the techniques were being applied by rice farmers.

From 1964 to 2010, IRRI hosted a total of 180 Bangladeshi scholars. Of this number, 98 were PhDs and 82 had an MS. IRRI is continuously providing ongoing training and capacity-building support to Bangladesh. By collaborating on a wide scope of research, including developing better rice varieties, strengthening rice-based farming systems, and improving crop cultivation practices, Bangladesh raised its level of rice production and minimized the intensity of food insecurity during major floods and monsoons.

Bhutan (1990 to 2004)

Shrestha (2004) reported that IRRI's rice research and technology development program in Bhutan was successful in increasing rice production and farm income and in improving food security. Annual rice imports stabilized despite population growth. Improved MVs were released and adopted and so were crop management practices. Adopters had higher income than nonadopters and crop diversification to higher-value cash crops took place. Sixty-eight percent rice self-sufficiency was achieved.

Institutionally, the program played a critical role in building the research capacity of Bhutan. A total of 182 training opportunities were made available and the staff provided critical inputs to national-level planning and policy-making in the agricultural sector.

Another insightful study about Bhutan was done by Gementiza (1992), who used multiple data-gathering techniques to evaluate IRRI's training and technology transfer course (T3C) in Bhutan. Her evaluation was conducted at (1) the IRRI participants' level, (2) in-country participants' level, and (3) farmers' level. Results show that Bhutanese scientists trained in T3C at IRRI and those who were trained in-country shared the same positive views about the usefulness of T3C, especially in dealing with their farmers, in both training and nontraining functions. T3C has established an initial base in building training capacity among the country's extension personnel. Moreover, the farmers' case study, although not conclusive, has shown strong indications that T3C's contributions reached the farmers' level. In areas where an agricultural project was going on and where the extension agents were concentrated, farmers adopted the new rice technology introduced to them. However, the author claimed that the objectives of the course were not fully met because of either nonuse or underuse of acquired T3C knowledge and skills. Training validity was more likely to be affected by the incompatibility of the training and the work organization.

Cambodia (1987 to 2001)

In response to Cambodia's critical food security situation, the Cambodia-IRRI-Australia Project (CIAP) started in 1987 with the aim of increasing the country's

rice production and productivity of rice-based production systems. The Raab and Abdon (2000) study on the impact of CIAP's human capital development and information efforts, 1987-99, was a good model for assessing the impact of investments in human capital development from the national perspective, using the country's database, their direct experience, and knowledge about the contributions of IRRI-related alumni. The authors assessed CIAP's impact on three levels: (1) in terms of the project's training and information dissemination accomplishments—numbers and categories of beneficiaries of project-sponsored training; (2) institutional impact—the degree to which the training has contributed to improved individual and/or organizational performance; and (3) production impact resulting from collective efforts of CIAP alumni.

Raab and Abdon (2000) went on to provide an overview of each of the three levels of impact.

- On accomplishments
  CIAP had directly supported close to 6,000 training opportunities (13% for women) for over 1,600 individuals (12% women) since its inception in 1987. Beneficiaries came from all of the project's direct organizations and also included substantial numbers of representatives from development agencies and national academic institutions. On average, these individuals were able to attend three training events apiece through a variety of mechanisms, including nondegree training (abroad and in-country), degree training, local and international conferences, and study tours.

  A major focus of the training was on developing a core of scientific expertise at the national level and the staff of the newly recognized Cambodian Agricultural Research and Development Institute (CARDI) was given particularly intensive attention. CARDI staff received an average of 16 opportunities apiece, including years of OJT and 12 postgraduate training opportunities. They represented 60% of the 42 individuals going on study tours and benefited from 90% of the 31 opportunities provided to attend international conferences.

  Efforts to produce and distribute training and information materials in various formats were considerable. These involved training manuals, glossaries, books, skills booklets, reports, videos, surveys, maps, and technical bulletins. A Web site (www.bigpond.com.kh/users/ciap/) was also developed for the project. It contained a description of the project, staff contact information, links to other sources of information, copies of the CIAP Bulletin, a publication list, the soil map of Cambodia, training opportunities, and a notice board for upcoming events.
- On institutional impact
  CIAP's main objective was to develop and strengthen capacity within the Ministry of Agriculture, Forestry, and Fisheries (MAFF), provincial agricultural offices (PAOs), and NGOs to provide technologies in support of Cambodian rice farmers. CARDI is perhaps the most visible outcome of this effort and its human resources are its greatest asset. CARDI staff members are now conducting high-quality research, they publish in national and international journals, and

they have strong working ties with national and international colleagues. But, the project was also instrumental in developing national capacity in a wide range of other government and nongovernment institutions. Alumni of CIAP training indicated that their training contributed to the quality of their work, gave them new knowledge and skills, enabled them to network with others, and increased their confidence in dealing with colleagues and farmers.

The output of this large network of CIAP-trained individuals was extensive and impressive. This included released varieties, foundation seed, alternative cultivation options, soil-based fertilizer recommendations, pest management practices, improved land preparation options, baseline surveys, and a national training program. The project also developed a wide range of reference collections, materials, and germplasm.

- On production impact CIAP's most important contributions were in the area of developing widespread and networked indigenous capacity to develop and disseminate knowledge and technologies. This was instrumental in empowering others, disseminating information, and facilitating priority activities. Training was a key factor in bringing this about.

  There was also a strong indication that the research products associated with the project reached farmers and were applied over increasing areas of their fields. These included varieties for both dry- and wet-season cropping, increased and more efficient use of inorganic fertilizer, more ecologically friendly pest management practices, and greater appreciation of the benefits of improved land preparation for optimum management practices.

  These findings were corroborated by Young et al (2001). In their report, the authors mentioned that CIAP's greatest impacts were in the introduction and promotion of new high-yielding varieties (HYVs), the selection of superior traditional varieties, integrated nutrient management (INM), and the training activities associated with these innovations. Demonstrated impacts can be divided into two categories: (1) in terms of the economic and nutritional impacts at both the household and national level, and (2) in terms of the outcomes that have resulted from collaborative efforts with other parties. CIAP's success has been dependent on strong working relationships with many other parties (NGOs, donor-funded projects) since these other parties have been key channels for the dissemination of new technologies to farmers. It was found, for example, that on-farm adaptive trials were more useful in demonstrating new technologies to NGOs and extension workers, who were then responsible for the dissemination of improved technologies.

  Likewise, Norris (2001) claimed that CIAP's most important contribution to NGOs was capacity building and training. CIAP offered

tailored training courses and seminars attended by NGOs for skills development. These skills strengthened NGO capacity to develop and adopt science-based agricultural activities that reflect NGO priorities. CIAP also conducted collaborative research with NGOs in the form of farm trials, demonstrations, and farming systems research. CIAP also played a role as a technical backstopping agency for the NGOs.

NGO impact on CIAP came in the form of expanded opportunities for CIAP to test new technologies in farmers' fields and to access grass-roots networks that reach hundreds of thousands of farmers, enabling the rapid spread of technologies and management through farmer-to-farmer exchange. NGOs of all sizes rely heavily on CIAP publications in developing rice-related projects. NGOs have also influenced CIAP's willingness to undertake farmer participatory research.

India (1964 to 2010)

The success in India and IRRI's partnership began with the introduction of the high-yielding IR8 rice variety dubbed "miracle rice," which helped save India from a massive famine in the 1960s. This was only the beginning of a productive partnership that led to more than 400 improved rice varieties with resistance to pests and diseases, streamlined rice production practices, and extensive information exchange with Indian scientists along with capacity building.

Hybrid rice research was also a significant stride in the partnership in which IRRI's support to India helped in its success in becoming second after China to commercialize hybrid rice. India has an extensive partnership with IRRI, in which around 170 institutions all over India now collaborate with IRRI. Owing to various efforts in 2010, India was not only self-sufficient in rice but also one of the world's major rice producers.

Concerted efforts by India and IRRI to develop rice varieties with resistance to pests and diseases and stresses such as drought and flooding, commercialize hybrid rice, streamline rice production practices so they are not only profitable but also sustainable and environment-friendly, and extensively exchange information with Indian scientists and researchers along with capacity building all helped India strengthen its rice production capacity.

Some 1,256 Indian researchers participated in education and training programs at IRRI from 1964 to 2010. A total of 91 IRRI scholars obtained a PhD and 16 an MS, 136 became OJTs/interns, and 9 were research fellows. More than 1,000 scientists (1,004) benefited from short-term courses.

Laos (1993 to 2007)

According to Shrestha et al (2006), the Lao-IRRI-Rice Research and Training Project (LIRRTP), funded by the Swiss Agency for Development and Cooperation (SDC), was established in 1990 to help the government of Lao PDR achieve sustainable rice self-sufficiency. Impact assessment clearly showed that the Lao-IRRI Project made a substantial contribution in establishing a fully functional rice research system in Lao PDR, which included the development of a network of 13 research stations and a well-trained cadre of research scientists and managers. During 15 years of operation, this project provided over 4,600 training slots, which included higher-degree training, short courses, on-the-job training, and participation in international conferences/seminars. The core group of trained staff now provides scientific and management leadership

in the agricultural research system of the country. Lao PDR is now a key site for rice research in uplands under IRRI's Consortium for Unfavorable Rice Environments.

Myanmar (1989 to 2000)

Shrestha et al (2002) reported that Myanmar-IRRI collaborative research and training made an impact as evidenced by the (1) growth in rice production; rapid diffusion of modern varieties (MVs); and very high return on investment; (2) integrated nutrient management (INM) practices showed performance similar to that of expensive chemical fertilizers; (3) cropping systems and crop-livestock research activities improved farmers' livelihood and increased the production of oil seeds, pulses, and industrial crops; and (4) stronger research capacity of national scientists, with 273 trained researchers.

Philippines (1963 to date)

One of the strong reasons why IRRI was established in Los Baños was the presence of the UP College of Agriculture (UPCA), which was reputed to be the strongest in Southeast Asia (Bernardo 2010). UPCA in the late 1950s had a strong Cooperative Rice Improvement Program with Dr. Dioscoro L. Umali as program leader. This program had many interdisciplinary projects, and the Bureau of Plant Industry (BPI), the Bureau of Agricultural Extension (BAE), and agricultural colleges and penal colonies participated in field-testing of improved technologies.

The creation of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) at UPLB also helped facilitate training of Southeast Asians in rice research at IRRI. Beginning in 1963, IRRI provided scholarships for those who wished to learn special techniques in rice research. Many scholars, particularly Filipinos, registered for their coursework at UPCA while their thesis research was done at IRRI under the supervision of IRRI senior scientists. IRRI scientists were appointed as affiliate professors at UPCA not only to serve as thesis advisers but also to teach courses at the graduate level.

IRRI's investment in the training of Filipino scientists also helped contribute to the establishment of the Philippine Rice Research Institute (PhilRice) on 5 November 1985. Then-President Ferdinand Marcos signed Executive Order 1061 creating PhilRice as a corporate body under the Ministry of Agriculture and Food (MAF). Although relevant rice research and development (R&D) efforts were done before the 1980s to tackle problems besetting the rice industry, efforts were at best fragmented and therefore did not translate into sustained rice self-sufficiency. Funding support for rice R&D was also negligible primarily because of the country's dependence on IRRI. But, with IRRI's global mandate, IRRI could not respond to all the needs of any one country. The rice problems in the Philippines could be better solved by having a strong national rice R&D body that would localize and take IRRI's technologies to farms. Today, PhilRice is considered a model research agency, a center of excellence, and a world-class research institution.

The Philippines has continued to benefit from various IRRI-sponsored courses as manifested by the sizable share of Filipino trainees relative to other countries (Paris et al 2004) up to now. The share in short-term training courses attended by Filipinos has decreased over time depending on the availability of funds from the Philippine government. Filipino scholars and fellows, on the other hand, increased. A total of 1,987 IRRI trainees came from the Philippines from 1962 to 2010. Some 197 obtained a master's degree, 93 became PhD scholars, 188 were OJTs or interns, and 1,509 enrolled in short courses. The trainees themselves were not the only

beneficiaries since they passed on the knowledge and skills they learned to other individuals. With the wide range of institutions and individuals that benefited from IRRI's training and professional advancement programs, IRRI indeed contributed to the development of human resources engaged in rice research in the Philippines.

Vietnam (1963 to 2010)

Since 1963, the Socialist Republic of Vietnam and IRRI have been collaborating in the exchange of rice breeding material, rice varietal improvement, resource management, and capacity building. Since then, a total of 89 IRRI breeding lines have been released as varieties in Vietnam. IRRI varieties now cover 70% of the rice-growing area in Vietnam. As of 2010, Vietnam was the fifth-largest rice producer in the world, and the second-biggest rice exporter. Planting modern rice varieties of short duration, improved management of resources, and appropriate government policies are responsible for Vietnam's consistent self-sufficiency in rice since 1985. Vietnam and IRRI worked hand in hand in varietal improvement, the conservation of rice diversity, sustainable farming systems, and the continued strengthening of human resource capabilities.

A total of 710 Vietnamese scientists were trained at IRRI from 1964 to 2009, of which 53 obtained a master's degree, 28 a PhD, 172 were OJTs/interns, and 457 Vietnamese scientists participated in IRRI's short-term courses. Many Vietnamese IRRI alumni now hold important positions in Vietnamese governmental institutions and universities.

VII. Conclusions

Human capacity building is the heart and soul of IRRI's past and future. For more than 50 years, IRRI has provided training to a total of 11,599 national scientists around the world, 22% of which were female. More than 10,000 personnel benefited from nondegree training and about 1,600 were supported in their MS/PhD programs. No other center in the Consultative Group on International Agricultural Research has trained as many professionals. The result is that, in every corner of the rice-growing world, one can find personnel who have been to Los Baños.

IRRI management has from the very beginning recognized the need for training in both research and extension activities in order to achieve a sustained increase in rice production. Yet, until now, there has been no close examination of the training program. Our objective in this report has been to reconstruct the database, examine the trends and changes over time in training activities, and raise issues regarding the future of the training program.

Records for the early 1960s to 1970s in particular were difficult to obtain. The Training Center acknowledged that training records were not systematically collected and stored in a central database. Many efforts were devoted to data mining from different sources (library, Internet, and personal communications with IRS), cross-checking information, and processing data in order to reconstruct and update the TC-OSA database. Identifying IRRI degree scholars who were able to complete their programs within the period reported posed another challenge. There was no information on the actual or even expected date of graduation. Scholars were encoded in the database on the basis of funding. Hence, it was common to see scholars being encoded twice or thrice depending on the source

and number of times the graduate program had been supported. Moreover, the contact details (email, home and office addresses) of training participants were not current as the TC-OSA database was not used as an alumni database. The contact information reflected institutional details at the time of being at IRRI. Hence, it was difficult to locate and contact former IRRI degree scholars to take part in the study.

Results of the study show that many short-term training courses were in general oriented toward research methodology and rice production technology and included specialized courses on crop management, agronomy, and physiology; diseases and their management; pests and their management; postharvest and mechanization; and water management. In addition, the training curricula included socioeconomics and policy; training and knowledge management and sharing; English communication and presentation skills; scientific writing; data management and statistics; and geographic information systems. New training courses also evolved over time such as genetic resources; genomics; molecular biology; plant breeding, genetics, and transgenics; women's leadership course, etc.

In nondegree training, most courses have been offered for a short period of time, which reflects in part a shift of interest and priority of the Institute and funding position for training. Early on, from the 1960s to '80s, the focus was on the rice production training course. Coupled with this was the 2-week rice production training offered to a range of participants from the Peace Corps to new IRRI staff. There was a period of interest in cropping systems and in water management. Today, IRRI features a much more diverse set of training activities.

The MS and PhD training program has also seen a shift in emphasis over time. There have been fewer scholars in crop management and agronomy and a sharp decline in socioeconomics. This was matched by an increase in areas such as plant breeding, genetics, genomics, and molecular biology. It is worth noting that this trend was evident as well in both developed- and developing-country universities, with a decline in interest in the traditional agricultural sciences.

Our survey of 50 scholars trained at IRRI reflects the fact that many of our alumni would like to continue a relationship with IRRI through further training/research opportunities, contacts with IRRI staff, access to IRRI publications, etc. Furthermore, several IRRI alumni have risen to positions of responsibility and as such serve as ambassadors for the Institute.

IRRI's research and training programs have no doubt played a critical role in building the research capacity of many NARES in Asia. Several studies point to IRRI's substantial contribution to the development of rice science and rice-related knowledge and technology and their dissemination and to the establishment of a fully functional rice research system in NARES. In a span of almost 50 years, IRRI has helped in the development of a well-trained cadre of research scientists and managers who are now providing scientific and management leadership in many agricultural research systems.

This report is timely in that training should in large part reflect IRRI's research priorities. Now would also seem to be a good time to maintain stronger contacts with former IRRI scholars, of which there are many, and consult with some of our outstanding alumni in identifying future needs and priorities to enable IRRI to continue its pivotal role in training and capacity building. However, this study is limited to the analysis of TC-OSA database training records. IRRI nationally recruited staff (NRS) whose scholarships for graduate

degree training went through IRRI's Professional Growth Committee (PGC) were not included in the study. Future work should focus on combining the two databases and have the broadened database regularly updated for a more complete and comprehensive assessment of IRRI's contribution to NARES research capacity. If it was possible to categorize seeds or germplasm according to source, variety, and characteristics, why can't we do the same for IRRI trainees? It is also suggested to look at the funding trends over the life of IRRI and how they have influenced the country and type of scholars taking part in IRRI training.

Also, IRRI should recognize and award outstanding alumni from time to time as it did in Hanoi in 2010.

It cannot be overemphasized that training has been the lifeblood of IRRI. Almost 12,000 scientists from IRRI and NARES have benefited from their IRRI training. IRRI management is prepared to continue to invest considerable resources in the training and development of the staff of NARES partners.

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Annexes

Annex Table 1. Country-wise distribution of IRRI participants by type of training attended, 1962-2010.

Region	Country	MS	PhD	Fellow	Intern/OJT	Short course	Total
Africa	Benin	0	0	0	0	2	2
	Botswana	0	0	0	0	1	1
	Burkina Faso	0	0	0	0	4	4
	Burundi	0	0	0	1	7	8
	Cameroon	0	0	0	0	6	6
	Congo	0	0	0	0	1	1
	Côte d'Ivoire	0	0	0	1	1	2
	Egypt	0	3	0	12	32	47
	Ethiopia	1	0	0	1	19	21
	Gambia	1	0	0	0	2	3
	Ghana	5	2	0	6	17	30
	Guinea-Bissau	0	0	0	0	1	1
	Guinea	0	0	0	1	1	2
	Kenya	3	0	0	4	15	22
	Liberia	0	0	0	1	13	14
	Madagascar	9	5	0	10	93	117
	Malawi	0	0	0	0	4	4
	Mali	0	0	0	4	7	11
	Mauritania	0	0	0	0	1	1
	Morocco	0	0	0	1	1	2
	Mozambique	0	0	0	2	15	17
	Niger	0	0	0	0	1	1
	Nigeria	6	3	0	10	48	67
	Rwanda	0	0	0	1	6	7
	Senegal	2	0	0	11	5	18
	Sierra Leone	0	1	0	2	16	19
	Somalia	0	2	0	2	5	9
	South Africa	0	0	0	1	0	1
	Sudan	1	0	0	0	9	10
	Tanzania	4	5	0	3	54	66
	Uganda	1	0	0	0	9	10
	Zambia	0	0	0	0	4	4
	Zimbabwe	0	0	0	2	4	6

Continued on next page

Annex Table 1 continued.

Region	Country	MS	PhD	Fellow	Intern/OJT	Short course	Total
Asia	Afghanistan	0	0	0	0	1	1
	Bangladesh	82	98	1	80	669	930
	Bhutan	2	0	0	17	81	100
	Brunei	0	0	0	0	1	1
	Cambodia	2	6	0	26	210	244
	China	53	93	1	128	583	858
	East Timor	0	0	0	0	8	8
	India	16	91	9	136	1,004	1,256
	Indonesia	39	32	2	119	798	990
	Iran	2	17	0	31	101	151
	Iraq	0	0	0	2	3	5
	Israel	0	0	0	0	1	1
	Japan	13	17	10	56	28	124
	Kazakhstan	0	0	0	0	5	5
	Lao PDR	6	3	0	49	173	231
	Malaysia	3	3	0	27	200	233
	Maldives	0	0	0	0	1	1
	Mongolia	0	0	0	0	2	2
	Myanmar	36	11	0	26	308	381
	Nepal	43	43	0	10	169	265
	North Korea	0	0	0	1	0	1
	Pakistan	18	28	0	35	132	213
	Philippines	197	93	0	188	1,509	1,987
	Singapore	0	1	0	0	2	3
	South Korea	19	33	0	130	151	333
	Sri Lanka	41	23	0	65	399	528
	Taiwan	29	1	0	12	5	47
	Thailand	73	30	0	88	674	865
	Uzbekistan	0	0	0	0	5	5
	Vietnam	53	28	0	172	457	710
Europe	Belgium	1	1	0	10	5	17
	Bulgaria	0	0	0	1	0	1
	Denmark	2	0	0	1	0	3
	Finland	0	0	0	0	1	1
	France	1	2	0	14	6	23
	Germany	10	17	0	19	11	57
	Greece	0	0	0	0	1	1
	Ireland	0	0	0	0	2	2
	Italy	0	0	0	5	2	7

Continued on next page

Annex Table 1 continued.

Region	Country	MS	PhD	Fellow	Intern/OJT	Short course	Total
	Netherlands	10	4	0	24	12	50
	Poland	0	0	0	0	1	1
	Portugal	0	2	0	1	3	6
	Russia	0	0	0	0	1	1
	Spain	1	0	0	5	3	9
	Sweden	0	0	0	2	0	2
	Switzerland	1	0	0	7	0	8
	Turkey	0	0	0	0	3	3
	United Kingdom	0	7	0	21	7	35
Latin America	Argentina	0	0	0	1	3	4
	Barbados	0	0	0	0	1	1
	Brazil	3	0	0	1	18	22
	Chile	1	0	0	0	1	2
	Colombia	7	0	0	5	7	19
	Costa Rica	0	0	0	0	3	3
	Cuba	0	0	0	18	11	29
	Dominican Republic	0	1	0	0	4	5
	Ecuador	1	0	0	1	3	5
	Guyana	2	0	0	0	3	5
	Haiti	0	0	0	0	1	1
	Jamaica	0	0	0	0	5	5
	Panama	0	1	0	1	0	2
	Peru	2	1	0	0	0	3
	Suriname	0	0	0	0	4	4
	Trinidad and Tobago	0	0	0	1	3	4
	Venezuela	2	0	0	0	1	3
North America	Canada	1	6	0	15	11	33
	Mexico	6	2	0	2	14	24
	United States	7	28	0	36	47	118
Ocenia	Australia	2	3	0	6	9	20
	Fiji	0	0	0	1	20	21
	New Zealand	0	1	0	0	1	2
	Papua New Guinea	0	0	0	3	14	17
	Samoa	0	0	0	2	0	2
	Solomon Islands	0	0	0	0	5	5
Global	Total	820	748	23	1,677	8,331	

Annex Table 2. Distribution of IRRI nondegree training programs by research theme, 1962 to 2008.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Crop management, agronomy, and physiology	Adaptive Research with a Farming Systems Program	–	–	–	–	–	–	23	–	–	–	23
	Cowpea & Soybean Production Training	–	–	–	–	23	16	–	–	–	–	39
	Crop Residue Management	–	–	–	–	–	–	–	–	–	15	15
	Cropping System Varietal Testing	–	–	–	–	8	–	–	–	–	–	8
	Cropping Systems Training Course	–	–	38	183	200	72	–	–	–	–	493
	Data Analysis for Assessing the Impact of Farming Systems Research	–	–	–	–	–	6	–	–	–	–	6
	International Rice Agro-Economic Network (IRAEN)	–	–	11	–	–	–	–	–	–	–	11
	Modern Rice Farming Course (MRFC)	–	–	–	–	–	–	–	17	–	–	17
	Multi-Agents Simulation for Natural Resource Management (MAS)	–	–	–	–	–	–	–	18	–	–	18
	Multiple Cropping Training Program	–	35	22	–	–	–	–	–	–	–	57
	Principles and Practices of Farm Management (PPFM)	–	–	–	–	–	–	–	–	19	–	19
	Rice & Field Crop Production TC	–	–	–	–	–	–	9	–	–	–	9
	Rice Production Training Course	10	165	162	347	490	54	23	15	62	16	1,344
	Simulation & System Analysis for RPTP[a]	–	–	–	–	–	55	49	–	–	–	104
	Simulation Modeling for R-W Systems	–	–	–	–	–	–	–	16	–	–	16
	Tidal Swamp Rice Production	–	–	–	–	–	–	19	–	–	–	19
	Two-Week Rice Production Course	–	–	–	–	–	–	–	–	149	–	149
	Weed Science Training Course	–	–	–	–	6	17	7	–	–	–	30
Total		10	200	233	530	727	220	130	66	230	31	2,377

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Diseases and their management	Forecast Equipment & Blast Nursery	–	–	–	–	1	–	–	–	–	–	1
	International Course on Rice Seed Health Testing	–	–	–	–	–	24	22	–	–	–	46
	Rice Seed Health Training Course	–	–	–	–	–	–	4	26	5	–	35
	Rice Seed Production & Testing	–	–	–	–	–	2	–	–	–	–	2
	Seed Health for Pest Management	–	–	–	–	–	–	–	8	–	–	8
	Virus Disease Diagnosis	–	–	–	–	–	2	–	–	–	–	2
	Workshop on Rice Seed Health Testing Policy for Safe & Efficient Germplasm Movement	–	–	–	–	–	–	–	–	17	–	17
Total		–	–	–	–	1	28	26	34	22	–	111
Genetic resources	Genebank Operations	–	–	–	–	–	6	–	–	–	–	6
	Genetic Resources and Conservation & Management (GRCM)	–	–	–	–	–	21	–	–	–	–	21
Total		–	–	–	–	–	27	–	–	–	–	27
Genomics, bioinformatics, and molecular biology	Advances in Marker-Assisted Selection Workshop	–	–	–	–	–	–	–	–	57	–	57
	AFLP Analysis for Rice Improvement	–	–	–	–	–	–	–	11	–	–	11
	Gene Cloning—ARBN	–	–	–	–	–	–	–	10	–	–	10
	Nucleic Acid-Based Techniques	–	–	–	–	–	–	–	5	–	–	5
	Protein-Based Techniques	–	–	–	–	–	–	–	8	–	–	8
	Rice Biotech Training Workshop	–	–	–	–	–	11	46	–	–	–	57
	SNP Discovery through EcoTILLING	–	–	–	–	–	–	–	–	20	–	20
Total		–	–	–	–	–	11	46	34	77	–	168
Pests and their management	Biological Pest Control in Rice-Based Cropping Systems	–	–	–	–	12	25	–	–	–	–	37
	Entom. Cropping System Network	–	–	–	–	4	–	–	–	–	–	4
	Integrated Pest Management Course	–	–	–	–	96	54	41	–	194	–	385
	Master Class on Rodent Management and Ecology	–	–	–	–	–	–	–	–	17	–	17
	Quantitative Research Techniques in Pest Ecology (QRTPE)	–	–	–	–	–	–	5	–	–	–	5
	Special Integrated Pest Management Training	–	–	–	–	–	–	–	–	4	–	4
Total		–	–	–	–	112	79	46	–	215	–	452

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Plant breeding, genetics, and transgenics	Rice Breeding Course: Laying the Foundation for the Second Green Revolution	–	–	–	–	–	–	–	–	–	75	75
	Rice Breeding with IRIS Component	–	–	–	–	–	–	–	–	16	–	16
	Transgenic Rice: Production & Development with Special Reference to Sheath Blight	–	–	–	–	–	–	–	13	–	–	13
	Upland Rice Training Course	–	–	–	–	58	15	–	–	–	–	73
	Upland Rice Variety Selection Techniques for African Countries	–	–	–	–	–	–	–	–	–	19	19
	Varietal Improvement for Rice-Based Farming Systems.	–	–	–	–	–	4	–	–	–	–	4
	Varietal Improvement of Dryland Legume Crops for Rice-Based Farming Systems	–	–	–	–	–	3	–	–	–	–	3
	Varietal Improvement of Upland Crops	–	–	–	–	–	4	–	–	–	–	4
	Varietal Testing for Intensive Rice Farming Systems	–	–	–	–	–	21	–	–	–	–	21
	Varietal Testing of Upland Crops	–	–	–	–	15	13	–	–	–	–	28
	Workshop on Genetic Engineering and Nutrition in Rice	–	–	–	–	–	–	–	–	12	–	12
Total		0	0	16	208	223	181	22	69	124	133	976
Postharvest and mechanization	Agricultural Engineering Course	–	–	26	99	167	107	53	–	–	–	452
	Engineering for Rice Agriculture Course (ERAC)	–	–	–	–	–	–	18	–	–	–	18
	Mechanization Consequences	–	–	–	8	–	–	–	–	–	–	8
	Multi-Purpose Dryer Design, Construction, & Maintenance (DDCM)	–	–	–	–	–	17	–	–	–	–	17
	Post-Production Training Workshop	–	–	–	–	–	–	–	–	21	–	21
	Rice Process Engineering	–	–	3	–	–	–	–	–	–	–	3
	Small-Scale Farm Tools & Equipment	–	–	–	–	–	–	6	–	–	–	6
Total		–	–	29	107	167	124	77	–	21	–	525

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Socioeconomics and policy	Application of Participatory Approaches to Agricultural Research and Extension	–	–	–	–	–	–	–	–	–	27	27
	Economics Training Program	–	–	–	–	31	–	–	–	–	–	31
	Farming Systems Socioeconomic Research (FSSR)	–	–	–	–	40	103	54	–	–	–	197
	Gender Analysis	–	–	–	–	–	–	79	–	–	–	79
	New Paradigms and Tools for Socioeconomic Analysis of Rice Production Systems in Asia	–	–	–	–	–	–	–	13	–	–	13
	Prosperity through Rice	–	–	–	–	28	39	–	–	–	–	67
Total		0	0	0	0	99	142	133	13	0	27	414
Soils and nutrient management	Developing Integrated Nutrient Management Options for Delivery	–	–	–	–	–	–	–	–	111	–	111
	International Azolla Training Course	–	–	–	–	–	38	–	–	–	–	38
	Physical Aspect of Soil Management for Rice-Based Cropping Systems (PARSM)	–	–	–	–	–	21	–	–	–	–	21
	Rice Nutrient Management	–	–	–	–	–	–	11	–	–	–	11
	Soil Management (Study Tour)	–	–	–	–	–	–	–	–	10	–	10
	Strategic Research in Integrated Nutrient Management	–	–	–	–	–	–	19	70	–	–	89
Total		0	0	0	0	0	59	30	70	121	0	280
Training and "knowledge management and sharing"	PhilRAA Alumni Workshop	–	–	–	–	–	–	–	–	29	–	29
	Training & Technology Transfer	–	–	–	–	–	120	35	–	0	–	155
	Training in IRRI Outreach Sites	–	–	–	–	–	–	–	–	0	–	1
	Training of Trainers' Course (TOT)	–	–	–	–	–	–	–	–	22	–	22
	Training of Trainers on Palay Check System	–	–	–	–	–	–	–	–	–	32	32
	Training on Video Production	–	–	–	–	–	–	2	7	–	–	9
	Trainers' Training on FSSR[a]	–	–	–	–	–	9	–	–	–	–	9
	Use of Information Technology in Reaching Farmers	–	–	–	–	–	–	–	13	–	–	13
Total		0	0	0	1	0	129	37	20	51	32	270

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Water management	Integrated Water Management in Rice Production	–	–	–	–	–	–	–	–	35	–	35
	Irrigation Water Management Course	–	–	–	60	117	110	67	–	–	–	354
Total		0	0	0	60	117	110	67	0	35	0	389
Experimental design, data management and analysis	Advanced Experimental Design	–	–	–	–	–	–	–	7	–	–	7
	Agricultural Research: Design and Management for Bangladesh	–	–	–	–	–	–	–	–	–	10	10
	Analysis of Experimental Data Using the SAS System	–	–	–	–	–	–	–	–	–	38	38
	Analysis of Mixed Models Using CropStat	–	–	–	–	–	–	–	–	–	17	17
	Analysis of Unbalanced Data	–	–	–	–	–	–	–	2	8	–	10
	Basic Experimental Design and Data Analysis Course Using CropStat	–	–	–	–	–	–	–	–	–	44	44
	Basic Experimental Designs and Data Analysis Using IRRIStat	–	–	–	–	–	–	–	–	24	21	45
	Database Management for Genetic Resources	–	–	–	–	–	9	–	–	–	–	9
	Experimental Design & Data Analysis	–	–	–	–	–	–	–	10	18	–	28
	GIS Training	–	–	–	–	–	–	23	42	–	–	65
	Improving and Assuring Data Quality in Crop Research	–	–	–	–	–	–	–	–	–	25	25
	Introduction to IRRIStat Statistical Software	–	–	–	–	–	–	–	10	24	–	34
	Introduction to SAS for Windows	–	–	–	–	–	–	–	2	58	–	60
	Introduction to the International Crop Information System (ICIS) for Plant Breeders	–	–	–	–	–	–	–	–	–	25	25
	Introduction to the R Statistics Computing Environment	–	–	–	–	–	–	–	–	16	–	16
	Introduction to the SAS System for Windows	–	–	–	–	–	–	–	–	22	–	22
	Mixed Model Analysis Using IRRIStat	–	–	–	–	–	–	–	–	18	–	18
	Rice Field Experimentation Workshop	–	20	34	–	–	–	–	–	–	–	54
	Statistical Procedures and Computer Applications in Agricultural Research (SPCAAR)	–	–	–	–	10	20	–	–	–	–	30
Total		0	20	34	0	10	29	23	73	188	180	557

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Communication and presentation skills	Communication Media Skills	–	–	–	–	–	–	–	–	4	–	4
	Conversational English for Rice Scientists	–	–	–	–	–	–	–	–	–	11	11
	Designing Computer-based Publications & Communication Skills Training	–	–	–	–	–	–	–	–	3	–	3
	Editing & Publication Training	–	–	–	–	7	37	–	–	–	–	44
	Conversational English for Rice Scientists	–	–	–	–	–	–	–	–	95	44	139
	English for Rice Scientists I	–	–	–	–	–	–	–	–	18	26	44
	English for Rice Scientists II	–	–	–	–	–	–	–	–	–	28	28
	Instructional Video Production	–	–	–	–	–	–	–	19	7	–	26
	Intensive English Course 1	–	–	–	–	–	–	–	–	33	–	33
	Intensive English Course 2	–	–	–	–	–	–	–	–	52	–	52
	Modular Public Speaking and Presentation Skills Workshop	–	–	–	–	–	–	–	–	21	–	21
	Scientific Writing & Presentation Skills Course	–	–	–	–	–	–	–	–	49	–	49
	Scientific Writing Workshop	–	–	–	–	–	–	–	–	–	28	28
	Scientific Writing Workshops for AMBIONET-CIMMYT	–	–	–	–	–	–	–	–	10	–	10
Total		0	0	0	0	7	37	0	19	292	137	492

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Others	Experiment Station Management	–	–	–	–	–	–	–	14	–	–	14
	Extrapolation of Agricultural Technology	–	–	–	–	–	12	–	–	–	–	12
	Farm Management	–	–	–	–	12	6	–	–	–	–	18
	IRRI-CIP Training Course on PR&E[a]	–	–	–	–	–	–	–	–	30	–	30
	Managerial Leadership Enhancement Training Course (MLETC)	–	–	–	–	–	–	13	–	–	–	13
	Mega Project	–	–	–	–	–	–	15	–	–	–	15
	Methane Emissions from Ricefields	–	–	–	–	–	–	15	–	–	–	15
	ORYZA2000	–	–	–	–	–	–	–	–	11	–	11
	Radiation Safety Course	–	–	–	–	–	–	–	–	–	18	18
	Refrigeration Engineering	–	–	–	–	–	3	–	–	–	–	3
	Research Management Consortia	–	–	–	–	–	–	18	–	–	–	18
	Research Management Training Course	–	–	–	–	–	–	46	–	–	–	46
	Rice Camp	–	–	–	–	–	–	–	–	–	20	20
	Rice-Fish Farming Systems.	–	–	–	–	–	11	–	–	–	–	11
	Rice Research Station Management	–	–	–	–	–	–	–	12	–	–	12
	Study Tour for 17 Indian Officials	–	–	–	–	–	–	–	–	17	–	17
	TMSL-RPI	–	–	–	–	11	2	–	–	–	–	13
	Two-Week Study Tour for SAIP Officers	–	–	–	–	–	–	–	–	9	–	9
Total		–	–	–	–	23	34	107	26	67	38	295

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
Combination	Rice Production Training-Cum-Scientific Visit	–	–	–	–	–	–	–	–	10	–	10
	Rice: Research to Production Course	–	–	–	–	–	–	–	–	–	55	55
	High-Yield Seed Production of Hybrid Rice	–	–	–	–	–	–	–	–	25	–	25
	Hybrid Rice Seed Production Course	–	–	–	–	–	–	–	–	19	–	19
	Hybrid Rice Seed Production Techniques	–	–	–	–	–	16	67	33	–	–	116
	Hybrid Rice Training for Pioneer Hi-Bred, Inc.	–	–	–	–	–	–	–	–	–	25	25
	Legume Varietal Improvement for Rice-Based Cropping Systems	–	–	–	–	–	5	–	–	–	–	5
	International Network on Soil Fertility and Fertilizer Evaluation for Rice (INSFFER)	–	–	–	41	109	58	59	–	–	–	267
	Application of Molecular Tools to Study Rice Viruses	–	–	–	–	–	–	–	8	–	–	8
	Ecological Management of Pests–Biological, Economic, and Social Dimensions	–	–	–	–	–	–	–	–	–	14	14
	Ecological Methods in Agro-Biodiversity & Pest Management Research	–	–	–	–	–	–	–	–	22	–	22
	Exploiting Biodiversity for Sustainable Pest Management	–	–	–	–	–	–	–	24	–	–	24
	Pest Assessment & Survey Database Management for Malaysia (PASDM)	–	–	–	–	–	5	–	–	–	–	5
	Pest Management in Deepwater Rice	–	–	–	–	10	29	–	–	–	–	39
	Rice Production and Post-Harvest	–	–	–	–	–	–	–	–	–	26	26
	Soil and Water Biochemistry & Ecotoxicology	–	–	–	–	–	–	–	26	–	–	26
	Asian Rice Biotechnology Network Genomics Workshop III	–	–	–	–	–	–	–	–	41	–	41
	Asian Rice Biotechnology Network I	–	–	–	–	–	–	14	–	–	–	14
	Asian Rice Biotechnology Network II	–	–	–	–	–	–	16	–	–	–	16
	Molecular Analysis of Transgenic Rice	–	–	–	–	–	–	13	–	–	–	13

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Annex Table 2 continued.

Research theme	Training program	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-08	Total
	Molecular Markers in Rice Breeding	–	–	–	–	–	–	–	–	14	–	14
	Marker-Assisted Selection (MAS): Theory, Practice, and Application	–	–	–	–	–	–	–	–	–	24	24
	G × E Analysis & Interpretation of Results	–	–	–	–	–	–	16	12	7	–	35
	Introduction to the International Crop Information System (ICIS)	–	–	–	–	–	–	–	–	18	–	18
	Introduction to New Developments in G × E Analysis and Interpretation of Results	–	–	–	–	–	–	–	13	–	–	13
	Leadership Course for Asian Women in Agricultural R&D	–	–	–	–	–	–	–	–	80	42	122
Total		–	–	–	41	119	113	185	116	236	186	996
All		10	220	312	947	1,605	1,323	929	540	1,679	764	8,329

[a]RPTP = Rice Production Training Program. R-W = Rice-Wheat. FSSR = Farming Systems Socioeconomic Research. PR&E = Participatory Research and Extension.

Annex Table 3. Country-wise distribution of training participation by years, 1962-2010.

Region	Country	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Africa	Benin	0	0	0	0	0	1	0	0	0	1	2
	Botswana	0	0	0	0	0	1	0	0	0	0	1
	Burkina Faso	0	0	0	0	3	1	0	0	0	0	4
	Burundi	0	0	0	1	0	0	1	0	0	6	8
	Cameroon	0	0	0	0	2	3	0	0	1	0	6
	Congo	0	0	0	0	0	1	0	0	0	0	1
	Côte d'Ivoire	0	0	0	0	0	1	1	0	0	0	2
	Egypt	0	1	7	6	12	6	6	6	1	2	47
	Ethiopia	0	0	0	0	4	2	1	1	9	4	21
	Gambia	0	0	0	0	1	0	0	0	1	1	3
	Ghana	2	0	4	0	7	6	2	0	5	4	30
	Guinea-Bissau	0	0	0	0	0	1	0	0	0	0	1
	Guinea	0	1	0	0	0	1	0	0	0	0	2
	Kenya	0	1	0	2	8	3	2	1	1	4	22
	Liberia	0	0	3	2	0	7	0	0	2	0	14
	Madagascar	0	1	0	0	15	52	41	7	1	0	117
	Malawi	0	0	0	0	0	1	1	0	0	2	4
	Mali	0	0	2	7	0	2	0	0	0	0	11
	Mauritania	0	0	0	0	0	1	0	0	0	0	1
	Morocco	0	0	0	0	0	0	2	0	0	0	2
	Mozambique	0	0	0	0	0	2	1	3	3	8	17
	Niger	0	0	0	0	0	1	0	0	0	0	1
	Nigeria	0	4	15	6	9	22	3	0	2	6	67
	Rwanda	0	0	0	0	0	1	0	0	1	5	7
	Senegal	0	0	4	6	6	0	2	0	0	0	18
	Sierra Leone	0	0	2	7	3	6	0	0	1	0	19
	Somalia	0	0	0	0	2	4	1	1	1	0	9
	South Africa	0	0	0	0	0	0	0	0	0	1	1
	Sudan	0	1	2	2	3	0	0	1	1	0	10
	Tanzania	0	2	0	3	14	20	6	1	11	9	66
	Uganda	0	0	0	1	0	0	1	2	1	5	10
	Zambia	0	0	0	0	2	1	0	0	1	0	4
	Zimbabwe	0	0	0	0	0	0	0	0	2	4	6
	Subtotal	2	11	39	43	91	147	71	23	45	62	534
Asia	Afghanistan	0	1	0	0	0	0	0	0	0	0	1
	Bangladesh	0	14	27	148	170	109	115	58	215	74	930
	Bhutan	0	0	0	0	17	44	18	12	8	1	100
	Brunei	0	0	0	0	0	1	0	0	0	0	1
	Cambodia	1	0	5	0	0	45	89	54	41	9	244
	China	0	1	0	63	210	194	84	69	147	90	858
	East Timor	0	0	0	0	0	0	0	0	8	0	8

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Annex Table 3 continued.

Region	Country	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
	India	2	41	47	109	199	163	172	121	276	126	1,256
	Indonesia	1	21	79	268	200	108	95	63	117	38	990
	Iran	0	1	3	5	8	18	29	9	62	16	151
	Iraq	0	1	0	1	2	0	0	1	0	0	5
	Israel	0	0	1	0	0	0	0	0	0	0	1
	Japan	8	9	12	11	14	5	9	8	23	25	124
	Kazakhstan	0	0	0	0	0	0	0	0	5	0	5
	Lao PDR	0	7	13	0	3	22	58	38	72	18	231
	Malaysia	1	7	4	60	63	35	8	11	42	2	233
	Maldives	0	0	0	0	0	1	0	0	0	0	1
	Mongolia	0	0	0	0	0	0	0	0	1	1	2
	Myanmar	0	7	20	45	119	44	22	21	69	34	381
	Nepal	0	3	3	30	43	45	51	28	37	25	265
	North Korea	0	0	0	0	0	0	0	0	0	1	1
	Pakistan	0	36	10	42	38	22	29	18	12	6	213
	Philippines	46	116	69	131	308	180	184	100	454	399	1,987
	Singapore	0	0	0	0	0	0	0	1	1	1	3
	South Korea	3	19	25	31	38	39	30	21	60	67	333
	Sri Lanka	0	35	63	89	177	98	30	8	17	11	528
	Taiwan	6	15	11	5	6	1	0	2	1	0	47
	Thailand	17	24	62	175	205	168	95	53	37	29	865
	Uzbekistan	0	0	0	0	0	0	0	0	5	0	5
	Vietnam	4	16	9	5	96	130	131	124	140	55	710
	Subtotal	89	374	463	1,218	1,916	1,472	1,249	820	1,850	1,028	10,479
Europe	Belgium	0	0	0	1	3	0	1	0	5	7	17
	Bulgaria	0	0	0	0	0	1	0	0	0	0	1
	Denmark	0	0	0	0	0	0	1	1	1	0	3
	Finland	0	0	0	1	0	0	0	0	0	0	1
	France	0	0	1	1	0	0	2	0	10	9	23
	Germany	0	1	0	1	12	4	12	8	13	6	57
	Greece	0	0	0	0	0	0	0	0	0	1	1
	Ireland	0	0	0	2	0	0	0	0	0	0	2
	Italy	0	0	0	0	0	5	0	0	2	0	7
	Netherlands	2	1	2	4	6	9	7	5	9	5	50
	Poland	0	0	0	0	0	0	0	0	0	1	1
	Portugal	0	0	0	0	0	0	0	1	5	0	6
	Russia	0	0	0	0	0	0	0	0	0	1	1
	Spain	0	0	0	0	0	0	2	0	2	5	9
	Sweden	0	0	0	0	0	0	0	0	2	0	2
	Switzerland	0	0	0	0	0	2	2	1	3	0	8
	Turkey	0	0	0	2	0	1	0	0	0	0	3
	U.K.	0	0	1	6	6	2	4	2	5	9	35
	Subtotal	2	2	4	18	27	24	31	18	57	44	227

Annex Table 4. Country-wise distribution of female participants in all IRRI training programs by time period, 1962-2008.

Region	Country	Females										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
Africa	Benin	0	0	0	0	0	0	0	0	0	0	0
	Botswana	0	0	0	0	0	1	0	0	0	0	1
	Burkina Faso	0	0	0	0	0	0	0	0	0	0	0
	Burundi	0	0	0	0	0	0	0	0	0	0	0
	Cameroon	0	0	0	0	0	0	0	0	1	0	1
	Congo	0	0	0	0	0	0	0	0	0	0	0
	Côte d'Ivoire	0	0	0	0	0	0	0	0	0	0	0
	Egypt	0	0	0	0	0	0	0	2	0	0	2
	Ethiopia	0	0	0	0	0	1	0	0	0	0	1
	Gambia	0	0	0	0	0	0	0	0	0	0	0
	Ghana	0	0	0	0	0	1	0	0	1	0	2
	Guinea-Bissau	0	0	0	0	0	0	0	0	0	0	0
	Guinea	0	0	0	0	0	0	0	0	0	0	0
	Kenya	0	0	0	0	1	1	1	0	0	1	4
	Liberia	0	0	0	0	0	0	0	0	0	0	0
	Madagascar	0	0	0	0	4	17	10	1	0	0	32
	Malawi	0	0	0	0	0	0	0	0	0	0	0
	Mali	0	0	0	0	0	0	0	0	0	0	0
	Mauritania	0	0	0	0	0	0	0	0	0	0	0
	Morocco	0	0	0	0	0	0	1	0	0	0	1
	Mozambique	0	0	0	0	0	0	0	1	0	1	2
	Niger	0	0	0	0	0	0	0	0	0	0	0
	Nigeria	0	0	0	0	0	3	0	0	0	1	4
	Rwanda	0	0	0	0	0	0	0	0	0	1	1
	Senegal	0	0	0	0	2	0	1	0	0	0	3
	Sierra Leone	0	0	0	0	0	0	0	0	0	0	0
	Somalia	0	0	0	0	0	0	0	0	0	0	0
	South Africa	0	0	0	0	0	0	0	0	0	0	0
	Sudan	0	0	0	0	0	0	0	0	1	0	1
	Tanzania	0	0	0	2	2	4	1	0	1	1	11
	Uganda	0	0	0	0	0	0	0	0	0	0	0
	Zambia	0	0	0	0	0	0	0	0	0	0	0
	Zimbabwe	0	0	0	0	0	0	0	0	0	2	2
Asia	Afghanistan	0	0	0	0	0	0	0	0	0	0	0
	Bangladesh	0	0	0	10	4	8	18	4	38	23	105
	Bhutan	0	0	0	0	2	0	1	3	3	0	9
	Brunei	0	0	0	0	0	0	0	0	0	0	0

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Annex Table 4 continued.

Region	Country	Females										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
	Cambodia	0	0	0	0	0	5	10	10	7	2	34
	China	0	0	0	2	36	30	13	9	31	26	147
	East Timor	0	0	0	0	0	0	0	0	3	0	3
	India	0	0	0	4	6	7	16	13	71	36	153
	Indonesia	1	0	8	20	26	18	26	10	43	16	168
	Iran	0	0	0	0	0	1	3	0	7	2	13
	Iraq	0	0	0	0	0	0	0	1	0	0	1
	Israel	0	0	0	0	0	0	0	0	0	0	0
	Japan	3	0	0	0	1	0	1	1	7	11	24
	Kazakhstan	0	0	0	0	0	0	0	0	0	0	0
	North Korea	0	0	0	0	0	0	0	0	0	0	0
	Lao PDR	0	0	0	0	0	2	9	5	13	4	33
	Malaysia	0	0	0	0	6	7	2	2	12	2	31
	Maldives	0	0	0	0	0	0	0	0	0	0	0
	Mongolia	0	0	0	0	0	0	0	0	1	1	2
	Myanmar	0	0	0	5	19	8	12	8	48	28	128
	Nepal	0	0	0	2	5	3	7	5	9	3	34
	Pakistan	0	0	0	0	0	0	4	0	2	0	6
	Philippines	11	8	6	32	76	71	79	53	267	227	830
	Singapore	0	0	0	0	0	0	0	0	1	0	1
	South Korea	0	1	1	2	0	1	3	1	12	17	38
	Sri Lanka	0	0	2	10	18	10	9	0	6	9	64
	Taiwan	0	1	0	2	2	0	0	2	1	0	8
	Thailand	1	3	12	31	58	47	28	27	17	9	233
	Uzbekistan	0	0	0	0	0	0	0	0	0	0	0
	Vietnam	1	5	2	0	20	28	38	40	55	29	218
Europe	Belgium	0	0	0	0	0	0	0	0	1	4	5
	Bulgaria	0	0	0	0	0	0	0	0	0	0	0
	Denmark	0	0	0	0	0	0	0	1	0	0	1
	Finland	0	0	0	0	0	0	0	0	0	0	0
	France	0	0	0	1	0	0	1	0	6	6	14
	Germany	0	0	0	0	1	0	2	2	7	2	14
	Greece	0	0	0	0	0	0	0	0	0	1	1
	Ireland	0	0	0	0	0	0	0	0	0	0	0
	Italy	0	0	0	0	0	4	0	0	2	0	6
	Netherlands	0	0	2	0	2	4	1	1	4	2	16
	Poland	0	0	0	0	0	0	0	0	0	1	1
	Portugal	0	0	0	0	0	0	0	1	4	0	5

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Annex Table 4 continued.

Region	Country	Females										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
	Russia	0	0	0	0	0	0	0	0	0	1	1
	Spain	0	0	0	0	0	0	1	0	2	3	6
	Sweden	0	0	0	0	0	0	0	0	0	0	0
	Switzerland	0	0	0	0	0	0	0	0	2	0	2
	Turkey	0	0	0	0	0	0	0	0	0	0	0
	United Kingdom	0	0	0	0	1	1	1	2	3	4	12
LAC	Argentina	0	0	0	0	0	0	0	0	0	0	0
	Barbados	0	0	0	0	0	1	0	0	0	0	1
	Brazil	0	0	0	0	0	4	1	0	1	0	6
	Chile	0	0	0	0	0	0	0	0	0	0	0
	Colombia	0	1	1	0	0	0	1	0	0	0	3
	Costa Rica	0	0	0	0	0	0	0	0	0	0	0
	Cuba	0	0	0	1	3	2	0	0	2	0	8
	Dominican Republic	0	0	0	0	0	0	0	0	0	0	0
	Ecuador	0	0	0	0	0	1	0	0	0	0	1
	Guyana	0	0	0	0	0	0	0	0	0	0	0
	Haiti	0	0	0	0	0	0	0	0	0	0	0
	Jamaica	0	0	0	0	0	0	0	0	0	0	0
	Panama	0	0	0	0	0	0	0	0	0	0	0
	Peru	0	0	0	0	1	0	0	0	0	0	1
	Suriname	0	0	0	0	0	0	0	0	0	0	0
	Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0
	Venezuela	0	0	0	0	0	0	0	1	0	0	1
North America	Canada	0	0	0	0	0	0	1	3	2	3	9
	Mexico	0	0	0	0	0	2	0	0	0	0	2
	U.S.	1	1	0	2	7	2	2	0	10	22	47
Oceania	Australia	0	1	0	0	0	0	0	1	4	3	9
	Fiji	0	0	0	0	0	0	0	0	0	0	0
	New Zealand	0	0	0	0	0	0	0	0	0	0	0
	Papua New Guinea	0	0	0	0	0	1	1	0	1	1	4
	Samoa	0	0	0	0	0	0	0	0	0	0	0
	Solomon Islands	0	0	0	0	0	0	0	0	0	1	1
	Total	18	21	34	126	303	296	305	210	709	506	2,528

Annex Table 5. Country-wise distribution of male participants in all IRRI training programs by time period, 1962-2010.

Region	Country	Males										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
Africa	Benin	0	0	0	0	0	1	0	0	0	1	2
	Botswana	0	0	0	0	0	0	0	0	0	0	0
	Burkina Faso	0	0	0	0	3	1	0	0	0	0	4
	Burundi	0	0	0	1	0	0	1	0	0	6	8
	Cameroon	0	0	0	0	2	3	0	0	0	0	5
	Congo	0	0	0	0	0	1	0	0	0	0	1
	Côte d'Ivoire	0	0	0	0	0	1	1	0	0	0	2
	Egypt	0	1	7	6	12	6	6	4	1	2	45
	Ethiopia	0	0	0	0	4	1	1	1	9	4	20
	Gambia	0	0	0	0	1	0	0	0	1	1	3
	Ghana	2	0	4	0	7	5	2	0	4	4	28
	Guinea-Bissau	0	0	0	0	0	1	0	0	0	0	1
	Guinea	0	1	0	0	0	1	0	0	0	0	2
	Kenya	0	1	0	2	7	2	1	1	1	3	18
	Liberia	0	0	3	2	0	7	0	0	2	0	14
	Madagascar	0	1	0	0	11	35	31	6	1	0	85
	Malawi	0	0	0	0	0	1	1	0	0	2	4
	Mali	0	0	2	7	0	2	0	0	0	0	11
	Mauritania	0	0	0	0	0	1	0	0	0	0	1
	Morocco	0	0	0	0	0	0	1	0	0	0	1
	Mozambique	0	0	0	0	0	2	1	2	3	7	15
	Niger	0	0	0	0	0	1	0	0	0	0	1
	Nigeria	0	4	15	6	9	19	3	0	2	5	63
	Rwanda	0	0	0	0	0	1	0	0	1	4	6
	Senegal	0	0	4	6	4	0	1	0	0	0	15
	Sierra Leone	0	0	2	7	3	6	0	0	1	0	19
	Somalia	0	0	0	0	2	4	1	1	1	0	9
	South Africa	0	0	0	0	0	0	0	0	0	1	1
	Sudan	0	1	2	2	3	0	0	1	0	0	9
	Tanzania	0	2	0	1	12	16	5	1	10	8	55
	Uganda	0	0	0	1	0	0	1	2	1	5	10
	Zambia	0	0	0	0	2	1	0	0	1	0	4
	Zimbabwe	0	0	0	0	0	0	0	0	2	2	4
Asia	Afghanistan	0	1	0	0	0	0	0	0	0	0	1
	Bangladesh	0	14	27	138	166	101	97	54	177	51	825
	Bhutan	0	0	0	0	15	44	17	9	5	1	91

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Annex Table 5 continued.

Region	Country	Males										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
	Brunei	0	0	0	0	0	1	0	0	0	0	1
	Cambodia	1	0	5	0	0	40	79	44	34	7	210
	China	0	1	0	61	174	164	71	60	116	64	711
	East Timor	0	0	0	0	0	0	0	0	5	0	5
	India	2	41	47	106	193	156	156	108	205	90	1,104
	Indonesia	0	21	71	248	174	90	69	53	74	22	822
	Iran	0	1	3	5	8	17	26	9	55	14	138
	Iraq	0	1	0	1	2	0	0	0	0	0	4
	Israel	0	0	1	0	0	0	0	0	0	0	1
	Japan	5	9	12	11	13	5	8	7	16	14	100
	Kazakhstan	0	0	0	0	0	0	0	0	5	0	5
	North Korea	0	0	0	0	0	0	0	0	0	1	1
	Lao PDR	0	7	13	0	3	20	49	33	59	14	198
	Malaysia	1	7	4	60	57	28	6	9	30	0	202
	Maldives	0	0	0	0	0	1	0	0	0	0	1
	Mongolia	0	0	0	0	0	0	0	0	0	0	0
	Myanmar	0	7	20	40	100	36	10	13	21	6	253
	Nepal	0	3	3	28	38	42	44	23	28	22	231
	Pakistan	0	36	10	42	38	22	25	18	10	6	207
	Philippines	35	108	63	99	232	109	105	47	187	172	1,157
	Singapore	0	0	0	0	0	0	0	1	0	1	2
	South Korea	3	18	24	29	38	38	27	20	48	50	295
	Sri Lanka	0	35	61	79	159	88	21	8	11	2	464
	Taiwan	6	14	11	3	4	1	0	0	0	0	39
	Thailand	16	21	50	144	147	121	67	26	20	20	632
	Uzbekistan	0	0	0	0	0	0	0	0	5	0	5
	Vietnam	3	11	7	5	76	102	92	84	85	26	491
Europe	Belgium	0	0	0	1	3	0	1	0	4	3	12
	Bulgaria	0	0	0	0	0	1	0	0	0	0	1
	Denmark	0	0	0	0	0	0	1	0	1	0	2
	Finland	0	0	0	1	0	0	0	0	0	0	1
	France	0	0	1	0	0	0	1	0	4	3	9
	Germany	0	1	0	1	11	4	10	6	6	4	43
	Greece	0	0	0	0	0	0	0	0	0	0	0
	Ireland	0	0	0	2	0	0	0	0	0	0	2
	Italy	0	0	0	0	0	1	0	0	0	0	1
	Netherlands	2	1	0	4	4	5	6	4	5	3	34
	Poland	0	0	0	0	0	0	0	0	0	0	0

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Annex Table 5 continued.

Region	Country	Males										Total
		1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	
	Portugal	0	0	0	0	0	0	0	0	1	0	1
	Russia	0	0	0	0	0	0	0	0	0	0	0
	Spain	0	0	0	0	0	0	1	0	0	2	3
	Sweden	0	0	0	0	0	0	0	0	2	0	2
	Switzerland	0	0	0	0	0	2	2	1	1	0	6
	Turkey	0	0	0	2	0	1	0	0	0	0	3
	United Kingdom	0	0	1	6	5	1	3	0	2	5	23
LAC	Argentina	0	0	0	0	0	0	0	0	3	1	4
	Barbados	0	0	0	0	0	0	0	0	0	0	0
	Brazil	0	0	1	2	5	6	0	2	0	0	16
	Chile	0	0	0	0	1	1	0	0	0	0	2
	Colombia	0	2	4	2	2	2	2	2	0	0	16
	Costa Rica	0	0	0	0	2	1	0	0	0	0	3
	Cuba	0	0	2	9	3	4	1	1	1	0	21
	Dominican Republic	0	0	0	2	0	2	1	0	0	0	5
	Ecuador	0	0	1	0	2	0	0	0	0	1	4
	Guyana	0	0	1	0	2	1	0	1	0	0	5
	Haiti	0	0	0	0	0	0	1	0	0	0	1
	Jamaica	0	0	0	0	3	2	0	0	0	0	5
	Panama	0	1	0	0	1	0	0	0	0	0	2
	Peru	0	0	0	0	1	0	0	0	1	0	2
	Suriname	0	0	0	0	2	1	1	0	0	0	4
	Trinidad and Tobago	0	0	1	2	0	1	0	0	0	0	4
	Venezuela	0	0	0	1	1	0	0	0	0	0	2
North America	Canada	0	0	0	0	1	1	3	4	11	4	24
	Mexico	2	0	2	1	8	8	0	1	0	0	22
	U.S.	2	10	4	13	9	2	2	0	10	19	71
Oceania	Australia	0	0	1	0	1	1	0	0	4	4	11
	Fiji	0	3	5	0	0	10	3	0	0	0	21
	New Zealand	0	0	0	0	0	0	0	1	1	0	2
	Papua New Guinea	0	0	0	1	4	1	4	1	2	0	13
	Samoa	0	0	0	0	1	0	1	0	0	0	2
	Solomon Islands	0	0	2	0	2	0	0	0	0	0	4
	Total	80	385	497	1,190	1,793	1,404	1,070	669	1,296	687	9,071

Annex Table 6. University location where degree scholars completed their graduate studies by country and region, 1962 to 2010.

Region	Country	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Africa	Egypt	0	0	0	0	1	1	0	0	0	0	2
	Madagascar	0	0	0	0	0	0	0	1	0	0	1
	Nigeria	0	0	0	0	0	0	1	0	1	0	2
	Tanzania	0	0	0	0	3	0	0	0	0	0	3
	Total	0	0	0	0	4	1	1	1	1	0	8
Asia	Bangladesh	0	0	0	0	1	2	0	1	7	13	24
	China	0	0	0	0	0	1	4	10	13	28	56
	India	0	0	6	4	2	9	7	9	17	10	64
	Indonesia	0	0	0	1	0	0	0	0	1	1	3
	Iran	0	0	0	0	0	0	0	1	2	3	6
	Japan	0	1	0	1	6	0	5	4	7	2	26
	Malaysia	0	0	0	0	3	1	0	1	0	0	5
	Myanmar	0	0	0	0	0	0	0	0	1	0	1
	Nepal	0	0	0	0	0	0	0	1	0	0	1
	Philippines	28	67	71	117	181	147	131	84	71	116	1,013
	South Korea	0	0	2	2	4	1	0	0	2	1	12
	Singapore	0	0	0	0	0	0	0	0	0	1	1
	Sri Lanka	0	0	0	0	7	2	0	0	0	0	9
	Thailand	0	0	2	12	3	7	3	1	1	3	32
	Vietnam	0	0	0	0	0	1	1	0	2	0	4
	Total	28	68	81	137	207	171	151	112	124	178	1,257
Europe	Belgium	0	0	0	0	0	0	1	0	0	0	1
	Denmark	0	0	0	0	0	0	0	0	1	0	1
	France	0	0	0	1	0	1	2	0	0	0	4
	Germany	0	1	0	1	6	1	4	6	2	2	23
	Netherlands	0	0	0	0	6	4	2	2	6	1	21
	Portugal	0	0	0	0	0	0	0	0	1	0	1
	Scotland	0	0	0	0	0	1	0	0	0	0	1
	Spain	0	0	0	0	0	0	0	0	1	0	1
	Switzerland	0	0	0	0	0	0	1	0	0	0	1
	United Kingdom	0	0	2	3	4	2	5	1	1	2	20
	Total	0	1	2	5	16	9	15	9	12	5	74

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Annex Table 6 continued.

Region	Country	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
LAC	Colombia	0	0	0	0	0	0	1	0	0	0	1
N. America	Canada	0	0	0	0	1	4	7	1	0	2	15
	Hawaii	0	0	1	1	0	0	0	0	0	0	2
	Mexico	0	0	0	0	0	1	0	0	0	0	1
	U.S.	2	11	25	33	37	18	17	1	2	4	150
	Total	2	11	25	33	38	23	24	2	2	6	166
Oceania	Australia	0	0	1	2	3	1	7	6	0	4	24
	New Zealand	0	0	0	0	0	0	0	1	0	1	2
	Total	0	0	1	2	3	1	7	7	0	5	26
Unidentified	No data	1	0	0	2	8	8	11	0	0	7	37

Annex Table 7. Name and location of universities where degree scholars completed their graduate studies, 1962 to 2010.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Australia	Australian National University	0	0	0	1	1	1	1	0	0	0	4
	La Trobe University	0	0	0	0	1	0	0	0	0	0	1
	Macquarie University	0	0	0	0	0	0	1	0	0	0	1
	Monash University	0	0	0	0	1	0	0	0	0	0	1
	Murdoch University	0	0	0	0	0	0	2	2	0	0	4
	University of Adelaide	0	0	0	1	0	0	0	0	0	0	1
	University of Melbourne	0	0	0	0	0	0	1	0	0	0	1
	University of New England	0	0	0	0	0	0	1	0	0	0	1
	University of Queensland	0	0	1	0	0	0	1	0	0	0	2
	University of Sydney	0	0	0	0	0	0	0	0	0	4	4
	University of Western Australia	0	0	0	0	0	0	0	4	0	0	4
Bangladesh	Bangabandhu Sheik Mujibur Rahman Agricultural University	0	0	0	0	0	0	0	0	0	2	2
	Bangladesh Agricultural University	0	0	0	0	1	0	0	0	4	9	14
	Bangladesh University of Engineering & Technology	0	0	0	0	0	1	0	0	0	0	1
	Jahanginagar University	0	0	0	0	0	0	0	0	1	0	1
	Rajshahi University	0	0	0	0	0	0	0	0	0	1	1
	University of Dhaka	0	0	0	0	0	0	0	1	2	1	4
Belgium	Katholieke Universiteit Leuven	0	0	0	0	0	0	1	0	0	0	1
Canada	Laval University	0	0	0	0	0	0	1	0	0	0	1
	McGill University	0	0	0	0	0	1	3	1	0	1	6
	University of Alberta	0	0	0	0	0	0	1	0	0	1	2
	University of Guelph	0	0	0	0	0	0	1	0	0	0	1
	University of Manitoba	0	0	0	0	1	3	0	0	0	0	4

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
	York University	0	0	0	0	0	0	1	0	0	0	1
China	Beijing Agricultural University	0	0	0	0	0	0	0	1	0	0	1
	China Agricultural University	0	0	0	0	0	0	0	0	1	4	5
	Chinese Academy of Agricultural Sciences	0	0	0	0	0	0	0	0	0	5	5
	Chinese Academy of Science	0	0	0	0	0	0	0	1	1	0	2
	Guangdong Academy of Agricultural Sciences	0	0	0	0	0	0	0	0	1	0	1
	Huazhong Agricultural University	0	0	0	0	0	0	1	1	0	4	6
	Hunan Agricultural University	0	0	0	0	0	0	0	0	2	7	9
	Jiangsu Academy of Agricultural Sciences	0	0	0	0	0	0	1	0	0	0	1
	Laiyang Agricultural College	0	0	0	0	0	0	0	1	2	1	4
	Nanjing Agricultural University	0	0	0	0	0	0	1	0	3	1	5
	North-Western A & F University	0	0	0	0	0	0	0	0	0	1	1
	Shenyang Agricultural University	0	0	0	0	0	0	0	0	0	1	1
	South China Agricultural University	0	0	0	0	0	1	0	0	0	0	1
	Wuhan University	0	0	0	0	0	0	0	3	0	0	3
	Zheijiang University	0	0	0	0	0	0	0	0	1	1	2
	Zhejiang Academy of Agricultural Sciences	0	0	0	0	0	0	1	1	2	1	5
	Zhejiang Agricultural University	0	0	0	0	0	0	0	2	0	1	3
	Zhongnan University of Economics and Law	0	0	0	0	0	0	0	0	0	1	1
Colombia	Colombian National University	0	0	0	0	0	0	1	0	0	0	1
Denmark	The Royal Veterinary of Agriculture University	0	0	0	0	0	0	0	0	1	0	1
Egypt	Cairo University	0	0	0	0	1	1	0	0	0	0	2

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
France	National College of Agriculture & Food Technology	0	0	0	1	0	0	0	0	0	0	1
	Université de Paris-Sud	0	0	0	0	0	0	1	0	0	0	1
	Université De Provence	0	0	0	0	0	0	1	0	0	0	1
	University of Lyons	0	0	0	0	0	1	0	0	0	0	1
Germany	Bodenkunde Hamburg University	0	0	0	0	1	0	0	0	0	0	1
	Botanical Institute, Stuttgart-Hohenheim	0	1	0	0	0	0	0	0	0	0	1
	Institute for Allegemeine Botanik	0	0	0	0	1	0	0	0	0	0	1
	Justus-Liebig University	0	0	0	0	4	1	0	1	0	0	6
	University of Bonn	0	0	0	0	0	0	0	0	2	1	3
	University of Giessen	0	0	0	0	0	0	0	1	0	0	1
	University of Göttingen	0	0	0	0	0	0	1	2	0	0	3
	University of Hamburg	0	0	0	1	0	0	0	1	0	1	3
	University of Hohenheim	0	0	0	0	0	0	2	1	0	0	3
	University of Leipzig	0	0	0	0	0	0	1	0	0	0	1
India	Andhra Pradesh Agricultural University	0	0	0	0	0	2	2	0	0	0	4
	Assam Agricultural University	0	0	0	0	0	0	1	2	0	0	3
	Bose Institute	0	0	0	0	0	0	0	1	1	0	2
	Calcutta University	0	0	0	0	0	0	0	0	1	0	1
	Ch. Charan Singh University, Meerut	0	0	0	0	0	0	0	0	0	1	1
	Deemed University	0	0	0	0	0	0	0	0	0	1	1
	Delhi School of Economics	0	0	0	0	1	0	0	0	0	0	1

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
	Dr. H.S. Gaur University	0	0	0	0	0	0	0	0	0	1	1
	G.B. Pant University of Agriculture & Technology	0	0	0	0	0	0	0	0	2	0	2
	G.K.V.K. University of Agricultural Sciences	0	0	0	0	0	0	0	0	1	0	1
	Himachal Pradesh University	0	0	0	1	0	0	0	0	0	0	1
	Indian Agricultural Research Institute	0	0	6	2	0	5	0	1	1	0	15
	Indira Gandhi Agricultural University	0	0	0	0	0	0	0	0	2	1	3
	Jawaharlal Nehru Agricultural University	0	0	0	0	0	0	0	1	0	0	1
	Jawaharlal Nehru Krishi Vishwa Vidyalaya	0	0	0	1	0	1	0	0	0	0	2
	Lucknow University	0	0	0	0	1	0	0	0	0	0	1
	Madras University	0	0	0	0	0	0	0	1	0	0	1
	Orissa University of Agriculture and Technology	0	0	0	0	0	0	0	1	0	0	1
	Osmania University	0	0	0	0	0	0	1	0	0	0	1
	Pune University	0	0	0	0	0	0	0	0	1	0	1
	T.C.B. College of Agriculture and Research Station	0	0	0	0	0	0	0	0	0	1	1
	Tamil Nadu Agricultural University	0	0	0	0	0	0	1	0	4	2	7
	University of Agricultural Sciences	0	0	0	0	0	0	0	0	1	1	2
	University of Calcutta	0	0	0	0	0	0	0	1	1	0	2
	University of Delhi	0	0	0	0	0	0	1	0	0	0	1
	University of Madras	0	0	0	0	0	1	0	1	2	0	4
	Veer Bahadur Singh Poorvanchal University	0	0	0	0	0	0	0	0	0	2	2
Indonesia	Bogor Agricultural University	0	0	0	0	0	0	0	0	1	1	2
	Gadjah Mada University	0	0	0	1	0	0	0	0	0	0	1

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Iran	Isfahan University of Technology	0	0	0	0	0	0	0	0	0	2	2
	Tarbiat Madarres University	0	0	0	0	0	0	0	0	0	1	1
	Tehran University	0	0	0	0	0	0	0	0	2	0	2
	University of Guilan	0	0	0	0	0	0	0	1	0	0	1
Japan	Hokkaido University	0	1	0	1	0	0	0	0	2	0	4
	Kyoto University	0	0	0	0	1	0	0	0	1	0	2
	Kyushu University	0	0	0	0	1	0	0	0	0	0	1
	Nagoya University	0	0	0	0	0	0	0	0	2	0	2
	Nara Institute of Science and Technology	0	0	0	0	0	0	0	0	0	1	1
	Okayama University	0	0	0	0	0	0	2	0	0	0	2
	Saga University	0	0	0	0	0	0	0	0	1	0	1
	Tahuko University	0	0	0	0	1	0	1	0	0	0	2
	Tottori University	0	0	0	0	0	0	0	1	0	0	1
	University of Kyoto	0	0	0	0	2	0	2	2	0	0	6
	University of Tokyo	0	0	0	0	1	0	0	0	0	1	2
	University of Tsukuba	0	0	0	0	0	0	0	0	1	0	1
	Yamagata University	0	0	0	0	0	0	0	1	0	0	1
Korea	Chonnam National University	0	0	0	0	0	1	0	0	0	0	1
	Gyeong Sang National University	0	0	0	0	0	0	0	0	0	1	1
	Kyung Pook National University	0	0	0	0	1	0	0	0	0	0	1
	Kyungbug National University	0	0	0	0	1	0	0	0	0	0	1
	Pusan National University	0	0	0	0	0	0	0	0	2	0	2
	Seoul National University	0	0	2	2	2	0	0	0	0	0	6

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Madagascar	University of Madagascar	0	0	0	0	0	0	0	1	0	0	1
Malaysia	Universiti Pertanian Malaysia	0	0	0	0	2	1	0	1	0	0	4
	University of Malaysia	0	0	0	0	1	0	0	0	0	0	1
Mexico	Universidad Autónoma Chapingo	0	0	0	0	0	1	0	0	0	0	1
Myanmar	Yezin Agricultural University	0	0	0	0	0	0	0	0	1	0	1
Nepal	Tribhuvan University	0	0	0	0	0	0	0	1	0	0	1
Netherlands	University of Amsterdam	0	0	0	0	0	0	1	0	0	0	1
	Wageningen Agricultural University	0	0	0	0	6	4	1	3	6	0	20
New Zealand	Massey University	0	0	0	0	0	0	0	1	0	1	2
Nigeria	University of Ibadan	0	0	0	0	0	0	1	0	1	0	2
Philippines	Ateneo de Manila University	0	0	0	1	1	0	0	0	0	0	2
	Bohol Agricultural College	0	0	0	0	1	1	0	0	0	0	2
	Central Luzon State University	0	0	1	0	8	14	22	2	1	3	51
	Central Mindanao University	0	0	0	0	0	0	0	0	0	1	1
	Gregorio Araneta University Foundation	0	1	0	1	2	3	2	0	0	0	9
	University of Southern Mindanao	0	0	0	0	0	0	0	0	1	1	2
	University of Sto. Tomas	0	0	0	0	0	1	0	0	0	0	1
	University of the Philippines–Diliman	0	0	1	4	4	5	2	3	1	2	22
	University of the Philippines–Los Baños	28	66	69	111	165	123	105	79	68	109	923
	Xavier University	0	0	0	0	2	0	0	0	0	0	2
Portugal	Institute for Biological and Experimental Technology (ITQB/IBET)	0	0	0	0	0	0	0	0	1	0	1
Scotland	University of Aberdeen	0	0	0	0	0	1	0	0	0	0	1

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
Singapore	National University of Singapore	0	0	0	0	0	0	0	0	0	1	1
Spain	University of Lleida	0	0	0	0	0	0	0	0	1	0	1
Sri Lanka	Postgraduate Institute of Agriculture, University of Peradeniya	0	0	0	0	7	2	0	0	0	0	9
Switzerland	Universitat Starsse 2	0	0	0	0	0	0	1	0	0	0	1
Tanzania	University of Dar es Salaam	0	0	0	0	3	0	0	0	0	0	3
Thailand	Asian Institute of Technology	0	0	0	10	2	0	2	0	0	0	14
	Kasetsart University	0	0	0	0	1	6	1	1	1	1	11
	Khon Kaen University	0	0	0	0	0	0	0	0	0	2	2
	Thammasat University	0	0	2	2	0	1	0	0	0	0	5
United Kingdom	Imperial College, London	0	0	0	1	0	0	0	0	0	0	1
	Nottingham University	0	0	2	0	1	0	0	0	0	0	3
	Sussex University	0	0	0	0	0	1	0	0	0	0	1
	University of Anglia-Norwich	0	0	0	0	0	0	1	0	0	0	1
	University of Birmingham	0	0	0	1	0	0	3	0	0	0	4
	University of Cambridge	0	0	0	0	1	0	1	0	0	0	2
	University of London	0	0	0	0	1	0	0	0	0	0	1
	University of New Castle Upon Tyne	0	0	0	0	0	1	1	0	0	0	2
	University of Reading	0	0	0	1	1	0	0	1	0	2	5
U.S.	Bowling Green State University	0	1	0	0	0	0	0	0	0	0	1
	Colorado State University	0	0	0	0	1	0	2	0	0	0	3
	Cornell University	0	0	7	3	8	5	3	0	1	1	28
	Dartmouth College	0	0	0	1	1	0	1	1	0	0	4

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
	Iowa State University	0	0	0	2	1	1	0	0	0	0	4
	Kansas State University	0	0	0	1	2	1	0	0	0	0	4
	Louisiana State University	1	2	2	1	1	0	0	0	0	0	7
	Michigan State University	0	0	0	2	1	0	0	0	0	0	3
	Mississippi State University	0	0	0	1	0	0	0	0	0	0	1
	North Carolina State University	0	0	1	0	2	0	0	0	0	0	3
	Ohio State University	0	1	0	0	1	1	0	0	0	0	3
	Oregon State University	0	0	1	4	0	0	4	0	0	0	9
	Pennsylvania State University	0	0	0	1	0	0	0	0	0	0	1
	Purdue University	1	1	1	2	0	0	0	0	0	0	5
	Rutgers University	0	0	0	0	0	0	0	0	1	0	1
	Stanford University	0	0	1	0	0	1	2	0	0	0	4
	Texas A&M University	0	1	0	0	0	0	0	0	0	0	1
	University of Arkansas	0	0	0	1	0	0	0	0	0	0	1
	University of California-Davis	0	1	5	3	6	2	1	0	0	2	20
	University of Florida	0	1	0	1	0	1	1	0	0	0	4
	University of Hawaii	0	1	2	3	1	2	1	0	0	0	10
	University of Illinois	0	1	2	0	0	0	0	0	0	0	3
	University of Kentucky	0	1	0	0	0	0	0	0	0	0	1
	University of Michigan	0	0	0	0	0	1	0	0	0	0	1
	University of Minnesota	0	0	2	0	1	1	0	0	0	0	4
	University of Missouri	0	0	0	0	4	1	0	0	0	0	5

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Annex Table 7 continued.

Country	University name	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	Total
	University of Nebraska	0	0	0	1	0	0	0	0	0	0	1
	University of Wisconsin	0	0	0	3	2	0	1	0	0	0	6
	Utah State University	0	0	0	0	1	1	0	0	0	0	2
	Virginia Polytechnic Institute and State University	0	0	0	0	0	0	1	0	0	1	2
	Washington State University	0	0	0	1	0	0	0	0	0	0	1
	Yale University	0	0	0	1	1	0	0	0	0	0	2
Vietnam	Cantho University	0	0	0	0	0	1	0	0	0	0	1
	Thai Nguyen Agro-Forestry College	0	0	0	0	0	0	0	0	1	0	1
	University of Vietnam	0	0	0	0	0	0	0	0	1	0	1
Unknown	University not indicated	1	0	0	2	9	8	11	0	0	7	38