New electronic format for the IRRI Annual Report

Welcome to IRRI’s new annual reporting format, which is using modern digital technology in the form of an interactive DVD instead of a traditional, static printed publication. Although you can still read about our progress in 2007, you can also see and hear about our work in a way that I hope will make learning more about our accomplishments an informative and pleasurable experience. There is no printed publication, but you can easily make printouts if you would like hard copies of various sections. I hope you enjoy exploring this report as much as we have enjoyed preparing it for you. For starters, click on my photo here for my video message.
IRRI’s new plan is launched

On 1 January 2007, we implemented IRRI’s new Strategic Plan (2007-2015), Bringing Hope, Improving Lives. While this new blueprint for progress is maintaining the Institute’s traditional emphasis on food security—a vital strategy to be sure—we are, for the first time, putting as our first goal the reduction of poverty among rice farmers and consumers. The recent dramatic rise in rice prices serves to re-emphasize the relationship among productivity, food security, and poverty reduction. Since we are serious about helping to achieve this most important of the UN’s Millennium Development Goals (MDGs) on alleviating poverty, we are focusing on the livelihoods of poor rice farmers and consumers because together they make up almost half of the world’s 6+ billion population.

Our other four goals focus on environmental sustainability, health and nutrition, access to information and knowledge, and supporting efforts everywhere to develop new and improved rice varieties. All of these are contributing both directly and indirectly to achieving the MDGs, not to mention having a close connection to the CGIAR’s priority areas for system-wide research.

Click here to get an overview of the targets for our Medium-Term Plan (2007-09).

Research progress in 2007

In January, IRRI kicked off seven exciting new research programs (see Figure). With an early memo of 2007, I announced the 5-year appointments of the leaders of these programs within the research management matrix who are responsible for the development and delivery of the research outputs. Elsewhere on this DVD, you can view their video introductions to their respective programs and just feel their enthusiasm.

The research progress and achievements in 2007, which are summarized program by program on this DVD, confirm the reality that our new Strategic Plan has truly been built on the strengths of the recent past.

Although this report officially reports on progress and activities during 2007, I would be remiss if I did not refer here to the rice price crisis that became a major concern during the first quarter of 2008 and continues at this writing (1 May 2008) and is being highlighted daily on the front pages of newspapers and on prime-time television. Many factors, both long- and short-term, have contributed to the rice crisis. At a fundamental level, the sustained rise in the price over the past 7–8 years indicates that we have been consuming more than we have been producing. As this 2007 annual report shows, even before the current scare, IRRI had been moving forward to achieve reliable, plentiful supplies of affordable rice for the world’s poor. It is evident that we can make significant inroads to solving the current crisis unless our hands are tied through a severe lack of financial support.

Funding

UN Secretary-General Ban Ki-moon recently stated that, to avoid a deep and prolonged food crisis, the world must boost agricultural production and that there is a need for a new Green Revolution. IRRI, which played a leading role in resolving the last major food crisis in the 1970s, and other centers of the Consultative Group on International Agricultural Research have the scientific knowledge and capability to develop technologies that can help poor farmers both avoid destitution in the face of weather-related disasters and pull themselves out of poverty.

As people in first-world offices murmur about the new food crisis currently in our midst, IRRI is putting forth solutions. For example, see our special Rice Solutions Web site. IRRI and its national partners are introduc-
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We have a strong and ever-growing alliance, is developing and deploying drought-tolerant maize in Africa.

These have not been overnight solutions: they have taken time and money. Development of submergence-tolerant rice began in the late 1980s. Yet, precisely when all signs are pointing to mass hunger not seen for decades, many traditional donors are withdrawing their support for agricultural research. If the current trends continue, it will not be the developing world’s poor farmers and consumers who are to blame.

Recent media reports have provided extensive coverage of the large grant from the Bill & Melinda Gates Foundation (BMGF) to IRRI, which was the extraordinary outcome of a July “convening” to discuss funding opportunities that I and other key IRRI staff members had with BMGF officials in Seattle. It is important that our supporters and the general public have a good understanding of this grant and how it fits into the overall financial picture of the Institute.

There is no doubt that the investment by BMGF is very good news from many perspectives. Perhaps most important is that the grant represents a strong endorsement by the world’s most rigorous grant-making foundation of IRRI’s new strategy and our ability to attempt to solve some of the world’s most pressing problems. At US$19.9 million over 3 years, the restricted grant is already being used to fund work on abiotic stresses in South Asia and Africa, including drought-tolerant varieties. The grant is the largest ever received by IRRI, but it is not the windfall as portrayed in some reports. A large chunk of the grant (more than $6 million) will be spent by our partners in Africa and Asia.

Some bad news offsets the good news about the BMGF grant. In January 2008, the Japanese contribution to IRRI for 2007 was reduced by about $300,000. Then we learned that the U.S. Agency for International Development (USAID) was contemplating substantially large cuts in its 2008 unrestricted contributions to the CGIAR including IRRI. We are currently working with the CGIAR Alliance to convince USAID that cuts in its valuable support for agricultural research will make it increasingly difficult to deal with the impacts of rising global cereal prices.

Likewise, we are implementing a number of major changes in how we manage our restricted grants from donors. This should enable us to function effectively in a world in which most of our support comes from such grants.

In a recent joint letter to Robert Zoellick, president of the World Bank, I expressed with CIMMYT Director General Thomas Lumpkin our disappointment over the significant erosion of support for agricultural research over the past 15 years, as demonstrated by the 2008 World Development Report, released in October 2007. Not only has support for productivity-oriented research in the CGIAR declined from more than 70% to around 35% of CGIAR funding, this has taken place within a shrinking CGIAR budget that has decreased by about 50% in real terms over the same time period. There is little wonder

that productivity growth rates of the world’s staple food have been steadily falling in recent years, especially in developing countries.

IRRI incurred planned deficits in 2005, 2006, and 2007 totaling about $10 million. These planned deficits will bring us close to our Board’s approved minimum reserve level but we will still be in a reasonable financial position compared with our CGIAR colleagues. Even if USAID does not cut IRRI’s funding, there will still be an expected, and manageable, deficit in 2008 despite the BMGF grant.

Click here for a summary of financial support for 2007. Appendix 3 contains the audited financial statements for 2007.

New chair and three new members on the IRRI BOT

As of 1 January 2008, Elizabeth Jean Woods (Australia) is the new chair of the IRRI Board of Trustees (BOT), replacing Keijiro Otsuka (Japan), who had served the Board since 2002. Click here to read a feature about her on The Australian Web site.
Dr. Woods is a former Rhodes Scholar and winner of several honors in Australian agriculture. She is also the present Foundation Professor of Agribusiness at the School of Natural and Rural Systems Management at the University of Queensland in Australia. Her role there is to provide leadership in the areas of agribusiness and rural management to enhance the University’s service to tropical Australia and Asia. Dr. Woods is recognized as an expert in tropical and sub-tropical agriculture and agribusiness, especially in relation to broadacre farming systems and the horticultural industry. She has a broad knowledge of Australian farming systems and related R&D activities in several Asian countries, especially Indonesia. She also chairs Australia’s Rural Industries Research and Development Corporation (RIRDC).

Also joining the IRRI BOT as of 1 January 2008 were new members Drs. Mutsuo Iwamoto, Seong-Hee Lee, and Achmad Suryana, who are replacing, respectively, Drs. Otsuka, Eun-Jong Lee (2002-07, Korea), and Achmad Fagi (2002-07, Indonesia).

Dr. Iwamoto, from Japan, is president of the Society for the Techno-innovation of Agriculture, Forestry, and Fisheries (STAFF). Prior to this, he was president of the Japan International Research Center for Agri-cultural Sciences (JIRCAS) from 2003 to 2005. He had previously served as director-general of the Agriculture, Forestry, and Fisheries Research Council (AFFRC) Secretariat under the jurisdiction of MAFF in Tokyo from 2001 to 2003; as research councilor at the AFFRC Secretariat; and as director-general of Tokai Regional Agricultural Administration from 1999 to 2001.

Dr. Lee, from the Republic of Korea, is the former director general of the National Institute of Crop Science (NICS), Rural Development Administration (RDA), Suwon, Korea. He still serves NICS as a senior researcher and is lecturing at Dankook University in plant physiology and experimental statistics. He worked for various agricultural technical and research institutions: National Seed Production and Distribution Office and National Agricultural Materials Inspection Office of the Ministry of Agriculture, Forestry, and Fisheries (MAFF); and Agro-chemicals Research Institute, Wheat and Barley Research Institute, and International Technical Cooperation Center (ITTC) of RDA.

Dr. Suryana, from Indonesia, has been the director general of the Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, since January 2004. Before he assumed this job, he worked at various institutions within the Ministry of Agriculture. He was the interim director general of Food Crops (2005-06) and director general of the Agency for Food Security (2000-04). He was also director of the Bureau of Planning (1998-2000), Center for Agricultural and Socioeconomics Research (1995-98), and Center for Agribusiness Investment and Environmental Improvement Assessment (1994-95).

During our September Board meeting in Vientiane, Laos, I recognized the very important contributions made by our outgoing board chair, Keijiro Otsuka (photo above left), Dr. Otsuka led the Institute through a very significant and important period that included the development and implementation of our new strategic plan and the opening of the Institute’s newest office in Africa. We will miss his intelligence and experience, but we are very fortunate to be able to call on someone like Dr. Woods to replace him. Dr. Otsuka said that one of his most important achievements as board chair was helping to reorient IRRI’s mission to focus more sharply on poverty reduction in poor rainfed areas in Asia, but also including sub-Saharan Africa. “This new focus is backed by a very strong commitment to rice research and the use of science to solve problems—something that has always been key to IRRI’s success,” he said.

In one of his final duties as board chair, Dr. Otsuka (left in photo above right) joined with me in a courtesy call on Lao PDR Prime Minister Bouasone Bounphavanh (right in photo above...
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right) and Minister of Agriculture Sita Heng Rasphone to thank them for hosting the board meeting in Laos.

Key staff members depart IRRI for important new assignments and new arrivals

Dr. Wang departs IRRI to become CGIAR director

Ren Wang, deputy director general for research (DDG-R; photos below), who departed IRRI on 23 July to become director of the CGIAR, was recognized for his more than 7 years of dedicated service to the Institute by investing enormous personal energy and enthusiasm into the management of IRRI’s research matrix, vigorously championing research innovation and encouraging scientists to pursue new and exciting opportunities, and enabling and empowering researchers and managers to realize their potential via effective behind-the-scenes support. He ensured that IRRI remained relevant and forward-looking by insisting on investments in state-of-the-art facilities and talented personnel and played a pivotal role in the development of IRRI’s Strategic Plan and Business Plan. He took special care to assure that our partners in national systems understood that they were highly valued by the Institute. He also moved the Institute forward toward a codified and vibrant total quality assurance program. Dr. Wang aggressively pursued new opportunities while making sure that IRRI’s core areas of research and capacity building were protected. He served as a role model for all at IRRI through his good humor, kind disposition, and true humility.

During his farewell seminar on 7 June, Dr. Wang gave an overview of the major developments and achievements in IRRI’s research and product portfolio that he had witnessed in the past 7 1/2 years. He identified areas or gaps that may affect IRRI’s development and health in the future. He also provided some insights into what IRRI management and staff must strive to address if they intend to make IRRI a center of excellence and the strongest center in the CGIAR in the future. Click here to view a video of his presentation. Click here to listen to the audio file while clicking here to follow along with his PowerPoint presentation. Click here to view a pdf file of Ren Wang’s activities at IRRI as gleaned from 7 1/2 years of stories in IRRI’s weekly Bulletin.

T.P. Tuong (at left in photo above conferring with Xijun Deng, chargé d’affaires, Embassy of the People’s Republic of China in the Philippines) accepted my request that he serve as acting DDG-R effective the date of Dr. Wang’s departure and until his replacement arrived (which was 1 April 2008 with the appointment of Achim Dobermann).

Dr. Hossain departs IRRI to head BRAC

Taking early retirement from IRRI, Mahabub Hossain, economist and head, Social Sciences Division (SSD), departed on 15 June to join BRAC (Bangladesh Rural Advancement Committee) as its executive director in his home country of Bangladesh. On 26 April, he gave a farewell summary of social science research at IRRI since 1992. Wrapping up his 15 years with a dual role as a researcher and administrative head in SSD, he presented a synthesis of socioeconomic studies on rice supply and demand trends in Asia and discussed constraints to increasing rice productivity, understanding rural livelihood systems, and the impact of improved rice technologies on poverty reduction.

He mentioned that the role of IRRI should continue to be enhancing rice research capacity of NARES, leading research for the development of technologies with abiotic stress tolerance, collaborating with NARES for maintenance breeding for the irrigated system, facilitating transfer of knowledge and technologies from ARIs to young NARES researchers, and maintaining genetic resources and exploring new traits. Click his photo below to view a 46:26 video of his presentation.

Click here to view a video of his presentation.
Dr. Hossain contributed to the social sciences by achieving excellence in research on a broad range of topics, including livelihood analysis, impact assessment, rice sector analysis, and poverty mapping; providing strong leadership in organizing social sciences research to meet the priority needs of the Institute; and developing a strong and harmonious research team through excellent management in SSD.

Professor Randy Barker joined SSD as consultant and acting head on 12 June 2007. He took the lead in successfully recruiting a permanent replacement for Dr. Hossain, who is Dr. Samarendu “Sam” Mohanty (photo right), scheduled to arrive in June 2008. Dr. Barker was the first head of SSD (then Agricultural Economics) from 1966 to 1978.

Mr. Akuffo-Akoto departs IRRI for AGRA; Mr. MacDonald replaces him

Kwame Akuffo-Akoto, director for management services, departed IRRI to become director for finance and administration for the Alliance for a Green Revolution in Africa (AGRA). We recognized him for his innovative, significant, and productive contributions that positively transformed IRRI’s management services. He exemplified dedicated service by providing the Institute with excellent financial leadership, being a pillar in developing and promoting best practices in fiduciary management and financial reporting by the CGIAR centers, and being instrumental in aligning CG financial practices with global standards and in formulating a single financial policy for the entire CGIAR. He was also recognized for playing a vital role in the Institute’s strategic planning, ensuring that HR policies were strictly but humanely implemented, providing strong and solid support for HR initiatives that further enhanced IRRI’s standards, being a guidepost in management services’ strategies and plans, and being a role model of IRRI’s values.

We appointed Norman MacDonald as the new director for management services, who arrived in early September. His selection was the result of an exhaustive international search. Prior to coming to IRRI, Mr. MacDonald had been deputy director general for corporate services at the Center for International Forestry Research (CIFOR) in Bogor, Indonesia. So, he has brought a wealth of relevant experience to the position.

Dr. Bennett retires

Dr. John Bennett (photo below), senior scientist, molecular biology in PBGB, retired in early January after 15 years of dedicated service to the Institute that involved numerous contributions to plant breeding, genetics, and biotechnology. Dr. Bennett guided the establishment of biotechnology facilities: Plant Molecular Biology Laboratory, Asian Rice Biotechnology Network (ARBN) shuttle research laboratory, and Containment Level 4 Transgenic Greenhouse. He provided markers to pyramid rice genes for gall midge resistance and bacterial blight resistance and a synthetic Bt gene for stem borer resistance. And, he obtained molecular insights into the reproductive processes of rice as related to drought tolerance and synthetic apomixis.

He was also involved in developing strong partnerships with many NARES and ARIs to apply new tools of molecular biology in plant breeding research, enhancing capacity build-
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International Food Policy Research Institute (IFPRI) and the Asian Development Bank (ADB). It brought together around 80 key policymakers, development partners, and researchers from all over Asia and others working for Asia to engage in dialogue on these important issues.

During the second day of the forum, I discussed *Strategies for the development and adoption of rice technologies for the poor*. I said there has been a slowdown in growth in rice production as the yield gains from the adoption of modern varieties in irrigated areas have become almost fully exploited and rice area is declining and that, over the past 5 years, the international rice price has doubled and the price for urea (fertilizer) tripled, the latter spurred on by the rise in oil prices. I added that rice stocks are at their lowest since the 1970s. If only we knew what was coming during the first quarter of 2008! I pointed out that the rising demand for biofuels, the pressures that urbanization and industrialization place on land and water resources, and the long-term effects of global warming would require new technologies that can be rapidly disseminated to boost output and keep prices low and stable. Click here to view a 14:30 video of my presentation, courtesy of ADB.

**Encouraging the next generation of rice scientists**

The ability of rice-growing countries to develop and deliver technology-based solutions for tackling constraints to rice production is hampered by the limited or decreasing number of institutions and human resources working on rice research and development, in general, and rice varietal improvement, in particular. Hence, one of our core goals is to develop the next generation of rice scientists, including rice breeders and geneticists, who will lead the realization of a Second Green Revolution. So, in 2007, we held a couple of activities toward this end.

**Second batch of rice campers given hands-on experience at IRRI**

Our second Rice Camp at IRRI took place 23-28 April with 20 tired but fulfilled campers from Thailand and the Philippines. Rice Camp aims to expose participants to current trends in rice science and rice farming, have them experience field and laboratory work, create awareness of the importance of rice science, build an interest within the participants and help them decide to choose rice science as a future career option, let them share their values with co-participants, expose them to the life of other people apart from their own, and let them have fun while doing the training. The participants (photo above) had hands-on experiences in different field operations, laboratory activities, and cross-cultural orientation. Since there were two cultures (Thai and Filipino) in the camp, the students had a good time experiencing new and different ideas first-hand. Click here to view a 1:25 video of the week’s activities. Click here to view a BBC feature on the camp on YouTube.

**Rice breeding courses**

Forty-six rice researchers from 21 countries participated in two rice breeding courses (RBCs) during 20-31 August and 1-12 October (photos next page). Participants represented Bangladesh, Bhutan, Cambodia, China, DPR Korea, Ethiopia, Ghana, India, Indonesia, Lao PDR, Mozambique, Myanmar, Nepal, Philippines, Russia,
South Korea, Spain, Tanzania, Thailand, Vietnam, and the United States. These courses aim to increase the number of rice breeders adept in the use of both conventional and modern tools and techniques for increasing the precision and impact of their breeding programs.

To achieve this, the RBCs are (1) providing theoretical knowledge on modern plant breeding methods and techniques; (2) teaching planning and information management tools, experimental techniques, and software for increasing rice breeding efficiency; (3) providing knowledge and tools to be able to perform prebreeding activities; (4) sharing experiences and lessons from other programs and countries; and (5) providing the latest information relevant to continued access to modern tools, technologies, and rice genetic resources. These training courses are partially supported by the Partnership Initiative for Plant Breeding Capacity Building.

Other notable activities and events in 2007

10th anniversary of IRRI-China office

The IRRI-China Office celebrated its 10th anniversary on 28 November at the Institute of Crop Science, Chinese Academy of Agricultural Sciences (CAAS) campus. Sixty senior officials and alumni from collaborating Chinese institutions (photo above); Dr. Ren Wang, CGIAR executive director, who was instrumental in the establishment of the ICO when he was still the vice-president of CAAS in 1997; and I attended the event.

It was my privilege to congratulate CAAS (our host institution in China) for its 50th anniversary celebration on 10 November and to emphasize the fruitful partnerships between China and IRRI emanating from the early 1970s. I highlighted the legacy of China-IRRI collaboration that includes the release of 46 IRRI germplasm accessions as varieties in China; more than 800 IRRI alumni, many of whom are now leading their institutions in rice research; the increasing number of ongoing collaborative projects and investments from both parties; and the various recognitions by China of IRRI’s contribution to the advancement of Chinese agriculture.

Several senior Chinese officials, in their congratulatory messages, applauded the continuing partnerships and the establishment of the IRRI-China Office in promoting and strengthening productive collaboration between China and IRRI. The officials and several IRRI alumni look forward to the prospects of more support for future collaboration and fruitful achievements of the partnerships.

Deploying ICT services to cyber communities

At the Philippine Rice Research Institute in Nueva Ecija, 18-19 January, leaders and team members of the Open Academy for Philippine Agriculture (OPAPA) and the IRRI-PhilRice PhilICT projects discussed
developing common benchmarking guidelines and problem identification tools to track delivery of services and desired outcomes in pilot cyber communities. The participants identified the most common problems that farmers encounter and the possible options to address those problems through the use of ICT and other means and developed 2007-08 work plans highlighting activities for their cyber communities.

IRRI’s Training Center Head Noel Magor (photo above) shared the experiences of village ICT development in Bangladesh.

Regional rice network meeting in Central Asia
On 8 February, I attended a meeting that brought together representatives of the Regional Rice Network in Central Asia in Tashkent, Uzbekistan. I co-chaired the meeting with Dr. Abdushukur Khanazarov, deputy minister for agriculture and water resources of Uzbekistan. Dr. Raj Paroda, head of the CGIAR Program Facilitation Unit and regional coordinator for the International Center for Agricultural Research in the Dry Areas (ICARDA), was also on the program. Mostly temperate japonica rice is grown in Central Asia and there is great potential for expanding rice production in the region.

New chapter opens for Myanmar’s rice economy
I had the privilege of attending an International Workshop on Myanmar’s Rice Economy and Policy, 26-27 February, in Nay Pyi Taw, the country’s new capital. Participants were eminent resource persons from China, the Philippines, Thailand, and Vietnam; senior officials from the Ministry of Agriculture and Irrigation (MOAI); representatives of rice millers and traders; senior professionals from the universities; and senior IRRI scientists. We examined the role of rice in the Myanmar economy, Myanmar’s potential contribution to the world rice economy in view of its highly favorable resource base for rice production, and policies needed to exploit the potential. I believe that this historical meeting was the opening of a new chapter in the illustrious history of rice in Myanmar and that the increase in rice production in Myanmar will not only help the economy of the country but will also significantly affect the world rice market.

New agreement helps permanently protect the world’s thousands of varieties of rice
An unprecedented new agreement— that will involve the annual dispersal in perpetuity of $600,000—was unveiled on 12 March to help fund the protection and management of the world’s thousands of unique rice varieties. IRRI and the Rome-based Global Crop Diversity Trust unveiled the historic new agreement as part of the special dedication ceremony at IRRI’s T.T. Chang Genetic Resources Center, which houses more than 100,000 samples of rice, the biggest and most important such collection in the world. The funding agreement is expected to help conserve and manage forever rice’s extraordinary diversity. This grant breaks new ground in our funding for this effort. Rice diversity, like all crop diversity, is at risk for the want of relatively small amounts of money. Given that we are talking about the biological base upon which the global food supply is built, it is extraordinary that the current situation is so precarious.

Asian development discussion with ADB officials
On 15 March, I was invited to the Asian Development Bank (ADB) in Manila (photo below) to discuss the importance of agriculture to Asia’s development. I reviewed with an audience of the Bank’s senior officials the serious challenges facing Asia in terms of persistent large-scale poverty, constraints to agricultural development, tightening rice supplies, and climate change. I outlined how strategic investments in agricultural research and development can help sustain the Asian economic miracle within an increasingly threatening environment. I also pointed out that, for almost half a century, Asia has led the world in efforts to lift people out of poverty. Despite this, the region is still home to 65% of the planet’s 1.3 billion poor.
Executive agreement for the Indonesia-IRRI Work Plan for 2007-09

The executive agreement for the Indonesia-IRRI Work Plan was signed during the Indonesia-IRRI Collaborative Work Plan Meeting, 22-23 March, at the Ministry of Agriculture and IAARD Headquarters in Jakarta. For the 2007-09 period, Indonesia and IRRI will focus on supporting the Indonesian Rice Production Increase Program, collaborative research, and human resource development. IRRI considered the work plan meeting very important by sending a large delegation of our scientists (photo above right), led by Deputy Director for Research Ren Wang, to show our support for Indonesia’s efforts to increase its production by 2 million tons of milled rice in 2007 and sustain the 5% rice production growth rate for 2008 to 2009.

Scientists discuss cool rice for a warmer world

During 26-30 March, more than 80 scientists from 14 countries in Asia, Australia, Europe, and North America (photo right) attended an international workshop on Cool Rice for a Warmer World held at the Crop Physiology and Production Center (CPPC), College of Plant Science and Technology, Huazhong Agricultural University (HZAU), Wuhan, Hubei, China. The workshop was sponsored by IRRI and HZAU, with partial financial support from the National Natural Science Foundation of China. In his message to the assembly, Ren Wang stressed the importance of the workshop in serving as a catalyst between upstream and downstream research on high-temperature stress around national research institutes. He also thanked the National Natural Science Foundation of China, stating that IRRI could benefit from its strong support.
Improving rice grain quality
A workshop on Clearing Old Hurdles with New Science: Improving Rice Grain Quality, was held at IRRI, 17-19 April. Participants (photo right) created a vision and mission for the International Network for Quality Rice (INQR); discussed new science that contributes to our understanding of rice grain quality traits; determined ways to capture that science and develop it to measure and understand rice grain quality; discussed collaborative opportunities for new projects on chalk, fragrance, and quality evaluation of physical traits; revisited the traits of physical, sensory, and cooking properties; and discussed the inclusion of nutritional quality into the definition of rice grain quality. This was the first international meeting specifically dedicated to rice quality in this century and it was also the first full meeting of the INQR.

Bill Gates visits IRRI-CAAS joint molecular breeding lab
On 18 April, a delegation from the Bill & Melinda Gates Foundation led by Bill Gates, co-founder of the Foundation and chairman and CEO of Microsoft Corp. (3rd from left in center photo), and Dr. Raj Shah, director of the Agricultural Development Program of the Foundation, visited the Chinese Academy of Agricultural Sciences (CAAS)-IRRI Joint Lab on Rice Molecular Breeding and Genetics headed by IRRI molecular geneticist Zhi-Kang Li (center in photo above).

After a brief introduction by CAAS Vice-President Dr. Zhang, the delegation met with Dr. Li and his team at CAAS. Dr. Li gave presentations on “Rice Breeding in China—Current Status and Prospects,” the concept of “Super Green Rice,” and progress in the China National Molecular Breeding Network, a new breeding strategy to combine gene discovery with variety development initiated at IRRI in 1998 and coordinated by Dr. Li. Mr. Gates showed great interest in the topics and discussed molecular markers, genome sequence, gene expression, proteomics, and rice breeding with Dr. Li. The group also visited the National Key Facility for Crop Gene Resources and Genetic Improvement and the China National Crop Gene-bank.

Temperate Rice Research Consortium launched during workshop in Korea
The Temperate Rice Research Consortium (TRRC) was launched during an international planning workshop on temperate rice, 2-4 May, in Suwon, Republic of Korea. More than 90 scientists from 12 temperate rice-growing countries in Asia, Europe, and North America attended the workshop (photo, top of next page), which was coordinated by IRRI with financial support from the National Institute of Crop Science (NICS), Rural Development Administration (RDA), Korea.

The TRRC aims to strengthen national agricultural research and extension system partnerships for technology development, validation, and dissemination for improvement of rice production and productivity in...
temperate environments; strengthen capacity building of human resources of TRRC partners; develop and share improved germplasm and technologies for problem solving and sustainable temperate rice production; and improve grain quality, nutritional value, and postharvest technology for the well-being of humankind and increased overall rice production.

Meeting with Chinese agriculture minister
On 18 June, I met with Chinese Agriculture Minister Sun Zhengcai (2nd from right in smaller photo) in Beijing. During the meeting, Minister Sun enthusiastically recognized the significant contribution that IRRI has made to the Asian Green Revolution as well as to the development of rice production and research in China. He also showed great interest in IRRI’s frontier projects and stated that these are strategically important initiatives.

Also while in Beijing, I signed a memorandum of agreement with Ms. Zhang Xiuqin, secretary general of the China Scholarship Council (CSC), which stipulates that CSC will support and IRRI will welcome Chinese citizens to pursue doctoral degree training and postdoctoral research programs at the Institute on an annual basis.

Thailand and IRRI sign rice pact
On 27 June, Thailand’s Ministry of Agriculture and Cooperatives and IRRI signed an agreement to expand our existing bilateral cooperation in the field of rice strain development to add increased value to Thailand’s important staple. The agreement was signed by Minister Thira Sutabutr and me at the Agriculture Ministry in Bangkok. Under the terms of the agreement, cooperation between Thailand and IRRI will be upgraded from the department level to the ministry level. IRRI-Thailand collaboration over the last 47 years has been quite fruitful.

Click here to see a summary of the highlights.

Feature in Wall Street Journal kicks off an unprecedented presence of IRRI in the media

For the first time, IRRI was featured on the front page of the prestigious Wall Street Journal newspaper in New York and the front page of the Asian Wall Street Journal here in Asia. The feature article, which first appeared on 28 July in the United States, was one of the longest reports on IRRI and its work for many years and includes interviews with IRRI staff Randy Barker, John Sheehy, Abdelbagi Ismail, and me. Included with the article is a slide show on rice and IRRI
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Graham McLaren, Richard Bruskiewich, Gene Hettel, Robert Hijmans, Duncan Macintosh, Noel Magor, Thomas Metz, Mila Ramos, Marco van den Berg, and Parminder Virk.Albert Borroto is an ex officio member serving as secretary, convener, and liaison as the new Web community manager for the Institute. I charged this panel to meet at least on a quarterly basis, or more often as necessary during the early going, to review the Institute’s information dissemination efforts and new network and Web project proposals and to monitor the progress of existing projects.

Expert consultation on biofuels
We hosted an expert consultation on biofuels, 27-29 August, organized by the Asia-Pacific Association of Agricultural Research Institutions (APAARI), CIMMYT, ICRISAT, and IRRI. Representatives from Brazil, China, India, Italy, Japan, Mexico, Pakistan, Papua New Guinea, the Philippines, Syria, Thailand, and the United States discussed the development of biofuels and their production and use in Asia. Profiles of current biofuel use and potential expansion in India, China, and the Philippines were presented, highlighting the different abilities of countries in Asia to produce biofuel.

Professor Cheng Xu pointed out that China lacked maize, and therefore production schemes requiring maize were generally not being permitted by the government. The participants also discussed the effects of developing biofuel production on food production and prices, as well as the possibility of small farms growing crops for biofuel.

Click here to view more details of the expert consultation. Raj Paroda, APAARI executive secretary, is hopeful that action will be taken to implement the various recommendations. The published proceedings will be circulated in due course.

Workshop on Poverty and Income Dynamics in Rural Asia and Africa
This workshop hosted by the 21st Century Center of Excellence of the National Graduate Institute for Policy Studies, Tokyo, Japan, and IRRI, 3-4 September, gathered social scientists and researchers from Japan, Bangladesh, Mozambique, and the Philippines, who presented results of their respective research. SSD acting head Randolph Barker explained IRRI’s approach to rural poverty research. A recurrent finding in the papers presented was that increased income from farming, which was brought about by the Green Revolution in rice farming, has led to a rise in farm income, which induces households to invest in children’s schooling. These educated children later on find jobs in the nonfarm sector, which leads to a further rise in household income and a reduction in poverty. IRRI is facilitating the production of the workshop proceedings, which should be available later in 2008.

CORRA supports various initiatives during 11th annual meeting
I attended the 11th Annual Meeting of the Council for Partnerships on Rice Research in Asia (CORRA) at the Institute of Agricultural Sciences for Southern Vietnam (IASSV), Ho Chi Minh City, Vietnam, 4-6 September.

The meeting was attended by 16 regular members composed of the heads of government agencies and four observers from various Asian countries, including 10 IRRI staff members and an FAO senior economist who served as resource persons.

The opening program was graced by Bui Ba Bong (next page upper photo), deputy minister of the Ministry of Agriculture and Rural Development (MARD) of Vietnam, and Mangala Rai, secretary of the Department of Agricultural Research and Education (DARE) and director general of the...
Indian Council of Agricultural Research (ICAR), and CORRA’s chair.

Dr. Rai explained the current important issues and concerns facing all CORRA member countries (e.g., global climate change, increasing water scarcity, needs to improve income through rice-based systems, etc.).

I reemphasized the strategic importance of CORRA in influencing the rice R&D agenda of the member countries, the current situation of the rice industry, the increasing role of the private sector and the need to set the terms for collaboration with it, and the urgent need to raise the next generation of rice scientists.

After the meeting, many members of CORRA proceeded to the Cuu Long Delta Rice Research Institute (CLRRRI) to participate in the celebration of CLRRRI’s 30th anniversary, during which IRRI staff members were awarded with medals in recognition of their many contributions to rice research in Vietnam. Among the awardees were Grant Singleton, Abdelbagi Ismail, Darshan Brar, Il-ryong Choi, and T.P. Tuong.

During the celebration, I gave a presentation on Rice research and food security: challenges for research in Asia. Click here to view my PowerPoint presentation.

IRRI BOT visits upland research sites in Laos

After completion of the BOT meeting in Vientiane, several members of the Board of Trustees, accompanied by IRRI staff members and me, visited upland research sites in Luang Prabang, Laos, on 22 September.

After an initial briefing by the project team at the Northern Agriculture and Forestry Research Center (NAFReC) office in Houy Khot, the BOT members, together with NAFReC and IRRI staff, visited the field site where upland research is being implemented. In the field, the lower left photo shows Eun-Long Lee of Korea, outgoing BOT member (2002-07), posing with some young future rice farmers. Incoming Board Chair Beth Woods frames a photo of her own while board member Tony Fischer looks on in the lower right photo.

IRRI is now implementing a program of research in upland areas of Laos in partnership with the National Agriculture and Forestry Research Institute (NAFRI) and its regional center, NAFReC. This research, funded by the International Fund for Agricultural Development (IFAD) and the Challenge Program for Water and Food (CPWF), aims to develop, validate, and deliver technologies for im-
proving household food security and reducing poverty through improved management of rice landscapes.

**Drought Frontier Project hosts international symposium**

The Drought Frontier Project (DFP) conducted an international symposium on Root Biology and MAS Strategies for Drought Resistance Improvement in Rice in collaboration with the University of Agricultural Sciences (UAS) in Bangalore, India, 26-29 September. The symposium brought together DFP consortium partners and several leading researchers from different countries in addition to IRRI scientists. The symposium aimed to review current knowledge of drought avoidance and discuss the scope of future research strategies on roots for deciphering the complexity of drought responses in rice.

**IRRC holds 3rd Steering Committee meeting and review in Hanoi**

The Irrigated Rice Research Consortium (IRRC) held its 3rd annual Steering Committee meeting in Hanoi, Vietnam, 8-10 October, to review the progress of the IRRC and consider future needs and priorities for natural resource management in intensive lowland rice production areas. Organized by IRRI and the Vietnamese Academy of Agricultural Sciences (VAAS), the meeting coincided with the start of a 2-week external review of the IRRC.

His Excellency Dr. Dao Xuan Hoc, vice minister of the MARD, Vietnam, officially welcomed 66 participants from 13 countries. Dr. Dao acknowledged the important contributions of IRRI, particularly the IRRC, to Vietnamese rice production and rural development. He mentioned that Vietnam is looking forward to strengthening its collaborative relationship with IRRC scientists to assist the country in tackling emerging issues that need a sustained investment in research on natural resource management in rice production systems.

Methods are also needed to deliver the outputs of this research in a timely manner to smallholder farmers. Dr. Dao emphasized that the IRRC will continue to be an important partner of MARD for many years to come.

Asia Rice Conference asks: Does rice have a future in Asia?

At this important meeting at Chonnam National University in Gwangju, Korea, in mid-October (photo below), I tried to answer that question in my keynote speech, *Why rice is still important in Asia and what IRRI is doing about it.* Click here to view a pdf file of my PowerPoint slides.

Breaking bread at the Makati Business Club luncheon

I addressed the Makati Business Club (MBC) during a noon luncheon on 23 October. My topic was *Rice, climate change, food security, and economic growth.* Click here to view my PowerPoint presentation. In the photo below, I’m chatting with Mr. Jaime Augusto Zobel de Ayala II, chairman and CEO of Ayala Corporation.

The MBC is a private nonstock, nonprofit business association organized as a Forum for Constructive Ideas. As a forum, the MBC is dedicated to addressing economic and social policy issues that affect the development of the Philippines. The main thrust of the MBC is to foster and promote the role of the private business sector in national development efforts, in both the planning and the implementation of policy. Click here for more info about the MBC.
Aerobic rice workshop shares knowledge
On 22-24 October, more than 70 scientists (photo right) participated in the International Workshop on Aerobic Rice in Beijing, China, to share knowledge and experiences in aerobic rice development and to identify new priorities for research.

Participants came from the Philippines, India, Thailand, Laos, Malaysia, Colombia, the Netherlands, the United States, and the host country, China. Co-organized by Drs. Wang Huaqi of the China Agricultural University and Bas Bouman of IRRI, the workshop was a joint undertaking of the Water “Saving” Work Group of the Irrigated Rice Research Consortium and the project “Developing a System of Temperate and Tropical Aerobic Rice (STAR) in Asia” of the CGIAR Challenge Program on Water and Food. The workshop brought together breeders and scientists who are working on the development and dissemination of aerobic rice in Asia.

World Rice Commerce 2007
Acting SSD Head Randolph Barker attended the 6th World Rice Commerce held in Bali, 31 October-1 November. He reported that the consensus seemed to be that rice prices were headed higher. No one was selling and everyone assumed that the new crop was already sold—a mere prelude to what was to come during the first quarter of 2008. Some country papers dealt with special segments of the rice market—japonica, basmati, parboiled—and others dealt with trade, quality, etc.

Rice modelers meet at IRRI
Six international scientists from Australia, France, Japan, and the Netherlands and 13 IRRI staff members attended the International Rice Model Mini-Workshop, 29-30 October 2007. The participants (photo right) explored options for collaboration on modeling of rice (crop growth, soil water, soil nutrients/soil organic matter, greenhouse gases, etc.) in terms of scientific developments (e.g., physiological processes, plant–environment interactions), software development, and model application.

The participants concluded that ORYZA2000 and APSIM are indeed a suitable basis for most of the envisioned model needs in studies such as climate change (including adaptation),
drought, risk management, and cropping systems management. Concrete action plans were developed for further joint development of ORYZA2000 to suit these purposes. Moreover, it was agreed to actively pursue stronger collaboration between Australia’s Agricultural Production Systems Research Unit (APSRU) and IRRI under an open-source policy.

Training course on Upland Rice Variety Selection Techniques for African Countries
A 10-day innovative training course on Upland Rice Variety Selection Techniques for African Countries was conducted at the IRRI Training Center (TC), 22-31 October. This joint undertaking between the government of Japan, through the Japan International Cooperation Agency (JICA), and IRRI supported self-help efforts that will lead to economic progress and a better life for the citizens of Africa. The course was led by TC Head Noel Magor; Arvind Kumar, course coordinator; Engr. Eugenio C. Castro, Jr., course co-coordinator/facilitator; and Kojima Nobuki, JICA coordinator. It was an area-focused training course designed to train field researchers and extension officers from various African countries (Malawi, Benin, Ethiopia, Uganda, Mozambique, Nigeria, Tanzania, and Zimbabwe) in evaluating upland rice varieties suitable for their respective countries and learning about upland rice production systems.

BioAsia 2007 brings together biotech world
Thailand hosted BioAsia 2007, the first international trade exhibition and conference for biotechnology, in Bangkok, 5-9 November. The event provided a large gathering of some 15,000 biotech enthusiasts in food, agriculture, health, and industrial and environmental sectors from all over the world.

Highlights of the event were (1) the 6th Asian Crop Science Association Conference, which brought together agricultural scientists in the region to share research experiences, with the theme Technology for Self-Sufficient Agriculture in Asia; and (2) the 2nd International Conference on Rice for the Future, which emphasized rice as a designer crop for healthier products. Discussions covered a wide range of research from breeding to genomics in human nutrition and health.

In my keynote lecture, I discussed New Solutions to Old Problems and Future Challenges: What Science Can Do to Make the Asian Rice Industry More Productive. I elaborated on problems of rice cultivation in Thailand related to flood, drought, and disease and described how to apply science and technology to solve these problems. Click here to view my PowerPoint presentation. During the event’s inauguration ceremonies, I had a few moments to discuss IRRI’s research with H.R.H. Princess Maha Chakri Sirindhorn (at left in left photo below).

Workshop on submergence-tolerant rice varieties held in Bangkok
The IRRI-Japan Project on Submergence-Tolerant Rice, Implementation plans to disseminate submergence-tolerant rice varieties and associated new production practices to Southeast Asia, conducted a successful workshop, 5-6 November in Bangkok, Thailand.

Dealing with the socioeconomic aspects of the project, the workshop was led by SSD scientist Thelma Paris, who is taking the lead in developing a response plan for the project; Dr. Sushil Pandey, who leads the follow-up study on the project; and Dr. Romeo Labios, project coordinator. Fifteen scientists from five Southeast Asian countries and seven IRRI scientists participated (right photo below).
New hybrid rice group aims to raise rice yields in the tropics

A new international research initiative, linking the private and public sectors for the first time, was launched on 9 November at the 2007 Asian Seed Congress. It aims to boost the research and development of hybrid rice for the tropics. The Hybrid Rice Research and Development Consortium (HRDC), established by IRRI, will strengthen public–private sector partnership in hybrid rice, a technology that can raise the yield of rice and thus overall rice productivity and profitability in Asia.

Hybrid rice takes advantage of the phenomenon of hybrid vigor—known as heterosis—to achieve yields 15–20% higher than those of nonhybrid (inbred) varieties. Over the past 3 decades, the technology has helped China achieve food security, but has not yet reached its potential in the tropics.

IRRI and its partners in the public and private sector have led research on the development and use of hybrid rice technology in the tropics for almost 30 years. Successful deployment of hybrid rice in Asia, however, requires more effective cooperation between public research institutions and the private sector in research to overcome current constraints.

According to IRRI senior hybrid rice researcher Fangming Xie (photo below), the HRDC will significantly enhance the capacity for hybrid rice research and product delivery, while providing services and support to the private sector in its product development and delivery that will benefit the general public. Click here to listen to a YouTube clip on what DDG-R Achim Dobermann has to say about the HRDC.

**IFEA established at IRRI**

I am pleased to announce that the IRRI Filipino Employees Association (IFEA) was established in 2007 so that our nationally recruited staff (NRS) can have a dynamic voice to represent them with management. The former Council of IRRI Employees (CIE) had ceased to function in September 2005. On 2 March 2007, an ad hoc committee was constituted by past officers of the old CIE, in coordination with the Community and Employee Relations Services (CERS), to rework the CIE constitution and by-laws for the new association. A general assembly of NRS ratified the amendments to the proposed IFEA constitution and by-laws on 1 August.

IFEA is now serving as the primary channel of communication between NRS and IRRI management, including me, the deputy directors general, directors, and their duly designated representatives. This is an extremely important step. I have been very supportive of having a strong employees association that can communicate and interact effectively with management. It is extremely healthy for the Institute to have a free dialogue—an open communication—so that the concerns, desires, interests, and suggestions of the staff have a mechanism to be expressed, heard, and acted upon. I look forward to working closely with IFEA to provide for the needs of the NRS and improve the quality of their life and working environment.

**ISO progress at IRRI**

ISO 14001 Certificate for ES EMS formally presented to IRRI

On 31 August, during a handover ceremony, the Experiment Station (ES) Environmental Management System (EMS) ISO 14001 Certificate was officially presented to the IRRI community by DDG-OSS William G. Padolina and Operations Head Terry Jacobsen. The ISO 14001 Certificate had been awarded earlier to ES on 22 June.

The photo below shows (L-R) Dr. Padolina, Mr. Jacobsen, me, ES Head...
Arnold Manza, and staff members Tom Clemeno, Ellen Oracion, Ben Manimtim, Roslen Anacleto, and Ric Hernandez.

This is truly a great achievement for the Institute. ISO 14001 is an internationally recognized standard for environmentally sustainable systems, and as such demonstrates IRRI’s commitment to environmental sustainability. The award required strict environmental policies to be planned, implemented, and monitored for compliance.

ISO 17025 training course
A training course on the implementation and auditing of a Quality Management System (QMS) that complies with ISO/IEC 17025 was held at IRRI, 3-7 September. ISO/IEC 17025 is a standard that applies to testing and calibration in laboratories. As Mr. Rassoulou Diallo, senior program officer from the Standards Council of Canada, the course’s resource person, explained, it is necessary to understand not only the standards involved but also the challenges that may be faced. Throughout the course, participants (photo above) learned about building and implementing a QMS that is in accord with ISO/IEC 17025.

50th anniversary on the horizon
IRRI will celebrate the 50th anniversary of its founding in 2009-10. Considering the enormous impact our institution has had on the well-being of hundreds of millions of people and the contributions it has made to global economic growth, this is a milestone of global significance. IRRI management and the Board of Trustees believe that this is a tremendous opportunity to invite all of IRRI’s friends and partners from around the world to celebrate with us 50 years of achievements and contributions.

We have decided to conduct several events during our 50th and to frame this in the context of a celebration of IRRI’s Golden Jubilee. The jubilee year will begin in late 2009 and continue until December 2010. It also offers a chance to reflect upon what has been achieved, thank those who have worked with us and supported us, and look forward to how we can continue to contribute in a meaningful way.

The events that will anchor the Golden Jubilee Year are

- November 2009: Rice Genetics VI Conference (Manila)
- 9 December 2009: 50th anniversary of the signing of the MOU between the Philippine government and the Ford and Rockefeller Foundations and a special thanks to the Los Baños community
- 13-14 April 2010: 50th anniversary of the first meeting of IRRI’s Board of Trustees (at IRRI)
- 15-30 April 2010: homecoming for IRRI alumni (staff and scholars) (at IRRI)
- October 2010: International Rice Congress in Hanoi, Vietnam

• December 2010: Annual General Meeting of the CGIAR in India.

To be sure that we can conduct such a complex set of activities in one year (and in a year that will immediately follow IRRI’s seventh External Program and Management Review in 2009), it is important that we begin planning now. So, in September I announced the creation of the IRRI Golden Jubilee Committee to be co-chaired by DPPC Mike Jackson and me. Other committee members are DDG-R Achim Dobermann, DDG-OSS Willy Padolina, Director of Management Services Norman Macdonald, Development Director Duncan Macintosh, CPS Head Gene Hettel, Head of Operations Terry Jacobsen, and Training Center Head Noel Magor.

As one of the activities to commemorate IRRI’s 50th, Rice Today is already publishing edited excerpts in the magazine from selected interviews with the IRRI pioneers of rice research.
We have already logged around 100 hours in conversation (many more planned) with nearly 50 pioneers, ranging from those who first roamed the rice plots with IRRI’s first director general, Robert F. Chandler, Jr., to others recently retired. The first three published interviews feature Peter Jennings, IRRI’s first rice breeder; Carolyn Moomaw Wilhelm, widow of IRRI’s first agronomist, James Moomaw; and Nyle Brady, IRRI’s third Director General. Click here to read the articles and transcripts and view the videos.

**Ambassadors and ministers visit IRRI to get research orientations and overviews**

Dr. Yang Boo Choe, ambassador of agricultural trade of Korea, together with Dr. Ki Whan Chung, senior director of the Korea Rural Economic Institute, visited on 10-11 April.

Dr. Subas Pani, secretary, Ministry of Rural Development, government of India (at left in photo below with TTCGRC Head Ruaraidh Sackville Hamilton at the International Rice Genebank), and Honorable Hemakumara Nanayakkara, minister of agriculture of Sri Lanka, visited IRRI on 1 and 2 June, respectively.

Kandeh Yumkella, director general of the United Nations Industrial Development Organization (UNIDO), together with three other officials from the Department of Foreign Affairs and UNIDO visited IRRI on 13 July to discuss IRRI’s research agenda.

Mr. Xijun Deng, chargé d’affaires, Embassy of the People’s Republic of China in the Philippines, together with 17 staff members visited IRRI on 17 August.

H.E. Jong-Ki Hong (2nd from left in photo below), Ambassador of the Republic of Korea to the Philippines, visited IRRI on 19 October. He was accompanied by embassy first secretary Jae-Myong Koh.

H.E. Dr. Armindo Maia, ambassador of Timor-Leste to the Philippines, paid a short visit to IRRI on 28 September.

Nine members of Commission B (Economic Affairs) of the Regional Representative of East Java, Indonesia, visited IRRI on 24 October to get an overview of the Institute’s recent research agenda and gather data and technical knowledge that they can adopt to improve rice yields in East Java, which eventually will benefit all of Indonesia. The photo above shows the delegation with GAMMA Lab Manager Menchu Bernardo (left).

**The relevance of rice research is recognized**

The work of rice researchers received major encouragement as 2007 drew to a close, with IRRI staff and their colleagues receiving widespread recognition and several major awards, including three CGIAR science awards at the Annual General Meeting of the CGIAR in Beijing.

These awards and the recognition that comes with them are clear confirmation of the world-class rice research being conducted today in Asia and elsewhere. It’s vital that donors and the community in general recognize the work that is being done and the enormous impact it has—even if the media do not report it.

More people rely on rice for their sustenance than on any other food. Millions, if not billions, of these people live in poor communities throughout the developing world. Research that helps rice farmers boost their production and income, or helps reduce prices to make rice more affordable, has the capacity to pull vast numbers of people out of poverty and, therefore, does nothing short of offering them better lives.

In the photo (top of next page) taken during the CGIAR-AGM ceremonies, I took great pleasure in posing with IRRI incoming BOT Chair Beth Woods, K.L. Heong (winner of the CGIAR COM+ Award for Communicating Science for People and the Planet), Darshan Brar (winner of CGIAR Outstanding Scientist Award), Kenong Xu (UC-Davis colleague) and David Mackill (representing all the co-authors who won the CGIAR Outstanding Scientific Article Award), and CGIAR Science Council Chair Rudy Rabbinge. Some more details on the AGM awards follow.
An Update for 2007 from the Director General

Compounding his reputation as an indefatigable champion of science for the poor, Dr. Brar (photo above) received the 2007 Outstanding Scientist Award, which honors original work by a senior scientist whose contributions have actual or potential regional or international significance that furthers CGIAR goals. Click here to watch a 2:30 video on YouTube, which summarizes Dr. Brar’s research and achievements.

The team of scientists (right photo) led by IRRI plant breeder David Mackill, in collaboration with colleagues from the University of California (Riverside and Davis), won the Outstanding Scientific Article Award during the AGM awards program. The winning paper, Sub1A is an ethylene response factor-like gene that confers submergence tolerance to rice, appeared in the 10 August 2006 issue of the prestigious journal Nature.

Authors K. Xu, X. Xia, T. Fukao, P. Canlas, R. Maghirang-Rodriguez, S. Heuer, A. Ismail, J. Bailey-Serres, P.C. Ronald, and Dr. Mackill describe their discovery of a gene (Sub1A) that confers submergence tolerance to rice, and the consequent breeding of this gene into a popular commercial variety.

Click here to view a time-lapse video comparing the flood-tolerance capabilities of popular rice variety IR64 with and without the Sub1A gene. Click here to access other links on the IRRI Web site that provide more background on this achievement.

Dr. Heong received the CGIAR COM+ Award for Communicating Science for People and the Planet. COM+ is a partnership among international organizations, media agencies, and communication professionals committed to using communications to advance a sustainable development agenda. The prize, which was also presented during the CGIAR’s award ceremonies, honors the Environmental Soap Opera for Rural Vietnam, an entertainment-education initiative led by Dr. Heong to help farmers improve their crop management systems. Agricultural information was weaved into the 239 episodes of a drama broadcast twice weekly to 2 million people in rural areas of the Mekong Delta.

Started in 2003 through support from the Rockefeller Foundation, the soap opera won the 2005 World Bank Development Marketplace Award, which provided additional resources to continue the program. The COM+ award includes $10,000 for IRRI to use for further communications initiatives.

Beyond these CGIAR awards, IRRI staff and BOT members were recognized for the following.

David J. Mackill, program leader for rainfed environments (Program 1; photo above) and plant breeder in PBGB, was elected a Fellow of the American Society of Agronomy (ASA) for 2007. Before rejoining IRRI in April 2001, Dr. Mackill was a research geneticist and adjunct professor at the University of California, Davis, and worked for the United States Department of Agriculture—Agricultural Research Service. His recent research has included identification of submergence-tolerance genes (see above) and development of rice germplasm for rainfed lowland conditions.

The 2007 Farrer Memorial Medal, which honors distinguished service in Australian agricultural science, was presented on 14 August to CSIRO Plant Industry Honorary Fellow and
IRRI Board Member Tony Fischer, at a ceremony at CSIRO’s Discovery Centre in Canberra. At the ceremony, Dr. Fischer gave the 2007 Farrer Oration, Improvement in Wheat Yield: Farrer, Physiology, and Functional Genomics, which discussed the past successes of Australian wheat breeding and the challenges of the future. “Dr. Fischer is well known internationally as a wheat cropping scientist,” said CSIRO Plant Industry Chief Jeremy Burdon.

On 12 October, IRRI BOT Chair Dr. Kei Otsuka accepted, on behalf of the Institute, the 6th Iue Asia Pacific Culture Prize during the Asia Pacific Forum of the Awaji Conference in Kobe, Japan. The photos show Dr. Otsuka receiving the award from Mr. Satoshi Iue, representative director of the Asia Pacific Forum and son of the founder of the Sanyo Corporation, which sponsors the prize (top photo, second column), and Dr. Otsuka giving a presentation about IRRI during the ceremonies (middle photo, second column).

The Iue Asia Pacific Culture Prize was established in 2001 to recognize individuals and organizations pursuing cultural and social activities within the Asia Pacific region that have made outstanding contributions to the promotion of international exchange and/or regional development. It is based on recommendations gathered from all over the world.

The prize certificate (below) states: “Your institute has made many great contributions to reduce poverty and solve environmental problems, and, through your efforts, we expect that in the future you will further lead the way to a multicultural society in the Asia Pacific region.”

Dr. Gary C. Jahn, entomologist and IRRI coordinator for the Greater Mekong Subregion, was honored on 15 October at the International Plant Protection Congress in Glasgow, Scotland, for his major contributions to the promotion of global plant protection. He received the International Plant Protection Award of Distinction from the International Association for the Plant Protection Sciences (IAPPS). The picture shows Dr. Jahn (right) receiving the award from Professor Hans Herren, of the Millenium Institute and IAPPS president. Others receiving the award were Professor Baruch Rubin, The Hebrew University of Israel; Professor John E. Foster, University of Nebraska, Dr. Mustapha El Bhoussini, ICARDA; Dr. Hari C. Sharma, ICRISAT; and Professor Zhenqi Li, Northwest A&F University, China.

Dr. Darshan Brar, head of PBGB, was chosen as one of two winners of the Koshihikari International Rice Prize for 2007. The award ceremony was held on 30 October in Fukui Prefecture, Japan. Dr. Brar shared the prize this year with Dr. Tantawi A.
Badawi, president of the Agricultural Research Center, Cairo, Egypt.

The Koshihikari International Rice Prize was established in 1997 on the occasion of the 50th anniversary of the development of rice cultivar Koshihikari, which has a strong reputation of being a very high-quality rice in Japan. The development of the Koshihikari variety is acknowledged as a prime example of the important contribution of local agricultural experiment stations to nationwide rice production. So, the Prize aims to recognize rice researchers working in universities and at international, national, and local agricultural research stations. Each laureate was awarded 500,000 Japanese yen. Click here to read the comments of Dr. Brar (photo left) during the award ceremony.

For his leadership in formulating and disseminating improved practices of site-specific nutrient management (SSNM) through partnerships with national research and extension organizations and the private sector in Bangladesh, China, India, Indonesia, Myanmar, the Philippines, and Vietnam, Dr. Roland Buresh was awarded the 2007 International Soil Science Award in early November by the Soil Science Society of America (SSSA) at its annual meeting in New Orleans, Louisiana, USA.

The photo below shows Dr. Buresh receiving his award from Iajuddin Ahmed (left), president of Bangladesh, and Rattan Lal (right), president of the SSSA. This prestigious award is given annually in recognition of outstanding achievement and service in the areas of international agricultural research, teaching, and extension.

Starting in 2006, SSNM principles have been incorporated into national extension initiatives in Indonesia and Vietnam. Before his return to IRRI in 2000, Dr. Buresh’s work at the World Agroforestry Centre (ICRAF) in Kenya was instrumental in developing a “science-based” understanding of soil and nutrient management in tropical agroforestry, which helped to heighten awareness of soil fertility depletion in Africa and to provide realistic assessments of the potential of agroforestry in soil fertility management.

The Academy of Science for the Developing World (TWAS) presented Dr. K.L. Heong with the TWAS Prize for Agriculture, recognizing his pioneering work in ecology and integrating biological and social sciences to promote integrated pest management (IPM), which helped millions of rice farmers reduce their pesticide use and helped to communicate science to the rural poor.

He received his prize from the president of TWAS, Professor J. Palis (right in photo below, third column), at the 18th TWAS General Meeting held in Trieste, Italy, 13-14 November. In accepting the prize, he delivered a presentation, Communicating agriculture to rural farmers, urging developing-country scientists to do more than achieving scientific excellence and publishing papers. Click here to read the synopsis of his presentation.

CPS Head Gene Hettel received the 2007 International Award of Excellence from the Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences (ACE).

As in every year, numerous IRS and NRS received various awards and honors. Click here to see the complete listing on this DVD.

Executive director of the Global Crop Diversity Trust visits IRRI

As the year wound down, Cary Fowler, executive director of the Global Crop Diversity Trust, together with Mr. Laurent Cibien and Mr. Alain Guillon, a film crew from ARTE TV, visited IRRI, 6-7 December, as part of the preparation for a documentary on the Svalbard Global Seed Vault.
or the Doomsday Vault as the media have dubbed it. Svalbard is a group of islands in the Arctic nearly 1,000 km north of mainland Norway. The group was in the Philippines to film at IRRI and the National Genebank and to visit farmers in the southern Philippines. The Global Crop Diversity Trust aims to safeguard and conserve the diversity of all major food crops.

In the photo, wild rice varieties in the GRC are the focus of attention for (L-R) Research Technician Nora Kuroda, Dr. Fowler, Assistant Scientist Soccie Almazan, GRC Head Ruaraidh Sackville Hamilton, and Research Technician Liza Yonzon. Click here to view on YouTube a 4:33 video of IRRI's preparation of rice seeds for the Vault.

Ultimately, the Doomsday Vault was officially opened on 26 February 2008. IRRI is the biggest contributor of all gene banks, shipping some 70,000 different accessions of rice from 123 countries. Click here to view on the Internet a video presentation of the opening day during which IRRI played a significant role.

2007—quite a year!
And that about wraps up my summary of the year’s activities and events. As you can see, if you read any of the above and clicked on a few links to some of the other materials, photos, and videos, 2007 was quite an action-packed year. There is much more detail throughout the rest of this DVD on the results of our exciting research agenda. So, read—and click—on and enjoy. We’d love to hear from you about what you think of this DVD presentation of our annual report. Let us know how we can improve for 2008!

We officially closed the year with a parade around campus with more than 500 IRRI staff members who gathered for the Institute-wide Christmas party on 14 December. With the theme “Holiday on Rice,” the IRRI family posed for a group shot—of what is becoming an annual snapshot at Christmas time for the Institute.

After the photo (next page) was taken, CPS photographer Ariel Javel Lana, the architect of this photographic feat, stewed a bit about the lack of a symmetric balance in the image due to a cement barrier and flower bed down the middle of the divided driveway entrance where he chose to take the picture so the fountain and flags would show in the background. As they assembled for the photo, people tended to gang up on the right side.
But, as luck would have it, the image won a Silver Award in the Photo Service Category of the 2008 Critique & Awards Program of the Association for Communication Excellence (ACE). The judges stated that “This fun, well-executed shot could be looked at for hours. The casual groupings are an effective way to show so many people. Even lighting lets us see all their faces.” Go figure! Anyway, click on the photo above and spend an hour or two to view a pretty impressive group of people—the IRRI family!

Robert S. Zeigler
Director General
Rice and human health: overcoming the consequences of poverty

Rice policy support and impact assessment for rice research

Information and communications: convening a global rice research community

Rice genetic diversity and discovery: meeting the needs of future generations for rice genetic resources

East and southern Africa: rice for rural incomes and an affordable urban staple

Raising productivity in rainfed environments: attacking the roots of poverty

Sustaining productivity in intensive rice-based systems: rice and the environment

Rice genetic diversity and discovery: meeting the needs of future generations for rice genetic resources

Information and communications: convening a global rice research community

Rice policy support and impact assessment for rice research

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Information and communications: convening a global rice research community

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Note
If you already have a standard audio-video file player such as Windows Media Player or Real Player installed on your computer, videos on this DVD should play with no problem. However, if you do encounter problems or have no player installed on your computer, click the icon above to download the QuickTime player.

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Treasurer to the Board

Los Baños Headquarters Location/Address
College, Los Baños
4031 Laguna
Philippines
Tel: (63-2) 580-5600; 845-0563
(63-49) 563-2701 to 2705
+1 (650) 833-6620 (USA direct)
Fax: (63-2) 580-5699; 845-0606
(63-49) 536-7995
+1 (650) 833-6621 (USA direct)

Email: irri@cgiar.org
Web: www.irri.org

IRRI Makati Office Location/Address
10th Floor, Suite 1009
Security Bank Center
6776 Ayala Avenue, Makati City 1226
Philippines
Tel: (63-2) 891-1236; 891-1303
Fax: (63-2) 891-1174

External Auditors
Isla Lipana & Co.
A member firm of PricewaterhouseCoopers
Finance and Audit Committee

Membership

The members of the Finance and Audit Committee are appointed by the Board. Its duty is to review and audit, from time to time, the accounts and financial condition as well as the management and internal control systems and procedures of the Institute. It also reviews periodically the Institute’s guidelines and procedures pertaining to human resources development, finance and budget and other administrative matters, and exercises the powers and performs the duties delegated to it by the Board. For the Institute’s audit and accounts, the Committee discharges its functions in consultation and coordination with the external auditors, the internal auditors, and appropriate consultants of the Institute.

The Chairperson of the Finance and Audit Committee, who is customarily appointed by the Board at the time when the Board appoints members of the Committee, presides over all meetings of the Committee. In his/her absence or disability, the Vice Chairperson shall acts as the Chairperson for that meeting.

The Finance and Audit Committee shall meet at least once a year. Special meetings may be held upon call by its Chairman or upon request of at least one member.

A vacancy in the Finance and Audit Committee is filled from among other members of the Board through election by the Board or election by the remaining members of the Finance and Audit Committee. Any person so elected by the Committee serves only until the next meeting of the Board.

Authority

The Finance and Audit Committee is authorized to investigate any activity of the Institute within its terms of reference and all employees shall be directed to cooperate with any request made by the Committee. The Committee shall be empowered to retain persons having special competence as necessary to assist the Committee in fulfilling its responsibilities.

The Composition in 2007 and Designation of Finance and Audit Committee

Dr. Emerlinda Roman  - Chairperson
Mr. M. Syeduzzaman     - Vice Chairperson
Dr. Ronald Phillips     - Member
Prof. Elizabeth Woods   - Member
Prof. Baowen Zhang      - Member
Prof. Ruth Oniang’o     - Member

Dr. Robert S. Zeigler (Director General), member, Finance only, does not participate in Audit Section of the Committee’s deliberations.
Statement by the Board Chair
For the year ended 31 December 2007

IRRI began to implement its new strategic plan 2007-2015 *Bringing Hope, Improving Lives* in January 2007 through seven programs (“MTP Projects”). This strategic plan looks at the implications for rice production in the context of the Millennium Development Goals (MDGs).

**Resource mobilization**

In 2007, revenue amounted to USD34.67 million which was an increase of 9% over 2006. IRRI received significant new grants to harness major scientific advances and address some of the biggest unsolved problems in agriculture. This included restricted grants from the Bill & Melinda Gates Foundation, USD19.9 million, Japan, USD4.2 million, two projects from International Fund for Agricultural Development (IFAD) for total of USD2.5 million, Australia, USD0.748 million and USAID, USD0.475 million, and unrestricted grants from Bangladesh and Portugal.

On the other hand, two donors have discontinued and two major donors substantially cut their unrestricted support. The European Commission compensated the non-delivery of their 2006 funding.

IRRI made considerable progress on developing new approaches to funding its research agenda. For example, the Hybrid Rice Development Consortium moved from the drawing board to reality. This unique partnership of public and private organizations provides a unique vehicle to develop hybrid rice varieties for the benefit of the world’s poor. We also entered into an agreement with the Global Crop Diversity Trust which provides funding for the maintenance of the International Rice Genebank.

**IRRI in Africa**

IRRI continued to develop its activities in Africa and this was greatly enhanced with new grants from the Bill & Melinda Gates Foundation (BMGF) and IFAD. The BMGF grant will initially help place improved rice varieties and related technology into the hands of small farmers in sub-Saharan Africa (as well as South Asia which is an integral part of the BMGF funded project). Farmers are expected to achieve a 50 percent increase in their yields within the next 10 years. IRRI is working closely with other national and international agricultural research centers, including the Africa Rice Center (WARDA). In addition, the project will build the capacity of researchers and seed producers in poor rice-dependent countries. The IFAD grant aims to alleviate poverty through improving rice production in Eastern and southern Africa.

**Financial Status**

IRRI’s financial position remains stable with total assets of USD66.18 million. The liquidity and long-term stability indicators remain above the CGIAR benchmarks.

IRRI incurred a deficit of USD2.91 million in 2007. The deficit on normal operations was USD1.0 million. The remaining portion of the deficit (USD1.91 million) was due to use of the reserves for identified research
and management initiatives within the new Strategic Plan, such as establishment of our program in Africa and development of exciting new research areas such as C₄ rice. The deficit was consistent with the Board approved plan to reduce the reserves and was described in the MTP.

**Risk Management**

The Board is satisfied with the progress made on the implementation of the risk management framework and actively monitors the risk mitigation measures taken. IRRI is facing some notable financial risks including a very much stronger host country currency.

**CGIAR Awards**

The Board would like to congratulate Dr. Darshan Brar, who received the 2007 Outstanding Scientist Award, which honors original work by a senior scientist whose contributions have actual or potential regional or international significance that furthers CGIAR goals. Furthermore, a team of scientists led by IRRI plant breeder David Mackill, in collaboration with colleagues from the University of California (Riverside and Davis) received the CGIAR Outstanding Scientific Article Award and, Dr. Kong Luen Heong for the CGIAR COM+ Award for communicating science for people and the planet.

**Board of Trustees**

In 2007, the IRRI Board of Trustees met on two occasions and a referendum was conducted through electronic mail.

I would like to express my sincere best wishes to the former Chairman of the Board, Dr. Keijiro Otsuka, and Drs. Achmad Mudzakkir Fagi and Eun Jong Lee who ended their Board service on December 31, 2007. The Institute gained from their invaluable contribution to its governance. I now welcome the new members of the Board of Trustees, Dr. Mutsuo Iwamoto, Dr. Seong-Hee Lee and Dr. Achmad Suryana.

**Appreciation**

On behalf of the Board of Trustees, I would like to thank the management and staff for their dedication and perseverance in facing the challenges during the year under review. We would also like to thank our donors, investors and the CGIAR partners for their continued support and cooperation to fulfill IRRI’s mission.

Prof. Elizabeth Woods
Chair
Board of Trustees
International Rice Research Institute
Financial statements
December 31, 2007 and 2006

Management Statement of Responsibility for Financial Reporting

The accompanying financial statements of the International Rice Research Institute (IRRI), for the years ended December 31, 2007 and 2006 are the responsibility of management. IRRI management also claims responsibility for the substance and objectivity of the information contained therein.

Our financial reporting practices follow the “Accounting Policies and Reporting Practices Manual – Financial Guidelines Series No. 2” of the CGIAR. IRRI maintains a system of internal control designed to provide reasonable assurance that assets are safeguarded and transactions are properly recorded and executed in accordance with management’s authorization.

A system of reporting within the Institute presents the management with an accurate view of the operations, enabling us to discern risks to our assets or fluctuations in the economic environment of the Institute at an early stage and at the same time providing a reliable basis for the financial statements and management reports.

The Board of Trustees exercises its responsibility for these financial statements through its Finance and Audit Committee. The Committee meets regularly with management and representatives of the external auditors to review matters relating to financial reporting, internal controls, and auditing.

Robert S. Zeigler
Director General

Norman A. Macdonald
Treasurer and Director for Management Services
INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

FINANCIAL STATEMENTS
AND SUPPLEMENTARY SCHEDULES
AS OF AND FOR THE YEARS ENDED
DECEMBER 31, 2007 AND 2006
# INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

**FINANCIAL STATEMENTS AND SUPPLEMENTARY INFORMATION**

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<td>Exhibit 2</td>
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<td>Indirect Cost Calculation</td>
<td>Exhibit 4</td>
</tr>
<tr>
<td>Schedule of European Community Funding</td>
<td>Exhibit 5</td>
</tr>
</tbody>
</table>
Independent Auditor’s Report

To the Board of Trustees of
International Rice Research Institute
Los Baños, Laguna

We have audited the accompanying financial statements of the International Rice Research Institute (a nonstock, not-for-profit organization), which comprise the statements of financial position as of December 31, 2007 and 2006 and the related statements of activities, changes in net assets and cash flows for the years then ended, and a summary of significant accounting policies and other explanatory notes.

Management’s responsibility for the financial statements

Management is responsible for the preparation and fair presentation of these financial statements and the supplementary schedules referred to below on the basis of accounting practices prescribed for international agricultural research centers under the auspices of the Consultative Group on International Agricultural Research (CGIAR). This responsibility includes: designing, implementing and maintaining internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or errors; selecting and applying accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor’s responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with International Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor’s judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity’s preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.
Independent Auditor’s Report
To the Board of Trustees of
International Rice Research Institute

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the International Rice Research Institute (a nonstock, not-for-profit organization) as of December 31, 2007 and 2006, and the results of its activities and its cash flows for the years then ended in conformity with the CGIAR guidelines.

Our audits were made for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplementary schedules of grants revenue, restricted agenda funding and operating expenses and the calculation of indirect cost rate for the years ended December 31, 2007 and 2006 are presented for purposes of additional analysis and are not a required part of the basic financial statements. The information in such supplementary schedules has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

PricewaterhouseCoopers

Makati City, Philippines
April 8, 2008
## INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

### STATEMENTS OF FINANCIAL POSITION
DECEMBER 31, 2007 AND 2006
(All amounts in thousand US Dollars)

<table>
<thead>
<tr>
<th></th>
<th>Notes</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>3</td>
<td>21,838</td>
<td>17,037</td>
</tr>
<tr>
<td>Short term investments</td>
<td>4</td>
<td>2,064</td>
<td>2,652</td>
</tr>
<tr>
<td>Accounts receivable - net</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donors</td>
<td>5</td>
<td>7,484</td>
<td>3,788</td>
</tr>
<tr>
<td>Employees</td>
<td></td>
<td>189</td>
<td>122</td>
</tr>
<tr>
<td>Other CGIAR Centers</td>
<td></td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>974</td>
<td>1,554</td>
</tr>
<tr>
<td>Inventories - net</td>
<td>7</td>
<td>572</td>
<td>555</td>
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<tr>
<td>Prepaid expenses</td>
<td></td>
<td>319</td>
<td>179</td>
</tr>
<tr>
<td><strong>Total current assets</strong></td>
<td></td>
<td>33,452</td>
<td>25,905</td>
</tr>
<tr>
<td><strong>Non-current assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property and equipment - net</td>
<td>8</td>
<td>11,113</td>
<td>9,883</td>
</tr>
<tr>
<td>Long term investments</td>
<td>9</td>
<td>21,612</td>
<td>23,738</td>
</tr>
<tr>
<td>Refundable deposits</td>
<td></td>
<td>6</td>
<td>6</td>
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<tr>
<td><strong>Total non-current assets</strong></td>
<td></td>
<td>32,731</td>
<td>33,627</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td></td>
<td>66,183</td>
<td>59,532</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Notes</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIABILITIES AND NET ASSETS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donors</td>
<td>10</td>
<td>16,732</td>
<td>5,652</td>
</tr>
<tr>
<td>Other CGIAR Centers</td>
<td></td>
<td>322</td>
<td>356</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
<td>645</td>
<td>2,834</td>
</tr>
<tr>
<td>Accruals and provisions</td>
<td>12</td>
<td>7,504</td>
<td>7,227</td>
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<tr>
<td><strong>Total current liabilities</strong></td>
<td></td>
<td>25,203</td>
<td>16,069</td>
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<tr>
<td><strong>Net assets</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Designated</td>
<td>14</td>
<td>40,980</td>
<td>43,463</td>
</tr>
<tr>
<td><strong>Total liabilities and net assets</strong></td>
<td></td>
<td>66,183</td>
<td>59,532</td>
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</tbody>
</table>

The accompanying notes on pages 7 to 17 are an integral part of these financial statements.
## INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

### STATEMENTS OF ACTIVITIES
FOR THE YEARS ENDED DECEMBER 31, 2007 AND 2006
(All amounts in thousand US Dollars)

<table>
<thead>
<tr>
<th>Note</th>
<th>Unrestricted</th>
<th>Temporary</th>
<th>Challenge Programs</th>
<th>Total</th>
<th>2006</th>
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<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants (Exhibit 1)</td>
<td>12,231</td>
<td>14,765</td>
<td>5,393</td>
<td>32,389</td>
<td>27,910</td>
</tr>
<tr>
<td>Other revenues</td>
<td>16</td>
<td>1,298</td>
<td>-</td>
<td>-</td>
<td>1,298</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13,529</td>
<td>14,765</td>
<td>5,393</td>
<td>33,687</td>
<td>30,179</td>
</tr>
<tr>
<td><strong>Operating expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program related (Exhibit 3)</td>
<td>12,567</td>
<td>13,951</td>
<td>5,393</td>
<td>31,911</td>
<td>28,258</td>
</tr>
<tr>
<td>Management and general (Exhibit 3)</td>
<td>6,526</td>
<td>814</td>
<td>-</td>
<td>7,340</td>
<td>6,567</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19,093</td>
<td>14,765</td>
<td>5,393</td>
<td>39,251</td>
<td>34,825</td>
</tr>
<tr>
<td>Recovery of indirect costs</td>
<td>(1,667)</td>
<td>-</td>
<td>-</td>
<td>(1,667)</td>
<td>(1,274)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17,426</td>
<td>14,765</td>
<td>5,393</td>
<td>37,584</td>
<td>33,551</td>
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<tr>
<td><strong>Net deficit from ordinary activities</strong></td>
<td>(3,897)</td>
<td>-</td>
<td>-</td>
<td>(3,897)</td>
<td>(3,372)</td>
</tr>
<tr>
<td>Unrealized foreign exchange translation gain</td>
<td>985</td>
<td>-</td>
<td>-</td>
<td>985</td>
<td>1,676</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>(2,912)</td>
<td>-</td>
<td>-</td>
<td>(2,912)</td>
<td>(1,696)</td>
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### Memo items
Operating expenses - by natural classification:

<table>
<thead>
<tr>
<th></th>
<th>Personnel costs</th>
<th>Supplies, services and others</th>
<th>Collaborators/Partners</th>
<th>Operational travel</th>
<th>Depreciation</th>
<th>Recovery of indirect costs</th>
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<tr>
<td>2007</td>
<td>8,649</td>
<td>6,092</td>
<td>15,499</td>
<td>14,402</td>
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<tr>
<td>2006</td>
<td>7,271</td>
<td>5,100</td>
<td>13,674</td>
<td>11,958</td>
<td></td>
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<td>2007</td>
<td>269</td>
<td>1,771</td>
<td>4,863</td>
<td>3,817</td>
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<tr>
<td>2006</td>
<td>1,066</td>
<td>1,392</td>
<td>2,924</td>
<td>2,651</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>1,838</td>
<td>410</td>
<td>2,291</td>
<td>1,997</td>
<td></td>
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<tr>
<td>2006</td>
<td>(1,667)</td>
<td>-</td>
<td>(1,667)</td>
<td>(1,274)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17,426</td>
<td>14,765</td>
<td>37,584</td>
<td>33,551</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

#### STATEMENTS OF CHANGES IN NET ASSETS
FOR THE YEARS ENDED DECEMBER 31, 2007 AND 2006
(All amounts in thousands of US Dollars)

<table>
<thead>
<tr>
<th>Note</th>
<th>Designated</th>
<th>Non-Vested</th>
<th>Total Non-Vested</th>
<th>Total Designated</th>
<th>Total Net Assets</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Invested in fixed assets</td>
<td>Non-Vested</td>
<td>Vested</td>
<td>Non-Vested</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unvested</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balances, January 1, 2006</td>
<td>-</td>
<td>8,524</td>
<td>9,557</td>
<td>6,632</td>
<td>3,941</td>
</tr>
<tr>
<td>Board of Trustees appropriation</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>(3,368)</td>
<td>(6,632)</td>
</tr>
<tr>
<td>Capital reserve replenishment</td>
<td>-</td>
<td>(1,764)</td>
<td>1,764</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>-</td>
<td>3,220</td>
<td>(3,400)</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Net deficit for the year</td>
<td>-</td>
<td>(97)</td>
<td>-</td>
<td>-</td>
<td>(1,770)</td>
</tr>
<tr>
<td>Balances, December 31, 2006</td>
<td>-</td>
<td>9,883</td>
<td>4,553</td>
<td>-</td>
<td>2,171</td>
</tr>
<tr>
<td>Board of Trustees re-designation</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,122</td>
</tr>
<tr>
<td>Capital reserve replenishment</td>
<td>-</td>
<td>(1,838)</td>
<td>1,838</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>-</td>
<td>3,169</td>
<td>(2,740)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Net deficit for the year</td>
<td>-</td>
<td>(101)</td>
<td>-</td>
<td>-</td>
<td>(1,885)</td>
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<tr>
<td>Balances, December 31, 2007</td>
<td>-</td>
<td>11,113</td>
<td>3,651</td>
<td>-</td>
<td>1,408</td>
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</tbody>
</table>

The accompanying notes on pages 7 to 17 are an integral part of these financial statements.
INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

STATEMENTS OF CASH FLOWS
FOR THE YEARS ENDED DECEMBER 31, 2007 AND 2006
(All amounts in thousands of US Dollars)

<table>
<thead>
<tr>
<th>Notes</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cash flows from operating activities</strong></td>
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<td></td>
</tr>
<tr>
<td>Net deficit</td>
<td>(2,912)</td>
<td>(1,696)</td>
</tr>
<tr>
<td>Adjustments for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation of property and equipment</td>
<td>8</td>
<td>2,291</td>
</tr>
<tr>
<td>Interest income</td>
<td>(1,257)</td>
<td>(1,690)</td>
</tr>
<tr>
<td>Net book value of disposed property and equipment</td>
<td>101</td>
<td>97</td>
</tr>
<tr>
<td><strong>Net deficit before working capital changes</strong></td>
<td>(1,777)</td>
<td>(1,292)</td>
</tr>
<tr>
<td>(Increase) decrease in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term investments</td>
<td>588</td>
<td>(2,613)</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>(3,177)</td>
<td>3,689</td>
</tr>
<tr>
<td>Inventories</td>
<td>(17)</td>
<td>(80)</td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>(140)</td>
<td>74</td>
</tr>
<tr>
<td>Increase in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td>8,857</td>
<td>1,296</td>
</tr>
<tr>
<td>Accruals and provisions</td>
<td>277</td>
<td>117</td>
</tr>
<tr>
<td><strong>Cash generated from operations</strong></td>
<td>4,611</td>
<td>1,191</td>
</tr>
<tr>
<td><strong>Interest received</strong></td>
<td>1,257</td>
<td>1,690</td>
</tr>
<tr>
<td><strong>Net cash provided by operating activities</strong></td>
<td>5,868</td>
<td>2,881</td>
</tr>
<tr>
<td><strong>Cash flows from investing activities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in long term investments</td>
<td>2,126</td>
<td>(4,073)</td>
</tr>
<tr>
<td>Net movement of fixed assets/acquisition reserve</td>
<td>429</td>
<td>(180)</td>
</tr>
<tr>
<td>Acquisition of property and equipment</td>
<td>8</td>
<td>(3,622)</td>
</tr>
<tr>
<td><strong>Net cash used in investing activities</strong></td>
<td>(1,067)</td>
<td>(7,705)</td>
</tr>
<tr>
<td><strong>Net increase (decrease) in cash and cash equivalent</strong></td>
<td>4,801</td>
<td>(4,824)</td>
</tr>
<tr>
<td><strong>Cash and cash equivalent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At the beginning of the year</td>
<td>17,037</td>
<td>21,861</td>
</tr>
<tr>
<td>At the end of the year</td>
<td>21,838</td>
<td>17,037</td>
</tr>
</tbody>
</table>

The accompanying notes on pages 7 to 17 are an integral part of these financial statements.
INTERNATIONAL RICE RESEARCH INSTITUTE
(A Nonstock, Not-for-Profit Organization)

NOTES TO FINANCIAL STATEMENTS
AS OF AND FOR THE YEARS ENDED DECEMBER 31, 2007 AND 2006
(All amounts in thousands of US Dollars unless otherwise stated)

Note 1 - General

International Rice Research Institute (the Institute) was established in 1960 to undertake basic research on the rice plant and applied research on all phases of rice production, management, distribution and utilization with the objective of attaining nutritive and economic advantage and benefit for the people of Asia and other major rice-growing areas.

The Institute was conferred the status of an international organization in the Philippines under Presidential Decree (PD) No. 1620.

As a nonstock, not-for-profit organization under Republic Act No. 2707 and an international organization under PD No. 1620, the Institute was granted, among other privileges and prerogatives, the following tax exemptions:

a. exemption from the payment of gift, franchise, specific, percentage, real property, exchange, import, export, documentary stamp, value-added and all other taxes provided under existing laws or ordinances. This exemption extends to goods imported and owned by the Institute, leased or used by its staff;

b. exemption from payment of gift tax; all gifts, contributions and donations to the Institute are considered allowable deductions for purposes of determining the income tax of the donor; and

c. exemption from payment of Philippine income tax of non-Filipino citizens serving on the Institute’s technical and scientific staff on salaries and stipends in United States (US) dollars received solely from, and by reason of, service rendered to the Institute.

The Institute receives support from various donor agencies and entities primarily through the Consultative Group on International Agricultural Research (CGIAR). CGIAR is a group of donors composed of governments of various nations and international organizations and foundations.

On May 19, 1995, an international agreement that recognizes the status of the Institute as an international organization was signed. The said agreement allows the Institute to have a juridical status to more effectively pursue its international collaborative activities in rice research and training.

The Institute’s major facilities are located in Los Baños, Laguna, Philippines. In addition, the Institute owns an administrative office in Makati City, Philippines. As of December 31, 2007 and 2006, the Institute has 905 employees.

The accompanying financial statements and supplementary schedules of the Institute were approved and authorized for issue by the Board of Trustees on April 8, 2008.
Note 2 - Significant accounting policies

The principal accounting policies applied in the preparation of these financial statements are set out below. These policies have been consistently applied to all the years presented.

Basis of financial statements

The accompanying financial statements, expressed in US dollars, are prepared on the basis of accounting practices prescribed for international agricultural research centers (Accounting Policies and Reporting Practices Manual - Financial Guidelines No. 2 or APRPM) under the auspices of the CGIAR.

The preparation of financial statements in conformity with CGIAR’s APRPM requires the use of accounting estimates and assumptions concerning the future. The resulting accounting estimates will, by definition, seldom equal to related actual results. It also requires management to exercise its judgment in the process of applying the Institute’s accounting policies.

Revenue recognition

Grants are recognized as revenue upon the substantial fulfillment of the conditions attached to them, regardless of the period when it is intended to be used, or when the donor has explicitly waived the conditions. Grants are classified according to the type of restrictions attached to them.

Unrestricted grants are grants received which the Institute may freely use for its mandated activities. Unrestricted grants are recognized in full in the period specified by the donor.

Restricted grants and challenge program are grants received in support of specified projects or activities mutually agreed upon by the Institute and donors. Revenue is recognized to the extent of expenses actually incurred. Excess of grants received over expenses, representing grants applicable to succeeding years, are shown as “Accounts payable - donors” account in the statement of financial position. Claims from donors for project expenses paid in advance are shown as Accounts receivable – donors in the statement of financial position.

Grants in kind are recorded at the fair value of the assets received while cash grants are recorded at its US dollar equivalent.

Expense recognition

Expenses are recognized when a decrease in future economic benefit related to a decrease in an asset or an increase in a liability has arisen that can be measured reliably. Expenses are recognized on the basis of a direct association between the costs incurred and the earning of specific items of revenue.

Cash and cash equivalents

Cash includes cash on hand and in banks. Cash equivalents are short-term, highly liquid investments that are both (a) readily convertible to known amounts of cash and (b) so near maturity date that they present insignificant risk of changes in value. These investments, as distinguished from short term investments are those that are acquired with original maturities of three months or less.
Short term investments

These consists of investments that are (a) acquired with original maturity of more than three months but not exceeding one year, and (b) those that are originally long term in nature but are currently due to mature within one year of the balance sheet date.

Accounts receivable

Accounts receivable are carried at gross amount less an allowance for any uncollectible amounts. Allowance for doubtful accounts is based on past experience and on a continuous review of receivable aging reports and other relevant factors.

When an accounts receivable is deemed doubtful of collection, the Institute provides an allowance for doubtful debt during the year in which it is deemed doubtful.

Any receivable or a portion thereof adjudged to be uncollectible is written off. The write-off is done after all efforts to collect have been exhausted.

Inventories

Inventories which consist of spare parts and supplies and other inventories are stated at the lower of cost or net realizable value. Cost, which includes the purchase price plus cost of freight, installation and handling charges, is determined using the moving average method.

Property and equipment

Property and equipment acquired prior to 1991 are carried at cost or estimated value; acquisitions starting 1991 are stated at cost. Capital expenditures with a minimum cost of US$500 or its equivalent and with an estimated life beyond one year are capitalized. The cost of an item of property and equipment comprises its purchase price and all other incidental cost in bringing the assets to its working condition for its intended use. Depreciation of all assets which are owned by the Institute is computed using the straight-line method over the estimated useful lives of the related assets, as follows:

<table>
<thead>
<tr>
<th>Category description</th>
<th>Estimated life in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical facilities</td>
<td></td>
</tr>
<tr>
<td>Building and improvements</td>
<td>60</td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Site improvements</td>
<td>25</td>
</tr>
<tr>
<td>Furnishing and equipment</td>
<td></td>
</tr>
<tr>
<td>Farming</td>
<td></td>
</tr>
<tr>
<td>Farm machinery and equipment</td>
<td>7-10</td>
</tr>
<tr>
<td>Shop machinery and equipment</td>
<td>7-10</td>
</tr>
<tr>
<td>Laboratory</td>
<td>5-10</td>
</tr>
<tr>
<td>Office</td>
<td>5-10</td>
</tr>
<tr>
<td>Auxiliary units</td>
<td>5-10</td>
</tr>
<tr>
<td>Vehicles</td>
<td>4-7</td>
</tr>
<tr>
<td>Computers</td>
<td>3-5</td>
</tr>
</tbody>
</table>
Depreciation is charged from the month an asset was placed in operation and is continued until the asset has been fully depreciated or its use is discontinued.

Property and equipment acquired through the use of grants restricted for a specific project are recorded as assets. Such assets are depreciated at a rate of 100% in the year of purchase. The depreciation expense is charged directly to the appropriate restricted project.

Long term investments

Investments are initially recorded at their acquisition cost if they are purchased and at their fair market value if they are received as grants. Investments in equity securities and debt securities are re-measured at their market value as of the reporting date. Investments acquired with the intention of keeping the same for more than a year from the acquisition date and which are not maturing within one year as of the reporting date, are classified as long term investment.

Accruals

Accruals represent liabilities to pay for goods or services that have been received, supplied, invoiced or formally agreed with suppliers.

Provisions

Provisions are recognized when the Institute has: (a) a present legal or constructive obligation as a result of past events, (b) it is more likely than not that an outflow of resources will be required to settle the obligation, and (c) a reliable estimate of the amount can be made. Provisions are measured at the present value of management’s best estimate of the expenditure required to settle the present obligation at the statement of financial position date.

When there are a number of similar obligations, the likelihood that an outflow will be required in the settlement is determined by considering the class of obligations taken as a whole. A provision is recognized even if the likelihood of an outflow with respect to any one item included in the same class of obligations may be small.

Leases

Leases of property where a significant portion of the risks and rewards of ownership are retained by the lessor are classified as operating leases. Payments made under operating leases are charged to operations on a straight-line basis over the period of the lease.

Foreign currency transactions and translations

Foreign currency denominated transactions are translated to US dollars for reporting purposes at standard bookkeeping rates which approximate the exchange rates prevailing at the dates of the transactions. Exchange differences arising from (a) the settlement of foreign currency-denominated monetary items at rates which are different from which they were originally booked; and (b) the translation of balances of foreign-currency denominated monetary items are credited or charged to operations during the year.
Contribution to provident fund

The contribution to provident fund is charged to personnel costs.

Recovery of indirect costs

The pooling of direct and indirect costs is based on the principle of attribution and assignability. Expenditures are pooled to different resource user units (cost centers) by direct identification. Expenditures that are common to the different cost centers are allocated on the basis of resource drivers. Non-operating and non-recurring expenditures are excluded in the computation.

Direct and indirect costs exclude capital expenditures but include depreciation in the case of unrestricted funded activities. For restricted grants, the indirect cost rates may include capital expenditures depending on the terms and conditions of the relevant agreements.

The method of calculating the indirect cost recovery rate is prescribed in the CGIAR Financial Guidelines No. 5.

Subsequent events

Post-year-end events that provide additional information about the Institute’s situation at the statement of financial position date (adjusting events) are reflected in the financial statements, if any. Post-year-end events that are not adjusting events are disclosed in the notes when material.

Note 3 - Cash and cash equivalents

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash on hand and in banks</td>
<td>12,759</td>
<td>5,917</td>
</tr>
<tr>
<td>Cash equivalents</td>
<td>9,079</td>
<td>11,120</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21,838</strong></td>
<td><strong>17,037</strong></td>
</tr>
</tbody>
</table>

Note 4 - Short term investments

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>With original maturities of more than 3 months but less than one year</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>Long term investments due to mature within one year</td>
<td>2,036</td>
<td>2,630</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,064</strong></td>
<td><strong>2,652</strong></td>
</tr>
</tbody>
</table>
Note 5 - Accounts receivable - donors

This account consists of outstanding approved unrestricted grants and expenses for restricted and challenge programs projects which are not yet collected from or reimbursed by donors.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>4,169</td>
<td>1,283</td>
</tr>
<tr>
<td>Restricted</td>
<td>3,105</td>
<td>2,251</td>
</tr>
<tr>
<td>Challenge programs</td>
<td>210</td>
<td>306</td>
</tr>
<tr>
<td></td>
<td>7,484</td>
<td>3,840</td>
</tr>
<tr>
<td>Allowance for doubtful accounts</td>
<td>-</td>
<td>(52)</td>
</tr>
<tr>
<td></td>
<td>7,484</td>
<td>3,788</td>
</tr>
</tbody>
</table>

Note 6 - Accounts receivable - others

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advances to suppliers</td>
<td>625</td>
<td>1,133</td>
</tr>
<tr>
<td>Others</td>
<td>349</td>
<td>421</td>
</tr>
<tr>
<td></td>
<td>974</td>
<td>1,554</td>
</tr>
</tbody>
</table>

Note 7 - Inventories

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare parts</td>
<td>519</td>
<td>501</td>
</tr>
<tr>
<td>Supplies and other inventories</td>
<td>300</td>
<td>302</td>
</tr>
<tr>
<td></td>
<td>819</td>
<td>803</td>
</tr>
<tr>
<td>Allowance for obsolescence</td>
<td>(247)</td>
<td>(248)</td>
</tr>
<tr>
<td></td>
<td>572</td>
<td>555</td>
</tr>
</tbody>
</table>
**Note 8 - Property and equipment**

The details of property and equipment at December 31, 2007 and their movements during the year consist of:

<table>
<thead>
<tr>
<th>At January 1, 2007</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>123</td>
<td>1,044</td>
<td>33,424</td>
<td>34,591</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(28)</td>
<td>(251)</td>
<td>(24,429)</td>
<td>(24,708)</td>
</tr>
<tr>
<td>Net book value</td>
<td>95</td>
<td>793</td>
<td>8,995</td>
<td>9,883</td>
</tr>
</tbody>
</table>

**Year ended December 31, 2007**

<table>
<thead>
<tr>
<th>Opening net book value</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>95</td>
<td>793</td>
<td>8,995</td>
<td>9,883</td>
</tr>
<tr>
<td>Additions</td>
<td>-</td>
<td>1,102</td>
<td>2,520</td>
<td>3,622</td>
</tr>
<tr>
<td>Disposal</td>
<td>-</td>
<td>-</td>
<td>(1,085)</td>
<td>(1,085)</td>
</tr>
<tr>
<td>Accumulated Depreciation</td>
<td>(2)</td>
<td>(263)</td>
<td>(2,026)</td>
<td>(2,291)</td>
</tr>
<tr>
<td>Disposal</td>
<td>-</td>
<td>-</td>
<td>984</td>
<td>984</td>
</tr>
<tr>
<td>Closing net book value</td>
<td>93</td>
<td>1,632</td>
<td>9,388</td>
<td>11,113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At December 31, 2007</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>123</td>
<td>2,146</td>
<td>34,859</td>
<td>37,128</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(30)</td>
<td>(514)</td>
<td>(25,471)</td>
<td>(26,015)</td>
</tr>
<tr>
<td>Net book value</td>
<td>93</td>
<td>1,632</td>
<td>9,388</td>
<td>11,113</td>
</tr>
</tbody>
</table>

The details of property and equipment at December 31, 2006 and their movements during the year consist of:

<table>
<thead>
<tr>
<th>At January 1, 2006</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>123</td>
<td>692</td>
<td>34,339</td>
<td>35,154</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(26)</td>
<td>(224)</td>
<td>(26,380)</td>
<td>(26,630)</td>
</tr>
<tr>
<td>Net book value</td>
<td>97</td>
<td>468</td>
<td>7,959</td>
<td>8,524</td>
</tr>
</tbody>
</table>

**Year ended December 31, 2006**

<table>
<thead>
<tr>
<th>Opening net book value</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>97</td>
<td>468</td>
<td>7,959</td>
<td>8,524</td>
</tr>
<tr>
<td>Additions</td>
<td>-</td>
<td>352</td>
<td>3,100</td>
<td>3,452</td>
</tr>
<tr>
<td>Disposal</td>
<td>-</td>
<td>-</td>
<td>(4,015)</td>
<td>(4,015)</td>
</tr>
<tr>
<td>Accumulated Depreciation</td>
<td>(2)</td>
<td>(27)</td>
<td>(1,968)</td>
<td>(1,997)</td>
</tr>
<tr>
<td>Disposal</td>
<td>-</td>
<td>-</td>
<td>3,919</td>
<td>3,919</td>
</tr>
<tr>
<td>Closing net book value</td>
<td>95</td>
<td>793</td>
<td>8,995</td>
<td>9,883</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At December 31, 2006</th>
<th>Physical Facilities</th>
<th>Infrastructure and Leasehold</th>
<th>Furnishing and Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>123</td>
<td>1,044</td>
<td>33,424</td>
<td>34,591</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(28)</td>
<td>(251)</td>
<td>(24,429)</td>
<td>(24,708)</td>
</tr>
<tr>
<td>Net book value</td>
<td>95</td>
<td>793</td>
<td>8,995</td>
<td>9,883</td>
</tr>
</tbody>
</table>
The total assets from restricted grants amounted to US$2,193 thousand and US$2,545 thousand as of December 31, 2007 and 2006, respectively.

Depreciation expense amounted to US$2,291 thousand and US$1,997 thousand in 2007 and 2006, respectively.

**Note 9 - Long term investments**

This account consists of principal-protected and Board approved low risk investments as follows:

<table>
<thead>
<tr>
<th>Account</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generali Worldwide Ins. Co. - USD</td>
<td>8,828</td>
<td>8,429</td>
</tr>
<tr>
<td>ING Investment Management - USD</td>
<td>1,125</td>
<td>1,500</td>
</tr>
<tr>
<td>ING Investment Management - EUR</td>
<td>2,925</td>
<td>5,260</td>
</tr>
<tr>
<td>Citibank New York Long-term Investment Umbrella Portfolio - USD</td>
<td>5,809</td>
<td>5,547</td>
</tr>
<tr>
<td>UBS Bank Medium Term Investment - EUR</td>
<td>2,925</td>
<td>2,002</td>
</tr>
<tr>
<td>Citibank New York Long-term Investment #389615 - USD</td>
<td>-</td>
<td>1,000</td>
</tr>
</tbody>
</table>

|                                                        | 21,612 | 23,738 |

The average annual interest rate on the above investments is 4% in 2007 (2006 - 5%).

**Note 10 - Accounts payable - donors**

This account consists of grants received in advance applicable to succeeding years.

<table>
<thead>
<tr>
<th>Account</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>948</td>
<td>836</td>
</tr>
<tr>
<td>Restricted</td>
<td>14,490</td>
<td>3,537</td>
</tr>
<tr>
<td>Challenge programs</td>
<td>1,294</td>
<td>1,279</td>
</tr>
</tbody>
</table>

|                                                        | 16,732 | 5,652 |

**Note 11 - Accounts payable - others**

This account consists of:

<table>
<thead>
<tr>
<th>Account</th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deferred training charges of scholars and trainees</td>
<td>236</td>
<td>290</td>
</tr>
<tr>
<td>Deferred salaries and benefits of post doctoral fellows</td>
<td>390</td>
<td>532</td>
</tr>
<tr>
<td>Funds in trust provided by donors</td>
<td>19</td>
<td>2,011</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

|                                                        | 645   | 2,834 |

(14)
Note 12 - Accruals and provisions

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accruals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade</td>
<td>1,769</td>
<td>1,920</td>
</tr>
<tr>
<td>Others</td>
<td>2,429</td>
<td>2,568</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,198</td>
<td>4,488</td>
</tr>
<tr>
<td><strong>Provisions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,306</td>
<td>2,739</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,504</td>
<td>7,227</td>
</tr>
</tbody>
</table>

Provisions consist of accumulated leave credits due to staff as of December 31, 2007 and 2006 based on current personnel policy manual, in addition to repatriation costs of internationally recruited staff.

Note 13 - Nationally Recruited Staff (NRS) Provident Fund

The Institute maintains a non-contributory provident fund for the benefit of its nationally recruited staff. The monthly contribution to the fund is computed at 10.5% of an employee’s monthly basic salary which is remitted to the trustee-administered funds. The fund provides for lump sum payment to qualified employees/members upon their separation from the Institute, under certain conditions.

The administration of fund by a Retirement Committee is based on approved investment guidelines as contained in the Trust Agreement.

Contributions to the fund amounted to about US$386 thousand and US$360 thousand in 2007 and 2006, respectively.

Note 14 - Net assets

The movements in Research Initiative Fund are shown below:

<table>
<thead>
<tr>
<th></th>
<th>Frontier Projects</th>
<th>Strategic Research Initiative</th>
<th>Africa and Needy Countries</th>
<th>Development Office</th>
<th>Knowledge Pathways Initiative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balances, January 1, 2006</strong></td>
<td>10,000</td>
<td>828</td>
<td>744</td>
<td>-</td>
<td>890</td>
<td>12,462</td>
</tr>
<tr>
<td>Expenses for the year</td>
<td>(310)</td>
<td>(415)</td>
<td>(591)</td>
<td>-</td>
<td>(189)</td>
<td>(1,505)</td>
</tr>
<tr>
<td>**Balances, December 31, 2006</td>
<td>9,690</td>
<td>413</td>
<td>153</td>
<td>-</td>
<td>701</td>
<td>10,957</td>
</tr>
<tr>
<td>Board of Trustees re-designation Expenses for the year</td>
<td>-</td>
<td>-</td>
<td>847</td>
<td>1,395</td>
<td>-</td>
<td>2,242</td>
</tr>
<tr>
<td></td>
<td>(978)</td>
<td>(192)</td>
<td>(489)</td>
<td>(40)</td>
<td>(212)</td>
<td>(1,911)</td>
</tr>
<tr>
<td>**Balances, December 31, 2007</td>
<td>8,712</td>
<td>221</td>
<td>511</td>
<td>1,355</td>
<td>489</td>
<td>11,288</td>
</tr>
</tbody>
</table>
Designated

On April 18, 2007, the Board of Trustees approved the re-designation of US$2,242 thousand from the Unrealized Foreign Exchange Translation to Research Initiative Fund and on September 20, 2007, the Board of Trustees also approved the re-designation of US$1,122 thousand from the Reserve for Unrealized Forex Translation to Reserve for Risk Management.

On October 12, 2006, the Board of Trustees approved the re-designation of US$6,632 thousand and US$3,368 thousand from the Staff Separation Reserve and Capital Reserve, respectively, to GRC Operations Reserve.

Undesignated

The Institute does not have undesignated net assets as of December 31, 2007 and 2006.

Note 15 - Leases

a. On September 7, 2001, the Institute renewed its lease agreement for research facilities with the University of the Philippines System (University). The lease agreement, which took effect on July 1, 2000, is for a period of 25 years to June 30, 2025, and is renewable upon mutual agreement of the parties. Under the terms of the agreement, the following provisions apply:

i. The Institute will pay a rental of one peso every year for the parcels of land used as sites for its laboratories, office and service buildings and housing. In addition and continuing the past practice of providing the equivalent in cash of the approximate value of agricultural products that otherwise could be grown on this land, the Institute provided a lump sum, and non reimbursable financial assistance to the University in the amount of US$375,000.

ii. For the duration of the lease, the Institute will also contribute to the cost of development and maintenance of the University road network, utilities, other infrastructure, health services, sanitary landfill management, security, etc. outside the leased land, in the amount of US$12,500 per year. Upon signing of the agreement, the first 10-year payment (US$125,000) was paid as a lump-sum, and the remainder will be paid in annual installments starting from the 11th year of the lease.

iii. Pursuant to the Memorandum of Understanding between the Government of the Republic of the Philippines and the Institute, all the physical plant, equipment and other assets belonging to the Institute shall become the property of the University when and if the Institute ceases its operation.

iv. In support of any expansion of the agricultural research program of the Institute and the University, the Philippine Government authorized the University to acquire, by negotiated sale or by expropriation, private agricultural property under PD No. 457.

b. The Institute signed a lease contract with Hewlett Packard (HP) for a seat management agreement involving the lease of computers and other bundled services. The agreement covers 4 phases, each phase effective for 3 years. The first phase started in October 2004, the last phase will end in October 2009. The minimum lease payment of this contract is US$59,181 per month.
c. The Institute also leases land and other properties from third parties for project experimental sites with periods ranging from one to five years. The leases mentioned above are accounted for as operating lease.

**Note 16 - Other revenues**

This account consists of:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment income</td>
<td>1,257</td>
<td>1,690</td>
</tr>
<tr>
<td>Self-sustaining activities</td>
<td>39</td>
<td>143</td>
</tr>
<tr>
<td>Miscellaneous, including realized gain (loss) on foreign exchange</td>
<td>2</td>
<td>436</td>
</tr>
<tr>
<td></td>
<td>1,298</td>
<td>2,269</td>
</tr>
</tbody>
</table>

**Note 17 - Indirect cost recovery rate**

The indirect cost recovery rate computed as per the CGIAR Financial Guideline No. 5 is 20.38% and 21.01% in 2007 and 2006, respectively. The computation of indirect cost recovery rate is shown on Exhibit 4.

**Note 18 - Contingencies**

The Institute has certain pending legal lawsuits and disputes. Management, however, believes that the ultimate outcome of these lawsuits and disputes will not materially affect the Institute’s financial position and the results of its activities.
### SCHEDULE OF GRANTS REVENUES

<table>
<thead>
<tr>
<th>Donors</th>
<th>Total Funds Available</th>
<th>Accounts Receivable</th>
<th>Advance Payment</th>
<th>Grant</th>
<th>2006 Grant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unrestricted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>1,227</td>
<td>(661)</td>
<td>566</td>
<td>563</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>1,026</td>
<td></td>
<td>1,026</td>
<td>953</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td>140</td>
<td>140</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
<td>480</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>388</td>
<td></td>
<td>844</td>
<td>882</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>150</td>
<td></td>
<td></td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>844</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>150</td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
<td></td>
<td>410</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>334</td>
<td></td>
<td></td>
<td>323</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>91</td>
<td>9</td>
<td>100</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>842</td>
<td>(287)</td>
<td>555</td>
<td>478</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>531</td>
<td></td>
<td>531</td>
<td>494</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>40</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2,431</td>
<td></td>
<td></td>
<td>2,171</td>
<td></td>
</tr>
<tr>
<td>United States of America</td>
<td></td>
<td>2,700</td>
<td></td>
<td>3,200</td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>15</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worldbank</td>
<td>1,800</td>
<td></td>
<td></td>
<td>2,068</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>9,010</td>
<td>4,169</td>
<td>(948)</td>
<td>12,231</td>
<td>12,836</td>
</tr>
</tbody>
</table>

| **Restricted**                |                       |                     |                 |        |            |
| **Temporary**                 |                       |                     |                 |        |            |
| Aquifer Limited               | 196                   | (30)                | 166             |        |            |
| Asian Development Bank (ADB) | 890                   | 191                 | 1,081           | 1,133  |            |
| Australia                     | 648                   | (101)               | 547             | 443    |            |
| Bill & Melinda Gates Foundation | 8,261             | (8,072)             | 189             |        |            |
| Brazil                        | 20                    | (20)                |                 |        |            |
| Canada                        | 270                   | (96)                | 174             | 43     |            |
| China                         | 16                    | (2)                 | 14              |        |            |
| Centro Internacional de Agricultura Tropical (CIAT) | 3 | 1 | 4 |
| Consultative Group on International Agricultural Research (CGIAR)/ International Fund for Agricultural Research (IFAR) | 68 | (49) | 19 |
| European Commission           | 723                   | 2,842               | 3,565           | 210    |            |
| Foundation for Advanced Studies on Agricultural Development (FASID) | 45 | 3 | 48 |
### Donors

<table>
<thead>
<tr>
<th>Donors</th>
<th>Total Funds Available</th>
<th>Accounts Receivable</th>
<th>Advance Payment</th>
<th>2007 Grant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Agricultural Organization of the United Nations (FAO)</td>
<td>35</td>
<td>(15)</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>France</td>
<td>240</td>
<td></td>
<td>240</td>
<td>483</td>
</tr>
<tr>
<td>Gatsby Foundation</td>
<td>160</td>
<td>(160)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>1,089</td>
<td>(620)</td>
<td>469</td>
<td>860</td>
</tr>
<tr>
<td>Global Crop Diversity Trust (GCDT)</td>
<td>263</td>
<td>(29)</td>
<td>234</td>
<td>218</td>
</tr>
<tr>
<td>Grain Biotech Australia (GBA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Challenges in Global Health through Albert - Ludwig University of Freiburg</td>
<td>159</td>
<td>(20)</td>
<td>139</td>
<td>167</td>
</tr>
<tr>
<td>International Atomic Energy Association (IAEA)</td>
<td>47</td>
<td>(30)</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>500</td>
<td></td>
<td>500</td>
<td>450</td>
</tr>
<tr>
<td>International Fund for Agricultural Development (IFAD)</td>
<td>1,255</td>
<td>(659)</td>
<td>596</td>
<td>681</td>
</tr>
<tr>
<td>International Fertilizer Association (IFA)/International Plant Nutrition Institute (IPNI)/International Potash Institute (IPI)</td>
<td>89</td>
<td>(28)</td>
<td>61</td>
<td>198</td>
</tr>
<tr>
<td>International Food Policy Research Institute (IFPRI)</td>
<td>20</td>
<td>(20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>338</td>
<td>(246)</td>
<td>92</td>
<td>63</td>
</tr>
<tr>
<td>Japan</td>
<td>5,256</td>
<td>(2,596)</td>
<td>2,660</td>
<td>1,548</td>
</tr>
<tr>
<td>Korea</td>
<td>1,201</td>
<td>(460)</td>
<td>741</td>
<td>693</td>
</tr>
<tr>
<td>Malaysia</td>
<td>38</td>
<td>6</td>
<td>44</td>
<td>32</td>
</tr>
<tr>
<td>Mexico</td>
<td>10</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Monsanto Fund</td>
<td>46</td>
<td></td>
<td>46</td>
<td>6</td>
</tr>
<tr>
<td>Nunhems BV</td>
<td>29</td>
<td>(3)</td>
<td>26</td>
<td>33</td>
</tr>
<tr>
<td>Plan International Cambodia</td>
<td>44</td>
<td>(2)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>28</td>
<td>5</td>
<td>33</td>
<td>56</td>
</tr>
<tr>
<td>Rockefeller Foundation (RF)</td>
<td>783</td>
<td>(167)</td>
<td>616</td>
<td>477</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1,269</td>
<td>(55)</td>
<td>1,214</td>
<td>1,311</td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td></td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>United States of America (USA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States Agency for International Development (USAID)</td>
<td>1,644</td>
<td>(932)</td>
<td>712</td>
<td>479</td>
</tr>
<tr>
<td>United States Department of Agriculture (USDA)</td>
<td>(9)</td>
<td>38</td>
<td>29</td>
<td>94</td>
</tr>
<tr>
<td>Worldbank</td>
<td>400</td>
<td>(78)</td>
<td>322</td>
<td>558</td>
</tr>
<tr>
<td>Others</td>
<td>86</td>
<td>9</td>
<td>95</td>
<td>42</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>26,150</strong></td>
<td><strong>3,105</strong></td>
<td><strong>(14,490)</strong></td>
<td><strong>14,765</strong></td>
</tr>
<tr>
<td><strong>Challenge Programs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water and Food</td>
<td>3,553</td>
<td>(455)</td>
<td>3,098</td>
<td>2,480</td>
</tr>
<tr>
<td>Generation</td>
<td>2,295</td>
<td>(839)</td>
<td>1,456</td>
<td>1,586</td>
</tr>
<tr>
<td>Harvest Plus</td>
<td>629</td>
<td>210</td>
<td>839</td>
<td>594</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>6,477</strong></td>
<td><strong>210</strong></td>
<td><strong>(1,294)</strong></td>
<td><strong>5,393</strong></td>
</tr>
<tr>
<td><strong>Total Restricted Grants</strong></td>
<td><strong>32,627</strong></td>
<td><strong>3,315</strong></td>
<td><strong>(15,784)</strong></td>
<td><strong>20,158</strong></td>
</tr>
<tr>
<td><strong>Total Grants</strong></td>
<td><strong>41,637</strong></td>
<td><strong>7,484</strong></td>
<td><strong>(16,732)</strong></td>
<td><strong>32,389</strong></td>
</tr>
<tr>
<td><strong>2006 Grant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Restricted Grants</strong></td>
<td><strong>32,627</strong></td>
<td><strong>3,315</strong></td>
<td><strong>(15,784)</strong></td>
<td><strong>20,158</strong></td>
</tr>
<tr>
<td><strong>Total Grants</strong></td>
<td><strong>41,637</strong></td>
<td><strong>7,484</strong></td>
<td><strong>(16,732)</strong></td>
<td><strong>32,389</strong></td>
</tr>
</tbody>
</table>
## The International Rice Research Institute

**Schedule of Restricted Agenda Funding**

For the year ended 31 December 2007

(In US$ thousands)

<table>
<thead>
<tr>
<th>Donor &amp; Program/Project</th>
<th>Grant Period (DD/MM/YY)</th>
<th>Donor &amp; Program/Project</th>
<th>Grant Period (DD/MM/YY)</th>
<th>EXPENDITURES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Temporary</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquifer Limited</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-invigorating the Mozambique Rice Industry through a Novel Public-Private Sector Partnership</td>
<td>27/04/07 - 26/04/09</td>
<td>A. Temporary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Development Bank (ADB)</td>
<td></td>
<td>Development and Dissemination of Water-Saving Rice Technologies in South Asia</td>
<td>01/01/06 - 31/05/09</td>
<td>395</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improving Poor Farmers' Livelihood Through Post-Harvest Technology</td>
<td>11/07/05 - 31/12/08</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improving Poor Farmers' Livelihood Through Rice Information Technology</td>
<td>19/11/04 - 19/11/08</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enhancing Farmers’ Income and Livelihoods Through Integrated Crop and Resource Management in the Rice-Wheat System in South Asia</td>
<td>01/01/05 - 31/12/08</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Integrating and Mobilizing Rice Knowledge to Improve and Stabilize Crop Productivity to Achieve Household Food Security in Diverse and Less Favorable Rainfed Areas of Asia</td>
<td>01/01/04 - 31/12/07</td>
<td>849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>4,499</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finetuning the Happy Seeder Technology for the Adoption in Northwest India</td>
<td>01/10/07 - 30/09/10</td>
<td>Australia</td>
<td></td>
<td>166</td>
</tr>
<tr>
<td>Impact of Migration and/or Off-farm Employment on Roles of Women and Appropriate Technologies in Asian and Australian Mixed Farming Systems</td>
<td>01/07/04 - 31/03/08</td>
<td>383</td>
<td>258</td>
<td>95</td>
</tr>
<tr>
<td>Implementation of Rodent Management in Intensive Irrigated Rice Production Systems in Indonesia and Vietnam</td>
<td>01/04/06 - 30/09/09</td>
<td>90</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Further Development of ICIS</td>
<td>01/07/06 - 30/06/08</td>
<td>31</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Fertilization-Independent Formation of Embryo, Endosperm and Pericarp for Apomictic Hybrid Rice</td>
<td>01/07/03 - 30/06/08</td>
<td>1,090</td>
<td>755</td>
<td>277</td>
</tr>
<tr>
<td>ACIAR Mission to South &amp; Southeast Sulawesi</td>
<td>01/05/07 - 30/06/07</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Training Workshop on Leadership for Asian Women in Agriculture R &amp; D and Extension</td>
<td>27/11/06 - 08/01/07</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Scoping Study to Identify Research and Implementation Issues Related to Management of the Brown Planthopper/Virus Problem in Rice in Vietnam</td>
<td>01/05/07 - 31/01/08</td>
<td>93</td>
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<td>Herbicide Use Strategies and Weed Management Options in Filipino and Australian Cropping</td>
<td>16/09/07 - 22/09/07</td>
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<td>Developing Molecular Markers to Enable Selection Against Chalk in Rice</td>
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<td>Publication of Rice in Laos</td>
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<td><strong>Bill &amp; Melinda Gates Foundation</strong></td>
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<td>Stress-tolerant Rice for Poor Farmers in Africa and South Asia</td>
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<td><strong>Canada</strong></td>
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<td>Developing Efficient Methods for Detecting Gene Enhancing Rice Drought Tolerance (CCLF)</td>
<td>01/04/04 - 30/09/07</td>
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<td>Programmatic Alignment Among IRRI, The Africa Rice Center and CIAT with Focus on Centers’ Activities in Africa</td>
<td>21/03/07 - 20/03/08</td>
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<td>Development of Disease-resistant, Cold-tolerant Rice Variety in South China Throughout Genomic Tools</td>
<td>05/02/07 - 04/02/09</td>
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<td>Centro Internacional de Agricultura Tropical (CIAT)</td>
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<td>Inception Workshop of the ICT-Knowledge Sharing Pilot Project Initiative</td>
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<td>Economic Assessment of a Change in Chemical Registration Policy Due to IRRI Research on Pesticide Use and Philippine Farmer Health</td>
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<td>Pyramiding Genes for Resistance to Bacterial Blight and Blast in Bangladesh Rice Cultivars Using Marker Assisted Selection</td>
<td>21/05/07 - 20/05/10</td>
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<td>Coordinating NGO Interventions for Improving Small and Marginal Farmer's Households, Livelihood and Food Security in Bangladesh</td>
<td>01/07/04 - 31/08/09</td>
<td>1,800</td>
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<td>Assessing Large-Scale Environment Risk with Tested Methods: Extension (ALARM TTC)</td>
<td>01/02/07 - 31/01/09</td>
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<td>Metabolomic Technology Applications for Plants, Health and Outreach</td>
<td>09/02/07 - 08/02/10</td>
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<td>Raising Productivity in Rainfed Environments</td>
<td>01/01/07 - 31/12/07</td>
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<td>Sustaining Productivity in Intensive Rice-Based Systems</td>
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<td>East and Southern Africa: Rice for Rural Incomes</td>
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<td>Rice Genetic Diversity and Discovery</td>
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<td>FASID - IRRI Water Saving Technology Project (A Survey to be Done in China)</td>
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<td><strong>Food and Agriculture Organization of the United Nations (FAO)</strong></td>
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<td>Enhancing National Capacities in Plant Breeding Through the 2007 Rice Breeding Course: Laying the Foundation for the Second Green Revolution</td>
<td>20/08/07 - 21/08/07</td>
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<td><strong>Gatsby Foundation</strong></td>
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<td>Gatsby Foundation - Collections of Landraces and Wild Species of Oryza in Kenya, Mozambique, Tanzania and Uganda (in collaboration with WARRDA)</td>
<td>01/05/07 - 30/04/10</td>
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<td><strong>Germany</strong></td>
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<td>Nutrient Management in Aerobic Rice Systems</td>
<td>01/07/05 - 30/06/08</td>
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<td>Applying Genetic Diversity and Genomic Tools to Benefit Rice Farmers at Risk from Drought</td>
<td>01/02/04 - 31/12/07</td>
<td>606</td>
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<td>From Genes to Farmers' Fields: Enhancing and Stabilizing Productivity of Rice in Submergence Prone Environments</td>
<td>01/01/04 - 31/12/08</td>
<td>1,261</td>
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<td>Managing Crop Residues for Healthy Soils in Rice Ecosystems</td>
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<td>Development of a Global Strategy for the Ex Situ Conservation of Rice</td>
<td>01/04/06 - 28/02/08</td>
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<td>Long-term Funding of the Ex Situ Collection of Rice Germplasm Held by IRRI</td>
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<td><strong>Grand Challenges in Global Health through Albert-Ludwig's University of Freiburg</strong></td>
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<td>ALUF/GCGH - Engineering Rice for High Beta-Carotene, Vitamin E and Enhanced Iron and Zinc Bioavailability</td>
<td>28/09/05 - 27/09/10</td>
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<td><strong>International Atomic Energy Association (IAEA)</strong></td>
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<td>Dissecting Drought Tolerance Mechanisms in Rice Through Gain of Function Deletion Mutants</td>
<td>15/06/06 - 14/06/07</td>
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<td>Selection of Greater Agronomic Water-Use Efficiency in Wheat and Rice Using Carbon Isotope Discrimination</td>
<td>15/11/03 - 14/12/08</td>
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<td>Transgenic in Rice</td>
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<td>Managing Rice Landscapes in the Marginal Uplands for Household Food Security and Environmental Sustainability</td>
<td>26/07/05 - 30/09/08</td>
<td>1,190</td>
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<td>Accelerating Technology Adoption to Improve Rural Livelihood in the Rainfed Eastern Gangetic Plains</td>
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<td>Accelerating Agricultural Technology Adoption to Enhance Rural Livelihoods in Disadvantaged Districts of India</td>
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<td>Programme for Alleviating Poverty Through Improving Rice Production in East and Southern Africa</td>
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<td><strong>International Fertilizer Association (IFA)/International Plant Nutrition Institute (IPNI)/International Potash Institute (IPI)</strong></td>
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<td>The Irrigated Rice Research Consortium Phase III-Site Specific Nutrient Management</td>
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<td><strong>International Food Policy Research Institute (IFPRI)</strong></td>
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<td>International Food Policy Research Institute (IFPRI) - Scoping the Potential Futures for Rice in Asia: Exploring Alternatives Strategies and Policies</td>
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<td>International Food Policy Research Institute (IFPRI) - Supporting Strategic Investment Choices in Agricultural Technology Development</td>
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<td><strong>Japan</strong></td>
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<td>Raising Productivity in Rainfed Environments: Attacking the Roots of Poverty (Program 1)</td>
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<td>Sustaining Productivity in Intensive Rice-based Systems: Rice and the Environment (Program 2)</td>
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<td>East and Southern Africa: Rice for Rural Incomes and an Affordable Urban Staple (Program 3)</td>
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<td>Rice and Human Health: Overcoming the Consequences of Poverty (Program 4)</td>
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<td>Rice Genetic Diversity and Discovery: Meeting the Needs of Future Generations for Rice Genetic Resources (Program 5)</td>
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<td>Information and Communication: Convening a Global Rice Research Community (Program 6)</td>
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<td>Development of Integrated Rice Cultivation System Under Water Saving Conditions</td>
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<td>Upland Rice Variety Selection Techniques</td>
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<td>Collaborative Research on Socioeconomic Constraints to Adoption of Technology and Farmer’s Response</td>
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<td>Transformation of Lowland Rice and Evaluation of Transformed Rice for Environmental Stress Tolerance</td>
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<td>Capacity Building To Enhance IRRI-NARS Future Collaboration</td>
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**Development of Breeding Materials for Rice Blast Resistance-Phenotypic Evaluation and Marker Assisted Selection to Develop Near-Isogenic Lines for Blast Resistance**
11/12/07 - 25/02/08
- 13
- 3
- 3

**Implementation Plans to Disseminate Submergence Tolerant Varieties and Associated New Production Practices to Southeast Asia**
19/03/07 - 31/03/09
- 4,236
- 1,238
- 1,238

**Total**
- 7,228
- 565
- 2,660
- 3,225

**Korea**

**Korea Support to IRRI’s Program**
01/01/07 - 31/12/07
- 50
- 50
- 50

**Wide Hybridization and Gene Introgression for Rice Improvement/Broadening Gene Pool of Rice: Wild Species Introgression and Marker Assisted Selection**
01/07/03 - 31/08/09
- 240
- 161
- 30
- 191

**Functional Genomics Approach to Identification of Broad-Spectrum Resistance Genes Against Rice Blast Disease in Korean Germplasm**
01/07/03 - 31/08/09
- 240
- 150
- 27
- 177

**Cooperative Funding for Korea-IRRI Collaborative Projects**
01/01/99 - 31/12/07
- 455
- 508
- 34
- 342

**Germplasm Utilization and Value-Added Project**
01/01/01 - 31/12/07
- 275
- 170
- 8
- 198

**IRRI Korea Office**
17/11/01 - 31/12/07
- 1,513
- 1,204
- 288
- 1,492

**Development of Japonica Cultivars with Pyramided Genes for Resistance to Bacterial Blight**
01/01/06 - 31/12/07
- 10
- 5
- 5
- 10

**Elucidation of the Causal Agents for Yellowing Syndrome of Rice**
01/01/06 - 31/12/07
- 10
- 5
- 5
- 10

**Study on Utilization and Evaluation of Hybrid Rice**
01/01/06 - 31/12/07
- 10
- 5
- 5
- 10

**Breeding for Super High-Yielding Rice Variety**
01/01/06 - 31/12/07
- 10
- 2
- 8
- 10

**A Comparative Study of Women’s Role and their Status in Societies under Semi-subsistence and Commercialized Agriculture in the Philippines, Vietnam and Korea**
01/01/06 - 31/12/07
- 10
- 2
- 8
- 10

**Major Characteristics Evaluation of Early Maturing Japonica Rice (MEJR)**
01/12/06 - 30/11/08
- 41
- 33
- 33

**Development of Water-Saving Technology for Increasing Water Productivity in Rice Cultivation**
01/04/04 - 31/05/07
- 48
- 42
- 6
- 48

**Breeding for Micronutrient-Enriched Japonica Rice for Improving Human Health**
01/04/05 - 31/03/08
- 140
- 73
- 51
- 124

**Identification of Resistance Genes for Biotic Stresses in Rice Through the Location/Expression Candidate Assocation Approach**
01/01/06 - 31/12/08
- 90
- 27
- 34
- 61

**Korean Seed Multiplication Project**
01/07/91 - 31/12/08
- 379
- 296
- 41
- 337

**Temperate Rice Research Consortium**
08/02/07 - 31/12/08
- 203
- 88
- 88

**Total**
- 3,724
- 2,450
- 741
- 3,191

**Malaysia**

**The Impact of Rice Production on Environmental Sustainability**
01/09/05 - 30/09/08
- 90
- 17
- 19
- 36

**Genetic Enhancement for High Quality Rice**
01/01/06 - 31/12/08
- 110
- 15
- 25
- 40

**Total**
- 200
- 32
- 44
- 76

**Mexico**

**IRRI/Mexico Collaborative Project**
01/01/07 - 31/12/07
- 10
- 10
- 10

**Monsanto Fund**

**Improving the Analytical Capability of IRRI in Support of the Nutritional Improvement of Rice Grains and the Dissemination of Modern Nutritional Information to Under-served Asian Populations**
23/06/04 - 22/06/07
- 220
- 174
- 46
- 220

**Nunhems BV**

**Further Development of International Crop Information Systems (ICIS) in Collaboration with Nunhems - Phase II**
01/04/06 - 31/03/10
- 80
- 12
- 26
- 38

**Plan International Cambodia**

**Poverty Reduction Options Validated in Drought Environments**
01/09/06 - 31/03/07
- 35
- 4
- 31
- 35

**Poverty Reduction Options Validated in Drought Environments Phase II**
01/05/07 - 29/02/08
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- 11
- 11

**Total**
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<td>Philippines</td>
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<td>Assessing the Impact of Potential Trade Liberalization of the Philippine Rice Sector</td>
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<td>Hybrid Nucleus and Breeder Seed Production (PhilRice - UPLB - IRRI)</td>
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<td>Improving Knowledge Exchange and Decision Making Among Rice Stakeholders Through ICT-based Technology Promotion and Delivery Systems</td>
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<td>Developing New Plant Type for Direct Seeding Rice Production Systems in the Philippines</td>
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<td>90</td>
<td>76</td>
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<tr>
<td>Total</td>
<td></td>
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<td>143</td>
<td>33</td>
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<tr>
<td>Rockefeller Foundation (RF)</td>
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<td></td>
<td></td>
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<tr>
<td>Detecting Alleles Conferring Improved Reproductive-Stage Drought Tolerance in Rainfed Rice</td>
<td>01/04/04 - 31/03/07</td>
<td>276</td>
<td>262</td>
<td>14</td>
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<tr>
<td>Developing and Disseminating Resilient and Productive Rice Varieties for Drought-Prone Environments in India</td>
<td>01/03/05 - 28/02/08</td>
<td>610</td>
<td>285</td>
<td>191</td>
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<td>Introggression of Genes for Drought Tolerance from Oryza Glaberrima into Indica Rice</td>
<td>01/04/05 - 31/03/08</td>
<td>76</td>
<td>46</td>
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<td>Tilling of Rice (Identification and Characterization of Genes that have the Potential to Enhance Drought Tolerance in Rice)</td>
<td>01/09/03 - 28/02/07</td>
<td>125</td>
<td>110</td>
<td>15</td>
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<td>Pathway Dissection and Candidate Gene Identification for Drought Tolerance in Rice by a Forward Genetics Approach</td>
<td>01/03/05 - 28/02/08</td>
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<td>895</td>
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<td>Lao PDR - Rice Research and Training Project - Transition Budget</td>
<td>01/10/06 - 31/12/07</td>
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<td>77</td>
<td>341</td>
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<td>The Irrigated Rice Research Consortium - Phase III Management Team</td>
<td>01/01/05 - 31/12/08</td>
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<td>557</td>
<td>462</td>
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<td>Productivity Workgroup</td>
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<td>402</td>
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<td>Water Saving Workgroup</td>
<td>01/01/05 - 31/12/08</td>
<td>356</td>
<td>121</td>
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<td>Labor Productivity Workgroup</td>
<td>01/01/05 - 31/12/08</td>
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<td>152</td>
<td>121</td>
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<td>Post Production Workgroup</td>
<td>01/01/05 - 31/12/08</td>
<td>353</td>
<td>172</td>
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<td>Total</td>
<td></td>
<td>3,331</td>
<td>1,275</td>
<td>1,214</td>
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<td>United States of America</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>United States Agency for International Development (USAID)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing, Comparing, NuMaSS: The Nutrient Management Support System</td>
<td>01/09/03 - 30/09/07</td>
<td>51</td>
<td>37</td>
<td>14</td>
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<td>Development of Rice Biotechnology Products for Asia: Technical and Pre-regulatory Components</td>
<td>01/01/05 - 30/09/08</td>
<td>2,580</td>
<td>441</td>
<td>541</td>
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<td>The Development of Adapted Germplasm for India with High Levels of Pro Vitamins Carotenoids</td>
<td>01/01/05 - 31/12/07</td>
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<td>21</td>
<td>38</td>
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<tr>
<td>Modeling the Impacts of BT Transgene Flow on Lepidopteran Food Web Structure and Stability on Wild Rice in Vietnam (Led by CLRRI - Under Program for Biosafety System BB1)</td>
<td>01/01/07 - 13/05/08</td>
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<td>26</td>
<td>26</td>
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<tr>
<td>Ecological Based Participatory IPM for Southeast Asia (Led by Clemson University - IPM-CRSP)</td>
<td>01/10/05 - 30/09/07</td>
<td>34</td>
<td>19</td>
<td>15</td>
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<tr>
<td>Advanced Breeding and Deployment of Abiotic Stress Tolerant Rice &amp; Wheat and Expansion of Hybrid Rice</td>
<td>01/10/07 - 30/09/08</td>
<td>150</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Revitalizing The Rice-Wheat Cropping Systems Of The Indo-Gangetic Plains: A daptation And Adoption Of Resource-Conserving Technologies In India, Bangladesh And Nepal (Component 1 Of The Global Development Alliance)</td>
<td>01/10/07 - 30/09/08</td>
<td>475</td>
<td>75</td>
<td>75</td>
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<td>Total</td>
<td></td>
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<td>518</td>
<td>712</td>
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<td>Donor &amp; Program/Project</td>
<td>Grant Period (DD/MM/YY)</td>
<td>Pledged Prior Years</td>
<td>2007</td>
<td>Total</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------</td>
<td>---------------------</td>
<td>------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| United States Department of Agriculture (USDA)  
KSU - Contribution of Three Defense Response Genes in Quantitative Disease Resistance | 01/07/03 - 30/06/07 | 134 | 116 | 18 | 134 |
| Enabling Open Access To IRRI-Assisted Theses and Dissertations Fund | 30/09/06 - 31/12/08 | 8 | 4 | 4 | 8 |
| Tilling and Ecotilling Resources of Japonica and Indica Rice | 01/04/04 - 31/03/08 | 84 | 52 | 7 | 59 |
| Georeferencing of Germplasm Resources Information Network - Georeferencing Project | 01/08/07 - 31/12/08 | 45 | | | |
| Total | | 271 | 172 | 29 | 201 |
| World Bank | | | | | |
| Environment Radio Soap Opera for Rural Vietnam | 01/07/05 - 15/06/07 | 132 | 95 | 37 | 132 |
| Collective Action for the Rehabilitation of Global Public Goods in the CGIAR Genetic Resources System: Phase 2 | | | | | |
| Upgrading Facilities to Ensure Security of the In-Trust Collections | 01/01/07 - 31/12/09 | 337 | 252 | | 252 |
| Removal of Backlogs in Regeneration, Characterisation, Health and Viability Testing, Documentation and Supply | 01/01/07 - 31/12/09 | 457 | 20 | | 20 |
| Improvements to Genebank Facilities, Equipment & Systems | 01/01/07 - 31/12/09 | 103 | 13 | | 13 |
| Total | | 1,029 | 95 | 322 | 417 |
| Others | | 153 | 4 | 95 | 99 |
| Bayer - Development of ICIS | 01/01/07 - 31/12/09 | 53 | | 18 | 18 |
| Centro Internacional de Agricultura Tropical (CIAT) Information and Communications Technology - Knowledge Management Initiative (ICT KM) - Good Practices for Managing Research Data | 01/10/07 - 30/09/08 | 20 | 1 | | 1 |
| National Graduate Institute for Policy Studies (GRIPS) - Mozambique Survey | 01/08/07 - 15/02/08 | 22 | 22 | | 22 |
| International Union of Pure and Applied Chemistry (IUPAC) - Terminology and Measurement Techniques of Starch Components | 16/05/05 - 15/05/07 | 7 | 1 | 6 | 7 |
| Japan Bank for International Cooperation (JBIC) - Mozambique Survey | 07/09/07 - 15/04/08 | 19 | | 19 | 19 |
| University of California (UC)-Berkeley - Biogeomancer Project | 15/05/06 - 31/03/07 | 23 | 3 | 20 | 23 |
| University of Tokyo (UT) - Production Survey at Tubuan Village in the Philippines | 20/06/07 - 19/10/07 | 9 | | 9 | 9 |
| Subtotal | | 67,560 | 16,018 | 14,765 | 30,783 |
| B. Challenge Program | | | | | |
| Water and Food | 01/11/02 - 31/10/09 | 10,565 | 5,618 | 3,098 | 8,716 |
| Generation | 01/01/04 - 31/12/08 | 4,892 | 2,141 | 1,456 | 3,597 |
| Harvest Plus | 09/09/03 - 31/12/08 | 2,647 | 1,563 | 839 | 2,402 |
| Subtotal | | 18,104 | 9,322 | 5,393 | 14,715 |
| Grand Total | | 85,664 | 25,340 | 20,158 | 45,498 |
# International Rice Research Institute
## Details of Operating Expenses

For the Years Ended December 31, 2007 and 2006
(In thousands of US$)

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<thead>
<tr>
<th></th>
<th>Research Programs</th>
<th>Research Support</th>
<th>Operations</th>
<th>Sub-total</th>
<th>Management</th>
<th>General Administration</th>
<th>Sub-total</th>
<th>Total</th>
<th>2006</th>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>1,807</td>
<td>6,428</td>
<td>2,221</td>
<td>2,221</td>
<td>8,649</td>
<td>9,660</td>
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<td>1,385</td>
<td>3,679</td>
<td>1,112</td>
<td>2,480</td>
<td>3,592</td>
<td>7,271</td>
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<td>258</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>269</td>
<td>344</td>
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<tr>
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<td>135</td>
<td>60</td>
<td>741</td>
<td>195</td>
<td>130</td>
<td>325</td>
<td>1,066</td>
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<td>208</td>
<td>494</td>
<td>1,461</td>
<td>75</td>
<td>302</td>
<td>377</td>
<td>1,838</td>
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<td><strong>Total operating expenses</strong></td>
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<td>1,632</td>
<td>3,746</td>
<td>12,567</td>
<td>3,614</td>
<td>2,912</td>
<td>6,526</td>
<td>19,093</td>
<td>19,751</td>
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<tr>
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<td>(1,667)</td>
<td>(1,667)</td>
<td>(1,274)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>7,189</td>
<td>1,632</td>
<td>3,746</td>
<td>12,567</td>
<td>3,614</td>
<td>1,245</td>
<td>4,859</td>
<td>17,426</td>
<td>18,477</td>
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<td></td>
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<td></td>
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<td>6,092</td>
<td>3,781</td>
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<td>177</td>
<td>4,361</td>
<td>64</td>
<td>675</td>
<td>739</td>
<td>5,100</td>
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<td>1,771</td>
<td>1,771</td>
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<td>75</td>
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<td>410</td>
<td>0</td>
<td>410</td>
<td>233</td>
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<td>76</td>
<td>180</td>
<td>13,951</td>
<td>139</td>
<td>675</td>
<td>814</td>
<td>14,765</td>
<td>10,414</td>
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<td><strong>Challenge Programs</strong></td>
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<td>758</td>
<td>961</td>
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<td>2,823</td>
<td>2,196</td>
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<td>466</td>
<td>326</td>
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<td>43</td>
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<td>43</td>
<td>233</td>
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<td></td>
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<td>675</td>
<td>814</td>
<td>20,158</td>
<td>15,074</td>
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<td>26,277</td>
<td>1,708</td>
<td>3,926</td>
<td>31,911</td>
<td>3,753</td>
<td>1,920</td>
<td>5,673</td>
<td>37,584</td>
<td>33,551</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Management and General</th>
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<td>Supplies &amp; services</td>
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<td>Depreciation</td>
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<td><strong>Sub-total</strong></td>
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</tr>
<tr>
<td>Recovery of indirect cost</td>
<td>(1,667)</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>26,277</td>
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</table>
### THE INTERNATIONAL RICE RESEARCH INSTITUTE
#### INDIRECT COST CALCULATION
FOR THE YEARS ENDED DECEMBER 31

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Operating Expenses</strong></td>
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<td></td>
</tr>
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<td>Research</td>
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<td>2,952</td>
</tr>
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<td>Operations</td>
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<tr>
<td><strong>Subtotal</strong></td>
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<td>28,999</td>
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<tr>
<td>Less: Overhead recovery</td>
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<td>1,274</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td>27,725</td>
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<tr>
<td><strong>Indirect Operating Expenses</strong></td>
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</tr>
<tr>
<td>Common sustenance services</td>
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<tr>
<td><strong>Total</strong></td>
<td>6,362</td>
<td>5,826</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>37,584</td>
<td>33,551</td>
</tr>
</tbody>
</table>

**Cost Ratios**

- Direct/Total: 83.07% (2007), 82.64% (2006)
- Indirect/Total: 16.93% (2007), 17.36% (2006)
### Exhibit 5

**THE INTERNATIONAL RICE RESEARCH INSTITUTE**  
**EUROPEAN COMMUNITY FUNDING**  
**STATEMENT OF EXPENDITURES**  
**FOR THE YEAR ENDED 31 DECEMBER 2007**  
(In thousands)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Grant period</th>
<th>Grant pledged</th>
<th>Expenditures (2007)</th>
<th>Budget balance</th>
</tr>
</thead>
<tbody>
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<td>Raising Productivity in Rainfed Environments</td>
<td>01/01/07 - 31/12/07</td>
<td>457 EUR, 668 USD</td>
<td>457 EUR, 668 USD</td>
<td>- EUR, - USD</td>
</tr>
<tr>
<td>Sustaining Productivity in Intensive Rice-Based Systems</td>
<td>01/01/07 - 31/12/07</td>
<td>424 EUR, 620 USD</td>
<td>424 EUR, 620 USD</td>
<td>- EUR, - USD</td>
</tr>
<tr>
<td>East and Southern Africa: Rice for Rural Incomes</td>
<td>01/01/07 - 31/12/07</td>
<td>309 EUR, 452 USD</td>
<td>309 EUR, 452 USD</td>
<td>- EUR, - USD</td>
</tr>
<tr>
<td>Rice Genetic Diversity and Discovery</td>
<td>01/01/07 - 31/12/07</td>
<td>1,054 EUR, 1,542 USD</td>
<td>1,054 EUR, 1,542 USD</td>
<td>- EUR, - USD</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>2,244 EUR, 3,282 USD</td>
<td>2,244 EUR, 3,282 USD</td>
<td>- EUR, - USD</td>
</tr>
</tbody>
</table>
Prof. Elizabeth J. Woods  
(chair)
Executive Director, Innovation and Biosecurity Investments  
Department of Primary Industries and Fisheries Primary Industries, Building 80 Ann St., Brisbane QLD  
GPO Box 46, Brisbane, Q 4001 Australia  
Tel: +61 (0) 7-3239-0511  
Fax: +61 (7) 3239-3074  
E-mail: beth.woods@dpi.qld.gov.au

Dr. Mutsuo Iwamoto  
President  
Society for Techno-Innovation of Agriculture, Forestry, and Fisheries  
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Dr. Jillian Lenné  
Consultant, Agricultural Research for Development, Consultant to the DFID Research into Use Program, Co-Editor-in-Chief, Field Crops Research; Visiting Professor in Agrobiodiversity, University of Greenwich, UK  
North OldMoss Croft, Fyvie, Turriff, Aberdeenshire AB53 8NA, UK  
Tel: +44 (0)165-806153  
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Founder, Rural Outreach Program (ROP), and Editor-in-Chief, African Journal of Food, Agriculture, Nutrition and Development (formerly African Journal of Food and Nutritional Sciences)  
KARI-NARL Complex  
Westlands, Off Waiyaki Way  
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Nairobi, Kenya  
Tel/Fax: +254 (20) 444-4030  
Email: oniango@iconnect.co.ke

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Executive Director, Innovation and Biosecurity Investments  
Department of Primary Industries and Fisheries Primary Industries, Building 80 Ann St., Brisbane QLD  
GPO Box 46, Brisbane, Q 4001 Australia  
Tel: +61 (0) 7-3239-0511  
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Fax: +86 (10) 6500-1869
Email: bwz46111@sohu.com; bgt338@agri.gov.cn
Group training courses conducted in 2007.

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<tr>
<th>Course title</th>
<th>Duration</th>
<th>Participants (no.)</th>
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<tr>
<td><strong>Natural resource/germplasm management/technical</strong></td>
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<tr>
<td>Training Workshop: Ecological Management of Pests (rodents, insects, weeds) - Biological, Economic and Social Dimensions</td>
<td>19 – 30 Mar</td>
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<td>Rice Camp</td>
<td>23 – 28 Apr</td>
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<tr>
<td>Agricultural Research: Design and Management for Bangladesh</td>
<td>30 Apr – 11 May</td>
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<td>Rice: Research to Production</td>
<td>14 May – 1 Jun</td>
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<td>Rice Technology Transfer Systems in Asia</td>
<td>6 – 18 Aug</td>
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<td>Rice Breeding Course: Laying the Foundation for the Second Green Revolution (1st offering)</td>
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<td>Radiation Safety Course</td>
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<td><strong>Biometrics and bioinformatics</strong></td>
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<tr>
<td>Basic Experimental Design and Data Analysis Using CropStat</td>
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<td>Analysis of Experimental Data using the SAS System</td>
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### Scholars and interns on board in 2007, by country and type.

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### Scholars, by country and type, who completed their training in 2007.

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### Summary of financial support to IRRI research agenda

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### Acquifer Limited

### Australian Centre for International Agricultural Research
- Fine-tuning the ”Happy Seeder” technology for adoption in Northwest India (led by Charles Sturt University), (DPPC2007-49), 2007/10/1–2010/9/30
- Developing molecular markers to enable selection against chalk in rice (DPPC2006-86), 2007/5/1–2012/4/30
- ACIAR mission to South and Southeast Sulawesi (DPPC2007-40), 2007/5/1–2007/6/30
- Scoping study to identify research and implementation issues related to management of the brown planthopper/virus problem in rice in Vietnam (DPPC2007-15), 2007/5/1–2008/1/31

### Bayer
- Development of ICIS in collaboration with Bayer-Phase 1 (DPPC2006-45), 2007/1/1–2009/12/31

### Bill & Melinda Gates Foundation
- Stress-tolerant rice for poor farmers in Africa and South Asia (DPPC2007-73), 2007/11/1–2010/10/31
Financial Support and Special-Funded Projects

Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung (German Federal Ministry for Economic Cooperation and Development)
• Transcriptome profiling of hybrid rice (under the small grants program) (DPPC2007-76), 2007/12/1–2009/11/30

Canadian International Development Agency
• Programmatic alignment among IRRI, the Africa Rice Center (WARDA), and CIAT, with a focus on center activities in Africa (DPPC2007-43), 2007/3/21/–2008/3/20

Challenge Program on Water and Food
• Aerobic rice and the pattern of changes in farm households’ rice production in northern China (DPPC2007-99), 2007/6/1–2007/12/31
• Exploring the relevance and feasibility of PES approaches for producing environmental services through changes in agricultural practices: a case study in the Mekong Region (DPPC2006-146), 2007/4/1–2008/3/31

European Commission
• Assessing large-scale environmental risks with tested methods (Alarm TTC) (DPPC2006-78), 2007/2/1–2009/1/31

Food and Agriculture Organization of the United Nations
• What has been the role of crop management technologies in rapid rice yield growth in the Philippines? (DPPC2007-126), 2007/11/16–2008/12/1

Foundation for Advanced Studies in International Development
• FASID-IRRI Water-saving technology project (DPPC2007-54), 2007/5/1–2008/3/10

Gatsby Charitable Foundation

Generation Challenge Programme
• Developing strategies for allele mining within large collections (DPPC2007-103), 2007/8/1–2008/7/31
• Refinement and distribution of iMAS for use by NARS and other user communities (led by ICRI-SAT) (DPPC2007-21), 2007/1/1–2007/12/31
• Validation of drought-response/resistance pathway genes by phenotypic analysis of mutants (led by Virginia Tech) (DPPC2006-114), 2007/8/1–2008/7/31
• Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29), 2007/8/1–2009/7/31

Guangdong Academy of Agricultural Sciences
• Development of disease-resistant, cold-tolerant rice variety in South China through high-throughput genomic tools (DPPC2007-10), 2007/2/5–2009/2/4

Data analysis support for existing projects in SP2 with emphasis on integrating results from microarray and mapping experiments (led by CIMMYT) (DPPC2007-20), 2007/1/1–2009/12/31
• Generation CP subprogram 2 leadership (fourth year funding) (DPPC2007-46), 2007/1/1–2008/12/31
• Generation CP data quality improvement and assurance (DPPC2006-116), 2007/1/1–2007/12/31
• Generation CP software engineering and collaboration platform (DPPC2006-117), 2007/1/1–2007/12/31
• Development of an integrated GCP information platform (DPPC2006-118), 2007/1/1–2007/12/31
• Application and development of web services technology (led by IPGRI) (DPPC2007-17), 2007/1/1–2008/10/31
• Creation and maintenance of templates for Generation CP data storage in repositories (led by CIMMYT) (DPPC2007-18), 2007/1/1–2008/10/31
• High-performance computing facilities for the Generation CP (led by CIP) (DPPC2007-19), 2007/1/1–2008/12/31
• Development of Generation CP domain models ontology (DPPC2006-108), 2007/1/1–2008/12/31
Financial Support and Special-Funded Projects

HarvestPlus

Information and Communications Technology-Knowledge Management Initiative
- Good practices for managing research data (DPPC2007-66) 2007/10/1–2008/9/30

International Food Policy Research Institute
- Supporting strategic investment choices in agricultural technology development (sub-grant under a Gates Foundation-funded project led by IFPRI) (DPPC2007-82), 2007/6/1–2008/3/31
- Scoping the potential futures for rice in Asia: exploring alternative strategies and policies (DPPC2007-51), 2007/4/1–2007/8/31

International Fund for Agricultural Development
- Accelerating agricultural technology adoption to enhance rural livelihoods in disadvantaged districts of India (IRRI as implementing agency) (DPPC2006-79), 2007/5/16–2010/6/30

Japan International Cooperation Agency

Ministry of Agriculture, Forestry, and Fisheries, Japan
- Development of breeding materials for rice blast resistance—for phenotypic evaluation and marker-assisted selection to develop near-isogenic lines for rice blast resistance (under the Japan Capacity Building Program) (DPPC2007-80), 2007/12/11–2008/1/25

Ministry of Foreign Affairs, Japan

National Graduate Institute for Policy Studies/Japan Bank for International Cooperation
- Mozambique survey (collect and analyze household-level data with the aim of understanding the determinants of income with particular focus on rice farming activities) (DPPC2007-92), 2007/8/1–2008/2/15

Plan International

Rural Development Administration, Korea
- Temperate Rice (Japonica) Research Consortium (TRRC) (DPPC2007-13), 2007/2/8–

Standing Panel on Impact Assessment, CGIAR Science Council
- Economic assessment of a change in chemical registration policy due to IRRI research on pesticide use and Philippine farmer health (DPPC2006-145), 2007/1/1–2007/12/31

System-wide Genetic Resources Programme
Financial Support and Special-Funded Projects


United States Agency for International Development

- Revitalizing the rice-wheat cropping systems of the Indo-Gangetic Plains: adaptation and adoption of resource-conserving technologies in India, Bangladesh, and Nepal (component 1 of the Global Development Alliance) (DPPC2007-100), 2007/10/1–2008/9/30
- Modeling the impacts of Bt transgene flow on lepidopteran food web structure and stability on wild rice in Vietnam (led by CLRRI-under PBS BBI) (DPPC2006-70), 2007/1/1–2008/5/13

United States Department of Agriculture


University of Tokyo

- Production survey at Tubuan Village in the Philippines (DPPC2007-72), 2007/6/20–2007/10/19
Honors, Awards, and Appointments for Staff & Board Members

Darshan Brar, senior scientist, PBGB
- Received the 2007 Koshihikari International Rice Prize, Fukui Prefecture, Japan, October.
- Received the CGIAR 2007 Outstanding Scientist Award, Annual General Meeting, December.

Gelia Castillo, consultant
- Named Most Distinguished University of the Philippines Alumna, June.

Eugene C. Castro, Jr., associate scientist, Training Center
- Named 2007 Most Outstanding Agricultural Engineer by the Philippine Society of Agricultural Engineers, April.

Achim Dobermann, program leader, CESD
- Received the Werner L. Nelson Award for Diagnosis of Yield-limiting Factors from the American Society of Agronomy, November.

Ralph Anthony Fischer, BOT member
- Named member of the Order of Australia, June.
- Received the 2007 Farrer Memorial Medal, CSIRO Discovery Centre, Canberra, Australia, August.

Roland Buresh, senior scientist, CESD
- Received the 2007 International Soil Science Award from the Soil Science Society of America for his leadership in formulating and disseminating improved practices of site-specific nutrient management through partnerships with national research and extension organizations and the private sector in Bangladesh, China, India, Indonesia, Myanmar, the Philippines, and Vietnam, November.

Ronald Cantrell and M.S. Swaminathan, former directors general
- Received the Royal Government of Cambodia’s Sahametrei Medal for the revival of rice research and development in the country, January.

Gisella Cruz Garcia, PhD student, Wageningen University
- Received the L’Oréal-UNESCO Women in Science award for 2007; her field of work on the biodiversity of paddy rice ecosystems will be carried out in cooperation with IRRI, February.

K.L. Heong, senior scientist, CESD
- Received the TWAS Prize for Agriculture from the Academy of Science for the Developing World for his pioneering work in ecology and integrating biological and social sciences to promote integrated pest management, Trieste, Italy, November.

Ralph Anthony Fischer, BOT member
- Received a plaque of recognition from the Philippine Rice Research Institute (PhilRice) for his contribution to capacity enhancement in social science research, March.

IRRI
- Awarded a Plaque of Appreciation by the Central Luzon State University as an international organization that contributed significantly to its growth and development, Science City of Muñoz, Nueva Ecija, Philippines, April.
- Received the 6th Iue Asia Pacific Culture Prize during the Asia-Pacific Forum of the Awaji Conference, Kobe, Japan, October.

Gary Jahn, Greater Mekong Subregion coordinator
- Received the International Plant Protection Award of Distinction from the International Association for the Plant Protection Sciences for his major contributions to the promotion of global plant protection, Scotland, October.

Gene Hettel, head, CPS
- Received the 2007 International Award of Excellence from the US-based Association for Communication Excellence in Agriculture, Natural Resources and Life and Human Sciences, June.

Mahabub Hossain, head, SSD
- Received a plaque of recognition from the Philippine Rice Research Institute (PhilRice) for his contribution to capacity enhancement in social science research, March.

Roland Buresh, senior scientist, CESD
- Received the CGIAR COM+ award for communicating science for people and the planet, 2007 CGIAR Annual General Meeting, December.
Ariel Javellana, officer-photography, CPS

- Won three awards in the 2007 Friends of the Earth International (FOEI) Photo Competition, Amsterdam, The Netherlands, August.

Ariel Javellana and Raymond Panaligan, officers-photography, CPS

- Won two silver awards for their photographic skills in the 2007 Critique and Awards competition of the US-based Association for Communication Excellence in Agriculture, Natural Resources and Life and Human Sciences, June.

Gurdev Khush, former plant breeder

- Received the Doctor of Science degree (honoris causa) from the Faculty of Life Sciences, Guru Nanak Dev University, Amritsar, India, March.

Gurdev Khush and Susan McCouch, former IRRI researchers

- Received the Golden Sickle Award for significant accomplishments and contributions in rice research, BioAsia 2007, Bangkok, November.

David Mackill, head, PBGB

- Elected Fellow of the American Society of Agronomy for 2007, New Orleans, Louisiana, USA, November.


- Received the 2007 CGIAR Outstanding Scientific Award for the winning paper, published in *Nature*, Sub1A is an ethylene response factor-like gene that confers submergence tolerance to rice, December.

Ronald L. Phillips, former BOT member

- Shared the 2006-07 Wolf Prize for Agriculture with Michel A.J. Georges for “groundbreaking discoveries in genetics and genomics, laying the foundations for improvements in crop and livestock breeding, and sparking important advances in plant and animal sciences,” January.

Grant Singleton, Abdelbagi Ismail, Darshan Brar, Robert Zeigler, Il-Ryong Choi, and T.P. Tuong

- Awarded medals of recognition from the Cuu Long Delta Rice Research Institute in recognition of their contributions to rice research in Vietnam, September.

M.S. Swaminathan, former director general

- Nominated to the Upper House (Rajva Sabha) of the Indian parliament, April.

Ren Wang, deputy director general for research

- Awarded by the Ministry of Agricultural and Rural Development of Vietnam for overseeing and championing the development of relevant plans and strategies that moved the Vietnam-IRRI relationship into a new era of rice research and technology delivery, among others, May.

- Named honorary professor by the Huazhong Agricultural University, Wuhan, China, June.

- Received a Plaque of Appreciation from PhilRice for helping strengthen the IRRI-PhilRice partnership toward a responsive and dynamic rice R&D agenda, July.

Robert Zeigler, director general

- Received a Doctor of Science degree (honoris causa) from Sardar Vallabh Bhai Patel University of Agriculture and Technology, Modipuram, Uttar Pradesh, India, for outstanding contribution to rice research and help in improving the livelihood of millions of rice farmers across the globe, February.

- Named Fellow of the American Association for the Advancement of Science for distinguished contributions in plant pathology, plant breeding, and microbial biology covering a range of food crops and microorganisms, and for leadership in international agriculture, October.
National agricultural research and extension systems

Bangladesh

Agricultural Advisory Society
Bangladesh Agricultural Research Council
Bangladesh Agricultural Research Institute
Bangladesh Agricultural University
Bangladesh Fisheries Research Institute
Bangladesh Institute of Nuclear Agriculture
Bangladesh Rice Research Institute
Bangladesh Water Development Board
Department of Agricultural Extension
Department of Agriculture - Kamal
Health Education and Economic Development
Local Government Engineering Department
Rural Development Academy
University of Dhaka

Benin

National Institute of Agricultural Research of Benin

Brazil

Empresa Brasileira de Pesquisa Agropecuária

Burundi

University of Burundi

Cambodia

Battambang Provincial Department of Agriculture
Cambodia Agricultural Research and Development Institute
Department of Agricultural Extension
Ministry of Agriculture, Forestry and Fisheries
Prek Leap National School of Agriculture
Prey Veng Provincial Department of Agriculture
Royal University of Agriculture - Cambodia

China

China Agricultural University
China National Rice Research Institute
Chinese Academy of Agricultural Sciences
Chinese Academy of Sciences
Fudan University
Guangdong Academy of Agricultural Sciences
Guangxi Academy of Agricultural Sciences
Huazhong Agricultural University
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<th>Country</th>
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<td>Egypt</td>
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<td>CCS Haryana Agricultural University, Rice Research Station, Kaul (Kaithal), India</td>
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<td>Lao PDR</td>
<td>Ministry of Agriculture and Forestry</td>
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IRRI’s Research Partners

Malaysia
- Malaysian Agricultural Research and Development Institute

Mali
- Institut d’Economie Rurale

Mozambique
- National Institute of Agricultural Research

Myanmar
- Department of Agricultural Research
- Myanmar Agriculture Service
- Taryaw Research Farm

Nepal
- Department of Agriculture
- Nepal Agricultural Research Council
- Regional Agriculture Station (RAS), Bhairahwa
- Tribhuvan University

Pakistan
- On-Farm Water Management
- Pakistan Agricultural Research Council

Philippines
- Agricultural Productivity Center for Bohol for the Visayas
- Agricultural Training Institute (ATI)-VII Central Visayas
- Bohol Agricultural Promotion Center
- Bulacan Agricultural State College
- Bureau of Agricultural Research
- Central Luzon State University
- Department of Environment and Natural Resources
- National Food Authority
- National Irrigation Administration
- National Post Harvest Institute for Research and Extension
- Philippine Rice Post-Production Consortium
- Philippine Rice Research Institute
- University of Southern Mindanao
- University of the Philippines System
- Visayas State University
- Western Mindanao State University
- Western Visayas State University

Russia
- Kuban State Agricultural University

Rwanda
- Institut des sciences agronomiques du Rwanda

Senegal
- Institut Sénégalais de recherches agricoles

South Africa
- African Centre for Gene Technologies

Sri Lanka
- Center for Agricultural Research and Programming
- Department of Agriculture
- University of Peradeniya

Thailand
- Chiang Mai University
- Kasetsart University
- Khon Kaen Plant Material and Technical Service Center
- Khon Kaen University
- Ministry of Agriculture and Cooperatives
- National Center for Genetic Engineering and Biotechnology

Vietnam
- Agricultural Science Institute for Southern Coastal Central of Vietnam
- An Giang University
- Bac Lieu People’s Committee
- Can Tho University
- Department of Agriculture and Rural Development- Bac Lieu Province Vietnam
- Food Crops Research Institute (Gia Loc)
- Hanoi Agricultural University
- Hue University of Agriculture and Forestry
- Integrated Resource Mapping Center
- Ministry of Agriculture and Rural Development
- Ministry of Higher Education
- National Agricultural Extension Center-Vietnam
- National Institute of Plant Protection
- National Institute of Soils and Fertilizers
- Nong Lam University
- Plant Protection Department
IRRI’s Research Partners

Research Institute for Aquaculture No. 2
Southern Plant Protection Center
Sub-Institute of Water Resource Planning
Thai Nguyen University
Vietnam Agricultural Science Institute
Vietnam Institute Agricultural Engineering and Post-Harvest
Vietnamese Academy of Agricultural Science

Advanced research institutes

Australia
Charles Sturt University
Commonwealth Scientific and Industrial Research Organisation
Curtin University of Technology
New South Wales Department of Primary Industries-Agriculture
Rural Industries Research and Development Corporation
The University of Queensland
University of Sydney

Belgium
Universite Catholique de Louvain-Unite de Physiologie Vegetale

Canada
Agriculture and Agri-Food Canada
McGill University
University of Alberta

France
Agropolis International
Centre de coopération internationale en recherche agronomique pour le développement
Institut de recherche pour le développement
Institut national de la recherche agronomique
Unite de recherche en genomique vegetale

Germany
Center for Environmental Research
Christian Albrecht University-Kiel
Forschungszentrum Karlsruhe GMBH
Martin Luther University Halle-Wittenberg
Max Planck Institute
MIPS Bioinformatics Center
Technische Universitat Darmstadt
Universitaet Bayreuth
University of Freiburg
University of Hamburg
University of Hohenheim
University of Leipzig

Japan
Chiba University
Foundation for Advanced Studies in International Development
Japan International Cooperation Agency
Japan International Research Center for Agricultural Sciences

Korea
International Crop Science Congress Organizing Committee
Pohang University of Science and Technology
Rural Development Administration

Netherlands
Plant Research International
Wageningen University and Research Centre

Singapore
National University of Singapore

Switzerland
Swiss Federal Institute of Technology

United Kingdom
European Bioinformatics Institute
John Innes Centre
Natural Resources Institute
Scottish Crop Research Institute
University of Cambridge
University of London

Ministry of Agriculture, Forestry and Fisheries
Nagoya University
National Agricultural Research Center
National Institute of Agrobiological Sciences
National Institute of Crop Sciences
Tsukuba University
United States of America
Clemson University
Colorado State University
Cornell University
Fred Hutchinson Cancer Research Center
Institute for Genomic Research
International Benchmark Sites Network for Agrotechnology Transfer Project
Kansas State University
National Center for Genome Resources
North Carolina State University
Ohio State University
Pennsylvania State University
Purdue University
United States Department of Agriculture:
  Agricultural Research Service
  National Agricultural Library
University of Arizona
University of Arkansas
University of California-Berkeley
University of California-Davis
University of California-Riverside
University of Florida
University of Hawaii
University of Illinois
University of Maine
University of Minnesota
University of Washington
Virginia Polytechnic Institute and State University
Western Michigan University
Yale University
Venezuela
Instituto Nacional de Investigaciones Agropecuarias
International centers/organizations
Association for Strengthening Agricultural Research in Eastern and Central Africa
Bioversity International
Caribbean Agricultural Research and Development Institute
Centro Internacional de Agricultura Tropical
Centro Internacional de Mejoramiento de Maíz y Trigo
Food and Agriculture Organization of the United Nations
International Atomic Energy Agency
International Center for Agricultural Research in the Dry Areas
International Center for Biosaline Agriculture
International Center for Research in the Semi-arid Tropics
International Center of Insect Physiology and Ecology
International Food Policy Research Institute
International Institute for Rural Reconstruction
International Institute of Tropical Agriculture
International Livestock Research Institute
International Network for the Improvement of Banana and Plantain
International Plant Nutrition Institute
International Potato Center
International Water Management Institute
SEAMEO Regional Center for Graduate Study and Research in Agriculture
The Africa Rice Center
United Nations Environment Programme
World Agroforestry Center
WordFish Center

Nongovernment organizations
Bangladesh
  Bangladesh Rural Advancement Committee
  WAVE Foundation
Cambodia
  Srer Khmer
India
  Barwale Foundation
  MS Swaminathan Research Foundation
  Nadia Zilla Farmers’ Development Organization
  SAMRUDHI Micro Fin Society
IRRI’s Research Partners

Japan
- Sasakawa African Association
- Overseas Agricultural Development Association

Myanmar
- Myanmar Rice and Paddy Traders Association

Philippines
- Diliman Computer Science Foundation, Inc.
- Infanta Integrated Community Development Assistance, Inc.

Thailand
- Chamnien Saranaga Foundation
- Thai Rice Foundation

United States of America
- Ohio State University Research Foundation
- Public Intellectual Property Resource for Agriculture
- The Samuel Roberts Noble Foundation, Inc.

Vietnam
- World Vision Vietnam

Private organizations

Bangladesh
- Socioconsult Ltd.

Cambodia
- Crenn and Associates
- Small and Medium Enterprises Cambodia

Denmark
- FOSS

Japan
- Domer, Inc.

United Kingdom
- Aquifer Limited

United States of America
- Li-Cor Inc.
- Nabisco Research and Development
- Perlegen Sciences, Inc.

Vietnam
- Voice of Ho Chi Minh Radio Broadcasting
Memoranda of Agreement with Partner Institutions

Australia

- Australian Centre for International Agricultural Research (ACIAR). Variation No. 1 relating to ACIAR Project No. CIM/2002/106 Fertilization-independent formation of embryo, endosperm, and pericarp for apomictic hybrid rice (DPPC2001-07). 10 Jan 2007
- Australian Centre for International Agricultural Research (ACIAR). Deed of Agreement between ACIAR and IRRI for the project Fine-tuning the “Happy Seeder” technology for adoption in Northwest India (DPPC2007-49). 3 Oct 2007
- Yanco Agricultural Institute (YAI) of the NSW Department of Primary Industries. Letter of Agreement between YAI and IRRI for the collaborative ACIAR-funded project Developing molecular markers to enable selection against chalk in rice (DPPC2006-86). 21 Nov 2007
### Memoranda of Agreement with Partner Institutions

#### Austria

#### Bangladesh
- **Bangladesh Agricultural Research Institute (BARI).** Letter of Agreement between BARI and IRRI for the ADB-funded project *Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia* (DPPC2004-02). 13 Apr 2007
- **Bangladesh Rice Research Institute (BRRI).** Letter of Agreement between BRRI and IRRI for the 2nd phase of the BMZ-funded project *From genes to farmers’ fields: enhancing and stabilizing productivity of rice in submergence-prone environments* (DPPC2002-45). 28 Mar 2007
- **Bangladesh Rice Research Institute (BRRI).** Letter of Agreement between BRRI and IRRI for the collaborative project *Development of rice with elevated iron and zinc in the polished grain: Phase 1 – understand and exploit GxE interactions for high iron-zinc in the polished grain* (DPPC2003-70). 16 Mar 2007
- **Bangladesh Rice Research Institute (BRRI).** Letter of Agreement between BRRI and IRRI for the ADB-funded project *Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia* (DPPC2004-02). 13 Apr 2007
- **Bangladesh Rice Research Institute (BRRI).** Letter of Agreement between BRRI and IRRI for the collaborative project *Development of rice with elevated iron and zinc in the polished grain: Phase 1 – understand and exploit GxE interactions for high iron-zinc in the polished grain* (DPPC2003-70). 17 Dec 2007
- **Government of Bangladesh.** Instrument of Ratification on the Agreement recognizing the international legal personality of IRRI. 10 Sep 2007
- **Intercooperation Bangladesh (IC).** Agreement between IC and IRRI concerning the initiative *Making research work for the poor* (DPPC2007-111) under DFID’s Research into Use Program. 27 Sep 2007

#### Belgium
- **European Commission (EC).** Amendment to the Consortium Agreement for Integrated FP6 Project “ALARM” *Assessing large-scale environmental risks with tested methods* (DPPC2006-78). 17 Apr 2007
- **European Commission (EC).** Addendum No. 1 to Contribution Agreement No. FOOC/2004/082-929 for the project *Coordinating NGO interventions for improving small and marginal farmer household livelihood and food security in Bangladesh* (Food Security for Sustainable Household Livelihood-FoSHoL) (DPPC2003-71). 2 Mar 2007

#### Canada
- **University of Alberta (UA).** Letter of Agreement between UA and IRRI for the GCP-funded project *Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding* (DPPC2006-29). 16 Oct 2007

#### Cambodia
- **Battambang Provincial Department of Agriculture (BBPDA).** Letter of Agreement between BBPDA and IRRI for the ADB-funded project *Improving poor farmers’ livelihood through postharvest technology* (DPPC2002-37). 4 Jul 2007
- **Cambodian Agricultural Research and Development Institute (CARDI).** Letter of Agreement between CARDI and IRRI for the MOFA-Japan-funded project *Implementation plans to disseminate submergence-tolerant varieties and associated new production practices to Southeast Asia* (DPPC2007-22). 14 Aug 2007
• Department of Agricultural Extension (DAE), Ministry of Agriculture, Forestry and Fisheries (MAFF). Letter of Agreement between DAE and IRRI for the purpose of conducting the training course on Agricultural Extension Methodologies and Practices and the training course on Support Services to Farmers’ Groups and Group Establishment for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 29 May 2007

• Department of Agricultural Extension (DAE), Ministry of Agriculture, Forestry and Fisheries (MAFF). Letter of Agreement between DAE and IRRI for the purpose of conducting the training course on Village Rice Mill Improvement and the training course on Safe Rice Storage for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 27 Jun 2007

• Department of Agricultural Extension (DAE), Ministry of Agriculture, Forestry and Fisheries (MAFF). Letter of Agreement between DAE and IRRI for the purpose of conducting the training course on Flat Bed Dryer Operation and Maintenance and a field day on Combine Harvester Demonstration and Farmers’ Feedback for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 2 Jul 2007

• Department of Agricultural Extension (DAE), Ministry of Agriculture, Forestry and Fisheries (MAFF). Letter of Agreement between DAE and IRRI for the purpose of administering the training of farmers provided by key/outstanding farmers for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 12 Nov 2007


• Prey Veng Provincial Department of Agriculture (PVPDA). Letter of Agreement between PVPDA and IRRI for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 4 Jul 2007

China

• Chinese Academy of Agricultural Sciences (CAAS). Letter of Agreement between CAAS and IRRI for the GCP-funded project Identifying genes responsible for failure of grain formation in rice and wheat under drought (DPPC2004-25). 26 Jan 2007


• Guangdong Academy of Agricultural Sciences (GDAAS). Letter of Agreement between GDAAS and IRRI for the project Development of disease-resistant, cold-tolerant rice variety in South China through high-throughput genomic tools (DPPC2007-10). 2 Feb 2007


• The China Scholarship Council (CSC). Memorandum of Understanding between CSC and IRRI for collaboration in agricultural research and training. 17 Jun 2007–16 Jun 2010

• The National Natural Science Foundation of China (NSFC). Letter of Agreement extending the Memorandum of Agreement between NSFC and IRRI for scientific and technical collaboration in research and training on rice and rice-based farming system. 14 May 2007–13 May 2013

• Wuhan University. Letter of Agreement between Wuhan University and IRRI for the FASID-IRRI Water-saving technology project (a survey to be done in China [pretest] (DPPC2007-54). 28 Jun 2007

• Yunnan Academy of Agricultural Sciences (YAAS). Letter of Agreement between YAAS and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007


Memoranda of Agreement with Partner Institutions

**Colombia**
- Centro Internacional de Agricultura Tropical (CIAT). Memorandum of Agreement between CIAT and IRRI for the project *Exploring the relevance and feasibility of PES approaches for producing environmental services through changes in agricultural practices: a case study in the Mekong Region* (DPPC2006-146). 1 Apr 2007 – 31 Mar 2008
- Centro Internacional de Agricultura Tropical (CIAT). Letter of Agreement (C063-07) between CIAT (on behalf of the Challenge Program on Water and Food Impact Assessment Project) and IRRI for the implementation of the project *Aerobic rice and the pattern of changes in farm households’ rice production in northern China* (DPPC2007-99). 8 Aug 2007
- Centro Internacional de Agricultura Tropical (CIAT). Amendment No. 2 to the Agreement C-033-05 between CIAT and IRRI for the project *Development of adapted germplasm for India with high levels of provitamin carotenoids* (DPPC2005-23). 12 Dec 2007
- Centro Internacional de Agricultura Tropical (CIAT) and International Food Policy Research Institute (IFPRI) on behalf of the HarvestPlus Challenge Program. Amendment No. 5 to HarvestPlus Agreement No. 7007 increasing the contract value and extending the project end date to 31 October 2007 of the project *Assessing the potential of biofortification to address micronutrient malnutrition in rice-based cropping systems of South and Southeast Asia* (DPPC2004-16). 6 Feb 2007
- Centro Internacional de Agricultura Tropical (CIAT) and International Food Policy Research Institute (IFPRI) on behalf of the HarvestPlus Challenge Program. Amendment No. 5 to HarvestPlus Agreement No. 5007 relative to the increase in contract value and extension of project end date of the project *Micronutrient-dense rice to reduce malnutrition* (DPPC2003-70). 27 Apr 2007
- Centro Internacional de Agricultura Tropical (CIAT) and International Food Policy Research Institute (IFPRI) on behalf of the HarvestPlus Challenge Program. Amendment No. 6 to HarvestPlus Agreement No. 7007 extending the project end date to 31 March 2008 of the project *Assessing the potential of biofortification to address micronutrient malnutrition in rice-based cropping systems of South and Southeast Asia* (DPPC2004-16). 17 Dec 2007

**Germany**
- Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. Grant Agreement (Contract No. 81099952) between GTZ and IRRI for the project *Enhancing and stabilizing the productivity of salt-affected areas by incorporating genes for tolerance of abiotic stresses in rice* (DPPC2007-09). 19 Dec 2007
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**Memoranda of Agreement with Partner Institutions**

**Hongkong**
- Brakeley Ltd. Agreement between Brakeley Ltd. and IRRI regarding the establishment of infrastructure and preparatory tasks for IRRI’s fundraising campaign. 30 May 2007–31 Dec 2007

**India**
- Banaras Hindu University (BHU). Letter of Agreement between BHU and IRRI for the ADB-funded project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia (DPPC2004-02). 13 Apr 2007
- Barwale Foundation (BF). Letter of Agreement between BF and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- Birsa Agricultural University (BAU). Letter of Agreement between BAU and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- Central Rainfed Upland Rice Research Station (CRURRS). Letter of Agreement between CRURRS and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- Central Rice Research Institute (CRII). Letter of Agreement between CRRI and IRRI relative to the “Coordinating unit for the IRRI-India drought network project” (DPPC2004-32). 12 Apr 2007
- Central Rice Research Institute (CRII). Letter of Agreement between CRRI and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- Haryana Agricultural University (HAU). Letter of Agreement between HAU and IRRI for the ADB-funded project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia (DPPC2004-02). 13 Apr 2007
- International Center for Research in the Semi-arid Tropics (ICRISAT). Letter of Agreement between ICRISAT and IRRI to implement the subproject Increasing crop productivity through soil-test-based sustainable nutrient management in eight target rainfed districts under the IFAD Facility Grant (DPPC2006-79). 21 Nov 2007
- Indira Gandhi Agricultural University (IGAU). Letter of Agreement between IGAU and IRRI for the implementation of the research project activities of Working Group 1 under the Consortium for Unfavorable Environments (CURE). 1 Jun 2007–28 Feb 2008
- Indira Gandhi Krishi Viswavidyalaya (IGKV). Letter of Agreement between IGKV and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
Memoranda of Agreement with Partner Institutions

- Jawahar Lal Nehru Krishi Vishwa Vidyalaya (JNKVV). Letter of Agreement between JNKVV and IRRI for the purpose of implementing the research activities of the 2007 Program of the Upland Rice Shuttle Breeding Network (URSBN) under the project Developing and disseminating resilient and productive rice varieties for drought-prone environments in India (DPPC2004-32). 2 Jul 2007
- Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV). Letter of Agreement between JNKVV and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- Narendra Deva University of Agriculture and Technology (NDUAT). Letter of Agreement between NDUAT and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
- SAMRUDHI. Letter of Agreement between SAMRUDHI and IRRI on the provision of additional fund for a study on Adoption and diffusion of rice varieties in Orissa (DPPC2004-16). 12 Nov 2007
- Tamil Nadu Agricultural University (TNAU). Letter of Agreement between TNAU and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007
Tata Energy Research Institute (TERI). Memorandum of Understanding between TERI and IRRI to collaborate in certain fields, such as climate change, biofuels, nutritional improvement in food grains, and soil health. 28 Sep 2007–27 Sep 2012

University of Agricultural Sciences (UAS). Letter of Agreement between UAS and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 16 Oct 2007


Indonesia


Indonesian Center for Agricultural Land Resources Research and Development (ICALRD). Letter of Agreement between ICALRD and IRRI on Using leaf color charts (LCC) for the dissemination of site-specific nutrient management (SSNM) in Indonesia (DPPC2004-30). 22 Aug 2007


Indonesian Center for Food Crops Research and Development (ICFORD). Letter of Agreement between ICFORD and IRRI for the purpose of implementing the research activities of the project Facilitating the dissemination of site-specific nutrient management (SSNM) in Indonesia within the framework of ICM and through the national fertilizer work group (DPPC2004-30). 13 Aug 2007


Ireland


Italy


Bioversity International. Letter of Agreement between Bioversity International and IRRI for the part-time assignment of Mr. Eric Clutario on the design and development of the CGMap project under the ICT-KM Program. 1 Jun 2007–31 Dec 2007

Bioversity International. Letter of Agreement between Bioversity International (on behalf of the System-wide Genetic Resources Programme [SGRP] of the CGIAR) and IRRI for the project System-wide improvement of location data quality, which is part of the World Bank-funded project Collective action for the rehabilitation of global public goods in the CGIAR genetic resources system: Phase 2 (DPPC2007-79). 12 Jun 2007

Bioversity International. Letter of Agreement between Bioversity International (on behalf of
the System-wide Genetic Resources Programme [SGRP] of the CGIAR) and IRRI for the project Reducing and managing the loss of genetic integrity of conserved germplasm, which is part of the World Bank-funded project Collective action for the rehabilitation of global public goods in the CGIAR genetic resources system: Phase 2 (DPPC2007-93). 28 Jun 2007

• Bioversity International. Letter of Agreement between Bioversity International (on behalf of the System-wide Genetic Resources Programme [SGRP] of the CGIAR) and IRRI for the project Development and implementation of risk-management procedures for individual genebanks and for collections in common, which is part of the World Bank-funded project Collective action for the rehabilitation of global public goods in the CGIAR genetic resources system: Phase 2 (DPPC2007-127). 31 Oct 2007

• Global Crop Diversity Trust (GCDT). Amendment to the Memorandum of Agreement between GCDT and IRRI for the project Long-term funding of the ex-situ collection of rice germplasm held by the International Rice Research Institute (DPPC2006-115). 26 Nov 2007

• Food and Agriculture Organization of the United Nations (FAO). Letter of Agreement between FAO and IRRI to support the organization and implementation of the 2007 Rice Breeding Course: laying the foundation for the second Green Revolution (DPPC2007-70). 31 Aug 2007

• Food and Agriculture Organization of the United Nations (FAO). Letter of Agreement between FAO and IRRI in support of research under the project What has been the role of crop management technologies in rapid rice yield growth in the Philippines? (DPPC2007-126). 16 Nov 2007

• International Fund for Agricultural Development (IFAD). Grant Agreement (No. 881-IRRI) between IFAD and IRRI for the project Accelerating agricultural technology adoption to enhance rural livelihoods in disadvantaged districts of India (DPPC2006-79). 20 Apr 2007


Japan

• Domer Inc. Memorandum of Understanding between Domer Inc. and IRRI for scientific collaboration. 1 Sep 2007–31 Aug 2010

• Faculty of Economics, University of Tokyo (UT). Letter of Agreement between the Faculty of Economics, UT and IRRI for the joint research Production survey, at Tubuan Village in the Philippines (DPPC2007-72). 20 Jun 2007

• Foundation for Advanced Studies on International Development (FASID). Terms of Agreement for joint research between FASID and IRRI for the Water-saving technology project (survey to be done in China [pretest]) (DPPC2007-54). 1 May 2007

• Graduate School of Horticulture, Chiba University (GSHCU). Memorandum of Understanding between GSHCU and IRRI to promote cooperation both in academic research and enhancing educational opportunities for researchers and students. 07 Jun 2007–6 Jun 2012

• International Cooperation Center for Agricultural Education (ICCAE), Nagoya University. Agreement between ICCAE and IRRI for the project Development of breeding materials for rice blast resistance–phenotypic evaluation and marker-assisted selection to develop near-isogenic lines for rice blast resistance (under the Japan Capacity Building Program) (DPPC2007-80). 8 Nov 2007

• Japan Bank for International Cooperation (JBIC). Consulting Service Agreement between JBIC and IRRI for the project Mozambique survey (collect and analyze household-level data with the aim of understanding the determinants of income with particular focus on rice farming activities) (DPPC2007-92). 7 Sep 2007


• National Graduate Institute for Policy Studies (GRIPS). Research Agreement (Contract No. H19-GRIPS-21COE-3) between GRIPS and IRRI for the project Mozambique survey (collect and analyze household-level data with the aim of understanding the determinants of income with particular focus on rice farming activities) (DPPC2007-92). 24 Jul 2007

• National Institute of Agrobiological Sciences (NIAS). Letter of Agreement between NIAS and IRRI for the GCP-funded project Identifying genes...

- Sasakawa Africa Association (SAA). Memorandum of Understanding between SAA and IRRI to exploit opportunities for research, development activities, and technology transfer to increase productivity and profitability of the rice sector in ways that ensure sustainability of the farming environment. 28 Jun 2007

Korea


Lao PDR


Malaysia


Mexico


- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Award letter between CIMMYT (on behalf of the Generation Challenge Program) and IRRI for the 2007 GCP-commissioned research project Application and development of web services technology (DPPC2007-17). 16 Feb 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Award letter between CIMMYT (on behalf of the Generation Challenge Program) and IRRI for the 2007 GCP-commissioned research project High-performance computing facilities for the Generation CP (DPPC2007-19). 16 Feb 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Award letter between CIMMYT (on behalf of the Generation Challenge Program) and IRRI for the 2007 GCP-commissioned research project Development of Generation CP domain information platform (DPPC2007-21). 16 Feb 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Award letter between CIMMYT (on behalf of the Generation Challenge Program) and IRRI for the 2007 GCP-commissioned research project Generation CP data quality improvement and assurance (DPPC2005-89). 19 Feb 2007


- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Letter of Agreement between CIMMYT and IRRI for the ADB-funded project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia (DPPC2004-02). 13 Apr 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Letter of Agreement between CIMMYT and IRRI for the ADB-funded project Detecting long- and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 30 Aug 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Amendment to the Letter of Agreement between CIMMYT (on behalf of the Generation Challenge Program) and IRRI to fund the 2007 GCP-commissioned research project Developing strategies for allele mining within large collections (DPPC2007-103). 12 Sep 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Amendment to the Letter of Agreement between CIMMYT (on behalf of the Generation Challenge Program) and IRRI to fund the 2007 GCP-commissioned research project Validation of drought-response/resistance pathway genes by phenotypic analysis of mutants (DPPC2006-114). 12 Sep 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Amendment to the Letter of Agreement between CIMMYT (on behalf of the Generation Challenge Program) and IRRI to fund the 2007 GCP-commissioned research project Generation CP data quality improvement and assurance (DPPC2006-116). 12 Sep 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Letter of Agreement between CIMMYT and IRRI for the ADB-funded supplementary project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia—socioeconomic and environmental impact assessment (DPPC2004-02). 25 Sep 2007

- Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). Amendment 1 to the award
letter between CIMMYT and IRRI for the GCP-funded project Detecting and fine-mapping QTLs with major effects on rice yield under drought stress for deployment via marker-aided breeding (DPPC2006-29). 6 Dec 2007

Myanmar


Nepal

- Nepal Agricultural Research Council (NARC). Letter of Agreement between NARC and IRRI for the ADB-funded project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia (DPPC2004-02). 13 Apr 2007

Netherlands


Norway

- Royal Norwegian Ministry of Agriculture and Food. Standard Agreement between the Royal Norwegian Ministry of Agriculture and Food and IRRI to provide a safety deposit of IRRI’s samples of plant genetic resources at the Svalbard Global Seed Vault. 4 Oct 2007–3 Oct 2017

Pakistan

- Pakistan Agriculture Research Council (PARC). Letter of Agreement between PARC and IRRI for the ADB-funded project Enhancing farmers’ income and livelihoods through integrated crop and resource management in the rice-wheat system in South Asia (DPPC2004-02). 13 Apr 2007

Philippines

- Philippine Rice Research Institute (PhilRice). Letter of Agreement between PhilRice and IRRI for the collaborative project Development of rice with elevated iron and zinc in the polished grain: Phase 1–understand and exploit G×E interactions for high iron-zinc in the polished grain (DPPC2003-70). 26 Jan 2007
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- University of the Philippines Los Baños Foundation, Inc. (UPLBFI). Letter of Agreement between UPLBFI and IRRI for the project Environmental scanning and stakeholder perception study towards the development of a strategic communication plan for Golden Rice (DPPC2007-121). 17 Dec 2007
- West Visayas State University (WVSU). Letter of Agreement between WVSU and IRRI for the implementation of research on Site-specific nutrient management (SSNM) and improved crop management for rice in Iloilo Province under the IFA/IPI/PPI-funded project for the Productivity and Sustainability Workgroup of the Irrigated Rice Research Consortium Phase III (DPPC2005-02). 2 Jan 2007
- University of the Philippines Los Baños Foundation, Inc. (UPLBFI). Letter of Agreement between UPLBFI and IRRI for the project Rice genetics V proceedings. 16 Mar 2007
- World Scientific Publishing (WSPC). Publishing Agreement between WSPC and IRRI relative to the publication of “Rice genetics V proceedings.” 11 April 2007

Sri Lanka

Singapore
- International Plant Nutrition Institute (IPNI) and the International Potash Institute (IPI). Memorandum of Agreement among IPNI, IPI, and IRRI regarding the marketing of the second edition of “Rice: a practical guide to nutrient management.” 11 April 2007
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<td>Switzerland</td>
<td>Swiss Agency for Development and Cooperation (SDC). Amendment to the Agreement between SDC and IRRI for a 3-month no-cost extension of the Lao PDR-IRRI rice research and training project (DPPC2006-100)</td>
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</tr>
<tr>
<td>Syria</td>
<td>International Center for Agricultural Research in the Dry Areas, Program Facilitation Unit (ICARDA-PFU). Letter of Agreement between ICARDA-PFU and IRRI for the project Regional rice network in Central Asia and the Caucasus (DPPC2007-91)</td>
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<td>Thailand</td>
<td>Bureau of Rice Research and Development (BRRD). Letter of Agreement between BRRD and IRRI for the MOFA-Japan-funded project Implementation plans to disseminate submergence-tolerant varieties and associated new production practices to Southeast Asia (DPPC2007-22)</td>
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<tr>
<td></td>
<td>Ministry of Agriculture and Cooperatives (MOAC). Memorandum of Understanding between MOAC and IRRI to facilitate and harmonize the collaboration in all areas of rice-related research and development.</td>
<td>27 Jun 2007 – 26 Jun 2012</td>
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<tr>
<td>Thailand</td>
<td>Thai Rice Foundation under Royal Patronage (TRF). Memorandum of Agreement between TRF and IRRI on sustainability of rice farming in Asia.</td>
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<td>USB</td>
<td>Ubon Ratchathani Rice Research Center (URRC). Letter of Agreement between URRC and IRRI relative to the implementation of additional activity within the Consortium for Unfavorable Rice Environment (CURE) entitled Survey of farmer’s nutrient management decision principles in northeast Thailand.</td>
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</tr>
<tr>
<td>United Kingdom</td>
<td>AQUIFER Limited (AQUIFER). Memorandum of Understanding between AQUIFER and IRRI for scientific and technical collaboration in rice research development and training in Mozambique.</td>
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<tr>
<td>USA</td>
<td>University of Cambridge. Letter of Agreement between the University of Cambridge and IRRI relative to IRRI’s support to help sponsor a C4 session during the meeting “C4 and CAM: from molecular diversity to ecological convergence” organized by the Department of Plant Sciences, University of Cambridge.</td>
<td>18 May 2007</td>
</tr>
<tr>
<td>USA</td>
<td>Colorado State University (CSU). Letter of Agreement between CSU and IRRI for the USAID-funded project Understanding genome variation to achieve broad-spectrum disease resistance in rice (DPPC2006-140).</td>
<td>30 Jan 2007</td>
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<td>USA</td>
<td>Cornell University (CU). Amendment No. 2 to Agreement No. 47009-7831 between CU and IRRI to increase the estimated cost, change the funding obligation schedule, and the financial and technical reporting dates for the GCP Competitive Scheme project Targeted discovery of superior disease QTL alleles in the maize and rice genomes (DPPC2004-88).</td>
<td>8 Feb 2007</td>
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<td>USA</td>
<td>Cornell University (CU). Amendment No. 3 to Agreement No. 47009-7831 between CU and IRRI.</td>
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to extend the period of performance to December 31, 2008 for the GCP Competitive Scheme project "Targeted discovery of superior disease QTL alleles in the maize and rice genomes" (DPPC2004-88). 1 Oct 2007


- United States Department of Agriculture (USDA). Amendment No. 1 to Nonfunded Cooperative Agreement No. 58-5402-4-086FN between the Agricultural Research Service (ARS), USDA and IRRI re: "IRRI rice germplasm storage and conservation." 29 Jan 2007

- United States Department of Agriculture (USDA). Amendment to Specific Cooperative Agreement between USDA and IRRI for the project "Enabling open access to IRRI-assisted theses and dissertations" (DPPC2006-72). 18 Jul 2007

- United States Department of Agriculture (USDA). Specific Cooperative Agreement No. 58-5348-7-134F between USDA and IRRI for the project "NPGS georeference project" (DPPC2007-94). 28 Sep 2007

**Vietnam**


- Southern Institute for Water Resources Planning (SIWRP). Letter of Agreement between SIWRP and IRRI for the project "Assessing the impacts of sea level rise on water and salinity levels in the Mekong River Delta, Vietnam during the dry season as a basis to identify possible threats for rice production" (DPPC2007-14). 14 Feb 2007

- Southern Plant Protection Center (SPPC). Letter of Agreement between SPPC and IRRI for the ACIAR-funded project "Scoping study to identify research and implementation issues related to managing..."
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- Vietnam Institute of Agricultural Engineering and Postharvest (VIAEP). Letter of Agreement between VIAEP and IRRI for the purpose of storage verification, farmer information material development, economic analysis training, and market awareness training for the ADB-funded project Improving poor farmers’ livelihood through postharvest technology (DPPC2002-37). 12 Nov 2007

Personnel (as of 31 December 2007)

Administrative staff
Robert S. Zeigler, PhD, director general
William G. Padolina, PhD, deputy director general for operations and support services
Ren Wang, PhD, deputy director general for research
To Phuc Tuong, PhD, acting deputy director general for research
Kwame O. Akuffo-Akoto, CCA, treasurer and director for management services
Norman A. Macdonald, CCA, director for management services

Michael T. Jackson, PhD, director for program planning and communications
Hector V. Hernandez, LLB, head, human resources
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Martin Kropff, PhD, consultant

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Achim Dobermann, PhD, consultant
Adonna M. Robles, MS, executive assistant I
Lucia V. Gamel, BS, executive secretary

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Roland J. Buresh, PhD, senior scientist, soil science
Yolanda H. Chen, PhD, scientist, entomology
Achim Dobermann, PhD, leader, Sustainability of Intensive Rice-based Systems Program and the IRRI-CIMMYT Alliance Project on Intensive Production Systems in Asia
Stephan M. Haefele, PhD, senior scientist, soil science/agronomy
Kong Luen Heong, PhD, senior scientist, entomology/IPM specialist
Yasukazu Hosen, PhD, scientist, soil science
Abdelbagi M. Ismail, PhD, senior scientist, plant physiology
David E. Johnson, PhD, senior scientist, weed science
Jagdish K. Ladha, PhD, senior scientist, soil science; coordinator, Rice-Wheat Consortium; and IRRI representative for India
Tanguy Lafarge, PhD, senior scientist, crop physiology
Personnel (as of 31 December 2007)

Crop and Environmental Sciences (continued)
Shaobing Peng, PhD, senior scientist, crop physiology
Benjamin K. Samson, PhD, scientist, agronomy
Rachid Serraj, PhD, senior scientist, crop physiology
John E. Sheehy, PhD, senior scientist, crop ecology/crop modeling and head, Applied Photosynthesis and Systems Modeling Laboratory
Grant Singleton, PhD, coordinator, Irrigated Rice Research Consortium
Reiner Wassmann, PhD, coordinator, Rice and Climate Change Consortium
Jill E. Cairns, PhD, international research fellow
Elizabeth Humphreys, PhD, international research fellow/leader for Theme 1 of the CPWF
Sarah Johnson Beebout, PhD, international research fellow, soil science
Christine Kreye, PhD, international research fellow, agronomy
Bhagirath Chauhan, PhD, postdoctoral fellow
Dilantha Gunawardana, PhD, postdoctoral fellow
Georgina Vergara, PhD, postdoctoral fellow
Michael Thomson, PhD, postdoctoral fellow
Yuichiro Furukawa, PhD, postdoctoral fellow
Rubenito Lampayan, PhD, postdoctoral fellow
Florence Palis, PhD, postdoctoral fellow
Impa Somayanda, PhD, postdoctoral fellow
Manoranjan Mondal, PhD, postdoctoral fellow, consultant
Gail Langellotto, PhD, collaborative research scientist
Olivier Panaud, PhD, collaborative research scientist
Jianliang Huang, PhD, visiting research fellow
Dongcheng Liu, PhD, visiting research fellow
Chua Gia Thuy, PhD, visiting research fellow
Jaehwan Roh, PhD, visiting research fellow
Do-Young Kwak, PhD, visiting research fellow
Peter Mitchell, PhD, consultant
Dirk de Waele, PhD, consultant
Greg Fanslow, PhD, consultant
Steven Cork, PhD, consultant
Jagdish Timsina, PhD, consultant
Monina Escalada, PhD, consultant
Kenneth Schoenly, PhD, consultant
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Edgar Paski, PhD, consultant
Len Wade, PhD, consultant
Alberto Barrion, PhD, consultant
Lewis Ziska, PhD, consultant
Rassoulou Diallo, consultant
Nguyen Nga, PhD, consultant
Romero M. Visperas, MS, senior associate scientist
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Ma. Angeles M. Quilloy, BS, assistant manager II - associate program manager
Ma. Liberty P. Almazan, BS, associate scientist
Serafin T. Amarante, MS, associate scientist
Anita A. Boling, PhD, associate scientist
Romeo J. Cabanggan, MS, associate scientist
Helen Grace S. Centeno, MS, associate scientist
Mary Jacqueline A. Dionora, MS, associate scientist
Evangelina S. Ella, MS, associate scientist
Joel D. Janiya, MS, associate scientist
Ma. Rebecca C. Laza, MS, associate scientist
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Ma. Theresa L. Tenorio, BS, assistant manager I - program coordination
Ruth A. Agbisit, BS, assistant scientist
Ma. Carmelita R. Alberto, MS, assistant scientist
Olivyn R. Angeles, MS, assistant scientist
Carmencita C. Bernal, MS, assistant scientist
Ambroicio R. Castaneda, MS, assistant scientist
Oliver B. Castillo, BS, assistant scientist
Nina Rosa F. Castillo, MS, assistant scientist
Josie Lynn A. Catindig, MS, assistant scientist
Tiffany Jane B. Chua, BA, assistant scientist
Teodoro Q. Correa, Jr., BS, assistant scientist
Marjorie P. De Ocampo, MS, assistant scientist
Nelzo C. Ereful, MS, assistant scientist
Joel D. Janiya, MS, associate scientist
Mirasol F. Pampolino, PhD, associate scientist
Rolinio C. Rodriguez, MS, associate scientist

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Department of Crop Science
University of the Philippines, Los Baños
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Office: Room 406, Irrigated Rice Research Center

Agricultural Research Service
United States Department of Agriculture
Washington, D.C., USA

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## Personnel (as of 31 December 2007)

### Crop and Environmental Sciences (continued)

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<thead>
<tr>
<th>Name</th>
<th>Role</th>
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</thead>
<tbody>
<tr>
<td>Angelita M. Romena, MS</td>
<td>assistant scientist</td>
<td></td>
</tr>
<tr>
<td>Joel D. Siopongco, BS</td>
<td>assistant scientist</td>
<td></td>
</tr>
<tr>
<td>Angelito T. Lape, BS</td>
<td>specialist - instrument</td>
<td>3,4</td>
</tr>
<tr>
<td>Marnol V. Santos, BS</td>
<td>specialist - instrument</td>
<td>3,4</td>
</tr>
<tr>
<td>Ruben G. Chavez</td>
<td>officer</td>
<td></td>
</tr>
<tr>
<td>Elisa M. Tabaquero, BS</td>
<td>officer - administrative coordination</td>
<td></td>
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<tr>
<td>Trina Leah T. Mendoza, MA</td>
<td>officer - communication &amp; extension</td>
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<td>Rexie Jane D. Parreño, MS</td>
<td>officer - project coordination</td>
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<tr>
<td>Crisanta S. Bueno, MS</td>
<td>researcher</td>
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<tr>
<td>Florence R. Danila, BS</td>
<td>researcher</td>
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<tr>
<td>Glenn D. Dimayuga, BS</td>
<td>researcher</td>
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<tr>
<td>James A. Egdane, BS</td>
<td>researcher</td>
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<tr>
<td>Eunice C. Escandor, BS</td>
<td>researcher</td>
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<tr>
<td>Jaime E. Faronilo, MS</td>
<td>researcher</td>
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<tr>
<td>Jedeliza B. Ferrater, MS</td>
<td>researcher</td>
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<tr>
<td>Rica Joy B. Flor, BS</td>
<td>researcher</td>
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<tr>
<td>Meggy Lou B. Katimbang, BS</td>
<td>researcher</td>
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<tr>
<td>Lizzida P. Llorca, BS</td>
<td>researcher</td>
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<tr>
<td>Abigail E. Mabilangan, BS</td>
<td>researcher</td>
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<tr>
<td>Maria Carmela A. Ong, BS</td>
<td>researcher</td>
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<tr>
<td>Jocelyn B. Pacia, BS</td>
<td>researcher</td>
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<tr>
<td>Zenaida P. Pascual, BS</td>
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<td>Emma D. Quicho, BS</td>
<td>researcher</td>
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<tr>
<td>Katherine Grace R. Tan, BS</td>
<td>researcher</td>
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<tr>
<td>Sylvia C. Villareal, BS</td>
<td>researcher</td>
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<tr>
<td>Katharine C. Ng, BS</td>
<td>associate - database management</td>
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<tr>
<td>Lolita L. Adriano</td>
<td>secretary III</td>
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<tr>
<td>Corazon E. Bambase, BS</td>
<td>secretary III</td>
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<td>Nonnie P. Bunyi, BS</td>
<td>secretary III</td>
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<td>Jacinta I. Evangelista, secretary III</td>
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<tr>
<td>Emma A. Fabian, BS</td>
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<tr>
<td>Jennifer D. Hernandez, BS</td>
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<td>Lourdes A. Herrero, BS</td>
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<td>Florencia G. Junsay, BS</td>
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<td>Salvie F. Marinhas, BS</td>
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<td>Maria Theresa R. Pucio, BL</td>
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<tr>
<td>Eva Corazon P. Reyes, BS</td>
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<tr>
<td>Rosalie L. San Antonio, BS</td>
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<td>Ireneo M. Gibas, BS</td>
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<tr>
<td>Rochelle E. Zantua, BS</td>
<td>technician III - research</td>
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<td>Maximo N. Alumaga, BS</td>
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<td>Jorge L. Alvarez, technician III - research</td>
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<td>Edgar O. Amoloza, technician III - research</td>
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<td>Emiliano M. Barcial, technician III - research</td>
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<td>Jesus S. Belen, technician III - research</td>
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<td>Aniceto B. Boncajes, BS</td>
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<tr>
<td>Mary Ann E. Burac, BS</td>
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<td>Modesto A. Calica, technician III - research</td>
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<td>Lucio N. Caramihan, technician III - research</td>
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<td>Rene B. Carandang, BS</td>
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<td>Ferdinand G. Corcuera, BS</td>
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<td>Teodoro M. Delgado, technician III - research</td>
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<td>Nilo G. Driz, technician III - research</td>
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<td>Ricardo L. Eugenio, technician III - research</td>
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<td>Pedro N. Gapas, BS</td>
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<td>Leonardo R. Holongbayan, technician III - research</td>
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<td>Donato V. Lanwang, technician III - research</td>
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<td>Lamberto V. Licardo, technician III - research</td>
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<td>Anicito P. Macahia, technician III - research</td>
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<td>Rufino D. Manuel, technician III - research</td>
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<td>Ramon B. Masajo, technician III - research</td>
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<td>Onofre A. Mendoza, technician III - research</td>
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<td>Victor R. Micosa, technician III - research</td>
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<td>Edsel T. Moscoso, BS</td>
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<td>Jerone R. Onoya, technician III - research</td>
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<td>Rene M. Panoso, technician III - research</td>
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<td>Maximo L. Pelagio, BS</td>
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<td>Enrique M. Reyes, technician III - research</td>
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<td>Eduardo V. Tandang, technician III - research</td>
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<td>Danilo D. Vasquez, technician III - research</td>
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<td>Sergio G. Velasco, BS</td>
<td>technician III - research</td>
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<td>Roselle M. Pamulaklakin, BS, data encoder</td>
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<td>Rizalina V. Sulabo, BS</td>
<td>data encoder</td>
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<td>Rodante R. Abas, technician II - research</td>
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<td>Melencio J. Apostol, BS</td>
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<td>Manolo S. Balanial, technician II - research</td>
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<td>Angel M. Bautista, technician II - research</td>
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<td>Siena B. Calibo, BS</td>
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<td>Ricardo S. Catangay, technician II - research</td>
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<td>Arturo L. Crisostomo, technician II - research</td>
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<td>Cesario B. De Mesa, Jr, technician II - research</td>
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<td>Macario W. Del Valle, technician II - research</td>
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<td>Leodegario O. Dela Rosa, technician II - research</td>
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<td>Deomides M. Dizon, technician II - research</td>
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<td>Edwin P. Dizon, technician II - research</td>
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<td>Roland N. Dizon, technician II - research</td>
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<td>Ruben M. Guevara, technician II - research</td>
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Personnel (as of 31 December 2007)

Crop and Environmental Sciences (continued)

Feriano T. Javier, technician II - research
Rogelio T. Lapastora, Jr., technician II - research
Victor H. Lubigan, technician II - research
Luis L. Malabayabas, technician II - research
Alberto I. Naredo, technician II - research
Rowena Z. Noblejas, BS, technician II - research
Carmelito S. Oca, technician II - research
Sonny C. Pantoja, technician II - research
Reyuel C. Quintana, technician II - research
Guido M. Ramos, technician II - research
Antonio M. Salamatin, technician II - research
Lino B. Tatad, technician II - research
Nicanor L. Turingan, technician II - research
Efren J. Turla, technician II - research
Rechelle B. Angeles, BS, technician I - research
Reyelle T. Mogul, BS, technician I - research
Osmundo C. Bondad, technician I - research
Leanilyn C. Lim, BS, technician I - research
Jan Michael D. Orlina, BS, technician I - research
Isidro M. Tolentino, technician I – research

India

Mahesh K. Gathala, PhD, scientist
Himanshu Pathak, PhD, senior associate scientist
Yashpal Singh Saharawat, PhD, scientist

Pakistan

Hafiz Mujeeb Ur Rehman, MS, manager - project research

Plant Breeding, Genetics, and Biotechnology

Darshan S. Brar, PhD, senior scientist, plant breeding and head
David J. Mackill, PhD, leader, Raising Productivity in Rainfed Environments Program
John Bennett, PhD, senior scientist, molecular biology
Il-Ryong Choi, Ph D, scientist, plant virology
Glenn B. Gregorio, PhD, scientist, plant breeding
Philippe Herve, PhD, scientist, molecular biology
Sigrid Heuer, PhD, scientist, molecular biology and consultant
Hung-Goo Hwang, PhD, senior scientist, plant breeding
Kshirod Kumar Jena, PhD, senior scientist, plant breeding and IRRI representative for Korea
Nobuya Kobayashi, PhD, scientist, plant breeding
Arvind Kumar, PhD, scientist, plant breeding
Hei Leung, PhD, senior scientist, plant pathology and leader, Rice Genetic Diversity and Discovery Program
Jan Leach, PhD, adjunct scientist
Kyu-Seong Lee, PhD, senior scientist, plant breeding

Country-based

Bangladesh

M. Murshedul Alam, PhD, assistant manager - project research

Pakistan

Hafiz Mujeeb Ur Rehman, MS, manager - project research

Plant Breeding, Genetics, and Biotechnology

Darshan S. Brar, PhD, senior scientist, plant breeding and head
David J. Mackill, PhD, leader, Raising Productivity in Rainfed Environments Program
John Bennett, PhD, senior scientist, molecular biology
Il-Ryong Choi, Ph D, scientist, plant virology
Glenn B. Gregorio, PhD, scientist, plant breeding
Philippe Herve, PhD, scientist, molecular biology
Sigrid Heuer, PhD, scientist, molecular biology and consultant
Hung-Goo Hwang, PhD, senior scientist, plant breeding
Kshirod Kumar Jena, PhD, senior scientist, plant breeding and IRRI representative for Korea
Nobuya Kobayashi, PhD, scientist, plant breeding
Arvind Kumar, PhD, scientist, plant breeding
Hei Leung, PhD, senior scientist, plant pathology and leader, Rice Genetic Diversity and Discovery Program
Jan Leach, PhD, adjunct scientist
Kyu-Seong Lee, PhD, senior scientist, plant breeding

Zhi Kang Li, PhD, senior scientist, molecular geneticist and coordinator, International Network for Molecular Breeding
Edilberto Redoña, PhD, senior scientist, plant breeding and coordinator, International Network for Genetic Evaluation of Rice
Casiana M. Vera Cruz, PhD, senior scientist, plant pathology
Parminder S. Virk, PhD, senior scientist, plant breeding
Fangming Xie, PhD, senior scientist, hybrid rice breeder
Rakesh K. Singh, PhD, international research fellow, plant breeding
Xuemei Ji, PhD, postdoctoral fellow
Aparna Das, PhD, postdoctoral fellow
Xiaochun Lu, PhD, postdoctoral fellow
Ramaiah Venuprasad, PhD, postdoctoral fellow
Stephen Zolovinski, PhD, postdoctoral fellow
Endang Septiningsih, PhD, postdoctoral fellow
Daisuke Fujita, PhD, postdoctoral fellow
Hao Chen, PhD, postdoctoral fellow
Dule Zhao, PhD, postdoctoral fellow
Depeender Grewal, PhD, visiting research fellow
Binying Fu, PhD, visiting research fellow
Woon-Goo Ha, PhD, visiting research fellow
Seung-Kyung Kim, PhD, visiting research fellow
You-Chun Song, PhD, visiting research fellow
Jian-Long Xu, PhD, visiting research fellow
Plant Breeding, Genetics, and Biotechnology (continued)

Gyeong-Rae Cho, PhD, visiting research fellow
Jong-Hee Lee, PhD, visiting research fellow
Myung-Kyu Oh, PhD, visiting research fellow
Krishna Jagadish, PhD, visiting research fellow
Yongming Gao, PhD, visiting research fellow
Ki-Young Kim, PhD, visiting research fellow
Choon-Song Kim, PhD, visiting research fellow
Suk-Man Kim, PhD, visiting research fellow
Bining Fu, PhD, visiting research fellow
Youn-Sang Cho, PhD, visiting research fellow
Eung-Gi Jeong, PhD, visiting research fellow
Muhammad Farooq, PhD, visiting research fellow
Young-Bok Kim, visiting research fellow
Xiaoli Sun, visiting research fellow
Jun-Hyeon Cho, visiting research fellow
An-Soo Lee, visiting research fellow
Geethanjali Subramaniam, collaborative research fellow
Gloria Despacio-Reyes, PhD, consultant
Surapong Sarkarung, PhD, consultant
Romeo Labios, PhD, consultant
Jing Tan, PhD, consultant
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Rogelio C. Cabunagan, MS, associate scientist
Nancy P. Castilla, PhD, associate scientist
Antonio A. Evangelista, BS, associate scientist
Vitaliano L. Lopena, MS, associate scientist
Isabelita P. Ona, MS, associate scientist
Alvaro M. Pamplona, BS, associate scientist
Benito U. Romena, MS, associate scientist
Rodolfo S. Toledo, MS, associate scientist
Ma. Concepcion U. Toledo, BS, associate scientist
Lina B. Torrizo, MS, associate scientist
Editha M. Abrigo, BS, assistant scientist
Teresa D. Alcalde, MS, assistant scientist
Modesto M. Amante, MS, assistant scientist
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Leodegario A. Ebron, PhD, assistant scientist
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Mercy Q. Samia, MS, assistant scientist
Darlene L. Sanchez, BS, assistant scientist
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Justina M. De Palma, MS, researcher
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Mary Ann S. Inabangan, BS, researcher
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Enrico Francisco L. Mercado, BS, researcher
Joie M. Ramos, BS, researcher
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Marilyn G. Belen, AB, secretary III
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Felicidad S. Danglay, BS, secretary III
Nelie M. Delos Reyes, BS, secretary III
Leonida P. Nazarea, BS, secretary III
Marilyn A. Rala, secretary III
Cecilia L. Salonga, BS, secretary III
Plant Breeding, Genetics, and Biotechnology (continued)

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Virgilio T. Ancheta, Jr, technician III - research
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Socorro L. Carandang, BS, technician III - research
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Leonardo S. Estenor, technician III - research
Angelito S. Francisco, technician III - research
Reynaldo (Abdullah) P. Garcia, technician III - research
Epifania F. Garcia, BS, technician III - research
Mario R. Izon, technician III - research
Wilfredo M. Lanip, BS, technician III - research
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Evelyn A. Liwanag, technician III - research4
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Virgilio P. Magat, technician III - research
Flavio A. Maghirang, technician III - research
Eleazar O. Manalaysay, technician III - research4
Eufrocinio M. Pizarra, technician III - research
Norberto T. Quilloy, BS, technician III - research
Nestor D. Ramos, technician III - research
Alexander G. Ramos, technician III - research
Pedro F. Reano, technician III - research
Elenita T. Silab, technician III - research
Ernesto C. Sumague, technician III - research
Emily P. Alcantara, secretary II4
Lorelie S. Olivo, BS, secretary II4
Ruben C. Abuyo, technician II - research
Emmanuel R. Adique, technician II - research4
Virgilio M. Angeles, technician II - research
Renel C. Aventurado, technician II - research4
Victor P. Banasihan, BS, technician II - research4
Julius B. Borgonia, technician II - research3,4
Ma. Gina L. Borja, BS, technician II - research4
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Ernesto M. Camagon, technician II - research4
Luízito L. Caracuel, technician II - research
Patricio M. Carandang, technician II - research4
Ronald L. Cornista, technician II - research
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Cheryl O. Dalid, BS, technician II - research1,4
Marlyn M. Del Valle, BS, technician II - research4
Angelito D. Del Valle, technician II - research4
Reynaldo J. Dela Cueva, technician II - research4
Crisostomo C. Dizon, technician II - research3,4
Mercy R. Dy, technician II - research
Tala Mac Laren C. Fugen, technician II - research1,4
Mario A. Garcia, technician III - research
Ma. Ruby F. Garcia, BS, technician II - research4
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Noel P. Llanza, technician II - research4
Ma. Concepcion F. Lotho, BS, technician II - research1,4
Sandra F. Magcayang, BS, technician II - research1,3,4
Carmela D. Malaban, technician II - research3,4
Katrina B. Malaban, BS, technician II - research4
Apolonio N. Mamiit, technician II - research4
Christine A. Manito, BS, technician II - research3,4
Marina C. Manzanilla, technician II - research4
Jose M. Marasigan, technician II - research
Leovino B. Matundan, technician II - research
Josefina G. Mendoza, BS, technician II - research
Lolita C. Mendoza, BS, technician II - research4
Florencia A. Montecillo, BS, technician II - research4
Arsenio R. Morales, technician II - research
Honorio M. Oboza, technician II - research
Daniel L. Pasuquin, technician II - research
Miladie P. Peñarubia, technician II - research4
Godofredo B. Perez, technician II - research
Macario S. Perez, Sr., technician II - research
Renato T. Pizon, Sr., technician II - research
Shayne S. Reaño, BS, technician II - research4
Marino G. Reyes, technician II - research3,4
Juvy G. Reyes, technician II - research4
Allan P. Salabsabin, BS, technician II - research
Noel S. Salac, technician II - research4
Janice A. Sapin, technician II - research
Eloisa B. Suiton, technician II - research4
Julito P. Talay, technician II - research
Personnel (as of 31 December 2007)

Plant Breeding, Genetics, and Biotechnology (continued)

Allan P. Trinidad, technician II - research
Naireen Aiza G. Vispo, BS, technician II - research
Evangeline A. Angeles, attendant - seed inventory
Noel L. Sosa, secretary I
Cenon P. Alvarez, technician I - research
Carlito A. Escosura, Jr., technician I - research
Paul Benny D. Malaban, technician I - research
Rodante M. Nuevo, technician I - research
Marcial C. Panting, technician I - research

Social Sciences Division

Mahabub Hossain, PhD, economist and head; leader, Improving Productivity and Livelihood for Fragile Environments Program
Sushil Pandey, PhD, senior scientist, agricultural economics and deputy head; leader, Rice Policy Support and Impact Assessment Program
Robert J. Hijmans, PhD, GIS specialist
Damien Jourdain, PhD, senior scientist, agricultural economics
Kei Kajisa, PhD, statistician, agricultural economics
Thelma R. Paris, PhD, senior scientist, gender specialist
Deborah J. Templeton, PhD, statistician, social science/economics
Kumi Yasunobu, PhD, IRS seconded from JIRCAS
Shigeki Yokoyama, MS, IRS seconded from JIRCAS
Hari Gurung, PhD, international research fellow, farming systems
Zahirul Islam, PhD, international research fellow
Yann H. Chemin, PhD, postdoctoral fellow
Humnath Bhandari, PhD, postdoctoral fellow
D.K. Grover, PhD, visiting research fellow
Randolph, Barker, PhD, consultant
Zenaida Sumalde, PhD, consultant
Bhanudeb Bagchi, PhD, consultant
Tran Thi Ut, PhD, consultant
Nguyen Tri Khiem, PhD, consultant
Shijun Ding, PhD, consultant
Agnes Rola, PhD, consultant
Debuddt Behura, PhD, consultant
Kamal Paudyal, PhD, consultant
Abu Nasar Md. Mahfuzur Rahman, consultant
Jonas Rune, consultant
Joyce Gorsuch, consultant
Piedad F. Moya, MS, senior associate scientist
Amelia D. Cueno, MS, associate scientist
Catalina P. Diaz, MS, associate scientist
Zenaida M. Huelgas, MS, associate scientist
Alice G. Laborte, PhD, associate statistician
Imelda R. Molina, MS, associate statistician
Arnel B. Rala, BS, associate statistician
Maria Lourdes E. Velasco, MS, associate scientist
Gina E. Zarsadias, MS, assistant manager I - assistant program manager
Aileen V. Lapitan, MS, assistant statistician
Joyce S. Luis, MS, assistant statistician
Esther B. Marchiano, BS, assistant statistician
Gerlie T. Tatlonghari, BS, assistant statistician
Ma. Teresa R. Ulat, BS, assistant statistician
Orlee P. Velarde, MA, assistant statistician
Mirla D. Domingo, BS, officer - administrative coordination

Crop Research Informatics Laboratory

Christopher Graham McLaren, PhD, senior scientist, biometrics specialist and head; leader, Information and Communications Program
Richard Bruskiewich, PhD, senior scientist, bioinformatics specialist
Thomas Metz, PhD, senior scientist, research informatics

Dehner M. De Leon, BS, officer - database administration
Josephine H. Narciso, BS, officer - database administration
Ellanie R. Cabrera, BS, researcher
Pio Adan A. Cenas, BS, researcher
Margil G. Funtanilla, BS, researcher
Aileen A. Maunahan, BS, researcher
Ma. Shiela D. Valencia, BS, researcher
Lorena S. Villano, BS, researcher
Ma. Cristina L. Obusan, BS, associate - database administration
Cornelia A. Garcia, BS, associate - graphics design
Joel E. Reano, BS, associate - statistics
Lydia B. Damian, BS, secretary III
Rosendo G. Gutierrez, BS, secretary III
Angelina A. Malabrigo, BS, secretary III
Teodora D. Malaban, BS, assistant - statistics
Jocelyn G. Barba, BS, secretary II
Anna Christine A. Doctolero, BS, secretary II

Country-based

Bangladesh

Md. Jashim Uddin, driver

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**Personnel (as of 31 December 2007)**

**Crop Research Informatics Laboratory (continued)**
Samart Wanchana, PhD, postdoctoral fellow
Ramil, Mauleon, PhD, postdoctoral fellow
Kil-Young Yun, PhD, visiting research fellow
Mylah Rystie U. Anacleto, BS, associate scientist
Alexander B. Cosico, BS, associate scientist
Arlet M. Portugal, BS, associate scientist
Violeta I. Bartolome, BS, senior specialist, statistics - consulting & training
Emily C. Deomano, MS, assistant scientist
Genevieve Mae B. Aquino, MS, specialist - bioinformatics
Jeffrey A. Detras, BS, specialist - bioinformatics data curation
Ma. Corina D. Habito, BS, specialist - data application programmer
Clarissa I. Pimentel, BS, specialist - database administration
Ryan Carlo B. Alamban, BS, specialist - platform software engineering
Kevin L. Manansala, BS, specialist - platform software engineering
Jeffrey B. Morales, BS, specialist - platform software engineering
Roque V. Almodiel, Jr., BS, systems analyst/programmer
Lord Hendrix A. Barboza, BS, systems analyst/programmer
Warren Vincent E. Constantino, BS, systems analyst/programmer
Michael Jonathan M. Mendoza, MS, systems analyst/programmer
Lilibeth M. Sison, BS, systems analyst/programmer
Rowena F. Valerio, BS, systems analyst/programmer
Lourdes C. Paunlagui, BS, officer - administrative coordination
William H. Eusebio, officer - database administration
Don L. Pabale, MS, officer - database administration
Emmali A. Manalo, BS, officer - institutional information systems management
Barry C. Peralta, BS, officer - platform software engineering
Jean Robelle R. Danga, BS, programmer
Manfred Carlo R. Cardenas, BS, programmer - web services
Veritas Morena R. Salazar, BS, researcher
Grain Quality, Nutrition, and Postharvest Center
Melissa A. Fitzgerald, PhD, head
Martin Gummert, BS, scientist, postharvest specialist
Fateme Habibi, visiting research fellow
Ton Gia Hoa, PhD, consultant
Sam Bona, consultant
Anthony Joseph Ryan, consultant
Oeun Sophat, consultant
Khuon Kompheak, consultant
Prom Chan Rasmey, consultant
Bui Tuyet Nga, consultant
Can Van Hung, consultant
Nguyen Van Doan, consultant
Ho Thi Tuyet, consultant
Vu Cong Khan, consultant
Meas Pyseth, consultant
Nguyen Nang Nhuong, consultant
Sorn Vichet, consultant
Adoracion P. Resurrecion, MS, associate scientist
Carlito B. Balingbing, BS, assistant scientist
Paterno C. Borlagdan, MS, assistant scientist
Rosario R. Jimenez, BS, assistant scientist
Elenita C. Sunaz, BS, officer - administrative coordination
Vito M. Butardo, Jr., BS, researcher
Venea Dara A. Daygon, BS, researcher
Mariafe P. Navarro, MS, researcher
Artemio V. Madrid, Jr., technician III - research
Inofra I. Sandoval, BS, technician III - research
Eduardo L. Secretario, technician III - research
Ana Lyn J. Genil, BS, secretary II
Juan L. Alzona, technician II - research
Romulo N. Aquino, technician II - research
Teodoro L. Atienza, technician II - research
Fernando C. Salisi, technician II - research
Lucena C. Samadio, technician II - research

**T.T. Chang Genetic Resources Center**
Nigel Ruairaidh Sackville Hamilton, PhD, senior scientist, evolutionary biology and head
Kenneth L. McNally, PhD, senior scientist, molecular genetics/molecular taxonomy
Kazutoshi Okuno, PhD, consultant
Yunlong Xia, PhD, consultant
Personnel (as of 31 December 2007)

T.T. Chang Genetic Resources Center (continued)

Flora C. De Guzman, MS, senior associate scientist
Renato A. Reaño, MS, associate scientist
Ma. Socorro R. Almazan, BS, assistant scientist
Maria Celeste N. Banaticla, MS, assistant scientist
Rhodesia C. Manzano, MS, assistant scientist
Ma. Elizabeth B. Naredo, BS, assistant scientist
Adelaida P. Alcantara, BS, specialist - database administration
Roniela H. Prantilla, BS, specialist - database administration
Michael B. Gamalinda, BS, researcher
Sheila Mae E. Quilloy, BS, researcher
Digna I. Salisi, BS, secretary III
Vicente M. Arcillas, technician III - research
Monique D. Barile, BS, technician III - research
Belinda R. Lapal, technician III - research
Emerlinda E. Hernandez, technician III - research
Felix R. Llanes, technician III - research
Minerva I. Macatangay, technician III - research
Reneeliza Jean A. Melgar, BS, technician III - research
Gregorio M. Mercado, technician III - research
Bernardo P. Mercado, technician III - research
Nelia A. Resurreccion, BS, technician III - research
Mario A. Rodriguez, technician III - research
Anthony N. Telosa, BA, assistant
Jenniffer P. Eleuterio, BS, assistant - database administration
Remegio L. Aguilar, technician II - research
Ricardo A. Apolinario, Jr., BS, technician II - research
Rancy M. Bauyon, technician II - research
Jeffe O. Cadion, BS, technician II - research
Leahelyn O. Castanar, BS, technician II - research
Lyruth S. Domagsang, BS, technician II - research
Hipolito M. Elec, technician II - research
Arnold B. Gonzales, technician II - research
Romulo R. Quilantang, technician II - research
Florencio F. Villegas, technician II - research
Lydia G. Angeles, BS, technician I - research
Imelda P. Boncajes, technician I - research
Nerissa L. Boongaling, technician I - research
Rosa B. Carandang, technician I - research
Jane D. Carandang, technician I - research
Isabelita P. De Mesa, technician I - research
Minerva N. Eloria, technician I - research
Minerva C. Gulde, technician I - research
Edwin H. Jarabejo, technician I - research
Nora M. Kuroda, BS, technician I - research
Alicia A. Lapis, BS, technician I - research
Wilma L. Lumaybay, technician I - research
Marynel V. Malabanan, BS, technician I - research
Yolanda P. Malatag, BS, technician I - research
Gilbert G. Mamiit, technician I - research
Emmanuel T. Manaig, technician I - research
Veronica V. Mangubat, technician I - research
Violeta T. Manila, technician I - research
Mae C. Merluza, technician I - research
Rhodora M. Pamplona, technician I - research

International Programs Management Office

Headquarters-based
Julian A. Lapitan, MS, senior manager
Margaret Ann S. Jingco, BS, assistant manager II
Marianne R. De Luna, MS, officer - administrative coordination

Country-based
Mohammed Zainul Abedin, PhD, IRRI representative for Bangladesh and FoSHoL project leader
Gary C. Jahn, PhD, coordinator for the Greater Mekong Subregion, IRRI representative and Lao-IRRI project manager, and senior scientist, entomology
Joseph F. Rickman, MS, leader, Rice in East and Southern Africa, and IRRI representative for the East and Southern Africa region
Zakaria L. Kanyeka, PhD, regional plant breeder for the East and Southern Africa region
M.A. Hamid Miah, PhD, liaison scientist for Bangladesh
Mahyuddin Syam, MPS, liaison scientist for Indonesia/Malaysia/Brunei Darussalam

Nenita T. Penales, technician I - research
Alicia B. Perez, technician I - research
Jacqueline M. Ragudo, technician I - research
Liza B. Yonzon, technician I - research

Edna R. Reyes, secretary III
Mark Bell, PhD, consultant
Geert Claessens, consultant

Country-based
Mohammed Zainul Abedin, PhD, IRRI representative for Bangladesh and FoSHoL project leader
Gary C. Jahn, PhD, coordinator for the Greater Mekong Subregion, IRRI representative and Lao-IRRI project manager, and senior scientist, entomology
Joseph F. Rickman, MS, leader, Rice in East and Southern Africa, and IRRI representative for the East and Southern Africa region
Zakaria L. Kanyeka, PhD, regional plant breeder for the East and Southern Africa region
M.A. Hamid Miah, PhD, liaison scientist for Bangladesh
Mahyuddin Syam, MPS, liaison scientist for Indonesia/Malaysia/Brunei Darussalam
Personnel (as of 31 December 2007)

International Programs Management Office
Country-based (continued)
Ming Zhao, PhD, part-time IRRI liaison scientist for China
V. Balasubramanian, PhD, consultant
Surapong Sarkarung, PhD, consultant
Ngo The Dan, PhD, consultant
Larry Harrington, PhD, consultant
Carlos Zandamela, consultant
Ahmad Salahuddin, consultant
U Ba Hein, consultant
Jan Orsini, consultant

Africa
Mahamudo Ismael Jala, driver
David Jose Muhale, technician III-research

Bangladesh
Md. Ahsanullah, driver
Md. Alimullah, guard
Md. Ruhul Amin, office attendant
Mohammad Asaduzzaman, MS, accountant I
Nuruzzaman Badal, driver
Tahmina Banu, MS, officer-administrative coordination
Jopinath Bazi, driver
Mamunul Haque, assistant manager II, communication
Nurul Islam, guard
Md. Abdul Mannan, information technology officer
Md. Fazlu Miah, guard

Shahjadi Parvin, MA, secretary II
Anthony Sarder, motor vehicle operator
Shamima Sultana, MA, secretary II
Md. S. M. Suzat, office attendant
A. S. M. Zahiruddin, accountant I
Abutaher M. Ziauddin, monitoring and evaluation specialist

Cambodia
Marie Kim Leng, BS, administrative coordinator

Cao Meng, office assistant
Yonghong Sun, BA, secretary/cashier
Zhongqiu Wang, BA, assistant manager II

India
Gopal Krishna Agarwal, BCom, administrative officer (finance & accounts)
Sivaprasad Bandarupalli, PhD, assistant manager II (lead coordinator)
Dalpat C. Bhandari, PhD, assistant manager II (lead coordinator)
Vanita Gupta, MCom, administrative associate
Savita Sharma, BA, administrative associate
Ayodhya Lodhi, driver cum general assistant
Kuldeep Poonia, BA, driver cum utility assistant
Prempal, assistant (housekeeping)
Anurudh Singh, assistant (housekeeping)

Indonesia
Iwan Adidharmawan, BS, accounting supervisor/administrative coordinator
Juanita Bawolye, BA, executive secretary
I Made Agus Mahardhika, driver
Diah Wurjandari Soegondo, BS, researcher
Bambang Soewilanto, BS, administrative coordinator

Korea
Seung-Hee Han, BS, administrative coordinator
Suh Jung-Pil, PhD, senior research scientist

Laos
Thany Keovongvichith, BA, writer/editor/translator
Kham Souk Mosky, driver
Sone Mosky, BS, administrative officer
Sonnedalinh Phoumvongxay, BA, secretary II
Onheuane Phouthachit, administrative assistant
Sansai Samountry, accountant
Sommai Yasongkua, driver

Myanmar
Nanda Soe Myint, driver/office aide
Ohnmar Tun, Bag, administrative coordinator

Nepal
Bhaba Prasad Tripathi, PhD, assistant manager/assistant scientist
 Personnel (as of 31 December 2007)

International Programs Management Office

Country-based (continued)

Thailand
Vitchu Chowanapong, BS, office clerk
Amporn Limsorn, office assistant
Apiporn Phuengwattanapanich, MS, assistant manager II
Punjama Tasana, BA, senior accountant

Vietnam
Do Phuong Thao, accounting assistant³
Nguyen Thanh Huyen, BS, assistant manager II
Nguyen Van Khang, driver

Training Center
Noel P. Magor, PhD, head
David Shires, MEd, international research fellow¹ and consultant⁴
Yoke Sau Metz, consultant¹⁹
Ma. Victoria DV Gummert, consultant¹⁹Alexis Faulkner, consultant¹⁹
Judith Buresh, consultant¹⁹
Charmian Sackville Hamilton, consultant¹⁹
Eugenio C. Castro, Jr., MS, associate scientist
Paul Benjamin R. Hilario, BS, assistant manager I⁵
Imee L. Aspiras, BS, assistant manager I
Maria Angeli G. Maghuyop, MS, specialist
Maria Socorro S. Arboleda, BS, officer
Ma. Teresa A. Clabita, BS, officer
Lauro M. Atienza, BS, officer
Arvin A. Benacente, BS, officer - audio/visual⁵
Anilyn D. Maningas, MS, officer - events⁵
Melanie M. Quinto, secretary III

Office of the Deputy Director General for Operations and Support Services
Ramon A. Oliveros, MS, executive assistant I
Rosalie P. Trinidad, BS, executive secretary

Brent International School
Joan L. Belsonda, BS, officer - administrative coordination¹

Intellectual Property Management Unit
Gerard F. Barry, PhD, Lead and coordinator, GoldenRice Network, and leader, Rice and Human Health
Inez Slamet-Loedin, PhD, shuttle scientist¹⁹
Raul M. Boncodin, BS, assistant manager II
W.M.H. Jaim, PhD, consultant¹⁹
Andrew Powell, PhD, consultant¹⁹
Frances Florifel B. Tesoro, BS, secretary III

Legal Services
Ildefonso R. Jimenez, BS, senior counsel
Walfredo E. Gloria, MS, senior counsel¹²
Cherryl C. Breva, BS, secretary III

Seed Health Unit
Patria G. Gonzales, MS, manager
Janice Q. Bautista, BS, assistant scientist¹
Carlos C. Huelma, BS, assistant scientist
Evangelina G. Gonzales, BS, secretary III
Atanacio B. Orence, technician III - research

Armin L. Penales, technician III - research
Salome P. Bulaquía, data encoder
Aurelio A. Gamba, technician II - research
Florencio I. Lapiz, BS, technician II - research
Jay A. Angeles, BS, technician I - research
Jose F. Banasihan, technician I - research

Visitors Office
Bita S. Avendaño, MS, assistant manager II³
Ria Anna B. Dimapilis, BS, associate⁶
Zorayda T. Menguio, BS, secretary III⁶

Operations
Terry B. Jacobsen, BA, head
Ricardo M. Hernandez, BS, assistant manager I

Experiment Station
Arnold R. Manza, MS, senior manager
Tomas P. Clemeno, BS, manager
Bienvenido B. Manimtim, BS, assistant manager I
Roberto P. Escandor, BS, officer
Mario A. Mandilag, Sr., officer
Erlianda A. Oracion, MS, officer - administrative coordination
Roslen S. Anacleto, MS, programmer
Rolando R. Pacion, associate - stock inventory
Virginia G. Aranda, BS, secretary III
Enrico A. Lucero, secretary III
Francisco G. Calibo, technician III - equipment
Jose F. Hernandez, technician III - equipment
Rolando G. Guevarra, technician III - mechanic
Rogelio R. Pamulaklakin, technician III - mechanic
Juanito M. Rosario, technician III - mechanic
Experiment Station (continued)

Efren E. Viquiera, technician III - mechanic
Isaías C. Abuyo, BS, technician III - research
Benedicto S. Alborida, technician III - research
Jesse C. Basanihan, technician III - research
Abraham G. Dalid, BS, technician III - research
Sulpicio J. Malabanan, technician III - research
Jose D. Manuel, BS, technician III - research
Antonio B. Rivera, technician III - research
Nazario B. Timbol, technician III - research
Celso L. Varron, technician III - research
Cecilio L. Villamayor, secretary II
Delphin M. Ilagan, technician II - equipment
Nicasio V. Malabanan, technician II - equipment
Pablito M. Pabalate, technician II - mechanic
Pedro C. Aala, technician II - research
Fabian L. Alcachupas, Jr., technician II - research
Carlos P. Alforja, technician II - research
Danilo O. Amoloza, technician II - research
Nestor M. Angeles, technician II - research
Anthony L. Aquino, technician II - research
Melecio J. Arcillas, technician II - research
Efren A. Bagui, technician II - research
Restituto M. Bandoy, technician II - research
Policarpio S. Barbadillo, technician II - research
Rogelio V. Bargola, technician II - research
Efren P. Bautista, technician II - research
Efren L. Blanco, technician II - research
Pedro G. Cabrera, Sr, technician II - research
Luis M. Calma, technician II - research
Lino M. Carandang, technician II - research
Vicente E. Carandang, technician II - research
Oscar L. Caspillo, technician II - research
Aurelio M. Catangay, technician II - research
Bonifacio B. Chavez, technician II - research
Edgardo T. Diaz, technician II - research
Ariel R. Dimapilis, technician II - research
Rogelio M. Elbo, technician II - research
Cesar Z. Esguerra, technician II - research
William C. Fortuna, technician II - research
Benjamin C. Garcia, technician II - research
Danilo O. Gonzaga, technician II - research
Nestor L. ilaw, technician II - research
Abraham G. Javier, technician II - research
Eduardo A. Lajarca, technician II - research
Virgilio T. Lalap, technician II - research
Fidel G. Lanorio, technician II - research
Mario M. Malbataan, technician II - research
Leopoldo P. Manito, technician II - research
Mateo F. Manzanilla, technician II - research
Pedro C. Mendoza, technician II - research
Andres M. Mercado, technician II - research
Godofredo M. Mercado, technician II - research
Gelardo R. Morales, technician II - research
Gregorio S. Oca, technician II - research
Ramiro C. Panting, technician II - research
Reynaldo A. Pelegrina, technician II - research
Roberto B. Revillaleza, technician II - research
Nestor G. Rizaldo, technician II - research
Alfredo G. Regalado, attendant - grounds maintenance
Quirino L. Atienza, technician I - research
Lucas M. Malbataan, technician I - research
Mario F. Villegas, technician I - research

Food and Housing Services

Ma. Obdulia B. Jolejole, BS, senior manager
Leody M. Genil, BS, assistant manager I
Priscilla S. Argosino, MS, officer
Benita M. Pangan, BS, officer
Fe C. De Ocampo, BS, associate - food service
Rolly M. Camayudo, assistant - recreation
Jojo P. Cabutin, BS, assistant - recreation
Anselmo R. Reyes, assistant - recreation
Limberto S. Aldipollo, assistant - stock inventory
Gina A. Ypil, BS, secretary II
Ricardo L. Bejosano, Jr., attendant - housing
Cristina E. Cauntay, attendant - housing
Irene S. Escoles, attendant - housing
Laureano M. Escuadra, attendant - housing
Edgardo S. Estenor, BS, attendant - housing
Aurelio C. Garcia, attendant - housing
Francisca O. Oro, attendant - housing

Physical Plant Services

Douglas D. Avila, BS, senior manager
Enrique O. Delos Reyes, BS, manager
Alfredo M. Mazaredo, MS, manager
Jaime A. Fojas, BS, assistant manager I
Fernando B. Madriaga, BS, assistant manager I
Nestor A. Malabuyoc, BS, assistant manager I
Teodoro G. Carreon, officer
Marissa E. Templanza, BS, officer - administrative coordination
Fidel L. Alvarez, technician III - carpentry
Levi C. Malijan, technician III - carpentry
Virgilio V. Verano, technician III - carpentry
Physical Plant Services (continued)

Luisito R. Vitan, technician III - civil
Robert F. Austria, BS, technician III - drafting
Enrique D. Baterina, technician III - electrical
Roberto E. Escueta, BS, technician III - electrical
Mario C. Garcia, technician III - electrical
Rufino R. Gibe, BS, technician III - electrical
Felix M. Halili, technician III - electrical
Benjamin C. Libutan, technician III - electrical
Rolando N. Simon, technician III - electrical
Marcelino M. Navasero, Jr., technician III - electronics and instrument repair
Ramon R. Suarez, technician III - electronics and telephone
Danilo F. Banasihan, technician III - instrument and telephone
Rodolfo G. Calibo, technician III - physical plant
Melencio E. Tapia, technician III - plumbing
Manolo M. De Guia, technician III - refrigeration and airconditioning
Leonardo S. Mangubat, technician III - refrigeration and airconditioning
Dionisio A. Ng, technician III - refrigeration and airconditioning
Juan L. Petrasanta, technician III - refrigeration and airconditioning
Ricardo C. Tabilangon, technician III - refrigeration and airconditioning
Domingo M. Ortiz, technician III - telephone
Apolinario T. Armia, technician III - welding
Anito Q. Mabalhin, technician III - welding
Fermin L. Junsay, BS, assistant - stock inventory

Mario S. Pinero, painter
Roberto N. Tamio, technician II - masonry
Regalado Q. Alcachupas, technician II - plumbing
Hilarion A. Hibek, technician II - plumbing
Jennifer R. Jarlego, BS, secretary I

Safety and Security Services
Glenn A. Enriquez, BS, senior manager
Maria Cristina B. Andaya, BS, assistant manager II - pollution control officer
Fancia Indira V. Olivar, BS, officer - occupational safety and health
Bionico R. Malacad, security investigator
Salvador T. Zaragoza, Jr., security investigator
William G. Amador, BS, core guard
Crisostomo M. Dela Rueda, core guard
Rodelo M. Empalmando, core guard
Pablo C. Erasga, core guard
Roberto M. Espinosa, Jr., core guard
Juanito C. Exconde, BS, core guard
Esteban C. Palis, core guard
Macario C. Punzalan, BS, core guard
Ernesto S. Regulacion, core guard

Transport Services
Manuel F. Vergara, BS, senior manager
John Arturo M. Aquino, BS, assistant manager I - vehicle repair shop
Carlito C. Cabral, BS, officer - administrative coordination
Reynaldo G. Elmido, associate - MPDS dispatch
Bonifacio M. Palis, associate - MPDS dispatch
Oscar A. Templanza, associate - MPDS dispatch
Rolando L. Santos, associate - service advisor
Perlita E. Malabayabas, BS, secretary III
Emilio R. Gonzalez, Jr., technician III - AC mechanic
Edwin S. Cabarrubias, technician III - mechanic
Roger M. Cuevas, technician III - mechanic
Romeo L. Jarmin, technician III - mechanic
Armando E. Malveda, technician III - mechanic
Roduardo S. Quintos, technician III - mechanic
Danilo G. Abrenilla, driver
Carlos Levy C. Banasihan, driver
Amador L. De Jesus, driver
Rodrigo M. Fule, driver
Diosdado M. Mamaril, BS, driver
Hernani M. Moreno, driver
Eduardo L. Pua, driver
Renato C. Vivas, driver
Martheen Francis O. Aquino, BS, technician II - mechanic
Mabini M. Linatoc, technician II - mechanic
Jomar P. Ofrecio, BS, technician II - mechanic
Ronilo M. Villanueva, BS, technician II - mechanic
Argyll D. Viyar, BS, technician II - mechanic

Office of the Director for Program Planning and Communications

Zenaida M. Federico, BS, executive secretary

Communication and Publications Services
Eugene P. Hettel, MA, editor and head
Bill Hardy, PhD, science editor/publisher
Adam Barclay, Grad Dip Science Communication, international research fellow
**Personnel (as of 31 December 2007)**

<table>
<thead>
<tr>
<th>Department</th>
<th>Position</th>
<th>Name</th>
<th>Qualification</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Communication and Publications Services (continued)</strong></td>
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<tr>
<td></td>
<td></td>
<td>Albert A. Borrero, BS, manager</td>
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<td></td>
<td></td>
<td>Sylvia Katherine S. Lopez, MS, assistant manager II</td>
<td>- product development</td>
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<td></td>
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<td>Teresita V. Rola, MPS, specialist - editorial</td>
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<td></td>
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<td>Anna Natasha A. Arsenal, specialist - marketing</td>
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<tr>
<td></td>
<td></td>
<td>Ginalyn H. Santos, BS, specialist - multimedia/web development</td>
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<td></td>
<td></td>
<td>Maria Guadalupe Y. Mondoño, BS, specialist - technical writing</td>
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<td></td>
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<td>Antonette Abigail E. Caballero, MS, officer - administrative coordination</td>
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<td></td>
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<td>Ariel D. Javellana, BS, officer - photography</td>
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<tr>
<td></td>
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<td>Jose M. Ibabao, officer - video production</td>
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<tr>
<td></td>
<td></td>
<td>Juan V. Lazaro, IV, associate - graphics design</td>
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<tr>
<td></td>
<td></td>
<td>Emmanuel A. Panales, BS, associate - graphics design</td>
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<tr>
<td></td>
<td></td>
<td>George R. Reyes, BS, associate - graphics design</td>
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<tr>
<td></td>
<td></td>
<td>Jose Raymond D. Panaligan, associate - photography/video</td>
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William M. Estrellado, warehouseman
Ernesto L. Nimede, Jr, BS, warehouseman
Jose L. Sibal, warehouseman
Delfin M. Lacandula, Jr., attendant
Fortunato P. Presto, attendant

¹Left during the year.
²On leave.
³Joined during the year.
⁴On project appointment.
⁵Transferred from Events, Visitors, and Information Services.
⁶Transferred from Food and Housing Services.
⁷Transferred from T.T Chang Genetic Resources Center.
⁸Transferred from International Programs Management Office.
⁹Transferred from Plant Breeding, Genetics, and Biotechnology Division.
¹⁰Transferred from Social Sciences Division.
¹¹Transferred from Training Center.
¹²Retired during the year.
¹³Died during the year.
¹⁵On study leave.
¹⁶Effective October 2007.
¹⁸Transferred from Crop Research Informatics Laboratory.
¹⁹Joined and left during the year.
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<td>Michael Jackson</td>
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<td>Gene Hettel</td>
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<td>Adam Barclay</td>
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<td>Abigail Caballero</td>
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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).

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Superior drought-tolerant and aerobic rice germplasm and management options developed for water-short rainfed environments by 2012
Through mechanisms such as CURE, this output will allow national agricultural research and extension system (NARES) scientists to adapt and validate improved germplasm (seeds and the genetic material they contain) and management practices suitable for local environments with farmer participatory research. The impacts will include reduced risk of crop loss due to drought, an increase in rice production and water productivity, and an increase in income from rice farming in water-scarce areas in eastern India, Nepal, Bangladesh, Pakistan, Thailand, Cambodia, and the Philippines.

Screening of hundreds of lines during the dry season allowed the identification of several potential donors of drought tolerance under upland conditions, in addition to the confirmation of several drought-tolerant cultivars. Under lowland conditions, we identified several promising donors for lowland drought stress. From multilocation trials conducted at partner sites in India, several lines were identified as drought-tolerant donors for lowland situations. Several lines are being used as parents in breeding programs for drought-tolerance improvement.

Improved breeding lines with higher yield than the reference variety Apo (3.5–4.2 tons per hectare) under favorable upland conditions and double the yield of Apo under severe drought (2.2–3.3 tons per hectare) have been developed. For shallow rainfed lowland conditions, breeding lines and hybrids with double the yield of the variety PSBRc 80 under severe drought stress (2.1–3.7 tons per hectare) and with yield of more than 5.0 tons per hectare under nonstress have been developed. These lines have been disseminated to partners in South and Southeast Asia and entered in national breeding programs.

In the IRRI-India drought-breeding network, we identified for the shallow rainfed lowland environment lines with double the yield of varieties IR64 and IR36 under severe drought (1.1–2.1 tons per hectare) and the same yield potential as that of IR64 (3.5–4.0 tons per hectare) under nonstress. For severe drought stress under medium-duration rainfed lowland conditions where varieties Swarna and Sambha Mahsuri failed to set grains, breeding lines with yield of more than 2.0 tons per hectare were identified. These lines yielded more than 5.0 tons per hectare under nonstress conditions.

Under lowland water-stressed environments, some hybrid varieties achieved higher yields than the inbred check variety and commercial hybrid check. Eighteen hybrid varieties yielded more than 5.0 tons per hectare, with yield advantage of 5.7% to 28.4% compared with the best inbred check.

The first set of superior aerobic varieties (bred to yield well in un-flooded, dry-land conditions, like maize or wheat) from IRRI was mostly improved upland lines with high early vigor, drought tolerance, and yield potential of 4.0 tons per hectare in dry
soil conditions. The second generation of improved aerobic rice lines possesses high weed-competitiveness, better grain quality, enhanced drought tolerance, and yield potential of more than 5.0 tons per hectare. IRRI is disseminating the second-generation aerobic rice lines to India, Bangladesh, Nepal, and Pakistan with support from the Asian Development Bank (ADB), and to Lao PDR, Vietnam, and other countries of Southeast Asia, Latin America, and Africa with the help of IRRI’s partners. Some of these second-generation aerobic lines have been tested in India, Bangladesh, Nepal, Pakistan, the Philippines, and Lao PDR.

Two major QTLs for grain yield under drought have been identified. One QTL explains 51% of the genetic variance for grain yield under stress. The other QTL explains 35% of the genetic variance. A major QTL for aerobic adaptation, explaining 51% of the genetic variance for grain yield under aerobic conditions, was also identified. Its effect was validated in the 2007 wet season.

Within the CURE network, improved crop management options have been developed, tested, and scaled up for drought-prone rainfed rice in India, Bangladesh, Thailand, and Cambodia. New shorter duration varieties combined with direct-seeding options, and improved weed and nutrient management, consistently increase yields and productivity in farmers’ fields, reduce the labor needed, and increase the opportunities for postrice crops. In 2007, such options were scaled-up to more than 10 villages in Chhattisgarh and Jharkhand. The introduction of short-duration varieties with or without direct seeding advanced the rice harvest in cropping systems in northern Bangladesh. As a consequence, the options for postrice crops increased and employment opportunities were created during the monga period (hungry months) as a result of the earlier harvest and increased cropping intensity. Out-scaling is ongoing in collaboration with nongovernmental organizations (NGOs).

In Cambodia, a survey conducted in 2006 and covering six villages in rainfed systems indicated extreme poverty and food insecurity. An integrated management approach was designed (named SROV-PHAL, it was based on the Australian RICE CHECK model) and tested in 2007. The results showed that the combination of improved varieties, good seed, and SROV-PHAL could increase yields considerably (to 3.3 to 3.7 tons per hectare on average, depending on the region). Farmers’ current practice, which was surveyed for a total of 133 farmers, was often suboptimal, giving rice yields of 1.8 to 1.9 tons per hectare on average.

Strategic analysis of inorganic fertilizer use in drought-prone systems showed that fertilizer-use efficiency in rainfed rice can be similar to that in irrigated systems; however, fertilizer rates need to be adjusted according to available water resources. Analysis of farmers’ fertilizer practice in northeast Thailand and the High Barind Tract of Bangladesh showed that farmers use their considerable site-specific knowledge to adjust existing fertilizer recommendations to their specific conditions. Based on this information and results from on-farm experiments, recommendations were revised and entered into the extension system to re-align with farmers’ local knowledge, research results, and extension messages.
 Superior germplasm and management options to overcome submergence stress developed by 2012

This output allows NARES in eastern India, Bangladesh, Myanmar, and Cambodia to validate elite lines and associated crop and resource management options to develop locally suitable submergence-tolerant and high-yielding varieties for the monsoon-season crop. These lines can be released to extension workers and, ultimately, farmers. The impacts include increased yield of monsoon-season rice, lower cost of rice production (from avoidance of replanting and yield losses from submergence), and reduced temporal fluctuations in yield. Adoption of the new variety-management package will lead to increased crop productivity across 10 million hectares of submergence-prone areas of South and Southeast Asia, resulting in reduced poverty among rice producers and consumers in that region.

Improved nursery management practices can result in healthier seedlings better able to tolerate flooded conditions after transplanting. The major recommendations include low seeding density, planting immediately after uprooting (compared with farmers’ practice of delaying transplant-
ing), sufficient nutrients in the nursery before transplanting, use of relatively aged seedlings (35–45 days), and avoiding excessive nitrogen. These practices—which produced healthy seedlings with higher biomass and carbohydrate content, resulting in enhanced establishment in the field and increased survival under flooding—were validated in farmers’ fields as a package with submergence-tolerant varieties in both Uttar Pradesh, India, and Rangpur, Bangladesh. Both submergence-tolerant and submergence-sensitive varieties were responsive, and yield advantages ranged from 30% to double. The nursery management options were also validated for the double transplanting (bolon) system in flood-prone areas of Bangladesh in several farmers’ fields. (The bolon system uses taller seedlings that are transplanted in standing water during the early monsoon season to ensure that plants are better able to withstand high water levels if flooding occurs.) The improved practices produced more robust, more vigorous, and taller seedlings that effectively withstood flooded conditions. The advantages were consistently reflected in higher grain yield. Out-scaling of the recommendations is now under way.

In 2007, we developed seed management options that enhanced germination and seedling establishment of rice genotypes tolerant of flooding during germination, when directly seeded in flooded soils. We examined the effects of seed age, seed priming (soaking and drying), sowing depth, temperature, and algal growth in floodwater. In all cases, tolerant genotypes had higher survival than sensitive ones. Effectiveness of seed priming was validated in Orissa, India, and Prachinburi, Thailand, under direct seedlinging.

Transfer of the Sub1 gene for submergence tolerance into six mega-varieties was completed in 2007. Transfer of Sub1 into the widely grown varieties Swarna, IR64, (see 127-day time-lapse video below) and Samba Mahsuri was completed in the previous year. In 2007, these varieties were evaluated at NARES sites under both on-station and farmers’ field conditions. The development of the varieties TDK1-Sub1, BR11-Sub1, and CR1009-Sub1 was completed in 2007, and each of them was confirmed to be tolerant of complete submergence. Yield trials with the pairs of varieties having and lacking the Sub1 gene showed that the gene itself did not have a negative effect on yield in shallow (nonsubmerged) conditions. In experiments at IRRI and in India, Swarna-Sub1 under shallow conditions outyields Swarna by about 10%. Seed of this variety is being produced in India and Bangladesh for more wide-scale distribution to farmers. In participatory evaluation tests in Bangladesh and India, the variety has met farmers’ requirements. Under the IRRI-Japan Project, farmer participatory evaluation of the rice varieties with the Sub1 gene is ongoing in Cambodia, Indonesia, Lao PDR, the Philippines, Thailand, and Vietnam.
Superior germplasm with tolerance for salinity and other soil problems, together with suitable management options, developed by 2012

This output allows NARES in salt-affected and problem-soil areas in South and Southeast Asia to validate and adapt superior germplasm and suitable crop and natural resource management (CNRM) options for release to farmers. Impacts will include adoption of the germplasm across 2 million hectares of salt-affected and other problem soils in India, Bangladesh, Myanmar, the Philippines, Indonesia, and Vietnam, resulting in increased yields and overall production in these areas.

The introduction of improved salt-tolerant rice varieties along with the matching natural resource management practices substantially increased and sustained productivity in representative salt-affected areas in India, Bangladesh, and Vietnam. Appropriate nursery management included transplanting older and well-nourished seedlings with minimum root damage and transplanting at a relatively high density.

In alkaline soils of Uttar Pradesh, India, the use of cheaper amendments such as “press-mud” (solid residue obtained from sugarcane juice after crystallization, this waste from sugar mills is used as a manure), proper fertilizers and farmyard manure, and tolerant genotypes helped
reduce gypsum requirements (GR) to 25% of the recommended dose (50% GR) and enhanced grain yield.

In coastal areas, proper nursery management coupled with the use of biofertilizers (Sesbania and Azolla), early planting date, and the use of early-maturing salt-tolerant varieties to avoid high salinity at flowering, especially during the dry season, were found to be effective in India (Orissa), Bangladesh (Shatkhira), and Vietnam (Tra Vinh), and are currently being upscaled through participatory varietal selection trials.

Multilocation trials conducted in farmers’ fields showed that a combination of improved management practices with improved varieties gave yield advantages of 75–90%. In addition, crop intensification using salt-tolerant rice and nonrice crops (such as oilseeds, fodder, pulses, and vegetables) and fish/shrimp culture during the dry season helped enhance food security and provide more employment opportunities, especially for women.

Nine new markers for the Saltol region were identified. Markers are segments of DNA linked to, or part of, an allele (a version of a gene) that controls an important trait and can easily be detected in the lab. Fine-mapping ruled out SalT as a candidate gene for Saltol, while the gene SKC1 remained a strong candidate. More than 30 markers closely linked with the Saltol region were tested for variation across different donors and recurrent parents, and at least four markers, which were found to vary from donor to donor, are being used for selection of Saltol for each parental combination of the marker-assisted selection (MAS) program.
(MAS involves linking a desired gene with a marker so that it can easily be transferred or bred into a rice variety.)

Seven co-dominant and nine dominant allele-specific markers were developed for Pup1 to facilitate MAS. Two additional flanking markers were also identified. Pup1-specific markers in combination with background markers are being applied to select the best progenies from five populations. Preliminary data suggest that Pup1 is of particular importance for aerobic drought-prone environments. By switching to aerobic conditions and optimizing growth conditions of Pup1 near-isogenic lines (NILs; two or more NILs are identical to each other apart from a small section of the genome that confers a particular trait) in soil-based pot experiments, the beneficial effect of Pup1 under phosphorus deficiency is now very evident.

Rice is more tolerant of salt stress during germination, active tillering, and grain filling, but sensitive during early seedling growth and the reproductive stage, starting from a few days before panicle initiation through pollination and fertilization. Tolerance at the seedling and reproductive stages is only weakly associated, suggesting the need to decipher the elements of tolerance at both stages to develop more resilient varieties. Key traits involved in tolerance at the seedling stage include salt exclusion, compartmentation of ions in structural and older tissues, vigorous growth, responsive stomata (small pores on leaves, which allow plants to cool down through water loss), and higher tissue tolerance. Growth and physiological responses during reproduction were investigated using genotypes contrasting in tolerance at both stages. Salt stress affects almost all aspects of vegetative and reproductive growth. It delays flowering, hinders neck node elongation and panicle exsertion, reduces spikelets per panicle, reduces pollen viability, and causes high panicle and spikelet sterility. Tolerant cultivars strongly exclude salts from the flag leaf (the uppermost leaf originating just below the panicle base) and developing panicles, to maintain their stomatal conductance and photosynthesis (particularly that of the flag leaf). Most of these mechanisms are effective during both seedling and reproductive stages.
Superior germplasm and improved management options for uplands developed by 2012
This output will allow NARES to evaluate improved germplasm for inclusion in their breeding programs and make improved technologies available to farmers. Such technologies will increase rice yields in upland areas and, through improved management of rice landscapes, reduce land degradation in sloping uplands. By incorporating cash crops into rice-based farming systems, farmers’ incomes will increase. Furthermore, policymakers and development agencies will have better information and knowledge of the food security problems of ethnic minorities in the uplands.

Vietnam and Lao PDR, respectively, screened 44 and 20 rice lines for sloping uplands from a pool of rice lines received from IRRI’s International Network for Genetic Evaluation of Rice (INGER) for upland and aerobic rice observation nurseries.

Farmer participatory research to evaluate upland rice varieties for sloping uplands under no fertilizer input in Vietnam identified four varieties with increased yield potential. These varieties yielded 13–38% higher than local check varieties, which averaged 0.8 ton per hectare. Similarly, on-farm farmer participatory varietal selection research in Lao PDR identified six upland rice varieties, including aerobic rice, with increased yield potential. These varieties yielded 50–92% higher than the local check variety for sloping upland conditions, which averaged 1.13 tons per hectare. In northeastern India, we identified two upland rice varieties for sloping uplands suitable for wider dissemination through farmer participatory varietal selection research. These varieties gave 19% and 53% higher yield, respectively, than the local check, which yielded 1.55 tons per hectare. In Nepal, farmer participatory varietal selection identified seven promising upland rice varieties for plateau and unbundled-terraced uplands. These varieties yielded 7–39% higher than local check varieties, which averaged 2.66 tons per hectare.

Weeds are a major problem in upland rice culture, irrespective of whether rice is grown as a shifting agricultural crop, as in much of the sloping uplands of Southeast Asia and northeastern India, or grown as a permanent agricultural crop in upland plateaus or dry terraced fields in the hills of Nepal. Further, the weed problem in shifting agriculture has intensified with the shortening of fallow periods because of increasing population pressure. Three weed control options were evaluated through research trials: a nonchemical method of combining variable seed rate and hand weeding in northeast India, integrated chemical and hand weeding in Nepal, and integrated chemical control and crop rotation in Lao PDR and Vietnam. The results from Lao PDR indicated that rehabilitation of Imperata-infested upland fields in Lao PDR can be achieved through the use of herbicide prior to planting pigeon pea, which also serves...
as a rotation crop in upland rice fields. The Nepal research concluded that a combination of weedicide spray and a single hand weeding 30 days after sowing was the best of the treatments tested, giving a yield advantage of 0.1 ton per hectare of rice and an incremental benefit worth US$105 per hectare over farmers’ practices.

Declining soil fertility and system productivity is an emerging but critical problem in upland agriculture. Research was conducted to study the suitability of incorporating legume (peanut, soybean, black gram, cowpea, and rice bean) and nonlegume (maize as intercrop and toria as succeeding crop) crops as an intercrop with upland rice, or as a fallow or succeeding crop after upland rice. These options aimed to improve the fallow and crop rotations in terms of soil fertility, and raise crop and system productivity in terms of physical and economic yield. Several crop combinations, including pigeon pea, peanut, and soybean, proved suitable at the research sites in Nepal, northeastern India, Lao PDR, and Vietnam. These rotations improved soil fertility, reduced weed populations, and also provided additional income to farmers.

Socioeconomic baseline studies of the 12 field research sites operated in four countries—India, Lao PDR, Nepal, and Vietnam—were completed. Survey results showed that the production of upland rice is an important livelihood activity. Because of low rice yields, 20–88% of households were found to be food deficient. Besides landholding and family size, household rice deficiency is correlated to land-type endowment—that is, households with only uplands, or primarily uplands with little lowlands, are mostly in rice deficit.

With strong extension support from local government units, farmer-partners, and NGOs in the Arakan Valley Complex (AVC), Philippines, scaling out of crop diversification practices continued in 2007. Through additional funding support from national and local government units and NGOs, scaling-out activities included the establishment of model farms in different rice-farming communities. A total of 54 model upland and rainfed lowland farms were established: 21 in the Arakan uplands; 16 in the Marilog, Davao, uplands; 4 in rainfed submerged areas (Kabacan and Cotabato); and 13 in the rainfed lowlands (Matalam and Cotabato). Each model is a rice-based farm showcasing diversified farming (growing other crops, such as vegetables and root crops, along with rice) coupled with raising animals for added income. The model farms were given free technical and material support throughout the cropping season and each served as a learning ground for
neighboring farmers. A total of 6,536 farmers obtained free technical and material (start-up seeds) assistance in 2007.

Rubber-growing has become popular in the AVC, both to replace old rubber trees depleted of latex and to meet growing demand for rubber worldwide. Since crop diversity in upland rice-based cropping has been adopted and scaled out by farmers, integrated pest management (IPM) in mixed cropping under immature rubber trees is being explored for food security and increased income while waiting 5–7 years for rubber trees to become productive. To document farmers’ practices in immature, high-value crops, 43 small-scale rubber farmers were surveyed to determine their socioeconomic characteristics, identify problems and constraints in rubber farming, and prioritize research activities and develop action plans in the valley. Results showed that farming remains the main source of income for the rubber farmers. A majority have their own lands, which they use for rubber and food crops. Only a few farmers had savings, meaning that most of the respondents manage only to sustain their daily basic needs of food, clothing, and shelter, with almost no money left to sustain farm operations. Poverty was reported as the most pressing problem, and the low levels of savings, education, and employment are perceived to be associated with poverty. On rubber farms, weeds remain the most common problem. Traditional rice varieties are commonly grown with improved varieties where diseases, pests, and weeds are occurring.

We combined ecological and genetic analyses of rice varieties to design a diversification scheme for IPM in legume-rice cropping systems grown under 1- to 3-year-old rubber plantations. We assessed the genetic diversity of traditional varieties using markers associated with disease resistance. The objectives were to study the effect of rubber-tree age on rice and mungbean planted between rows, and to determine the performance of Dinorado (a traditional high-quality rice variety) and UPLRi-5 (a high-yielding modern rice variety) mixtures and rice-mungbean intercropping in rubber-agroforestry systems.

Growth of rubber was not affected by intercropping in year 1. In year 2, however, significant differences in girth of rubber trees among the intercropping treatments were observed. Based on 2 years of data, diversified rice and mungbean intercrops under immature rubber plantations are promising for reducing pest problems and increasing farm productivity compared with the farmers’ practice of planting only their Dinorado or UPLRi-5 as a monocrop. The year 3 trial is in progress to confirm these results.

Lampung Province, Indonesia, is an area characterized by the rice fungal disease blast. Blast is a major constraint on rice yields, keeping them at 1.6 tons per hectare in an environment that could otherwise achieve yields 2.5 times higher (4 tons per hectare). In 2007, we continued an evaluation of rice lines and varieties for purposes of developing a package of upland varieties with broad-spectrum blast resistance. Access to resistant varieties would mean that farmers do not have to change varieties in response to the frequent shifts in blast populations. This process involved on-station screening of 500 candidate lines and varieties, resulting in the selection of about 20 candidates. Researchers obtained valuable information from growers through on-farm evaluations in the 2005-06 and 2006-07 growing seasons, which will be useful in finalizing the entries suitable for this package, expected in 2008. For the current season (2007-08), the team chose an interactive, participatory approach that facilitates the monitoring of farmer acceptability of these new lines. We supplied 5-kilogram seed kits to key farmers designated as “group leaders,” who conducted scaling-out meetings to disseminate the seed based on each farm’s rice land area. A total of 1,515 kilograms of seed was distributed to Seputih Raman, Sukadana, Pekalongan, and Metro Raya villages. Group leaders ensured that farmers sowed the lines separately by package and not in a bulk mixture, and will assess the progress of the crop throughout the growing season.

Another major technology output in 2007 was CURE’s investigation in Lampung Province of rice genetic diversification as a tool to maintain the productivity of improved varieties that are less resistant to blast than traditional varieties such as Sirendah. Farmers have always been interested in higher yielding improved varieties, but they have been discouraged by these materials’ susceptibility to blast. The proposed technology would allow them to grow their preferred, low-yielding, traditional varieties with higher yielding modern cultivars, while reducing the incidence of blast. The investigation has yet to produce conclusive results about the most effective ratio of rows of improved varieties to traditional varieties. Experiments conducted in farmers’ fields showed that interplanting one to two rows of a moderately susceptible variety with four to six rows of a modern or traditional variety that is moderately resistant to blast can reduce neck blast. However, results suggest that the tall modern traditional variety outcompeted the shorter modern variety when interplanted with at least two rows of the modern variety. More research will be required before the findings can be distilled into decision tools or management principles for widespread use by farmers.
Resource management options and strategies for intensification and diversification of rainfed systems developed by 2012

This output will enable NARES to use sustainability indicators to monitor ecosystem health in rainfed environments. NARES researchers will also be able to test and refine landscape management and cropping system strategies, and develop technology advisory notes and extension materials. This information will allow extension workers and development agencies to be trained on improved farming systems and ecosystem management, leading to farmers adopting new land management and cropping system strategies. Ultimately, this will lead to increased cropping intensity in areas characterized by short and erratic monsoons, and increased land and water productivity in salt-affected coastal areas in Vietnam and Bangladesh.

In 2007, we established a method to assess functional biodiversity as an indicator of regulatory ecosystem services, natural biological control, and invasion resistance. The assessment was conducted at 120 sampling sites in Luzon, Philippines (50% rainfed and 50% irrigated), in 2007. The study involved arthropod sampling, computing species richness using rarefaction, and other biodiversity indices.

An analysis of patterns and drivers of intensification and diversification in the rainfed lowlands of eastern India was conducted. Analysis of trends in the last 30 years indicates that the area under rice and wheat has increased in this period at the expense of coarse cereals and pulses. States dominated by rainfed agriculture such as Assam, Jharkhand, Chhattisgarh, and Orissa continued to be largely rice-based, and rice covers 82% or more of the gross cropped area. Although fruits and vegetables have gained importance as cash crops, the proportion of land that they occupy is small. Increasing income levels and rapid urbanization have led to changes in demand. These trends are also occurring in regions dominated by rainfed agriculture and are likely to improve the incentive for diversification toward high-value products. Reforms were initiated in the domestic market to attract the participation of the private sector. Thus, agro-processing firms are now allowed to buy produce directly from farmers. One reason for limited intensification and diversification is that the current rice technology still does not allow a postrice crop because of long cropping duration.
In 2007, we developed and tested short-maturing high-yielding varieties for the dry season, together with the use of modern varieties in the wet season. These materials, together with appropriate cropping calendars, monitoring of salinity in river water, harvesting of fresh water during high tides (in preexisting networks of irrigation canals), and proper crop management, enable two cropping seasons per year. In contrast with the traditional monocropping or rice-sesame systems, the double-rice cropping system more than doubled annual rice production. Suitable varieties and CNRM options are now being out-scaled through government efforts to increase the capacity of stored fresh water for the dry season and provide seeds of modern high-yielding varieties for both seasons. In areas where salinity is too high during the dry season, and brackish water is available, farmers are being trained to adopt a rice-shrimp system to increase their income.

During the past 3 years, in India and Bangladesh, extensive participatory on-farm research on improved CNRM options (including management of variety, establishment, weeds, and nutrients) has been conducted through CURE in collaboration with the Natural Resources Institute. These studies have demonstrated options that enable an earlier harvest and increase the possibilities for a postrice legume crop. In Bangladesh, farmers’ groups tested the options of dry and wet seeding of rice to advance the rice harvest and subsequently grow postrice legumes. In eastern India in 2007, out-scaling of these options reached about 30 hectares in three project villages and more than 80 hectares in nine adjacent villages. Because of good rains in 2007, chickpea was planted after rice in all three project villages (dry season 2007-08) and in some adjacent villages. Farmers are keen to plant a postrice chickpea crop due to higher yield and the higher market price compared with the usual postrice crop of grasspea (*Lathyrus sativus*).

In 2007, we established a new database on water quality for the coastal zone of the Mekong Delta and tools to support decision making on water management for Bac Lieu Province, Mekong Delta, Vietnam. An acidity module was established and incorporated into a previously validated hydraulic and salinity model. The database and the model were used to investigate the dynamics of water quality and effects of land-use and water-management strategies on water quality, and to make decisions on the operation of sluices for salinity control that facilitated both rice and shrimp production in the province.
Poverty in Asia is particularly common among rural populations that depend on rainfed agriculture with rice as the staple food and principal source of employment and income. Rice yields in these rainfed ecosystems remain low at 1.0 to 2.5 tons per hectare and are unstable, primarily due to abiotic stresses, especially drought, flooding, and adverse soils.

In the past decade, major scientific progress has been made. New tools have been developed in crop physiology, genomics, biotechnology, and nutrient and water interaction in drought conditions; geographic information systems (GIS); and simulations. This greatly increases the likelihood of success in developing and deploying high-yielding rice varieties with tolerance for abiotic stresses.

The high risk of crop failure and low response to inputs of the traditional varieties currently being used by farmers in these rainfed areas discourage investment in appropriate management options and inputs. Replacing these traditional, low-yielding varieties with high-yielding, input-responsive, stress-tolerant varieties will encourage farmers to invest more in fertilizers and other management practices because of the assured returns.

In 2007, significant progress was made in addressing the problems of rainfed areas through research focusing on the five major outputs of Program 1. Research on drought tolerance identified superior donors exhibiting consistent tolerance in multilocation testing. Elite breeding lines and hybrids were identified that have high yield potential and can give double the yields of existing varieties under drought stress. Large-effect quantitative trait loci (known as QTLs, these are areas of the genome that increase or decrease the expression of a trait to a particular degree)

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controlling drought tolerance have been validated for both upland and aerobic environments (in aerobic conditions, rice is grown in unflooded fields, like wheat or maize; rice bred for such environments is known as aerobic rice).

Improved seed and nursery management options that reduce the risk of loss from submergence during crop establishment and vegetative growth were developed and validated.

Mega-varieties with tolerance for abiotic stresses were developed or are in the pipeline, through incorporation of major QTLs, including *Sub1* (submergence), *Saltol* (salinity), and *Pup1* (phosphorus deficiency). New natural resource management (NRM) options that enhance the productivity of salt-affected lands were developed. Improved understanding of the physiology of salt tolerance identified traits that confer tolerance at different growth stages and suggested ways to enhance tolerance for salt stress.

The Consortium for Unfavorable Rice Environments (CURE) continued to serve as a mechanism to validate and adapt new technologies with farmer participatory research and fast-track the diffusion of knowledge-intensive technologies by facilitating linkages among research, extension, and development. The program was successful in developing an initiative on abiotic stress tolerance funded by the Bill & Melinda Gates Foundation.

The causes of stagnation or decline in diversification in rainfed rice-based systems were identified. Options for double cropping in salt-affected areas of Bangladesh and India were identified through proper varietal selection and crop management, and a rice-shrimp system was successful where fresh water was not available during the dry season.

Introducing early-duration varieties and direct-seeding methods allows farmers to adopt a rice-chickpea cropping system in drought-prone regions of eastern India. A database on water quality and a hydraulic model were used to investigate the effects of land-use and water-management strategies on water quality, and to make decisions on the operation of sluices for salinity control that support rice and shrimp production in the Mekong Delta.
Improved rice germplasm and management practices to enhance yield potential and achieve sustainable productivity developed by 2012
This output will allow NARES and other intended users to use improved germplasm and management practices in research, breeding, and extension programs. Germplasm will be made widely available through the International Network for the Genetic Evaluation of Rice (INGER). Consortia (IRRC, RWC) will play an important role in disseminating and facilitating uptake by farmers. It is expected that technologies will be transferred to NARES institutions that serve one-third of the annual irrigated rice area in Asia (around 25 million hectares). Yield gaps will be reduced and technology options will lead to a reduction in the unit cost of production.

In 2007, we developed more than 20 elite inbred (self-pollinating) varieties with yield advantage of more than 20% over popular varieties along with desirable grain quality and multiple resistance to diseases and pests. Several promising improved new-plant-type (NPT) lines were identified by breeders in India and have been evaluated in the All India Coordinated Rice Testing Program. An improved NPT line (IR77186-122-2-2-3, released as NSIC Rc 158) and an aromatic line (IR71137-243-3-3-2-3, released as NSIC Rc 148) were released in the Philippines. The latter is the Philippines’ first semidwarf high-yielding aromatic line.

Ten hybrids with improved yield and heterosis (hybrid vigor), derived from four female and six male lines, are ready for testing by NARES in seven locations in the Philippines and six locations in Indonesia.

Near-isogenic lines (NILs; two or more NILs are identical to each other apart from a small section of the genome that confers a particular trait) for 14 different blast resistance genes were developed and new lines with multiple resistance to blast were developed for use in breeding programs. The blast resistance genes—mainly from Japanese blast differential varieties—were bred into both japonica and indica backgrounds.

Experiments on healthy canopy management were conducted successfully at IRRI and four sites in China. Key canopy characteristics for high-yielding healthy canopies were identified. Varieties with taller stature, fewer tillers, and lower leaf N concentration had fewer diseases. Disease incidence, particularly that of sheath blight, can be controlled through managing fertilizer nitrogen (N) more precisely and differently for varieties with different plant types in order to reduce disease.
development and maximize grain yield in irrigated rice systems. One season of on-farm research examining the interaction between seed rate and zinc (Zn) management was completed in the Philippines. Two years of on-farm research on optimization of zinc management with seed rate was completed in central Vietnam. The results of this work have been compiled into first concepts for improving Zn management in relation to healthy canopies for high yields.

In 2007, we advanced our knowledge of the components of grain quality and consumers’ preferred quality traits for Cambodia, Laos, and Vietnam. Twelve months’ data were collected in six markets in three provinces in Laos and in two markets in southern Vietnam. A rural market information system was set up in four villages in Vietnam and eight villages in Cambodia. Analysis of the market survey data and data collection for the 12 rural market information systems is ongoing.

Postharvest management technologies developed in 2007 will help minimize farmers’ postharvest losses. Hermetic storage systems—known widely as “superbags,” and which allow cereal grains to be safely stored for extended periods—are being locally produced in Indonesia and farmer evaluation was conducted in Cambodia, Indonesia, Vietnam, Laos, and Myanmar. Mini combine harvesters have been introduced to Cambodia and Laos. Dryer manufacturing was introduced to Laos, Cambodia, and Myanmar (including 24 dryers installed in Myanmar and 4 dryers installed in Laos). An assessment of problems with dryers was conducted in South Sumatra and a new type of fan was introduced, which improved performance. A new automaticrice husk furnace for drying was commercialized in Vietnam. Local production of a low-cost grain moisture meter was established in the Philippines and a prototype of an improved digital model was developed. Technical and economic baseline assessment of village rice mills was completed in Cambodia, including four rice mills set up to produce exportable organic rice based on international standards. Electronic-learning postproduction courses were developed in English, Khmer, and Vietnamese languages and tested in Myanmar and Laos.

We have identified a new gene, Pi40, that confers broad-spectrum resistance to a range of Korean and Philippine types of the fungal disease blast. A DNA marker tightly linked to Pi40 has been identified (a marker is a segment of DNA linked to, or part of, an allele—a version of a gene—that controls an important trait and can easily be detected in the lab). Seventeen advanced backcross japonica lines expressed resistance to multiple Korean blast types. We have shared five blast-resistant lines with researchers in China, Egypt, Korea, Spain, the United States, and Vietnam.

A new brown planthopper (BPH) resistance gene (Bph18) was introduced into six temperate japonica cultivars using marker-assisted selection (MAS; this involves linking a desired gene with a marker so that it can easily be transferred or bred into a rice variety). We evaluated 10 advanced japonica breeding lines possessing Bph18. One line showed high yield potential, excellent grain quality, and strong resistance to BPH. We have shared advanced breeding lines with NARES in China, Korea, and Vietnam.

We identified 36 early-maturing and highly fertile lines that are tolerant of cold conditions at the reproductive stage, and 27 lines that are tolerant of cold at the seedling stage. Nine recombinant inbred lines (RILs) from a japonica × indica cross exhibited cold tolerance at both seedling and reproductive stages. Cold-tolerant breeding lines were shared with NARES in Bangladesh, China, Korea, and Thailand.

An International Network for Quality Rice (INQR) was established during a grain quality workshop held at IRRI in April 2007. Collaborative projects on standardizing and improving grain quality assessment methods have begun, with emphasis on developing a new test for total amylose content.
Integrated resource management options and germplasm to address threats to sustainability related to trends of increasing intensification and diversification and decreasing freshwater resources developed by 2012

This output allowed NARES to validate and promote modified agricultural practices that can be adopted by farmers to improve sustainability and maintain or improve yield despite intensification, diversification, and declining water availability. The knowledge and practices generated will be adopted within partner NARES and consortia, and will be applicable to areas exceeding 5 million hectares in South Asia, Southeast Asia, and China. Furthermore, options to reduce the effects of salinity on productivity will be adopted by farmers in India and Bangladesh on upward of 1 million hectares. This output is also responsible for practices that reduce the risk of uptake of toxic metals in rice in South Asia and options that respond to water scarcity in northern China, the Philippines, India, and Myanmar. Sustainability and improved or maintained productivity of rice production systems will enable income to be diversified, and income and nutrition to be improved, for millions of families in South Asia, Southeast Asia, and China.

In 2007, IRRI researchers developed crop residue and weed manage-
ment options for minimum-till and direct-seeded rice-farming systems, following principles of conservation agriculture. Weed and residue management practices for dry-seeded rice after conventional and zero-tillage, and wet-seeded rice after puddling, were developed and widely assessed in rice-rice and rice-wheat systems of the Indo-Gangetic Plains. Weed management options for direct-seeded rice were validated in farmers’ fields (around 100 farmers’ field trials and 500 hectares). Detailed data sets on crop and weed growth were collected at three sites to characterize shifts in weed species composition and weed ecology. Strategic studies on germination and emergence of a range of key weed species were conducted. The results of the research and development activities were disseminated through the Labor and Productivity Work Group of the IRRC, through training courses, extension materials, and presentations at national and international meetings. Training materials, such as weed information leaflets in four languages, were provided through the IRRC, and we conducted training courses in pest ecology and weed management. The weed module of the CD-based Rice Doctor Mk2 has been completed.

Promising options were developed to overcome yield stagnation and decline in the rice-wheat system in the Indo-Gangetic Plains of South Asia. More than 500 on-farm trials and technology demonstrations were conducted at project sites in Bangladesh, Nepal, and Pakistan for refinement, validation, dissemination, and enhanced adoption of resource-conserving technologies (RCT) and integrated crop management (ICM) technologies. ICM resulted in an increase in yield and income compared with conventional practices. A large number of farmers are using the leaf color chart to determine N-fertilizer applications, resulting in N savings of up to 40 kg N per hectare compared with farmers’ practice. The RCTs (except drum-seeding) in rice gave similar yields but higher profit than conventional practices. Zero-tillage and reduced tillage in wheat in the rice-wheat system have been hugely popular in India, Pakistan, and Nepal. Currently, about 3 million hectares are under zero- or reduced tillage in India. Laser land leveling has been a success in Pakistan and India. In Pakistan alone, more than 170 laser units are in operation on more than 50,000 hectares. The modified zero-till drills, double-disc drills, and rotary disc drills have been tested for multicrop seeding and seed-cum-fertilizer application. Power-tiller-operated multicrop seeders were introduced in Bangladesh and found to be profitable. Double zero-till systems were evaluated in India.

Through the IRRI-CIMMYT Alliance, IRRI researchers studied the biophysical yield potential and feasibility of rice-maize systems using crop models to guide research. A regional biophysical and socioeconomic assessment of the current and future potential for rice-maize systems in Asia was completed for 27 sites in the Philippines, Indonesia, Vietnam, Thailand, China, India, Bangladesh, and Nepal. Macroeconomic data and crop simulation models were used in combination with detailed climate data to assess yield potential, to design principal cropping systems choices, and to identify major abiotic and socioeconomic
constraints. Results showed substantial potential for rice-maize systems in many areas, as well as large existing yield gaps, particularly for maize. A more detailed country analysis was completed for Bangladesh. Key short- and long-term systems-level management issues identified include

i. Early planting of the maize crop after rice to maximize yield potential and profit. This requires high-yielding, early-maturing rice varieties, direct seeding and/or early planting to shorten the duration of the rice crop, and maize varieties that can germinate and establish under conditions of excess soil moisture.

ii. Balancing nutrient inputs to maintain soil fertility and increasing nitrogen-use efficiency.

iii. Sustainable cropping systems and mechanized tillage, residue, and crop-establishment solutions for fast crop turnaround and conservation of water and soil organic matter.

Three years of field research examining alternatives to burning of crop residues were completed at two locations in China and one location in India. Experiments of 2–3 years’ duration at three additional locations in China were also completed. Results highlighted the merit of integrating improved site-specific nutrient management (SSNM) with residue management. A promising no-till system for establishing the second rice crop into the mulch of the first rice crop was identified in Guangdong, China. The experiences of the project were combined with an extensive review of the literature into a major review article outlining a principal framework for management options for crop residues in Asian rice-based cropping systems. Research identified cropping environments where crop residues could be safely removed for off-field use and where retention of crop residues, especially as mulch, was essential for sustainable land management. In other research, we examined the implications of residue management for greenhouse gas emissions and decomposition patterns of a brittle straw mutant.

Research on new concepts and technologies for integrated crop management continued across Asia. Key emphasis has been on strategic and adaptive research for rice-rice systems under water-scarce conditions (Philippines, Vietnam, India, Bangladesh, and Myanmar), rice-wheat systems (India, Bangladesh, Nepal, and Pakistan), and...
emerging rice-maize systems (Philippines, Vietnam, Indonesia, Bangladesh, India, and China). Research on understanding of the yield decline in aerobic rice (rice bred to yield well in unflooded fields) observed at IRRI indicated that N deficiency was mainly responsible for the yield decline and that ammonium sulfate was better than urea in alleviating soil sickness caused by continuous aerobic monocropping. Various biotic stresses (such as nematodes and root pathogens) have also been identified as potential causes of yield collapses at other locations. A first international conference on aerobic rice was held in Beijing, China. A regional analysis indicated relatively large areas with potential for aerobic rice not only in Asia but also in Africa and South America.

Laser leveling, an important technique for successful direct seeding of rice, was demonstrated and promoted in northwestern India, Pakistan, Laos, Myanmar, and Vietnam. Data sets on crop and weed growth in response to weed management practices for wet and dry direct seeding of rice were used to develop a decision tree for direct-seeding. In northwestern Bangladesh, 50% of the rural poor face famine in October and November—a period known as monga—because of seasonal scarcity of agricultural employment. IRRI scientists supported the Bangladesh Rice Research Institute in work with two nongovernmental organizations (NGOs) to introduce direct seeding of rice for earlier rice harvest, thus enabling additional crops for generating new food and income sources. Wet-seeded or dry-seeded rice crops established well and there was no flood damage, unlike in transplanted crops. Earlier harvest of direct-seeded rice allowed farmers to grow a potato/maize relay crop and created 200 extra days of employment per hectare. Medium- and long-term studies in the rice-wheat system indicated that wheat can be successfully grown with no tillage and on beds, but that direct-seeding and bed-planting technologies for rice need improvement on a site- and season-specific basis. SSNM in rice was further fine-tuned for a range of local conditions. A revised pocket guide for nutrient management in rice was published. National and location-specific guidelines continued to be refined in collaboration with NARES groups in Indonesia, China, the Philippines, and Vietnam. Research on zinc identified problems of fertilizer adulteration and expanded regionally to assess the extent of zinc deficiency and develop cost-effective zinc management practices, including a diagnostic kit for assessing zinc content in soil or fertilizer. A long-term experiment at IRRI provided first evidence that conversion of continuous rice-rice systems to more aerated crop rotations such as rice-maize can lead to substantial losses of soil organic carbon and soil nitrogen-supplying capacity if full tillage is performed for the maize crop. Minimum- or zero-tillage solutions will be required for sustainable management of diversifying rice systems.

The Temperate Rice Research Consortium (TRRC) was established in 2007 as a new platform for research on yield potential and quality, blast disease resistance, cold tolerance, and water- and nutrient-use efficiency in temperate rice-growing regions. 🌾
Integrated management options for improved environmental sustainability in rice-based landscapes developed by 2014

This output generates new knowledge on ecosystem resilience, material flows, and hydrological cycles, which will be used by scientists of NARES and other institutions to develop improved technologies and policy options.

A project to develop indicators of biological control started in the Philippines, Malaysia, China, and Vietnam under the ALARM project. Insecticide resistance monitoring began in China, Vietnam, and the Philippines. Methodologies for assessing biological control services were developed and are currently also being tested in the Philippines. Five training sessions to teach methods of biodiversity assessment were organized for NARES partners.

The World Bank Development Marketplace 2005 environmental soap opera completed broadcast of 104 episodes and focus group discussions and posttest evaluations were completed. The final 20 episodes, adapted to encourage farmers in the Mekong to adopt an “escape strategy” to avoid virus infections, helped the information rapidly reach 1 million farmers in just 3 months.

A first international training workshop on Ecological management of pests—biological and social dimensions was held at IRRI.
Options to adapt rice systems to climate change, particularly higher temperatures and raised sea levels, and to minimize greenhouse gas (GHG) emissions developed by 2014

By generating knowledge of the likely effects of climate change on rice production, this output will allow NARES and advanced research institutes (ARIs) to develop strategies, germplasm, and crop-management options that cope with climate change and address challenges to food production. The widespread adoption of germplasm and management options to address climate change will help assure future harvests and the well-being of rice farmers and consumers worldwide.

An international workshop on heat stress in rice was conducted in Wuhan, China, in 2007 to discuss specific research needs for adapting rice and rice systems to rising temperatures. The Rice and Climate Change Consortium (RCCC) will conduct both strategic and applied research on three major themes:

1. From the genome to the field: exploiting germplasm opportunities to meet the challenge of climate change,
2. Changes in ecosystem functions and ecosystem resilience in diversifying rice landscapes, and
3. Assessing the impact of climate change and evaluating policies and management strategies for adaptation and mitigation.

An international workshop—Cool rice for a warmer world—was held in Hunan, China, to review knowledge of high-temperature tolerance in rice and map out research strategies for future work. At IRRI, in collaboration with various NARES and ARI partners, new research activities on heat tolerance through exposure to high temperatures started. Mass screening for early daytime flowering was performed us-
ing 4,200 accessions. Three lines were found that opened flowers and concluded peak flowering before 0900. An INGER heat-tolerance nursery with 22 entries in five countries with high-temperature regimes was developed. The first crosses and backcrosses with heat-tolerant parents were made. Studies on a range of genotypes for the effect of high night temperatures on growth, grain filling, and yield continued.

Research was undertaken on the effect of different temperature regimes on two rice varieties—IR8 and IR60—that achieve high yields through differing panicle architecture (IR8 via large panicles; IR60 via more panicles per square meter). Further research needs to be carried out on a wider range of genotypes, but the results so far suggest new opportunities for breeding for panicle architecture, for both total yield and yield of edible and/or salable rice.

Other activities included impact assessment studies on sea level rise in the Mekong Delta, an assessment of straw availability and technology options for bioenergy production from rice straw (with King Mongkut’s University, Bangkok), the development of a pilot site for large-scale measurement of greenhouse gas, water and energy fluxes in diversifying rice systems, evaluation of biochar for carbon sequestration and soil improvement, and an expert consultation on biofuels held at IRRI.
Strategies for uptake and impact of research results in place by 2010

NARES partners and other institutions will use the strategies developed through Output 5 to deliver improved technologies, and governments will adopt policy options to facilitate the efficient delivery of improved technologies and management strategies for intensive rice-based farming systems. The livelihoods of millions of Asian rice-farming families will be enhanced because of greater and faster uptake of appropriate technologies to improve the sustainability of rice-based cropping systems.

In 2007, IRRI researchers developed improved management practices and demonstration sites for intensive rice-based farming systems, including the rice-wheat system, in India, the Philippines, and Vietnam.

In India, household surveys of 40 farmers (20 users of IRRC technology and 20 nonusers) from each of three states in the Indo-Gangetic Plains indicated a 35–50% increase in net income for those farmers who used direct-seeded rice technologies.

In the Philippines, demonstration sites established in 2006 validated four IRRC natural resource management technologies; in 2007, demonstration sites were established in five regions. Technologies for the respective regions
were selected based on farmers’ needs. Field activities were coordinated by the Philippine Rice Research Institute (PhilRice), the National Irrigation Authority, provincial agriculturists, and local government.

In Vietnam, technologies were validated and demonstration sites established in the south (two provinces; three technologies), center (two provinces; two technologies), and north (four provinces; two technologies). Impact assessment of SSNM in two provinces in the north (374 households) showed adoption levels of 63% in Ha Nam and 59% in Ha Tay provinces, with a 2–3% increase in income.

In Indonesia, we catalyzed a novel approach for uptake of SSNM and ICM through a fertilizer working group and technical group to facilitate dissemination.

In 2007, we developed policy options for China and the Philippines on improved management for intensive rice-based farming systems. In China, field studies in two provinces in the north and four in the center/south led the Chinese Center for Agricultural Policy to propose that aerobic rice and SSNM be implemented nationally and be adopted by the national extension system. Country-specific recommendations for SSNM were developed in consultation with colleagues from China and the Philippines. A national workshop on Rice nutrient management in China brought together most of the research groups involved in developing and disseminating nutrient-management recommendations for rice in a forum that aimed to facilitate national-level consensus on the principles of nutrient management.

The IRRC continued developing and strengthening three In-Country Outreach Programs (ICOPs) in Indonesia, Myanmar, and the Philippines. In an ICOP, the work groups of the IRRC and NARES contribute collaboratively through expanded activities of validation, integration, scaling up, and scaling out of principles, approaches, and technology options. Where possible, the IRRC has encouraged the involvement of the private sector and NGOs.

A high level of engagement continued with the agricultural ministry in Myanmar, which has led to a high profile for the IRRC and government funding to support demonstration sites for IRRC technologies in four divisions, and has influenced policies on rice production and marketing. In 2007, the IRRC co-sponsored a workshop in Myanmar on the research-extension interface for natural resource management of rice and also assisted in developing the Myanmar Rice Knowledge Bank.

The ICOP in the Philippines was established through the Knowledge Management and Promotion Program of PhilRice. New sites were added as field trials to validate technologies in different provinces.

In Indonesia, the ICOP has provided a focal point for the IRRC to respond to, and link with, initiatives by the government of Indonesia such as the Rice Production Increase Program (known as P2BN) and a new national outreach program (Prima Tani). Under the ICOP umbrella, dissemination of SSNM technologies accelerated in 2007 through the formation of a national fertilizer working group for building consensus on technologies and a national technical team for capacity building of trainers. Likewise, a national workshop led to the development of a national team expert in hermetic storage. Provincial activities in 2007 included the development of common study sites in South Sumatra and South Sulawesi. A new Australian Centre for International Agricultural Research project on adaptive management to increase rice production in South and Southeast Sulawesi was developed.
Intensive rice systems provide 75% of the world's rice supply and are of strategic importance for food security at affordable prices, particularly for the urban and rural landless poor in Asia. Irrigated rice areas are among the world’s most enduring, environmentally sound, and productive agroecosystems, and increased productivity in recent decades has had a significant impact on poverty reduction. In addition to food, they provide many “ecosystem services” that people living in these areas depend on. Environmental sustainability is threatened, however, by the loss of prime rice land and biodiversity, climate change, and inappropriate management systems, often caused by land, water, or labor shortages. Average yields of irrigated rice must continue to rise at an annual rate of 1% and this growth must be achieved with sustainable technologies. The unit cost of production needs to be lowered to benefit rice producers and consumers. Vital ecosystem services must be recognized, valued, and protected. Mitigating the threats to productivity posed by intensification, diversification, water shortages, and climate change will require innovative resource management and improved varieties.

Program 2 addresses the above challenges. Output 1 generates germplasm (seeds and the genetic material they contain) with improved productivity and grain quality that is also less affected by biotic (pests and diseases) and abiotic (such as drought and

Dr. Achim Dobermann
Leader, Program 2
Researchers are using conventional and biotechnological approaches to tap into genetic resources and produce highly productive and well-adapted inbred and hybrid rice varieties. Molecular breeding is being used to incorporate genes from exotic and wild species into improved cultivars and parents for superior hybrids. The germplasm thus generated is being combined with innovative crop management concepts.

Outputs 2 and 3 focus on crop and resource management for ecological intensification at the field and landscape levels. This approach will help close the gaps between achieved and potential yield, alleviate constraints, and improve the environmental sustainability and ecological resilience of intensive rice systems. Emphasis is on holistic, integrated crop management solutions for key lowland rice systems such as rice-rice, rice-wheat, or rice-maize. Such solutions tackle issues such as declining water availability and quality, low nitrogen-use efficiency, deteriorating soil fertility, micronutrient deficiencies, and increased pest buildup. We also work on developing new indicators of ecological resilience and sustainability, which will be vital to better understand and monitor key ecosystem services in rice landscapes.

Research in Output 4 concentrates on germplasm and management options to improve rice adaptation to climate change and mitigate greenhouse gas emissions from rice systems. Particular emphasis is on understanding the impact of climate change on rice and on developing new genotypes with improved tolerance for high temperatures at the sensitive flowering and grain-filling stages, thus minimizing yield losses to global warming or temperature extremes.

Output 5 facilitates adaptive research and dissemination of key technologies for greater impact, through collaboration with national agricultural research and extension services (NARES) and a wider range of other public- and private-sector partners. The Irrigated Rice Research Consortium (IRRC), the Rice-Wheat Consortium (RWC), and the IRRI–International Maize and Wheat Improvement Center (CIMMYT) Alliance project on Intensive Production Systems in Asia (IPSA) spearhead this research in different intensive production systems of Asia, with emphasis on reduced tillage and direct seeding, water-saving irrigation, site-specific nutrient management, ecologically based rodent management, and postharvest technologies.
Research priorities and policy options formulated by 2009 through characterization of the rice production environment and markets with regard to productivity potential and environmental stress and their interface with poverty

This output will allow a network of key policymakers and researchers to develop and use a validated and approved regional rice research and development plan, leading to increased productivity of sustainable rice-based systems in ESA.

During 2007, work progressed on the development of a network of key policymakers and researchers in ESA. Collaboration was sought with international and national research institutes and networks such as the Africa Rice Center (WARDA) and the Tanzania-based East and Central African Rice Research Network, as well as agricultural departments, universities, and private companies in Mozambique, Tanzania, Uganda, Rwanda, and Burundi. Initial meetings were held to
determine areas of common interest and to determine the real needs of each country. Two representatives from Mozambique and Tanzania were selected to attend the Rice Policy Forum held at IRRI in early 2008. IRRI has signed Memoranda of Understanding (MOUs) with Burundi and Uganda and is in the process of finalizing MOUs with Rwanda and Tanzania.

As part of an effort to understand the rice environment for research, production, and marketing, a socio-economic survey involving 450 farm families was conducted at Chokwe in southern Mozambique. This survey aimed to identify the constraints to rice production within the region, determine what kind of policy support may be needed to overcome these constraints, and assess the impact rice production could have on rice farmers’ livelihood, especially the poor. Preliminary results found that chemical fertilizer was very expensive and therefore not used by many farmers, labor shortages occurred often due to HIV/AIDS, birds were a problem during harvest time, and farmers often attained low farm-gate prices associated with high transportation costs and lack of market knowledge.

In 2007, field visits were undertaken with rice researchers in three ESA countries to evaluate the capacity of regional scientists and extension officers to conduct research and extension activities. We visited the Institut des Sciences Agronomiques du Burundì and the University of Burundi; the Institut des Sciences Agronomiques du Rwanda, Rwanda Agricultural Development Authority, and the Rwandan Ministry of Agriculture; and the National Agricultural Research Organization and the Namulonge Crop Resource Research Institute in Uganda.

The major constraints faced by all researchers throughout the region were a lack of and poorly maintained research facilities and infrastructure and insufficient operating funds to conduct research. It was also found that there were very few agronomists, plant protection specialists, and socioeconomists and no agricultural engineers working on rice in the region. Throughout Burundi, Rwanda, and Uganda, fewer than 30 researchers and technicians were working in rice research and extension. Research facilities were refurbished by IRRI at Chokwe and Quelimane in Mozambique to enable research activities to be conducted.
Elite lines including *O. glaberrima* derivatives with genes for stress tolerance validated by 2010

This output will allow national agricultural research and extension systems (NARES) to develop and use elite varietal lines appropriate to ESA rice environments. Improved varieties will increase profits for farmers and the availability of higher quality rice for consumers.

In 2007, work was undertaken to develop a network of rice breeders from key institutes. Rice breeders were identified and interviewed in Mozambique, Tanzania, Uganda, Rwanda, and Burundi. Collaboration began through joint screening studies at two sites in Mozambique and one site in Tanzania in the 2007-08 season. More than 4,000 lines were collected from ESA and Latin America and screened at IRRI, Philippines. From these collections, more than 2,500 lines are now being prepared for evaluation at Chokwe and Quelimane in Mozambique and Dakawa in Tanzania. Selections from these trials will be further tested in the other ESA countries.

In 2006-07, a number of IRRI varieties were compared with a modern local variety in yield trials in Mozambique. Of the 20 selected IRRI varieties, 14 showed yield advantages when compared with the local check variety. These are now undergoing further evaluation in ESA. Bacterial leaf blight, neck and sheath blast, and rice yellow mottle virus have also been identified as major rice diseases within the ESA region. A collection of germplasm (seeds and the genetic material they contain) from IRRI, Philippines, with known resistance to blight and rice yellow mottle virus will be tested in local hotspots, especially Tanzania, in 2008. Training workshops in 2008 will improve the capacity of ESA pathologists to identify local pathogens and breeders to select and test germplasm suitable for their local rice environments.
This output will allow NARES and other users to promote efficient production and post-production technologies for ESA. The resultant improved quality and quantity of rice produced and stored by farmers and the commercial sector will increase farmer and commercial profits and increase the availability of higher quality rice for consumers.

A number of crop-production experiments were conducted in Mozambique in 2007. Studies on plant nutrition, time of planting, and plant establishment were undertaken at Chokwe in southern Mozambique. Results showed that no yield advantage was attained at nitrogen (N) fertilizer rates above 80 units per hectare and that rice yields decreased by 20% for every month that planting was delayed after December, up to March. Soil puddling proved to be an effective weed-management practice and seeding rates could be substantially reduced without affecting yield. Studies in 2008 will further quantify time-of-planting and nutrition constraints and also address problems encountered after harvest.
Capacity of key rice scientists, technicians, and extension staff to conduct research and to validate and disseminate technologies strengthened by 2010

This output will allow scientists and extension officers to improve and use their skills in research, breeding, and extension activities, ensuring that the products of rice research in ESA are delivered to farmers more efficiently and effectively.

In 2007, two Mozambican agronomists attended a 2-week regional rice production training course in Tanzania and three plant breeders attended a 3-week training course in plant breeding at IRRI, Philippines. Training institutes in Uganda, Rwanda, and Burundi were also identified for future collaboration.

During 2008, training courses will be conducted to address local capacity constraints in rice production and postproduction, plant pathology, and germplasm selection and monitoring techniques.
East and southern Africa: rice for rural incomes and an affordable urban staple

More than 100 million people in East and southern Africa (ESA) live in extreme poverty and depend on agriculture. Many of these people are rice consumers and small rice producers who live in Burundi, Kenya, Mozambique, Rwanda, Tanzania, and Uganda. Demand for rice across these countries has been increasing at more than 6% per year. Much of this demand has come from urban consumers who preferred imported rice from Asia because it was cheaper and of better quality than locally grown rice. However, it is important to note that dramatic increases in the price of rice occurred in early 2008. With rice’s rising importance in Africa, these price rises make it more important than ever for African farmers to boost their productivity.

Rapid urbanization, the growing participation of women in the formal labor force, and population growth have resulted in a shift in consumer preference away from cassava, sorghum, millet, and maize. Rice is now either
the second or third most important food crop in the ESA countries. At present, 36% of the rice consumed in ESA is imported at a cost of more than US$450 million. There are more than half a million very poor rice farmers in this region whose poverty could be reduced by growing and selling rice to local urban markets. Increased local production would also reduce reliance on imported rice.

Potential for increasing crop yields is substantial. Although rice production has grown at more than 2.5% per year since 1990, this is mostly due to expansion of the rice-growing area. Rice yields have remained low and stagnant at 1–2 tons per hectare because of unfavorable rice environments and poor management. More than 90% of the rice is grown in rainfed ecosystems that rely on hand labor and very few inputs. Investigations across the region have found that production is constrained due to the limited range of rice varieties that have resistance to pests and diseases; a lack of inputs such as reliable water, affordable fertilizer, and labor; high postproduction losses; poor transportation systems; and an inability to access markets effectively. In some of these countries, less than 10% of locally grown rice is actually sold. Technical capacity is also very low, with fewer than 50 trained rice researchers and technicians working across the six countries.

In 2007, an integrated research-based program was implemented to improve the quality and quantity of ESA rice and to link farmers to local and regional markets. Activities were undertaken to determine the research priorities and policy options needed to support a rice industry, to select and develop varieties that are acceptable to the market and are resistant to local pests and diseases, to evaluate and demonstrate sustainable production and postharvest rice-based technologies, and to improve the capacity of key rice scientists, technicians, and extension staff. These activities were funded by grants from the International Fund for Agricultural Development, AQUIFER Ltd. (a company that sets up self-sustaining business enterprises in a number of African countries), and IRRI.
Nutritionally enhanced rice germplasm developed by 2009

This output encourages scientists to develop improved germplasm lines from their research and breeding programs. Once germplasm (seeds and the genetic material they contain) is developed, seed will be delivered to farmers by public and private seed companies and NARES. The public health and food sectors will promote nutritionally enhanced grain—such as pro-vitamin A–enriched Golden Rice—to consumers, who will benefit from greater availability of rice with increased nutritional content.

In 2005-07, the leading Golden Rice 1 transgenic event was bred into the popular variety IR64 and, in 2008, is undergoing outdoor testing (a total of 20 lines in a confined trial) at IRRI in the Philippines. Golden Rice 1 refers to the new version of the biofortified grain with five times the level of the original discovery; Golden Rice 2 is the more recently developed second-generation version, which has an additional five times higher level of pro-vitamin A than its predecessor. The Golden Rice 1 materials are adapted sufficiently now to begin initial field tests.

Initial bilateral and multilateral discussions on the strategic communication, promotion, and deployment plans for Golden Rice and other biofortified rice are under way with the leading governmental agencies and public health provider groups in the Philippines and to a lesser extent in India.
The generic and specific back-ground biosafety-related information on the Golden Rice 1 and Golden Rice 2 events has been assembled and used in support of IRRI’s confined test application of Golden Rice 1-IR64 in the Philippines. These same data sets and reports are also available for use by our Golden Rice partners in India and elsewhere. IRRI and the Philippine Rice Research Institute (PhilRice) are active in discussions with the Philippine government regulatory authorities to conclude the discussion on the specific data requirements for a science-based risk assessment of Golden Rice.

Leading lines and varieties with the intermediate target level of iron in the highly polished grain have been identified and confirmed in multiple environments, locations, and years. The leading materials have been shared with NARES in India, China, Indonesia, Bangladesh, and Vietnam for breeding and adaptation or for local selection. A human bioavailability trial of iron from rice is still under discussion with HarvestPlus.

Lead donor parents for high zinc and iron were crossed with elite lines and more than 300 lines have been developed from three single crosses. Seeds produced from these lines during the 2007 wet season were evaluated in replicated field experiments and promising lines identified by mid-2008. Another set of 645 lines from six backcrosses were developed during the 2007 wet season and were scheduled to be field-evaluated in 2008. Production began of lines from five crosses involving leading high-zinc and high-iron donor parents and the submergence-tolerant version of IR64. Similarly, two crosses involving BR29, a mega variety in Bangladesh, and lead donor lines were carried out. In anticipation of the needs for superior agronomic performance in the target areas, crosses were initiated between four lead iron and zinc materials and the submergence-tolerant derivatives of Asian mega varieties IR64, Swarna, Sambha Mahsuri, TDK1, and BR11. Elite germplasm was shared with collaborators from Indonesia, Bangladesh, and the Philippines.

High-zinc candidate materials, including varieties, have been identified and confirmed in multiple environments, locations, and years. Special efforts are being made to develop suitable varieties for Bangladesh and Indonesia. The preliminary plan for a stable isotope (extrinsically labeled) human bioavailability trial has been developed, with activities being undertaken by a consortium comprising HarvestPlus, the International Center for Diarrheal Diseases Research (Bangladesh), the Bangladesh Rice Research Institute, the University of California (Davis), Flinders University (Australia), Harvard University School of Public Health, the International Zinc Nutrition Consultative Group, and IRRI. Current activities include a national survey of local rice processing and cooking practices, and a study of retention of zinc in the food. In addition, the preliminary plan for a stable isotope (extrinsically labeled) human bioavailability trial has been developed. A related set of activities is being planned for Indonesia in 2008.
Strategies for the development, promotion, and delivery of biofortified rice, including transgenic rice, developed by 2010 for India and the Philippines, and then for Bangladesh, China, and Vietnam

The strategies developed in this output will allow public health policymakers, NARES scientists, and nongovernmental organizations (NGOs) to integrate biofortified rice into complementary food-based intervention approaches that address nutritional deficiencies, leading to increased awareness of the benefits of transgenic biofortified rice. The consumption of biofortified rice will reduce morbidity and mortality, especially in women and children, caused by those diseases exacerbated by micronutrient deficiencies. Furthermore, there will be a decreased prevalence of mineral and vitamin deficiencies in poor rice-consuming women and children.

In 2007, we developed communication plans to highlight the benefits of transgenic biofortified rice for the Philippines. PhilRice has taken the lead, in collaboration with IRRI and HarvestPlus, in developing the communication strategy and plan. Program 4 initiated a series of bilateral discus-
sions with the Philippine Department of Agriculture and various Philippine groups involved in nutrition and human health programs, including the National Nutrition Council (NNC), the Food and Nutrition Research Institute, and Helen Keller International (HKI). This dialogue focused on the current status of Golden Rice in the Philippines and started the process of understanding how Golden Rice might be most effectively deployed, initially as a complement to current efforts, for the relief of vitamin A deficiency. NNC is the highest nutrition policy-making body in the Philippines, while HKI is a leading NGO with significant engagement in community-based vitamin A supplementation in rural Philippines. A collaborative agreement was completed with the College of Development Communication of the University of the Philippines Los Baños to conduct a survey of key stakeholders’ perceptions and a meta-analysis of previous Golden Rice–related studies. A risk communication workshop held in 2007 was attended by representatives from various Philippine government agencies, NGOs, and universities. PhilRice will take the lead in seed production using the established rice seed growers network throughout the country.

The Golden Rice deployment plan in India has been deferred to the India Golden Rice Network, with participation from IRRI and the Golden Rice Network.
Strategies to reduce contamination of rice grains and to improve practices that decrease risks to human health developed by 2012

This output will allow NARES and policymakers to promote improved agricultural practices, leading to a reduction in occupational and accidental health consequences of rice cultivation and consumption.

A baseline survey on Arsenic contamination in rice grain and its implications for productivity and cultural practices of rice and for human health in Bangladesh was commissioned by IRRI and completed by the Bangladesh Agricultural University, Mymensingh. The study focused on two previously known arsenic-affected areas, Faridpur and Lakshimpur. It was concluded that, despite using higher doses of fertilizers and insecticides, the productivity of the most popular boro (dry-season) rice variety, BR29, decreased in farmers’ fields in arsenic-affected areas.

An ongoing study with the Philippine Bureau of Postharvest Research and Extension aims to establish baseline data on the formation of aflatoxin in the individual postharvest operations of rice paddy by comparing best-practice postharvest management with less optimal farmers’ practices under Philippine conditions.

In 2007, we established close collaboration with a consortium, led by Dartmouth College, New Hampshire, USA, that was awarded a National Science Foundation grant for the identification of quantitative trait loci (known as QTLs, these are areas of the genome that increase or decrease the expres-
sion of a trait to a particular degree) in a rice mapping population. Program 4 supported the proposal for the grant, which will screen for variation in metal and ion content of the rice grain and begin the process of mapping genetic loci that control this variation. The project will study all heavy and toxic metals that may accumulate in rice. The project leaders visited IRRI in 2007 for training on analytical methods and procedures.
Rice and human health: overcoming the consequences of poverty

IRRI’s Program 4 is a direct result of the Institute’s commitment to improving the nutrition and health of poor rice consumers and farmers—Goal 3 of IRRI’s Strategic Plan, Bringing hope, improving lives. Under Program 4, IRRI improves the nutritional value of rice for poor rice consumers. Micronutrient deficiencies, especially of iron, zinc, and vitamin A, afflict millions of poor Asians—people who receive most of their nutrition from rice and who stand to benefit from consuming more nutritious rice. In this light, IRRI is undertaking projects that will deliver increased dietary levels of iron, zinc, and pro-vitamin A (the precursor of vitamin A) through improved, biofortified rice varieties.

Program 4 has a limited amount of direct support from IRRI and derives or has derived most of its funding from the HarvestPlus Challenge Program (a multi-institute program to develop nutritionally enhanced crops), the U.S. Agency for International Development (USAID), the Grand Challenge in Global Health #9 of the Bill & Melinda Gates Foundation (through the University of Freiburg), the Asian Development Bank, the Indian Council of Agricultural Research, and the Rural Development Agency of the government of Korea.

As well as developing improved breeding materials and varieties, we are also committed to extending our involvement with
national agricultural research and extension systems (NARES), national nutrition organizations, and nutritional advocacy groups to ensure the successful deployment and impact of IRRI’s biofortified rice.

In 2007, we were unable to secure funding for Output 3, *Increased understanding of the roles of macromolecules in rice grains for caloric efficiency by 2010*. The goal of this output is to supply knowledge used to identify and breed rice germplasm with a better starch profile, which will contribute to the health of undernourished people by delivering more calories per meal.
Genetic diversity platform for gene function identification in domestic and wild rice gene pool established by 2011

The genetic diversity platform will represent a new paradigm in the use of germplasm in NA-RES breeding programs. It will be used to facilitate better understanding of rice allelic diversity for improved use of rice germplasm, to expand opportunities to identify useful genetic diversity in germplasm collections through the use of enabling genetic techniques and SNP data, and to broaden access to favorable alleles associated with traits available for breeding. By thus improving the efficiency with which researchers use functional diversity in the rice germplasm, we will accelerate the development of rice germplasm adapted to target conditions.

The available complete rice genome sequence makes it possible to determine the fine-scale genetic variation of multiple varieties of rice. This is an important step toward relating genome variation to biological variation in various agronomic traits. Under an international collaboration with multiple funding sources, we accomplished genome-wide SNP discovery for 20 diverse rice lines relative to 100 megabases (DNA is composed of “bases,” which sit side by side each other to form the DNA sequence) of the nonrepetitive regions of the genome of...
the Nipponbare rice variety. Perlegen Sciences, which in 2005 teamed up with IRRI to help detect genetic variation (in the form of SNPs) and its relationship to specific traits, predicted 259,721 non-redundant SNPs (sites in Nipponbare where 1 or more lines differ). The SNP information reveals the evolutionary history of the varieties, showing three main groups—temperate and tropical japonica with aromatic, aus, and Rayada, and indica with Aswina. About 93% of the genome is covered by at least 1 SNP per 100 kilobases, providing valuable marker information for genetic diversity studies and selection in breeding. To enable early public access to this wealth of data, version 1 of the SNP annotation database is available via the OryzaSNP project pages hosted at the International Rice Functional Genomics Consortium Web site. A more refined dataset with functional tools for applications is due for completion around mid-2008.

Fine-scale genetic variation was used for testing the relationship between SNPs in candidate genes and abiotic stress tolerance in a panel of diverse germplasm. (Abiotic stresses include such stresses as drought, flooding, and soil-nutrient deficiencies. Biotic stresses include pests and diseases.) Initial results indicated significant association of the biomass of the rice plant’s shoot under stress with specific variation in the sucrose synthase gene. In addition, we identified genetic loci (areas in the genome containing a gene) affecting three quality traits—gelatinization temperature, aroma, and amylose content.

These results together suggest the potential of aligning genetic diversity with important agronomic traits. The rich SNP dataset provides the tool for genome-wide determination of genetic variation in rice, a key step toward a comprehensive platform for associating genetic variation with biological phenotypes and agronomic traits. The dataset is being used by the global research community to design genotyping tools for broad usage. As a result, we expect genotype information from many rice germplasm and breeding lines to be accumulated over the next several years.

We have significantly improved our ability to transform multiple genotypes of indica rice. The transformation frequencies reached as high as 25% for IR64. In total, we achieved 1,500 independent transformation events. Single transgene insertions constitute 60% of these events. Good fertility was achieved in 70% of the independent transformants. With transformation of indica rice becoming routine, we are in a position to test candidate genes’ function directly in an indica rice background. We are also developing Web-based multimedia training modules for broader access to improved transformation methodologies. The robust and consistent protocol will remove a major bottleneck in rice transformation which so far has been largely restricted to japonica rice. It will facilitate the testing of gene functions in relevant genetic backgrounds. The practice will change the operation of many laboratories around the world in making transgenic plants for gene function validation or for direct genetic engineering of indica rice.

In collaboration with the Max Planck Institute at Tuebingen, Germany, we achieved specific suppression of target genes in both Nipponbare (japonica) and IR64 (indica) rice varieties by artificial microRNA-guided cleavage of messenger RNA (mRNA). MicroRNAs (miRNAs) are short RNA molecules involved in regulating gene activity in animals and plants (RNA is a form of nucleic acid, like DNA). The miRNAs degrade the rice’s own mRNAs—molecules that correspond to genes and allow enzymes, regulatory factors, or other proteins to be produced—and consequently turn off the gene in question. The method was evaluated by targeting three different rice genes—spotted leaf-11, phytoene desaturase, and elongated uppermost internode—in different tissues. This is the first report that artificial miRNAs efficiently trigger gene silencing and mimic mutant phenotypes in monocots. Improved transformation of indica rice together with the novel gene-silencing technique will benefit many rice researchers engaged in genetic engineering and validation of gene function in rice.
Specialized genetic stocks for trait dissection produced by 2011

This output will allow the research community to use well-characterized genetic stocks for gene function identification. The improved availability of stocks will promote collaboration between advanced research institutes (ARIs) and NARES. The resultant discovery of genes and gene combinations will enable development of germplasm adapted to target environments. In 2007, we made progress in developing mutant stocks for tackling diseases, salinity, and cold problems.

We isolated and characterized a collection of mutants with altered response to blast disease, cold, and salinity stresses. For analysis of broad-spectrum disease resistance, we isolated six susceptible mutants from screening more than 7,000 mutant lines of San-Huang-Zhan No. 2 (SHZ-2), an indica variety with durable blast resistance. The mutant phenotypes and mutation frequency suggest a repertoire of resistance mechanisms in SHZ-2, making these mutants particularly valuable for understanding the genes controlling durable resistance.

For salinity tolerance, we confirmed the phenotypes of four salt-tolerant and three salt-sensitive IR64 mutants under normal and saline conditions. Under salt stress, tolerant mutants showed better performance and higher yield than IR64. The tolerant mutants produce higher biomass, take less salt from the soil, and tend to compartmentalize salt away from active tissues such as newly developed leaves, hence protecting the plants. Two tolerant mutants are potential new varieties since they had the same IR64 genetic background.

For analysis of cold tolerance, we isolated five cold-sensitive mutants of Jinbubyeo, a cold-tolerant temperate japonica cultivar, under low-temperature stress. Results from genetic analysis suggested single recessive gene control for cold sensitivity. The mutant lines can now be used for dissection of cold-tolerance mechanisms.
Genetic pathways for selected traits determined using genome-wide and comparative biology approaches with priorities on stress tolerance, nutrition and grain quality, and yield established by 2015

Users of this knowledge will contribute to the International Rice Functional Genomics Consortium objective of understanding genes controlling target traits, which will enable researchers to develop markers for breeding and lead to, production of prebreeding lines. Acceleration of gene discovery on a genome-wide scale will improve sustainability in intensive production areas and increase productivity in marginal areas.

Two approaches—QTL mapping in advanced backcross lines and whole-genome expression (transcriptome)—were used to identify genes associated with blast resistance in rice. Using genome-wide microarrays, we followed the transfer of chromosomal segments from a rice variety expressing broad-spectrum blast resistance in advanced backcross lines. The microarray, as a mapping tool, detects single-feature polymorphisms (DNA insertions and deletions) in unique genes evenly spaced along the chromosomes. We found four regions—two on chromosome 2, one on chromosome 6, and one on chromosome 9—associated with blast resistance in the advanced backcross lines. Within the narrow regions on chromosome 6 and chromosome 9, candidate defense genes, including disease-resistance genes, were found.

Using 22,000 (22K) gene chips, we identified at least two regions on chromosome 4 (12 genes) and chromosome 10 (30 genes) that showed correlated expression patterns in SHZ-2. The convergence of mapping and expression data provided a rich source of candidate genes for validation. We are testing whether coordinated expression of these genes is responsible for the quantitative resistance observed in advanced breeding lines. The fact that these regions contain known sequences will help us identify specific genes responsible for the trait of interest.

In analysis of traits related to grain quality, we discovered two SNPs in the gene that may account for swelling of the starch granule and gel consistency. For gelatinization temperature and amylose, we produced primers, SNPs, and simple sequence repeats (SSRs; a form of marker) for determining heritability. We expect to have an online database showing the allelic state for each gene for the germplasm collection (comprising cultivated and traditional varieties, and wild rice species) and for breeding materials in the hybridization block trials. This will provide a faster selection tool for breeders. The results and markers will be delivered to Programs 1 and 2 for selection for gel consistency in breeding materials.

A workshop on “Supercharging the rice engine” was held at IRRI on 17-21 July 2006, which was followed by the formation of a C₄ Consortium (23 members). A book summarizing the scientific discussion of the workshop, and ways and means to move forward in developing C₄ rice was published in 2007. At IRRI, an Applied Photosynthesis and Systems Modeling Laboratory was constructed to undertake the new
research in this area and to manage interactions with the C₄ Consortium. The laboratory will complement the work of the C₄ Consortium by concentrating on whole-organ, plant, and crop photosynthesis. The primary objectives are to discover the extent of C₄-ness in wild-rice relatives, to assess C₄-ness in mutants and transgenic materials, and to apply photosynthetic discoveries to rice productivity. Initial experiments involved screening about 4,500 accessions of wild relatives of rice (other species of Oryza and closely related genera) for tendencies toward C₄-ness and determining characteristics of C₄-ness such as vein spacing, size of bundle sheath cells, chloroplasts in bundle sheath cells, and number of mesophyll cells between adjacent veins. Screening work will be completed in early 2008. Large carbon dioxide screening chambers were constructed for screening physiological variants. Carbon dioxide compensation point at 30 °C is being measured in selected materials.

A combination of genetic mapping, candidate gene analyses, and expression analyses has positioned us for the isolation of high-value genes in the next 2 years. The gene for resistance to tungro has been fine mapped to a region on chromosome 7 and several candidate genes are being investigated. For phosphorus-deficiency tolerance, candidate gene analyses focused on two genes—a putative protein kinase and a dirigent-like gene. Transgenic plants were generated to study the function of these genes in detail.
Ex situ conservation of rice germplasm expanded and enhanced through better understanding of the genetic diversity within and between collections in a global network by 2011 to contribute to long-term conservation efforts, harmonized with genebanks in other CGIAR institutes through the SGRP

Expanded conservation and improved management of rice germplasm will lead to increased awareness of NARES partners and policymakers concerning the importance of germplasm resources and the need for their preservation, and will promote increased use of germplasm collections. This work ensures that permanent genetic resources are available for meeting current and future needs in rice improvement, and increases the ability to develop rice germplasm adaptive to unforeseen challenges.

Summary information has been assembled on more than 500,000 accessions from 41 rice genebanks outside IRRI. A draft strategy for efficient global conservation of rice genetic resources was developed in conjunction with 27 rice experts from Asia, Africa, Europe, and the Americas at a workshop organized and hosted by IRRI. The strategy is based on providing effective local links to researchers and breeders while sharing responsibilities for conservation.

Coordinated through SGRP, a new initiative was begun to expand and enhance the effective conservation of rice germplasm across the CGIAR. A new larger long-term seed store was planned and is under construction. Studies are in progress to improve best practices for genebank management, developing economically rigorous decision-support tools for management, incorporate risk management, devise improved performance measurement indicators, analyze and improve maintenance of genetic integrity, upgrade regeneration protocols, establish more secure protocols for keeping transgenic rice separate from nontransgenic rice, improve procedures and strategies for characterization and diversity analysis, document a large percentage of global holdings of rice accessions in a central rice registry, develop improved system-wide standards for the safe movement of germplasm, and improve integration between the rice collections at IRRI, the Africa Rice Center (WARDA), and the International Center for Tropical Agriculture (CIAT).

In 2007, we addressed unresolved rice taxonomic issues. Research results support recognition of tetraploid *Oryza officinalis* as a distinct species—*O. malampuzhaensis* as first published by Krishnaswamy and Charasekharan.
from its diploid counterpart. These accessions will be re-identified as *O. malampuzhaensis* in the International Rice Genebank Collection Information System/International Rice Information System database.

Phenotypic and molecular analysis of 72 accessions of *O. punctata* also indicated that the perennial tetraploids may be sufficiently distinct from the annual diploids to be considered a separate species. However, we need to further analyze several tetraploids that did not fit this classification before reaching a final conclusion.

Morphological analysis of 75 accessions of South American tetraploids showed *O. grandiglumis* in a distinct cluster from *O. alta* and *O. latifolia*, confirming existing taxonomy.

Research under this output is underpinned by a large amount of processing of accessions to keep them viable, healthy, and available for use. Eighty-seven incoming samples were grown for seed production, additional seed was produced for 3,721 existing accessions, 16,339 viability tests were completed, 23,941 samples were distributed to 186 recipients in 31 countries, and 4,000 accessions were characterized phenotypically.

Arrangements were concluded to deposit duplicate samples of 70,000 accessions as a safety backup in the Svalbard Global Seed Vault in the Arctic. All were prepared during 2007, to be shipped early in 2008. The actual deposition of the rice accessions occurred in a ceremony held on 26 February 2008.

Long-term broadened access to genomic resources and associated tools, particularly for NARES

This output will equip national agricultural research and extension systems’ (NARES) researchers and extension agents with better options for the development and delivery of new varieties. Gene and marker selection technology will be more easily implemented by NARES and integrated into NARES breeding programs. This will also increase the capacity of NARES scientists to use genomic knowledge and tools to develop improved varieties.

An IRRI–International Center for Maize and Wheat Improvement (CIMMYT) joint project on developing low-cost, gene-based marker technology in collaboration with national program partners in Asia (China, India, Indonesia, and the Philippines) and Africa (through WARDA and the Institut de la recherche pour le développement) was supported by the Generation Challenge Programme in 2005-07. SNP markers for bacterial blight resistance genes Xa21 and xa5 in rice and the opaque2 gene in maize were developed and used in different nongel-based technologies for marker-assisted selection (MAS; this involves linking a desired gene with a marker so that it can easily be bred into a rice variety) applications: dot-blot and microplate assay technologies and fluorescence resonance energy transfer assay, and microarray-based genotyping methods. Validation of technologies was performed by the different partners through hands-on training and demonstration in India.

In 2007, two IRRI workshops provided training to NARES breeders in the application of high-throughput technologies for MAS application. Nineteen NARES/small-company partners from Africa (2), China (2), France (1), India (10), Indonesia (2), Philippines (1), and Thailand (1) participated in the workshop on “Low-cost gene-based technologies for MAS application in rice and maize” at Barwale Knowledge and Study Center, Jalna, Maharashtra, India, 26-29 April 2007. IRRI and CIMMYT researchers and scientists served as trainers and resource persons to provide hands-on technologies, principles of the technologies, and breeding strategies and applications in rice and maize.

In collaboration with the Barwale Foundation, we trained 30 participants from national institutions, universities, small and medium enterprises, and private seed companies involved in crop improvement in rice and other crops in India at the Workshop-cum-Training on MAS for Crop Improvement, Hyderabad, India, 20-24 August 2007. A laboratory manual was developed for these training workshops and was updated later to include recent improvements of the methodologies.

Gene-based markers have been developed for tagging resistance genes for bacterial blight and submergence-tolerance gene Sub1A. To identify multiple genetic mechanisms for tolerance of phosphorus deficiency, gene-specific markers were developed to identify rice varieties that do not possess the Pup1 locus (which confers tolerance of phosphorus deficiency). This gene-tar-
geted germplasm screening approach revealed that the \textit{Pup1} locus is mainly present in rice varieties developed for rainfed stress-prone environments, whereas it seems to be largely absent from modern, irrigated, and lowland varieties.

Efforts to revitalize INGER have progressed in several areas, including germplasm exchange, documentation, and training. A total of 1,236 breeding lines from IRRI, ARIs, CGIAR centers, and NARES were exchanged and disseminated through 18 types of nurseries and special screening sets in 40 major rice-growing countries (a total of 521 nursery sets involving 38,000 seed samples). Two international training courses on rice breeding were held for 46 participants from 21 countries. Digitalization of INGER data, elimination of a 3-year reporting backlog, and dissemination of data and reports through the Internet were achieved. Increased awareness of NARES breeders and policymakers on germplasm-exchange issues through workshops, meetings, and visits resulted in increasing germplasm exchange activities. Overall, there was greater integration of INGER with other networks, consortia, and projects at IRRI and within the CGIAR.
Program 5 provides the foundation for applying rice genetic diversity in the implementation of IRRI’s Strategic Plan. It focuses on three themes: characterization and creation of genetic diversity, and gene-function assignment; conservation and documentation of germplasm (seeds and the genetic material they contain); and enabling access to and use of genetic diversity and associated tools. These activities aim to solve production problems by using genetic diversity and by providing a genetic research platform that enables efficient conservation and use of genetic diversity. Thus, Program 5, which represents the interface between understanding and applying genetic diversity, promotes a convergence of approaches and innovations. Although the program’s activities are driven by the problems IRRI seeks to solve, the research also accommodates exploratory work to serve long-term needs.

In developing a public genetic research platform, a key achievement of Program 5 has been the production of more than 150,000 high-quality single-nucleotide polymorphisms (known as SNPs, these are small variations, such as single-base mutations, in gene sequences) across 20 rice genotypes through the OryzaSNP project, a collaborative effort coordinated by the International Rice Functional Genomics Consortium. To analyze grain-quality and stress-tolerance traits, we are determining the relationship between genetic diversity and phenotype—the actual form the plant takes in the field. We have also improved the efficiency with which indica rice can be transformed (in transformation, a gene or genes from another variety or species...
are inserted into the genome of the target variety), which will facilitate the testing of gene functions in different rice varieties.

We have made good progress toward identifying genes and chromosomal regions with important agronomic benefits. Through genetic mapping and candidate-gene analysis, we have narrowed the list of genes conferring tolerance for salinity, phosphorus deficiency, and tungro disease. Furthermore, a large-effect quantitative trait locus (known as QTLs, these are areas of the genome that increase or decrease the expression of a trait to a particular degree) for drought tolerance has been identified in advanced backcross lines and near-isogenic lines (NILs; two or more NILs are identical to each other apart from a small section of the genome that confers a particular trait). This discovery is paving the way for identifying the genetic determinants for drought tolerance.

In the exploratory work of designing C₄ rice, we have established a collaborative framework to look for “C₄-ness” in wild and domesticated rice germplasm. So-called C₄ plants, such as maize, photosynthesize more efficiently than C₃ plants, such as rice. A C₄ version of rice, if possible, could substantially boost productivity using the same or fewer inputs.

Efforts in germplasm conservation and dissemination have resulted in improved movement of genetic resources. The standard material transfer agreement is fully implemented, enabling uninterrupted germplasm flows. From January to August 2007, IRRI distributed accessions that represented 40% of total reported global transfers. We completed the upgrading of IRRI’s International Rice Genebank, and are now well positioned for the implementation of the Global Public Goods–Phase 2 activities. Revitalization of the International Network for Genetic Evaluation of Rice (INGER) had a healthy start in 2007. Through consultation meetings with national agricultural research and extension systems (NARES), we affirmed the roles and values of INGER, and 2007 saw a modest rise in germplasm exchange throughout the year. INGER and special training workshops have also provided training and re-tooling opportunities for rice researchers and breeders from NARES.

Considerable growth in rice functional genomics research has occurred since the complete rice genome sequence was published in 2005. We aim to continue expanding research activities aided by genome information and associated tools. Program 5 will concentrate on isolating genes as demanded by IRRI’s impact-oriented programs. Use of fine-scaled, genome-wide markers will be a key feature of germplasm characterization. A marker is a segment of DNA linked to, or part of, an allele (a version of a gene) that controls an important trait and can easily be detected in the lab. We will continue to mobilize the international community to invest in such a public platform. Within IRRI, we will seek to optimize DNA-based germplasm characterization through a combination of upgrading in-house capability and selective outsourcing. We will continue to emphasize the development of specialized genetic stocks that have proven value for gene identification. To maximize their utility, we will aim for breeding-ready genetic stocks to enable fast uptake of results from the gene discovery program.
The rice component of the Crop Science Information Resource (an initiative of the IRRI-CIMMYT Alliance), which is a global community-curated repository and network of public crop science information resources, established by 2010

The vision of Output 1 is that many researchers within the rice science community will use the Crop Science Information Resource as a primary source of current, publicly available, and easily accessible crop research information. This will enable them to accelerate and focus crop research for development leading to sustainable productivity increases.

In 2007, we developed a consolidated rice germplasm information system for genetic resources, genomics, and crop improvement that is being cross-linked with indexed rice literature and related information. Germplasm records from the T.T. Chang Genetic Resources Center (GRC) and from the International Network for the Genetic Evaluation of Rice (INGER) were fully consolidated into the International Rice Information System (IRIS). Initial cross-linkages with pertinent rice literature were curated. Third-generation Web access to IRIS was deployed, based on GCP technology.

Elements of a Web services–driven informatics network of IRRI and external genomics and comparative cereal information were prototyped in 2007. A Web query interface within the IRFGC portal is being deployed to query these distributed genomics data resources. An online comparative stress-gene resource was established with Web service linkages to related resources such as the Coopération internationale en recherche agronomique pour le développement.
(CIRAD)–hosted GreenPhyl database. This work is continuing into 2008 with one postdoctoral fellow from CIRAD. Wheat and maize data were entered into the International Wheat Information System v3 (IWIS3) and the International Maize Information System (IMIS) using the ICIS databases; these are now also wrapped with GCP Internet-access protocols.

Technology for a community-curated Encyclopedia of Rice Science using Web 2.0 protocols was developed. The encyclopedia will be fully deployed as an output target in 2008.
The Cereal Knowledge Bank, an online resource of knowledge on cereal production for rice, maize, and wheat, containing rice information from IRRI’s Rice Knowledge Bank, established by 2010

The Cereal Knowledge Bank (CKB) is the preferred source of up-to-date information on new technologies and best practices used by extension workers, other farmer intermediaries, and farmers for rapid dissemination and uptake of appropriate crop technologies. Expanded dissemination and accelerated adoption of new productive and sustainable farming practices result in increased total returns to rice research and its impact on poverty.

In 2007, the RKB came online within the CKB. IRRI and CIMMYT worked closely in 2007 with three exchange visits concerning the CKB.

The outcome has been a convergence of approach to the CKB that encompasses the successful principles of the RKB of having central management of a core knowledge bank and independent but linked NARES country knowledge banks. The CKB encompasses rice, wheat, and maize cereal systems. It is a major step forward for two international centers to join hands in working with NARES on a common platform for extension, farmer, and young scientist knowledge management.
The World Rice Community Portal—which uses Internet technology for access to information and for interaction on rice by supporting self-organizing communities and multilateral communication—operational by 2010

This portal is used to build global communities that interact, debate, and collaborate on rice research for development and extension. This innovative approach to knowledge sharing and problem solving accelerates the development and uptake of the results of rice research for development.

In 2007, IRRI signed a contract with Google Inc. to make full-text searchable versions available of all publications to which IRRI holds copyright, with options to expand this activity for other literature, and with unlimited internal access and partial external access depending on copyright restrictions. A DSpace platform (an open-source online tool for accessing, managing, and preserving scholarly works) was installed for open access to articles published by IRRI scientists and collaborators. IRRI-produced images are being made available to clients and the general public under a Creative Commons license in its Photo Bank and on Flickr.

IRRI is running a nonprofit version of the Salesforce.com–hosted Community Relationship Management platform, which will house information on people associated with IRRI such as collaborators, scholars, alumni, trainees, and staff.

The IRFGC Web site was redeployed as a Web 2.0 site using the Joomla! framework, into which many diverse community management tools can be plugged. The site also includes access to data resources of the Oryza-SNP project.

The country knowledge bank principle is an ongoing development. In 2007, Thailand, Vietnam, Cambodia, and Sri Lanka country sites transferred management to the respective country NARES. Indonesia was due to follow.
Phase I of the Informatics and Communication Service for Crop Science—which is a public research, development, and dissemination service for informatics and communication technology targeting agricultural scientific research and extension—completed by 2010

This output gives crop scientists increased benefits from appropriate informatics and communication technology. Increased application of such technology leads to more equitable access, and to rapid development, dissemination, and adoption of rice science information and technology.

In 2007, Web-based communication and collaboration systems for crop science were established, supported, and extended. These systems are in daily use by ICIS developers and users, and serve as the software development platform for the GCP subprogram 4 (Bioinformatics and Crop Information Systems). The CropStat statistical software package was upgraded, enhanced, and released as CropStat version 7.

As part of GCP subprogram 5 (Capacity Building and Enabling Delivery), an online introductory course for bioinformatics was developed and published on the GCP Wiki site. As part of an information and communication technology–knowledge management (ICT-KM) project, Good Practice in Research Data Management, a support site for research data management in the form of a Wiki was established. The site was populated with best practices, data management recipes, and guidelines. The initial installation, configuration, and testing of IRRI file repositories were carried out in cooperation with IRRI’s Information Technology Services. Three research groups of IRRI’s Crop and Environmental Sciences Division and several users in the Social Sciences Division are now using these file repositories. An institutional digital repository was installed at IRRI and made available for testing to Communication and Publications Services and Library staff. About 200 digital knowledge objects were uploaded, a simplified version of the Rice Thesaurus was integrated, and full-text indexing locally and through the Google search engine was achieved.
In 2007, we released IRRI-contributed software technology to the GCP and continued to enhance ICIS software for crop research communities. Progress was made on developing and enhancing ICIS tools for crop information management. Version 5.4 of ICIS was released in June at the 2007 ICIS Developers Workshop. IRIS was enhanced with facilities to manage seed exchange in compliance with the Standard Material Transfer Agreement. These facilities are being implemented in the Seed Inspection and Distribution Unit (SIDU) at CIMMYT for maize and wheat. New versions of the IWIS3 and IRIS databases were released on CD in June 2007. Progress was made on developing an IMIS genealogy database for maize. A maize pedigree parser was developed by programmers at IRRI and will be deployed to harvest maize pedigrees from CIMMYT’s maize Fieldbook application.

IRRI continued its leading role on GCP comparative stress gene ortholog database and visualization tools (“orthologous” genes are similar genes in different species that originated from a common ancestor). The database and Web interface were significantly enhanced in 2007 in time for presentation at the annual review meeting of the GCP. The GCP-scientific domain model and application programming interface framework was firmly established as a production framework. Development of the Web (Koios, —a specialized search engine for Generation Challenge Program research data, analysis, and visualization tools) and standalone interface (GenoMedium, which allows users to query, visualize, and analyze data using the tools available at GCP Pantheon) was continued with new functionality such as ICIS data sources and integration with the GCP Templates data editor.

CRII staff assisted with or conducted 12 training courses in 2007 in addition to continued consultation on experimental design, data management, and analysis for all programs across IRRI and CIMMYT. The strategy for institutional research data management developed in 2006 is being implemented in two programs at IRRI and, when support staff are recruited at CIMMYT, it will be implemented in two programs there. New statistical models for incorporating molecular and pedigree information into analysis-of-genotype and genotype-by-environment data are being developed, as are tools for routine computation of pedigree relationships. Research on statistical methodology for association analysis using pedigree information is being conducted and a new selection-index methodology is being tested via simulation models.
It is imperative for IRRI as a research for development organization to make sure that the information produced by its research, along with that gathered by other organizations, flows to our partners in the national agricultural research and extension systems (NARES) and, ultimately, to farmers.

Advances in information and communications technology give IRRI both the opportunity and obligation to share information in new ways. We now have an imperative to share equitably and provide access to knowledge and information collected by researchers around the world. Previously, this has been technically very difficult, if not impossible. However, with new technologies, the Internet, and the rapidly declining price of mass storage of information, the potential for sharing knowledge is greater than ever before. IRRI has a duty to think about how to make that potential become reality.

Program 6 will see IRRI convening wide communities of researchers and extension workers who come together around real problems and challenges in rice research and development. In this role, the Institute is also working to build the next generation of rice researchers.

In 2007, the first full year of its activity, the program worked toward its major goals of optimum stewardship of information and knowledge, sharing this knowledge in an equitable way, and acting as a conduit for research—both basic and applied—from advanced research institutions to NARES and, finally, farmers.

Progress was made on all Program 6 outputs in 2007. For the first output—the development of a Crop Science Information Resource—the following activities were undertaken:

**Information and communications: convening a global rice research community**

**Dr. Graham McLaren**
Leader, Program 6
• Germplasm information for rice genetic resources, breeding, and international testing was integrated into an International Crop Information System (ICIS) database hosted as the International Rice Information System (IRIS);

• A catalogue of stress genes was implemented to facilitate comparative genomics for Generation Challenge Programme (GCP) crops. Genomics is the science of discovering genetic structure, variation, and function, and the interrelationships among these;

• A portal was established for the International Rice Functional Genomics Consortium (IRFGC);

• Data from the OryzaSNP project to substantially characterize the molecular diversity of 20 representative rice germplasm varieties were published through the IRFGC portal; and

• A start was made on facilities for a community-curated Encyclopedia of Rice Science.

  Management of the Rice Knowledge Bank was strengthened to ensure that extension services and farmers have reliable access to scientific knowledge. The Cereal Knowledge Bank (CKB) has been initiated in collaboration with the International Maize and Wheat Improvement Center (CIMMYT) following the same principles of authentication and access. Rice, maize, and wheat extension information is now available in a single CKB portal (www.knowledgebank.irri.org and www.knowledgebank.cimmyt.org).
Widely used portal technology, Joomla!, has been employed for both the science information resources and the knowledge banks. A Community Relationship Management information system has been deployed using a not-for-profit version of a commercial system called Salesforce. IRRI-owned technical information has been made freely available as open content through Google Book Search (described in more detail later), which has made the full text of more than 300 IRRI books available on the Internet for viewing and downloading.

The Crop Research Informatics Laboratory (CRIL) has implemented an Information and Communications Service to support research programs. This service includes consultation and training for biometrics, data management, and bioinformatics as well as support for collaboration tools (http://cropwiki.irri.org and http://cropforge.org), statistical programs and data, and information management software. Updated versions of CropStat (a statistical software package) and other software tools were developed and released throughout 2007.
Updated subnational/farm database and maps on socioeconomic aspects of rice production in major rice-growing countries of Asia prepared by 2012

The data compiled in this output are used by researchers, policymakers, and development agencies to generate improved knowledge of trends in the rice economy and policies, extrapolation domains of improved rice technologies, and drivers of change in agriculture and rural development. Knowledge of trends in rice and the agricultural economy and drivers of change are advanced through data analysis, research publications, and discussions in international fora, and used in IRRI-NARES bilateral research planning meetings.

An increased understanding of long-term trends in, and spatial patterns of, rice production, based on credible socioeconomic data, will lead to more informed decision making and improved resource allocation and prioritization of rice research. Ultimately, improved funding decisions will increase the likelihood of faster agricultural and rural development in the rice-growing areas of Asia.

In 2007, we produced the first version of a global subnational rice distribution database, a compilation of statistical data from national sources. This work builds on older data from IRRI (Asia) and the International Center for Tropical Agriculture (CIAT; Latin America), but includes new data for most countries, including Bangladesh, India, and Thailand. The global database was due to be released on the Internet within the year. Future work will increase resolution by using satellite-derived data and put more emphasis on capturing time series and long-term curation of these data.

We completed development of a database on male migration and division of labor by gender in rice production systems in villages in eastern Uttar Pradesh, West Bengal, Jharkhand, northern Bihar, Uttaranchal, and Uttar Pradesh, India. Similar databases were developed for the Philippines, Thailand, and Vietnam. These data help researchers, policymakers, and development agencies develop and improve their own programs by considering changing gender roles and the consequent impacts on rice production.

A subnational database of administrative boundaries containing nearly 120,000 geographic features and names was updated. This database is currently being used at IRRI for poverty mapping and geo-referencing data from the Institute's International Rice
Genebank, and is being picked up by many others for mapping and analysis. Work continues on improving some of the details for some countries. Future work will focus on optimizing the informatics approach to collaborative data creation, curation, and distribution.

The world rice database was revised substantially and updated. Time-series data on rice production, area, and yield from 1961 onward were incorporated, with greater emphasis on Africa. Compilation and analysis of subnational poverty maps for Asia and major rice-growing countries of Africa started in 2007, with worldwide compilation essentially completed. First-round analysis of patterns of poverty and the geographic variables associated with poverty was also completed. This is now being refined and written up.

Rice Around the World

World rice production in 2007 was approximately 645 million t. At least 114 countries grow rice and more than 50 have an annual production of 100,000 t or more. Asian farmers produce about 90% of the total, with two countries, China and India, growing more than half the total crop. Click here to enter.

World Rice Statistics

World rice statistics (WRS) presents comprehensive time series data related to rice. Data on rice production, trade, consumption, inputs, prices, and other related information are compiled from international and national statistical sources, personal communications, and from responses to questionnaires sent by IRRI’s Social Sciences Division.
Comprehensive knowledge of changes in rural livelihood systems and interactions among technology, infrastructure, and institutions in major rice-growing countries of Asia developed by 2009

Policymakers and research managers can use the information obtained through this output to improve research prioritization, rural investment portfolios, and policies. An increased understanding of livelihood strategies will help the intended users develop and implement research projects and agricultural policies that will increase the likelihood of the research outputs making a contribution to associated development goals.

Data collection for studying farm consolidation, land tenure, and input use in rice production in India was completed. These data will be used to investigate the efficiency of rice production under increasing labor scarcity. Discussions were held with the Food and Agriculture Organization of the United Nations (Bangkok office) and the Department of Agricultural Economics of the University of the Philippines for identifying suitable partners for collecting and analyzing similar data for Thailand and the Philippines, respectively.

Assessments of broader changes in gender roles in rice production and how improved technologies interact with these gender roles were conducted. The results indicate that gender roles are changing rapidly, with women family members of poor farming households working increasingly as unpaid laborers on their own farms, as wage laborers, and as farm managers. Tasks traditionally separated by gender are becoming less distinct, with women increasingly replacing men in irrigating fields, applying chemical fertilizers, spraying chemicals, and hauling inputs and farm products, for example. In the Philippines, labor participation by females on rice farms has decreased, with women increasingly seeking nonfarm employment opportunities.

A study of the economic costs of drought and rice farmers’ coping mechanisms was completed. The results indicate that the household-level consequences of drought are severe, with poor households losing a substantial proportion of their income in drought years. As a result, many households fall back into poverty during drought years. The economic costs of drought were found to be much higher in less diversified systems of eastern India than in Thailand and China, where income is more diversified. The report of the study was published in a book, *Economic costs of drought and rice farmers’ coping mechanisms*, and a journal paper.
Policy reform options based on analyses of long-term changes in comparative advantages in rice production in major rice-growing countries of Asia developed by 2012

Policy makers can use the information generated by this output to guide policy for increasing the economic efficiency of rice production. Research managers can use the information for research prioritization. Improvements in the policy environment, particularly in the areas of trade, rural development, and natural resources policy, will increase the likelihood that gains from research are not only realized but are also of greatest benefit to the targeted groups, namely, poor rice farmers and consumers.

Two case studies on social capital and irrigation management in the Philippines were completed, and the results are summarized in research reports. A follow-up and update survey was started and was continued in 2008. In addition to the Philippine studies, a project is ongoing in China. These data sets will be used to investigate the determinants of water-use efficiency, with particular focus on institutional differences and differences in intensity of pond use between water users’ groups.

Another study focusing on the Philippines also investigated the impact of institutional change on farmers’ adoption of alternative wetting-and-drying (AWD) technology for saving water. The team started a baseline survey in collaboration with the Philippine Rice Research Institute and the National Irrigation Administration. Using baseline survey data, we are examining who suffers from water shortage, how they manage the shortage, and who pays and who does not pay for irrigation. We will then explore the effectiveness of alternative institutional arrangements to enhance the adoption and sustainable use of AWD technology.
Knowledge of potential and realized impacts of rice research on poverty reduction and sustainable management of natural resources generated by 2009

IRRI and NARES will use the knowledge generated by this output for research prioritization and to support more effective project development and implementation. Donors may also use this information in deciding which projects to fund. More informed investment decision making, along with improved project design and implementation, increases the likelihood that research outputs reach the intended target groups and have a significant payoff. As a result, the livelihoods of target groups are improved through sustainable increases in productivity.

In 2007, IRRI implemented strategies to institutionalize an impact culture. An impact-focus framework for developing and evaluating projects was developed and strategies for increasing its relevance and use are continuing in 2008. The framework has already been used in workshops and by some IRRI staff in developing project proposals. A workshop was convened on Orienting, Designing, and Implementing Projects to Make a Difference on 13 June 2007. Around 20 IRRI staff participated.

A generic impact pathway was developed for use across the Consultative Group on International Agricultural Research (CGIAR) system. A description of the value of developing and using impact pathways in rigorous impact assessments was prepared and submitted to the CGIAR Standing Panel on Impact Assessment (SPIA) for inclusion in its publication, Strategic guidelines for ex post impact assessment of agricultural research, due in 2008.

A policy-oriented impact pathway was developed. This provides impact assessment practitioners with a pragmatic strategy for documenting the consequences of a policy change and linking this back to the policy-oriented research by not only identifying outputs, outcomes, and impacts but also by explicitly considering the myriad influences and attributing issues. As such, it is an important prelude to ex post impact assessment because it provides a guide to the major focal points of an analysis, and to data needs and sources.

IRRI hosted the final workshop of the SPIA Policy-oriented Research Impact Assessment case studies in December 2007. Ten impact assessment specialists from CGIAR centers presented the methods and tools they have developed to ensure analytical
rigor in the assessment of policy-oriented research. The case study presented by IRRI was on the economic impact of the 1992-96 Philippine “pesticide policy package,” which consisted of a suite of pesticide regulatory policies and implementing guidelines aimed at banning or restricting the use of highly toxic insecticides in rice production and encouraging safer pesticide management practices. The study examined those factors that brought about or influenced the government’s decision to change the policies on pesticides and pest-control practices and, where possible and justified, to attribute these benefits to the key players, with a focus on relevant IRRI research. The results indicated that an earlier health cost study conducted by IRRI in 1991 contributed to a policy change that resulted in very large benefits in terms of private health costs avoided.

A survey was conducted to assess the impact of the “Three Reductions, Three Gains” (3R3G) campaign in Vietnam, which aims to reduce input rates—seeds, nitrogen fertilizer, and pesticides—and eventually to reduce production costs, improve farmers’ health, and protect the environment. The survey data provided evidence of the adoption of 3R3G recommendations primarily in terms of lowered seed rates followed by reduced pesticide and fertilizer rates.

An assessment of the impact of site-specific nutrient management (SSNM) in northern Vietnam began. Household survey data were collected and the analyses completed so far show positive returns from SSNM.
Strategies and policies for facilitating rapid dissemination and diffusion of improved technologies developed by 2009

Based on the knowledge generated by this output, current approaches to technology dissemination will be refined by national extension systems and community and farmer organizations to facilitate rapid technology diffusion. Technologies will thus reach more farmers faster, increasing the total returns from rice research and its impact on poverty.

Innovative strategies for promoting faster uptake of technologies by men and women were documented and synthesized into a book entitled *Innovations in rural extension: case studies from Bangladesh*. This book includes the broad principles for a new approach to extension by illustrating the innovative complementarities that can be built between farmer education, farmer organizational development, extension and communication, and pro-poor business development. Cases on innovative strategies for involving women as agents of change included women-led group extension, the family approach whereby husbands and wives receive training together, and the production of videos in which women’s knowledge and skills were presented alongside scientific information.

Participatory and community approaches and partnership among research institutes, NGOs, and farmers, including women, were found to be keys to success in validating and scaling up of “best bet” technologies from IRRI, the World Agroforestry Center (ICRAF), the International Maize and Wheat Improvement Center (CIMMYT), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and NARES partners from the Indian Council of Agricultural Research and other agricultural universities. Case studies were published in a monograph titled *Technologies for improving rural livelihoods in rainfed systems of South Asia*.

A comparative review of the social, cultural, and institutional factors that determine technology adoption and adaptations in Indonesia, Myanmar, the Philippines, and Vietnam was started.

A review of alternative institutional approaches used in IRRI for technology validation and scaling up was conducted. The key ingredients for success were the suitability of technology to the target farmers, inclusion of dissemination partners in the technology design phase, capacity building of partners, establishment of crucial linkages among partners, plurality of approaches given the diversity of the target domain, and engaging policymakers through dialogues and other forms of communication.
The impact of rice research on poverty reduction and environmental sustainability depends on appropriate policies and technologies that address farmers’ livelihood needs. Strategic assessments for agricultural and economic growth in rice-producing regions, the dynamics of rural livelihoods, the nature and determinants of poverty, and commodity and market trends in increasingly globalized markets are critically important for determining investment priorities for rural development. Planning and prioritizing rice research also require a deeper understanding of people’s access to and use of natural resources and other forms of capital—physical, financial, human, and social—and their interactions with government agencies, nongovernmental organizations (NGOs), and other institutions that influence people’s livelihood strategies. It is critically important to understand the changes in farmer practices that are currently taking place as well as the drivers of such changes, including farmers’ knowledge, perceptions, and criteria for technology choices, and how components of livelihood systems and rice technologies interact. Such an understanding provides the scientific basis for technology design, targeting, and delivery.

Program 7 is geared toward providing sound advice to policymakers, research managers, and donors regarding the design of agricultural interventions through policy analyses, livelihood studies, and impact assessments focused on the rice systems of Asia. Through close partnership with national agricultural research and extension systems (NARES), the program also contributes to building capacity for broader socioeconomic and policy analyses of the agricultural sector.
In 2007, the program made substantial progress in compiling national and subnational data on rice production, area, and yield over time for major rice-growing countries. This information was combined with similar information on national and subnational poverty statistics to identify areas with substantial overlap between rice area and poverty using geographic information systems (GIS) tools. The program also undertook a major initiative to revive and update the world rice database that includes information on major economic trends in rice production, prices, and economic returns. The revised world rice database is due to be published in 2008.

Another major initiative of the program was to organize a rice policy forum, which was held on 18-19 February 2008. The main objectives of the forum were to bring in NARES perspectives on key policy issues adequately in Program 7’s design and implementation, to identify key policy research issues, and to set up a network of rice policy researchers. About 30 national and international policy researchers participated in the forum.

The program also made substantial progress in developing an impact culture within IRRI through several training workshops on project evaluation and impact assessment. Both NARES and IRRI staff were exposed to approaches and tools for project evaluation and impact assessment.
Journal articles (refereed)


Bouman BAM. 2007. A conceptual framework for the improvement of crop water productivity at different spatial scales. Agric. Syst. 93: 43-60.


Collard BCY, Das A, Virk PS, Mackill DJ. 2007. Evaluation of ‘quick and dirty’ DNA extraction meth-


Kundu S, Bhattacharyya Rajan, Prakash Ved, Pathak H, Gupta HS, Ladha JK. 2007. Long-term yield trend and sustainability of rainfed soybean-wheat system through farmyard manure application in...


**Books (monographs)**


**Book chapters**


Publications and Seminars


Conference and workshop papers—proceedings


Publications and Seminars


Pathak H, Ladha JK, Saharawat YS, Gathala M. 2007. Impact, productivity, income and environmental impact assessment of RCTs in RW system using...


Singh VP, Singh Y, Singh G, Mortimer AM, Johnson DE. 2007. Crop performance and incidence of weed species with the introduction of direct-seeded rice...


Conferece and workshop posters


Conference and workshop papers–presented


on Genetic Evaluation of Rice, 8-11 May 2007, Bangkok, Thailand.


Publications and Seminars


Naredo MEB, Gamalinda MB, Melgar RJA, McNally KL. 2007. EcoTILLING the wild Oryza germplasm:


Pathak H. 2007. Mitigation and adaptation of Indian agriculture to climate change. Paper presented at the National Symposium on Global Warming and


Redoña ED. 2007. Revitalizing INGER: a 32-year-old multilateral system of sharing and utilizing the world’s advanced rice breeding resources. Paper presented at the INGER Technical Advisory Committee Meeting, 8-11 May 2007, Bangkok, Thailand. (in CD format)


Publications and Seminars


Sheehy JE, Brar DS. 2007. Modifying photosynthetic pathways: C3 to C4. Paper presented at the National Conference on Climate Change and Indian Agri-
culture, 12-13 Oct 2007, Indian Council of Agricultural Research, New Delhi, India.


Publications and Seminars

Ligand-LRR receptor kinase interaction is required to control the number of megaspore mother cells in the rice ovule. Paper presented at the 3rd International Apomixis Conference, 27 Jun-1 Jul 2007, Wernigerode, Germany.

Electronic publications
Hettel GP. 2007. Significant dates in IRRI history. www.irri.org/about/history.asp

Magazines and newsletters

Others
Publications and Seminars


Heong KL. 2007. Communicating agriculture to rural farmers. TWAS Prize for Agriculture lecture delivered at the Annual General Meeting of the Third World Academy of Science, 14 Nov 2007, Trieste, Italy.


Htay KM. 2007. Performance of different varieties as influenced by water regimes under aerobic condi-
Publications and Seminars


Seminars

Banu S. 2007. Pathological and genetic studies on brown spot (Bipolaris oryzae) resistance in rice (Oryza sativa). Presented at the Plant Breeding,


Barry G. 2007. The development of GM rice in Asia: has the time come for Bt rice and golden rice? Presented at the University of California, Berkeley, 6 Mar 2007, Berkeley, California, USA.


Iftekharuddaula K. 2007. Marker-assisted backcross breeding for Sub1 QTL in BR11, the mega-variety of Bangladesh. Presented at the Plant Breeding, Genetics, and Biotechnology Division, 28 Mar 2007, International Rice Research Institute, Los Baños, Philippines.


Nejad GM. 2007. Identification and validation of QTLs for salt tolerance at rice seedling stage by selective genotyping. Presented at the Plant Breeding, Genetics, and Biotechnology Division, 3 Apr 2007, International Rice Research Institute, Los Baños, Philippines.


Peng S. 2007. Strategies for publishing SCI papers in field crops research with high quality and impact. Presented at the China Agricultural University, 18 Dec 2007, Beijing, China.


Sato K. 2007. A true figure of rice genome unclosed by the mapping of full-length cDNA clones. Presented at the Joint Division Seminar of the Crop Research Informatics Laboratory and Plant Breeding, Genetics, and Biotechnology, 7 Feb 2007, International Rice Research Institute, Los Banos, Philippines.


Serraj R. 2007. Drought resistance improvement in rice at IRRI. Presented at the Bangladesh Rice Research Institute, Gazipur, Bangladesh.


Singleton GR. 2007. Overview of key issues and summary comments. Presented at the Annual Review Meeting, 12-15 Nov 2007, Department of Biological Sciences, University of Swaziland, Kwaluseni, Kingdom of Swaziland.


**Thursday rice research seminars (Audio files and PowerPoints are available online for most via the weekly electronic Bulletin archives)**

Global agricultural R&D: technological distance, location effects, and R&D spillovers. Phil Pardey, Department of Applied Economics, University of Minnesota, USA; 8 February. Powerpoint and audio.

Nutrient- and water-efficient rice: improving root development, and molecular breeding for Fe and Zn biofortification. Ping Wu, College of Life Science, Zhejiang University, China and State Key Laboratory of Plant Physiology and Biochemistry, Zhejiang, China, 1 March. Powerpoint and audio.

As men’s and women’s roles change, how should we address gender issues in rice-based agriculture? Thelma Paris, 8 March. Powerpoint and audio.

Using many genes for selection and cross prediction in plant breeding. Howard Eagles, University of Adelaide, Australia, 15 March. Powerpoint and audio.

Multi-scale land use analysis for agricultural policy assessment. Alice Laborte, 22 March. Powerpoint and audio.

Ecological theory, pest management, and conservation biology: lessons for rice ecosystems. Charles Krebs, University of British Columbia, Canada and University of Canberra, Australia, 29 March. Powerpoint and audio.

People, natural resources, and climate: how ICRAF is trying to make a difference in the Philippines. Rodel Lasco, World Agroforestry Center, 12 April. Powerpoint and audio.

Impact of rice research on food security and poverty reduction: lessons learnt from my research at IRRI. Mahabub Hossain, 26 April. Powerpoint and audio.

Promoting research and scholarship through open access and epublishing. Fides Lawton, Library Resources Unit, University of Technology, Sydney, Australia, 17 May. Powerpoint and audio.

Nuclear terrorism and the “dirty bomb”: what we should know. Eulina Mendoza Valdezco, Philippine Nuclear Research Institute, 24 May. Powerpoint and audio.


Is IRRI the strongest center in the CGIAR, and will it be in the future? Ren Wang, 7 June. Powerpoint and audio.


Gender and diversity in times of change. Vicki Wilde, CGIAR Gender & Diversity Program, 19 July.

Up-to-date knowledge at the doorstep of farmers: a catalytic role for IRRI and CIMMYT. Noel Magor, 9 August. Powerpoint and audio.

Asian philanthropy: a new fund-raising initiative at IRRI. Duncan Macintosh, 16 August.


Revisiting IRRI’s terminology for rice-growing environments. Bas Bouman, 30 August. Powerpoint and audio.


Re-engineering IRRI’s Internet connections. Marco van den Berg, 4 October. Powerpoint and audio.


Biofuels—what’s in it for rice farmers? Achim Dobermann, 18 October. Powerpoint and audio.


Division seminars

Crop and Environmental Sciences

Toward planthopper gene functional studies. Dr. Hiroaki Noda, National Institute of Agrobiological Sciences, Tsukuba, Japan. (jointly with PBGB)

An integrated approach of tolerance to water deficit involving precise phenotyping, QTL mapping and modeling. Dr. François Tardieu, Institut National de la recherche agronomique, Montpellier, France. (jointly with PBGB)

Regulation of male reproductive failure in drought-stressed cereals. Dr. Deep Saini, dean, Faculty of Environmental Studies, University of Waterloo, Canada. (jointly with PBGB)


Effect of elevated soil temperature and CO₂ concentration on soil microbial activities and dynamics of methane in paddy field. Dr. Kazuyuki Inubushi, professor of soil science, Graduate School of Horticulture, Chiba University, Japan.

Designing a community-based model water management project for mitigation of methane emissions from paddy field in Indonesia: preliminary report. Mr. Yasuhiko Muramatsu, graduate student-Graduate School of Science and Technology, Chiba University, Japan.
Interactive effects of N and water availabilities on the competitiveness of Canada bluejoint grass: white spruce seedling growth, foliar $^{13}$C and $^{15}$N. Ms. Miwa Matsushima, graduate student graduate School of Science and Technology, Chiba University, Japan.

Rice productivity in a changing climate. Dr. Lewis Ziska, Crops Systems and Global Change Laboratory, USDA-ARS, USA.

Navigating our way towards drought-adaptation in cereals with fine-mapping. Dr. Andrew Borrell, principal research scientist, Department of Primary Industries and Fisheries, Queensland, Australia.

WOCAT Knowledge management learning and decision support. Dr. Hanspeter Liniger, senior research scientist and programme coordinator, WOCAT Centre for Development and Environment (CDE), Switzerland. (jointly with SSD)

Mapping the unknown? The spatial extent of sustainable land management. Dr. Godert van Lynden, Sustainable Land Management ISRIC - World Soil Information, The Netherlands. (jointly with SSD)

What I know about Zn. Dr. Guy Kirk, professor of soil systems and head of the Soil Systems Group, National Soil Resources Institute, Natural Resources Department, Cranfield University.

Rodent ecology and management in the agro-ecosystems of the Sierra Madre, Philippines. Alex Stuart, PhD student, University of Reading, UK.

National Rainfed Area Authority and possible areas of India-IRRI partnership. Dr. J.S. Samra, CEO, National Rainfed Area Authority of India. (jointly with PBGB)

**Plant Breeding, Genetics, and Biotechnology**

Genome-wide gene expression analysis in rice: beyond differential gene expression. Dr. Ramil Mauleon.

Identification of subspecies-specific markers and their relationship with hybrid barrier in rice. Dr. Joong Hyoun Chin.

A true figure of rice genome unclosed by the mapping of full-length cDNA clones. Dr. Kouji Satoh, Department of Molecular Genetics, National Institute of Agrobiological Sciences, Japan.

Sociological research on rice biofortification: preliminary findings. Ms. Sally Brooks, DPhil student, Knowledge, Technology and Society (KNOTS) Research Team, Institute of Development Studies, University of Sussex, UK.

Rice research in a non rice-growing country: recent results on transcription factor profiling, drought and salt tolerance, and amino acid metabolism. Mr. Bernd Mueller-Roeber, Ms. Karin Koehl, Ms. Ellen Zuther, Mr. Rainer Hoefgen, Mr. Holger Hessen, Max-Planck-Institute for Molecular Plant Physiology, Golm, Germany.

Marker-assisted backcross breeding for $Sub1$-QTL in BR11, the mega-variety of Bangladesh. Mr. Khandakar Iftekharuddaula.

Pathological and genetic studies on brown spot ($Bipolaris oryzae$) resistance in rice ($Oryza sativa$). Ms. Salina Banu.

Identification and validation of QTLs for salt tolerance at rice seedling stage by selective genotyping. Mr. Ghasem Mohammadi-Nejad.


Early response regulatory modules in chilling-tolerant japonica rice. Dr. Benildo G. de los Reyes, Plant Molecular Genetics, Department of Biological Sciences; Department of Biochemistry, Microbiology and Molecular Biology, University of Maine.


Rice seed priming: an effective tool in improving germination, crop stand, and economic yield. Dr. Muhammad Farooq.

Biological and genetic characterization of a putative rice mutant for reaction to rice tungro disease. Dr. Negussie Zenna.

Bacterial determinants and plant defense pathways underpinning rhizobacteria-mediated systemic resistance in rice. Mr. David De Vleesschauwer.

Status of resistance breeding to bacterial blight in Korea. Dr. Ki-Young Kim.

Nutritional quality improvement of BR29, a popular variety in Bangladesh through transgenic approaches. Mr. Alamgir Hossain.

**Social Sciences**

Potential of social capital for community development. Mr. Shigeki Yokoyama.

Farming systems research for crop diversification in Cambodia and Australia: issues and future direction. Dr. Bob Farquharson, New South Wales
Publications and Seminars

Department of Primary Industries, Tamworth Agricultural Institute, Australia.

Agricultural and economic development and poverty alleviation: lessons from five Asian countries. Dr. Randolph Barker.

Economics of water saving: roles of pricing policies, infrastructures, and institutions. Dr. Kei Kajisa.

The great unknown: exploring agricultural development in the Philippines and Bangladesh. Ms. Anna Katherine Johnson, intern, World Food Prize.

Remote sensing applications in crops with specific reference to peanuts. Dr. Graeme Wright, Queensland Department of Primary Industries and Fisheries, Australia.

What we learned from ADB-RETA 6136. A qualitative assessment of technology impact at several CURE sites. Dr. Stephen Zolvinski.

An integrated approach to rice paddy monitoring over Asia with MODIS and AMSR-E. Dr. Wataru Takeuchi, Regional Network office for Urban Safety Remote Sensing and GIS, Asian Institute of Technology, Thailand and assistant professor, Institute of Industrial Science, University of Tokyo, Japan.

Developing impact pathways for CPWF Project No. 7 – development of technologies to harness the productivity potential of salt-affected areas of the Indo-Gangetic, Mekong, and Nile river basins. Ms. Amie delos Reyes-Cuenco.


Upland rice, food security, and farmer livelihoods: some preliminary findings from village surveys in Laos. Ms. Ma. Lourdes Velasco.

The Analytical Service Laboratories continue to provide both analytical and analysis-related services to IRRI’s research projects, collaborators, and UPLB. They also offer the use of soil and plant facilities for sample preparation and provide facilities and services to projects involving the use of radioactive materials.

**Analytical services**

ASL completed a total of 47,719 analyses for routine plant, soil, and water samples.

Plant samples accounted for 53% of the completed analyses, with N and ICP suite elements as the most requested determinations (ASL Table 1). About 78% of the total samples received came from the Crop and Environmental Sciences Division (CESD); the rest came from Plant Breeding, Genetics, and Biotechnology Division (PBGB), Grain, Quality, Nutrition, and Postharvest Center (GQNPC), Safety and Security Services (SSS), IRRI Medical Clinic, World Agroforestry Center (ICRAF), and University of the Philippines Los Baños (UPLB) (ASL Table 2).

**New ASL reporting system**

In coordination with E. Paski, S. Beebout, T. Metz, and M. van den Berg, the new ASL Data Reporting System was developed by M. Santos, incorporating the ISO 17025 formatting requirement, a QC section, and interpretation in the final analysis report. This new reporting system addressed the long-standing major bottlenecks of data processing and reporting at ASL.

Additional features in the new analysis report include the sender’s code, limit of quantitation, quality control section (accuracy and precision information), and interpretation of the QC section. ASL initiated a short training course that aims to give participants an understanding of QA/QC of ASL data to help them understand and take advantage of the additional information incorporated in their analysis reports. The training also aims to help the different research groups at CESD and PBGB to apply the QA concept in their own field testing and laboratory analysis.

With the purchase of the new inductively coupled argon plasma (ICP; photo above) in December 2006, three ASL staff members (M. Ong, M. Santos, and J. Belen (photo below)) were sent to Melbourne, Australia, in February to participate in the training on operations, application, and preventive maintenance of the new Perkin Elmer 5300 dual—view inductively coupled argon plasma.
The team worked on developing methods for the new ICP for multielements, heavy metals, and total arsenic determinations in support of the Institute’s future strategic needs for such analyses.

The following methods were developed and are being validated in the new ICP:

1. **Plant digests, ASL New Optima**
   - From plant digests using 1% HNO₃ and 4% HClO₄
   - Includes 21 elements: Al, Ca, Cu, Fe, K, Mg, Mn, Mo, Na, P, S, Zn (old)
   - As, Cd, Co, Cr, Ni, Pb, Se, Sr, V (new)
   - Accuracy
     - Within 90−110% for Al, Ca, Cd, Co, K, Mg, Mn, Mo, P, S, and Zn
     - Within 80−90% for Fe
     - About 70% for As and Cd in the ICP suite, if concentration is greater than 10 mg kg⁻¹ for As and 1 mg kg⁻¹ for Cd

2. **Soil extracts, TEBases**
   - From soil extracts of soluble and exchangeable cations with 1 N ammonium acetate
   - LOQs for the following exchangeable bases:
     - Ca = 0.295 meq 100 g⁻¹
     - Na = 0.064 meq 100 g⁻¹
     - K = 0.277 meq 100 g⁻¹
     - Mg = 0.216 meq 100 g⁻¹

3. **Plant boron**
   - From 0.5 N HCL extract of dry-ashed plant sample
     - LOQ of 1.03 mg kg⁻¹ and accuracy of within 95−97% in plant dry-ashed sample

**IRRI-CIMMYT CROP RESEARCH INFORMATICS LABORATORY**

**Institutional progress**

Considerable time has been spent coordinating budgets and work plans between CIMMYT and IRRI and integrating the CRIL work plans into the institute medium-term plans (MTPs). This should be more straightforward in subsequent years. The institute-wide responsibilities of CRIL-CIMMYT are somewhat masked by its situation within the Genetic Resources and Enhancement Unit. A CRIL-CIMMYT steering committee should be established to help CRIL prioritize future activities and ensure that centerwide priorities are considered.

CRIL staffing at IRRI has progressed with three CIMMYT-funded NRS being recruited and seven project staff being hired. This was due both to staff turnover and to meet additional Generation Challenge Programme (GCP) software engineering commitments. Staff turnover in the area of informatics is very high due to market pressures on informatics staff salaries, even within the Philippines. This is an ongoing problem.

In terms of internationally recruited scientific staff, a quantitative geneticist and simulation modeling postdoc is being recruited at IRRI. Two IRRI-hosted GCP-funded postdocs worked in bioinformatics analysis in 2007. One will continue to work as a GCP-funded fellow into 2008. The second is the successful candidate for the new 3-year bioinformatics postdoctoral position in IRRI-CRIL, which will be within the IRRI-hosted C₄ rice frontier project.

CIMMYT has employed a postdoctoral scientist under a commissioned GCP project to support ontology development.

IRRI has recruited a senior software engineer, well known to the IRRI-CIMMYT GCP development team, to help reinforce CRIL capacity to meet our burgeoning software engineering commitments both within and without the GCP. This proposed 3-year IRS position is anticipated to be largely, but not wholly, GCP-funded. Some CRIL core funding or additional project funding will be required.

The 2006-08 CRIL MTP assumed the replacement of an IRS crop information specialist and the appointment of NRS to support research data management at CIMMYT. These positions are required to fulfill institutional information management requirements, which are not easily funded by external projects. Financial constraints have delayed the recruitment of these positions. We will adjust MTP objectives downward to take account of reduced staffing.

**Technical progress**

CRIL staff conducted or assisted with 16 training courses in 2007 in addition to continued consultation on experimental design, data management, and analysis for all programs across IRRI and CIMMYT (CRIL Table 1). Research projects over all programs in IRRI and CIMMYT consulted with CRIL staff on data management, design, and analysis of experiments and bioinformatics. CRIL staff were involved in authoring 30 peer-reviewed articles.

The strategy for institutional research data management developed during 2006 is being im-
implemented in two programs at IRRI and, when NRS support staff are recruited at CIMMYT, it will be implemented in two programs at CIMMYT. A support site for research data management in the form of a Wiki was established at IRRI (http://cropwiki.irri.org/everest). The site has been populated with best practices, data management recipes, and guidelines. Short video clips of complex procedures or useful tools are being integrated.

Progress has been made on developing and enhancing International Crop Information System (ICIS) tools for crop information management. Version 5.4 of ICIS was released in June at the 2007 ICIS Developers Workshop. IRIS was enhanced with facilities to manage seed exchange in compliance with the Standard Material Transfer Agreement. These facilities are being implemented in The Seed Inspection and Distribution Unit at CIMMYT for maize and wheat. New versions of the IWIS3 and IRIS databases were released in June on CD. Progress has been made on developing an International Maize Information System genealogy database for maize. A maize pedigree parser has been developed by programmers at IRRI and will be deployed to harvest maize pedigrees from the maize Fieldbook application.

Work is continuing on the GCP Bioinformatics Platform designed to integrate diverse data sources via Web services and provide a workbench of integrated bioinformatics analysis and visualization tools. Two postdocs provided bioinformatics support to GCP projects, one specializing in analysis of microarray data and the other in analysis of candidate gene families.

New statistical models for incorporating molecular and pedigree information into analysis of genotype and genotype by environment data are being developed as well as tools for routine computation of pedigree relationships. Research on statistical methodology for association analysis using pedigree information is being conducted in relation to GCP and Phenome Atlas data. New selection index methodology is being tested via simulation models.

The IRRISTAT statistical software package has been upgraded and enhanced and released as CropStat version 7.2.3. This is a freely available resource for analysis of agricultural research data. Software implementing the new Inclusive Interval Mapping algorithm for QTL analysis developed by CRIL and CAAS scientists has been released. The QuLine simulation tool has been used to analyze strategies for pyramiding chromosome segments affecting quality traits from rice chromosome segment substitution lines.

COMMUNICATION AND PUBLICATIONS SERVICES

Publications and publishing

Through CPS, IRRI produced 11 titles in 2007, including six scientific books, four issues of Rice Today, and the Annual Report of the Director General 2006-07. Also produced were two issues of the International Rice Research Notes (IRRN) and three issues of Rice Research for Intensified Production and Prosperity in Lowland Ecosystems (RIPPLE). Currently, around 20 titles are in the production queue for 2008 and beyond. For updates on the status of IRRI publications, go to http://bulletin.irri.cgiar.org/pubstatus.htm.
In the area of co-publishing, *Rice Genetics V*, the Rice Genetics Collection, and *Charting new pathways to C₄ rice* have been published by World Scientific Publishing Co. (WSPC; Singapore; [www.worldscientific.com](http://www.worldscientific.com)). CPS is currently negotiating with APS (American Phytopathological Society) Press for *Rice Diseases and Their Management*, which is on track to be one of the showcase publications for IRRI’s golden jubilee in 2010.

Due to increasing printing costs, the *IRRN*, IRRI’s long-running journal of 32 years, which has expedited communication among scientists concerned with development of improved technology for rice and rice-based cropping systems, ceased hard-copy publication with the June 2007 issue. The journal is going open access in 2008 using Open Journal Systems (OJS) and will be available online only. OJS is a journal management and publishing system that was developed by the Public Knowledge Project (PKP) to expand and improve access to research and the quality of refereed research ([http://pkp.sfu.ca/?q=ojs](http://pkp.sfu.ca/?q=ojs)). With *IRRN* now going open access, all contributing authors from the national agricultural research and extension systems (NARES) are encouraged to register using this link—[www.irrnjournal.org](http://www.irrnjournal.org)—to create individual accounts and provide information about themselves. Manuscripts can now be submitted online upon registration, with the review process performed in real time and the status of the manuscript shown on the author’s profile page.

*Rice Today* has begun publishing edited excerpts from selected interviews with the *Pioneers of Rice Research*. As one of the activities to commemorate IRRI’s 50th anniversary in 2010, around 100 hours of conversation have already been logged with more than 50 pioneers (with many more planned), ranging from those who first roamed the rice plots with IRRI’s first director general Robert F. Chandler, Jr. to others recently retired. Through 2010, *Rice Today* editors plan to feature interview excerpts with occasional full edited transcripts and video highlights on the magazine’s Web site.

**Dr. Peter Jennings,** IRRI’s first rice breeder (1961-67; photos above) with a long career in Latin America after his work in Asia, kicked off this historic series with a singular wit. He played a major role in the development of IR8, the rice variety that would ultimately change the face of agriculture across Asia. For a sample video clip, click on any of the photos above. To read the entire interview transcript with interesting photos and links and to view the complete video, go to [www.irri.org/publications/today/Jennings.asp](http://www.irri.org/publications/today/Jennings.asp).

**Using external service providers**

To help determine to what extent IRRI should use external service providers to disseminate information and educational materials, CPS and Information Technology Services (ITS) are currently running two experiments involving publications and photographs. We are looking at whether or not we should go internal or external exclusively with either or both of the following: a) in-house photo bank ([www.ricephotos.org](http://www.ricephotos.org)) vs Flickr ([www.flickr.com/photos/][528x551]); b) in-house IRRI publications catalog ([www.irri.org/publications/catalog/index.asp](http://www.irri.org/publications/catalog/index.asp)) vs. Google Book Search ([http://books.irri.org](http://books.irri.org)). See the ITS report for more on Google and Flickr.

**IRRI on the Web**

In 2007, with the goals of Program 6 (Information and communication: convening a global rice research community) in mind, a Web community manager position was created in CPS. The task of the manager has been to set the stage to move forward in earnest toward developing a new IRRI Web presence with a Web content management system in place for the Institute. It will be an integrated system with multiple sites and institutional information around an [http://irri.org](http://irri.org)--branded corporate Web portal.

The Institute aims to have a broad and far-reaching presence on the Web. The starting point for integrating the new Web system is the matrix of activities in the medium-term plan. Because the Institute’s varied audiences have different content needs, we are carefully mapping our overall strategy and vision for our Web presence in a phased approach. This will lead to an output that can be delivered by mid- to late 2008, followed by successive improvements from that point on.

**IRRI and rice in the media**

The year 2007 was a particularly busy one for IRRI in the media, revolving around such hot topics as flood-tolerant rice, climate change, water shortages, biofuel, and the emerging rice price–rice shortage phenomenon that continues to become more serious. We continue to add articles and audio feeds at [www.irri.org/media/articles.asp](http://www.irri.org/media/articles.asp) that quote IRRI staff.
Research Support Services

IRRI editors worked on more than 940 pages appearing in refereed journal articles, 1,439 pages appearing in IRRI’s scientific books, plus 91 pages for the International Rice Research Notes, more than 160 posters, four issues each of Rice Today and the newsletter Ripple, and more than 1,000 pages of additional conference papers, abstracts, proposals, and other documents.

The IRRI Copy Center, managed by ITS, generated 228,604 copies during 2007.

EXPERIMENT STATION

The International Rice Research Institute Experiment Station (ES) was awarded the ISO certification on 22 June 2007 in recognition of the full compliance of its Environmental Management System (EMS) with the requirements of the ISO 14001:2004 international standard. The accreditation covers the management of the farm’s operations and other support services being provided by the ES.

In 2007, the ES provided support services to some 307 field and greenhouse experiments. The Field Operations Unit served the requirements of 164 field experiments, while the Controlled Plant Growth Facilities and Grounds Unit (CGFG) supported 56 experiments in the Phytotron and CL4 transgenic greenhouse facilities and 87 experiments in all other greenhouses. More than 9,800 maintenance and service requests were fully served by the various support units of the ES during the year.

Crop production operations

ES seed increase and rice production operations in 2007 were done on 141 ha, a 2% reduction from the 2006 total rice production area of 144 ha. Before 2002, the ES was incurring high annual expenditures to maintain fields not used for experiments. The currently established practice of producing rice on the vacant fields resulted in more efficient and cost-effective maintenance operations, better use of the land, and reduced maintenance cost. It helped the Institute recover costs with the added value and benefits of supplying low-cost but high-quality milled rice to its national employees. Farm operations remain focused on providing research support services. The purpose of rice production operations at the farm has mainly been more on efficient maintenance of fields not used for research and less on getting high yields. As such, rice production operations are given lower priority.

Land use

Some 285 ha were used during the 2007 dry and wet seasons. The biggest user groups are ES and PBGB. ES used some 141 ha for field demonstration, seed increase, and rice production purposes, whereas PBGB planted a total of 94 ha for its various experiments.

Seedling requirements of the different field experiments were established and maintained by the ES on 9.5 ha of dry and wet nursery beds, using field nurseries covering 7.5 ha and 2 ha, respectively. The rest of the seedling requirements were grown on a 40 × 10-m pavement using modified dapog nurseries.

<table>
<thead>
<tr>
<th>Division</th>
<th>Dry season</th>
<th>Wet season</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CESD</td>
<td>15</td>
<td>19</td>
<td>34</td>
</tr>
<tr>
<td>ES</td>
<td>80</td>
<td>61</td>
<td>141</td>
</tr>
<tr>
<td>GRC</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>PBGB</td>
<td>51</td>
<td>43</td>
<td>94</td>
</tr>
<tr>
<td>TC</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Total</td>
<td>155</td>
<td>130</td>
<td>285</td>
</tr>
</tbody>
</table>

Communication support

CPS continues to provide communication support for the entire Institute, including editing, graphic design, art and illustration, audiovisual, photography, video, and advice on printing at IRRI’s copy center and with outside vendors.

In 2007, approximately 21,100 new digital photographs were produced. Thirteen video programs were produced and 38 shorter clips were provided for the Bulletin (IRRI’s weekly newsletter for staff, BOT, and alumni; http://bulletin.irri.cgiar.org) and PowerPoint presentations. Around 35 IRRI videos were also displayed on YouTube.

Graphic artists produced 53 illustrations, laid out 1,660 pages for publications, and prepared and printed 158 posters on the CPS large-format printer.

on these and other issues via the Web sites of others such as ABC Radio Australia, Associated Press, Agence France-Presse, BBC, CNN, Newsweek, International Herald Tribune, Science, The Economist, National Public Radio (U.S.), Reuters, Time, USA Today, Wall Street Journal, and the Washington Post, among others. This collection now comprises more than 160 features and audio feeds dating back to June 1968.

As IRRI approaches its 50th anniversary in 2010, the Web page on Significant Dates in IRRI History at www.irri.org/about/history.asp is continually being updated as new events occur and more past historical events are added. Serving as a window to issues, activities, and features about rice across the globe, Rice News Worldwide (http://ricenews.irri.org) provided links to nearly 1,000 timely stories in 2007 and it continues to be updated daily.
than research requirements, thus keeping production costs down and ensuring that resource requirements for the rice production component of ES operations do not conflict with Institute research needs and do not conflict with the farm’s research support mandate.

More than 62% of production crops were established mainly by direct seeding through manual broadcasting of pregerminated seeds, drum seeding on wet fields, and seed drilling on dry-prepared areas, whereas the rest were established using manual and mechanical transplanting methods, particularly in deep plots and during wetter periods of the year when weather and field conditions did not favor direct-seeding operations.

ES harvested 413 t of paddy from ES-managed production plots. Another 108 t of mixed varieties and remnant grains from border rows and excess materials from finished experimental setups were harvested from researchers’ plots. Harvesting in large plots was mainly done with the use of mechanical combine harvesters.

**Agrochemical applications and crop protection services**

A total of 81 t of different kinds of fertilizers were served to various users of the farm in the form of ammonium sulfate, complete fertilizer, muriate of potash, solophos, urea, zinc oxide, and zinc sulfate. This total reflected a 15% reduction in fertilizer applied as compared with the previous year.

Manual bird scaring remains the preferred method for avian pest control; the use of bird nets was the second option, with 5.6 ha of the field being covered with nets immediately after seeding or near harvest. On the other hand, rat management practices, which mainly include installation of trap barrier systems, maintenance of fallow areas, burrow destruction, field sanitation and hygiene, and closed seasons, contributed well to zero incidence of severe rat damage in all rice crops. Rat control services included the installation of 150 baiting stations, 71.1 ha of active barrier systems, and 426 live traps. The rat traps yielded a total of 1,086 live catches for the whole of 2007.

Sustained efforts to reduce pesticide use have resulted in further declines in insecticide, herbicide, and molluscicide use at the farm. The use of resistant varieties and zero insecticide application in most ES-managed production plots as well as less use in researchers’ plots and lower insect pressure about the fields helped reduce insecticide use. Routine manual snail and snail egg collections in the fields and greenhouses, on the other hand, contributed to less molluscicide use. Integrated and ecological pest management practices, combined with the use of machines and applicators in chemical applications, generally helped reduce the costs of pest control and improved the safety of field operations. Recent studies have also revealed a decrease in arthropod load and an increase in biodiversity over the years as a direct impact of reduced pesticide use at the farm.

**Irrigation and drainage services**

The irrigation requirements of all field experiments were met and maintained through staggered work schedules of ES research technicians that extended irrigation services over weekends and holidays, depending on irrigation demand, especially during peak periods. Sprinkler and perforairn irrigation systems were installed in seven blocks during the dry season and in six blocks during the wet season. Portable pipes equipped with overhead sprinklers were installed in 11 blocks. Three irrigation risers, five concrete boxes, and two gate valves were repaired in the upland and lowland areas. Five new units of drainage outlets were developed and constructed. Flat hoses were installed to meet special irrigation requirements in blocks D, L, and the 700 series. The submersible pumps in seven blocks were extracted, repaired, and reinstalled with minimum downtime, ensuring reliable irrigation to all field setups throughout the year. The irrigation team also did road clearing, drainage desilting, and on-the-spot repair of broken manhole covers and perimeter fences. The irrigation wells are already showing signs of aging and deterioration as observed from collapsing casings and occasional pump breakdown due to debris from damaged casings. A 2-5-year program for drilling new wells to gradually replace the old wells has been recommended.

**Land development and civil works**

Two hectares of upland fields in blocks UQ and UQ3 were converted to accommodate lowland requirements of new experiments on climate change. Some 200 m of new irrigation lines and 100 m of covered drainage were developed during the year. Two blocks were reworked to improve drainage. The access road in block C44 was backfilled. A new landfill site was designed, developed, and constructed in block UV to replace the old dumpsite. The new landfill has industry-standard polyvinyl liners and is equipped with a leachate collection tank for effective management of waste effluents. One hundred meters of concrete wall was put up near block 2000 as part of a continuing program to improve security and safety.
in the area. Repair of the other 100 m of the concrete fence that was damaged during a typhoon in 2006 was also completed in 2007. Routine maintenance activities included roadside mowing operations, reservoir maintenance, road grading, straw and field waste collection and turnover to a soil rotation site, soil hauling, and delivery to a soil-grinding facility.

Other important civil works implemented by ES involved environmental compliance activities in relation to the ISO 14001 requirements. This included, among others, the installation of chemical-resistant polyurethane coating on the critical portion of the shop floor, construction of a grease-and-oil trap system for the effective management of liquid wastes and potential pollutants, installation of emergency eyewash stations, design and installation of appropriate warning signs, deployment of receptacles for potentially hazardous wastes, insulation of kerosene pipe lines in the drying areas, construction and deployment of secondary containment facilities, emission testing of all farm vehicles, including tractors and mobile pumps, and dust and noise monitoring in the crop-processing areas. The headhouse of the Crop Protection Unit was also refurbished to serve as a function area for administrative and other activities of the unit away from the agrochemical warehouse and decontamination facility.

Equipment fabrication, repair, and maintenance services

The ES Mechanical Shop provided repair, fabrication, and maintenance services for the tractors, farm equipment, implements, machinery, and irrigation facilities. More than 800 requests for repair and maintenance of light and heavy equipment and farm implements from the different units and research divisions were met. Forty-two units of different types of threshers and seed cleaners and 20 units of different dryers were also repaired and maintained. Routine maintenance and repair services were also provided to the Rice Mill Unit.

Postharvest services and rice mill operations

Postharvest support services provided by ES include threshing, cleaning, drying, and storage, among others. A majority of the drying requirements of researchers for plant samples and harvested grains were accommodated using the oven dryers and flat-bed dryers being maintained by the station.

The Rice Mill Unit produced more than 292 t of milled rice in 2007. About 4.8 t were issued to different organizational units, while another 7.4 t were sold to the highest bidder via a sealed public bidding process organized by the Materials Management (MM) unit. The rest of the milled rice (equivalent to about 280 t) was issued to the MM unit for distribution to the nationally recruited staff (NRS) monthly rice entitlement. The rice mill output for 2007 fulfilled more than 8 months’ supply of milled rice for all IRRI NRS.

The byproducts of the milling operations totaled 35.8 t of broken rice, 64.7 t of rice bran, and some 9,000 sacks of rice hulls. Broken rice was sold through bidding, whereas rice hulls were sold to regular buyers who use these for insulation, animal beddings, landscaping, and composting purposes. About 10.5 t of rice bran were set aside and used as fish feed in the fish production project of the ES, while the other 54.2 t were sold to the highest bidder.

Phytotron/CL4 services

Basic research support services were provided by the Phytotron/CL4 unit to all experiments conducted in the Phytotron and transgenic greenhouse facilities. Some 198 maintenance and service requests were met during the year. The main bulk of manual operations at the CL4 involve the autoclaving of incoming and outgoing soil and plant materials. The staggered annual preventive maintenance shutdown of each transgenic greenhouse bay in the CL4 facility was implemented one bay at a time throughout the year, while the annual preventive maintenance shutdown operations for the Phytotron were done in November. Phytotron users consumed a total of 14,520 gallons of RO-grade water for their experiments. Significant renovation work done in 2007 included installation of two new chillers and eight air-handling units, electronic software and hardware upgrade, door replacements for the six glasshouse bays in the Phytotron, replacement of floor panels and beam support in glasshouse 5, and upgrade of the temperature control and cooling system in the CL4. Other maintenance work included the stopgap repair of the Baltimore cooling tower, replacement of defective parts of the indoor and outdoor growth chambers, and the servicing of the solar panel bays and chiller areas, chilled water pumps, rainwater tanks, and growth chambers. Renovation of the Baltimore cooling tower and the hot-water tank is proposed for 2008.

A new Committee on Phytotron usage composed of the ES senior manager, an IRS from CESD, and another IRS from PBGB was formed. The Committee reviewed and updated policies, guidelines, and procedures on the use and allocation of Phy-
Greenhouse services

The Greenhouse Unit provided basic support services to all experiments conducted in the glasshouses, screenhouses, and associated facilities. This included the servicing of 371 maintenance requests, provision of 1,668 assorted pots, and delivery of 748 t of ground soil to support the soil requirements of greenhouse experiments and some field requirements for soil cover on seedbeds as well. Major improvements in the greenhouse section for 2007 involved general refurbishments in the screenhouses intended for transgenic rice testing. Hybridization rooms were constructed for CS-01, CS-02, CS-03, and CS-07 to suit new operational requirements of PBGB and meet the requirements of the Philippine National Committee on Biosafety. Some 43 benches were repaired and replaced with new linings. Roofs were replaced on two greenhouses. Desiltation and clearing of drainage canals were done in greenhouse clusters B and C. Other routine operations included soil hauling, grinding and delivery, glass roof cleaning, screen and glass repair, soil and plant waste collection, and overall upkeep and maintenance of greenhouse surroundings and landscape.

CESD remains the biggest user of all greenhouse facilities, followed closely by PBGB. GRC, on the other hand, is the main user of the screenhouse facility in the upland complex dedicated to maintaining wild rice and the genebank germplasm collections.

Staggered 1-mo greenhouse shutdown operations in 11 greenhouses facilitated necessary annual preventive maintenance operations. This procedure helps reduce pesticide applications by providing a long break in the crop, pest, and disease cycles inside these facilities. Shutdown operations included general clean-up, surface wash down, and repair of roofing and all support structures. Despite advice from CGFG staff, most researchers continually opted to forgo the shutdown operations in the rest of the greenhouses in view of special requirements to continuously use available space. Increased frequency of pesticide applications, buildup of pest populations, and thus recurring pest-related problems were noted in the facilities that never had the standard shutdown period. A number of such facilities now show signs of deterioration due to misuse and lack of preventive maintenance. Re-centralization to the ES of the management and allocation of greenhouse space is seen as a possible option to help address these concerns.

Grounds services

The Grounds Services Unit met 323 requests for plant decoration, landscape maintenance and development, and other services. Service requests from office staff at the research center and from residents at staff housing covered indoor plant decorations and outdoor landscaping support services for various residential areas, offices, the auditorium, and building halls, and during seminars, workshops, and special events conducted at IRRI. Routine operations involved lawn maintenance and regular mowing services, road sweeping, brush cutting, and garbage collection at the research center, meteorological stations, reservoirs, and various staff housing units of the Institute.

Prominent areas that were improved and landscaped in 2007 were the IRRI main entrance gate, old post II, Mechanical Shop, ES Main Gate, and F.F. Hill Board Room. Landscape improvement activities were also done in two of the Jamboree staff houses. New equipment acquisitions for the year were two power saws, three push mowers, and other personal protective gear. Sixty new trash bins were also acquired to replace worn-out units and for deployment in additional areas requiring waste segregation. Waste segregation in the greenhouse area and staff housing was continued. Trimming of trees and clearing operations on perimeter fence areas were done in staff housing as part of the annual clearing program. Workers’ quarters were also refurbished. The Grounds Services Unit also continued to manage the fish production project in the farm reservoirs. Low-cost maintenance operations included periodic pond clean-up, weekly harvesting, and regular feeding of the fish with rice bran from the rice mill. Some 944 kg of fresh fish were harvested and sold to IRRI staff and other buyers.

Kabesilya labor services

Kabesilya services rendered by two agricultural labor providers as requested by the various research divisions and support units in 2007 totaled 624,988 person-hours. This reflected a 2% reduction in use compared with the previous year’s total of 639,892 person-hours. Manual bird-scaring services, on the other hand, went up by 4% from 108,589 hours to
113,245. No wage hike for agricultural workers in the region was provided by the National Wage Board in 2007.

Performance of kabesilya workers was continuously monitored by the ES Administrative Unit. The summary of performance data taken from kabesilya job completion feedback forms revealed 100% acceptability of services provided for bird scaring in 2007. Percentage acceptability is defined as the percentage of acceptable performance over the total number of requests met. Acceptability is indicated by affirmative responses of end-users to the question posted on the form asking users whether the performance of the kabesilya worker is satisfactory or better and whether the worker can be accepted for assignment to the same unit in future similar work requirements. Acceptability of all other task-based services remained high at 99.3%.

**Partnership activities and other support services**

The ES, in coordination with the Office of the DDG-OSS and the Community and Employee Relations Unit of IRRI, continued to accommodate various external requests for equipment assistance and associated technical support services from the surrounding communities, organizations, and institutions such as the local government units of Bay and Los Baños, nongovernment organizations, PhilRice, the Los Baños Science Community Foundation Incorporated, Gawad Kalinga, University of the Philippines Los Baños (UPLB), and the UP Open University. Equipment and labor assistance were provided by ES to various UPLB and municipal government units, schools, and communities. Communication linkages and close coordination with UPLB were also maintained by the station through the IRRI-UPLB Management Committee regular meetings and personal communications between UPLB and ES staff. Other support activities provided by ES in 2007 were the conduct of field tours and demonstrations for visitors endorsed by the Visitors and Information Services Office as well as orientation of new staff and scholars endorsed by the Training Center (TC). ES staff also participated as facilitators and trainers in course offerings of the TC and provided planning and logistical support to the conduct of various field demonstrations and tours.

**Implementation of the environmental management system**

The EMS was completely and successfully implemented in 2007. The requirements set forth in the ISO 14001:2004 international standard have been fully complied with. The ES was awarded the ISO 14001:2004 Certificate on 22 June 2007, which was presented by the director general to the IRRI community in a simple ceremony held in August.

Highlights of the year’s EMS-related activities were a series of management reviews, internal audits, and external audits of the system. In 2007, at least 14 system procedures, 109 operational control procedures, and the EMS Manual were written up, reviewed, finalized, and implemented by the ES management team with support from the IRRI Environmental Council and IRRI management. As part of the commitment to continually improve the system, formal training on EMS implementation and awareness was provided to key personnel of the Safety and Security Services Unit, the Legal Services Unit, and the ES, who are largely involved in the implementation of the EMS. A general assembly meeting attended by all ES staff and major farm service provid-
environments undergo frequent changes as a result of computer technology advances. Coping with more sophisticated user needs is a major dilemma for IRRI librarians. The staff work together to upgrade LDS to Library 2.0 status, that is, an effective library without walls, with substantial digital collections, robust Web site, and active electronic links to full-text documents, which are accessible to users without any barriers of space and time, and built with community participation.

**Information resources**

Building a dynamic library collection in anticipation of client needs is made more difficult by the continuing increase in prices of books and journals, the dollar devaluation, and a limited budget. Adding more information resources to the existing collection of digital and print materials is a must, but, with limited resources, the library cannot acquire every item requested by scientists. Hence, careful prioritization is done, with journal subscriptions getting the biggest chunk of the budget.

**Rice technical literature.** As in the past, the library focused on maintaining its status as the holder of the most comprehensive collection of rice technical literature. (LDS Table 1). Awareness of newly published rice articles is made possible by weekly alerts received by e-mail from Current Contents Connect (CCC). For articles published in nonsubscribed journals, all librarians were tasked to request free copies from authors or from partner libraries as soon as alerts were received. Some 3,441 pdf files of rice articles published in nonsubscribed journals were obtained, free of charge, from the authors or from partner libraries or publishers’ Web sites. Only 73 articles were purchased via pay-per-view. Assuming that the average cost per article via pay-per-view is $30, LDS generated savings approximately $103,000.

Membership in the CGIAR Libraries and Information Services Consortium (CGIARLISC) was beneficial for stretching available resources. Most CGIAR libraries were especially active in providing document delivery services. Partner libraries in the Philippines also generously shared their resources with the IRRI library. Taking advantage of periodic free trial access to vital journals and databases enabled LDS to download hundreds of rice articles.

**Digital resources.** The IRRI library finds ways to bring diverse and scattered digital resources on the Web into a coherent and accessible file via the library’s online catalog. Instant links to full-text documents are created as soon as relevant materials are discovered. In spite of the continuing increase in cost of information materials and the resultant slowing down of book purchases and journal subscriptions, the digital collection continued to expand as open–source journals and electronic books became freely available. Information resources on the Web, consisting of 188 electronic journals and 35 e-monographs or Web sites, were catalogued and made available to clients via hyperlinks in the online catalog. Full-text documents are within the reach of IRRI researchers with a few mouse clicks.

With the acquisition and linking of 3,441 pdf files with the rice database, instant access to 9,198 electronic files is now available to researchers on campus. New items are added daily to the rice database.

Intensive searching of free rice technical literature on the Web resumed in the latter part of 2007. This yielded 625 pdf files that were promptly linked to the rice database and the OPAC.

**Databases and journal subscriptions.** The transition from print to electronic format meets the needs of users for instant access to full-text articles. However, a major hindrance is the average increase in costs of licenses for journals in agriculture (39% for 2003-07). Prices continue to rise, so making relevant journals and databases accessible to IRRI staff is an uphill climb.

Vital databases such as CCC, CABDirect, LC Classification Web, and TEEAL (The Essential Electronic Agricultural Library) continued to be available to IRRI staff. Anthrosource, a key resource for the social sciences, was active up to August 2007. After careful prioritization of titles for subscription, 10 journals and two databases were removed from the subscriptions list. LDS subscribed to 231 titles (52 consortial

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**LDS Table 1. Collection development in 2007.**

<table>
<thead>
<tr>
<th>Publication type</th>
<th>Added in 2007</th>
<th>Total collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monographs (books and pamphlets)</td>
<td>1,031</td>
<td>114,466</td>
</tr>
<tr>
<td>Rice reprints (print format)</td>
<td>87</td>
<td>27,850</td>
</tr>
<tr>
<td>Rice literature (pdf files)</td>
<td>3,441</td>
<td>11,760</td>
</tr>
<tr>
<td>Journals (print and electronic)</td>
<td>188 electronic journals</td>
<td>1,473 active titles</td>
</tr>
<tr>
<td>Journal subscriptions</td>
<td>(~10)</td>
<td>231 titles on subscription</td>
</tr>
<tr>
<td>Theses</td>
<td>99</td>
<td>4,688</td>
</tr>
<tr>
<td>Video cassettes</td>
<td>15</td>
<td>236</td>
</tr>
<tr>
<td>CDs</td>
<td>11</td>
<td>184 titles</td>
</tr>
<tr>
<td>Online databases</td>
<td>0</td>
<td>46 9 (including free sources)</td>
</tr>
<tr>
<td>Electron links created</td>
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<td></td>
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<tr>
<td>OPAC</td>
<td>260</td>
<td>2,822</td>
</tr>
<tr>
<td>Rice database</td>
<td>3,441</td>
<td>9,198</td>
</tr>
</tbody>
</table>
subscriptions, 137 nonconsortial, 42 (via cross-access fees). Of these, only 63 are in print format, whereas 168 are available online.

Regular searching of open-access journals available via the Web and immediate linking with the online catalog and e-journals tab were pursued vigorously.

LDS continued to be an active member of the CGIARLISC and, through joint subscriptions, more titles were made accessible to IRRI staff.

Print monographs. The print collection was enriched with the addition of 1,118 monographic materials (books, theses, and reprints). Of these, only 300 books and theses were purchased, while the rest were donations or exchange publications.

Information access
Remote access to e-journals by outposted staff. Through the CGIARLISC, LDS acquired EZproxy, the leading software solution for serving library clients remotely. With this, remote access to electronic journals licensed to IRRI was enabled for outreach scientists in October.

The Library’s integrated system, the Millennium. No new upgrades were installed in 2007 because of the need to migrate to a new and more capable server. Nevertheless, clients were able to access the LDS collection, even from remote areas, 24 hours a day.

The rice database and the Online Public Access Catalog (OPAC). A total of 10,153 new rice articles were indexed for the rice database, which now carries 261,763 records. Instant access to the world’s latest rice literature continued to be provided by the IRRI library. Researchers with no Internet access can still search for the latest rice literature through the semiannual issues of the Rice Literature Update, the print version of the rice database.

For the OPAC, 1,031 bibliographic records for books, journals, pamphlets, nonrice reprints, nonprint materials, and remote electronic resources were added. This catalog now carries 77,335 records, with 2,895 links to full-text documents, Web sites, or databases.

The library’s Web site (http://ricelib.irri.cgiar.org) While fulfilling the library’s continuing commitment to provide effective and innovative service to its clients, the Web site served as an interface to access both electronic and nonelectronic resources. Although no change in design took place in 2007, the Web site remains available to remote clients all over

LDS Fig. 2. Screenshot of a rice database record with hyperlinks to the full-text documents. Click screenshot to view.
the world. The library’s Web presence continued to grow during the year. Overall visits to the Web site were up from 53,874 in 2006 to 55,529 successful page visits in 2007. Links were updated regularly and new information resources were added as soon as they were found.

**Services**

The advent of new information technologies is accompanied by changes in user needs and the way LDS delivers information. There was an observed strong preference for remote and instant access. The integrated library system being used by LDS, the Millennium, enables remote users to search and retrieve information from the LDS Web site with no difficulty. Same-day delivery of documents was the norm, except when the requested documents were not readily available. Electronic document delivery is the preferred mode as it is the fastest and the most cost-effective way of transmitting documents. Conventional document delivery is used only when the person requesting has no e-mail address. The LDS team rendered the following services:

- Provided information to scientists, students, librarians, the public in IRRI, and other institutions in 56 countries worldwide.
- Delivered 1,879 documents electronically. The figures here include only those documents requested from LDS. Statistics on direct downloads are not available.
- Answered 1,697 reference questions.
- Made 49 literature searches for IRRI and other scientists.
- Published two issues of the *Rice Literature Update*, the print version of the rice database.
- Handled 13,318 book loans, renewals, reserves, and holds.
- Processed 58 interlibrary loans for UPLB Main Library and PhilRice. Some 59 theses and journal titles were borrowed from the UPLB Main Library.
- Made 63 current awareness announcements in the electronic *IRRI Bulletin* and the *IRRI Announcements Wiki*. The regular Library Corner in the *IRRI Bulletin* carried announcements regarding new publications by IRRI staff, newly acquired technical rice literature, new books of general interest, new reference sources, useful Web sites, rice theses, Table of Contents Alerts, free access to journal issues, useful Web resources, policy changes, etc.
- Did regular updating of featured lists of new acquisitions, video cassettes in the AVLC, list of conferences, publications by IRRI staff, and rice theses on the library’s Web site.
- Provided orientation and guided tours for 346 new staff, scholars, trainees, and visitors.
- Gave technical support to WebAGRIS users in local libraries.
- Gave instruction on the installation and use of database management software such as EndNote, Procite, or WebAGRIS to 23 IRRI staff and other librarians.
- Monitored accessibility of LDS databases in the CGVirtual Library. Answered several requests for literature through this portal.
- Purchased, catalogued, and processed 140 books for other units of IRRI.
- Bound 1,131 volumes of books and journals and fabricated 326 Princeton files and folders.

IRRI continued to be an active provider of requested documents to CGIAR and other partner libraries worldwide (LDS Table 2). Sixty-five free documents were received from CGIAR libraries in return. Forty-three countries availed of services in 2007 (LDS Table 3). In addition, libraries in these countries and 13 others were beneficiaries of exchange of publications, making a total of 56 countries served in 2007.

**Projects**

On top of its regular services, LDS undertook projects alone or in collaboration with other units in IRRI or outside institutions to quickly deliver services to worldwide clients and ensure that its collection will be accessed by researchers of the future (LDS Table 4).

**Collaboration within and outside IRRI**

LDS acknowledges that fulfilling the needs of worldwide clients cannot be accomplished by relying solely on its own resources but from active collaboration with other IRRI units, CGIAR librarians, and other partners as well.

Partnerships with CPS enabled the production of a *Rice Thesaurus* and the *Database of IRRI Digital Publications*. CRIL staff installed the DSpace software and provided the server that hosts IRRI’s repository. LDS also participated in Program 6 activities, which supported the intensive searching of free rice technical articles on the Web. From IRRI’s outreach offices, Yong Hong Sun, IRRI-China; Seung-Hee Sunny Han, IRRI-Korea; Dr. Gopal Krishna Aggarwal, IRRI-India;...
LDS Table 4. Projects pursued in 2007.

<table>
<thead>
<tr>
<th>Project title</th>
<th>Entries added in 2007 / remarks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Directory of Rice Workers</td>
<td>428 (revisions and additions)</td>
<td>2,575</td>
</tr>
<tr>
<td>Intensive Searching of Free Rice Articles/ Monographs from the Web</td>
<td>625 (linked and added to pdf archives)</td>
<td>2,665</td>
</tr>
<tr>
<td>Maintenance of Rice pdf Archives</td>
<td></td>
<td>11,760</td>
</tr>
<tr>
<td>Encoding of Retrospective Rice Literature into the Rice Database</td>
<td>The rice database now covers 1951-current rice literature</td>
<td></td>
</tr>
<tr>
<td>Rice Thesaurus (jointly with CPS)</td>
<td>3,229 terms with subject trees</td>
<td></td>
</tr>
<tr>
<td>Database of IRRI Digital Collections (jointly with CPS)</td>
<td>4,680</td>
<td>9,963</td>
</tr>
<tr>
<td>Knowledge Sharing in Rice Research; Citation Analysis of IRRI Scientists'</td>
<td>Full report can be requested from LDS</td>
<td></td>
</tr>
<tr>
<td>Literature Output, 2000-04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhancing Access to IRRI-assisted Theses and Dissertations (with AgNIC support)</td>
<td>1,241</td>
<td>1,361</td>
</tr>
<tr>
<td>Institutional Repository (jointly with CRIL)</td>
<td>262</td>
<td>262</td>
</tr>
<tr>
<td>IRRI in the News and Rice in the News databases</td>
<td>325</td>
<td>16,256</td>
</tr>
<tr>
<td>New Publications by IRRI Staff (e-list posted on the library’s Web site)</td>
<td>91</td>
<td>425</td>
</tr>
</tbody>
</table>

and Dr. Syam Mahyuddin, IRRI-Indonesia, provided assistance when needed.

Several authors of rice technical papers readily sent electronic copies or reprints of their papers upon request. Active membership in the CGIARLISC and AgNIC enriched the pool of documents available to researchers. The chief librarian continued to coordinate the joint journal subscriptions of the CGIARLISC up to September 2007. AgNIC supported the digitization of selected pages from IRRI-assisted theses.

In addition to the CGIAR librarians, LDS received support from the following: Dr. Takenori Hayashi, Agriculture, Forestry & Fisheries Research Information Center, Japan; Mr. Ryuichi Murata, National Agricultural Research Center for Hokkaido Region, Japan; Mr. John Woolston, CIMMYT consultant; Ms. Shahnaz Zuberi, director, Scientific Information, NARC, Islamabad, Pakistan; and Ms. Belky Mesones, INIA, Cuba.

Some 964 libraries in the Philippines and in other parts of the world received free IRRI publications and most of them sent theirs in exchange. The beneficiaries of extra resources (duplicate and superseded materials) were Bicol University, Laguna State Polytechnic College, Romblon State College, Aklan State University, farmers from Aklan and Bohol, Bogor Agricultural University, Divine Word College of Calapan, and the Mindanao State University Library. Local institutions that shared free documents with IRRI are the Thomas Jefferson Information Center and the libraries of the University of the Philippines Los Baños, UPLB CEAT, the Asian Development Bank, the Philippine Rice Research Institute, Ateneo de Manila University, and the De La Salle University.

The Food and Agriculture Organization of the United Nations (FAO) AGRIS Center continued to provide technical support in the use of WebAGRIS. LDS regularly added content to the AGRIS databases by inputting 201 bibliographic records.

Local library groups such as the Agricultural Librarians Association of the Philippines (ALAP) and the Philippine Agricultural Libraries and Information Services Network (PhilAgriNet) availed of IRRI librarians’ expertise in professional growth activities for local librarians. ALAP invited the IRRI chief librarian to be a resource speaker at its 35th-anniversary forum. PhilAgriNet members consulted IRRI librarians on problems related to database management using WebAGRIS software.

Professional growth of staff

The library staff took in-house training courses on various Microsoft modules, personnel management, computer security awareness, and personal development offered by IRRI. Staff also obtained training outside of IRRI to become aware of trends in the information world.

VISITORS AND INFORMATION SERVICES

In 2007, the Institute welcomed and hosted 46,833 visitors from different countries compared with 46,031 in 2006. (VIS Table 1). Among the VIPs who visited IRRI were Hon. Hemakumara Nanayakkara, minister of agriculture of Sri Lanka; secretaries of the ministries of agriculture of various countries; Hon. Ruth Asmundson, mayor, Davis, California; 41 ambassadors together with the members of the diplomatic community—H.E. Gérard Chesnel, ambassador of the Republic of France; H.E. Dr. Armindo Maia, ambassador of Timor-Leste; H.E. Annika Markovic, ambassador of Sweden; representatives of...
various donors and international organizations such as Ms. Ursula Schäfer-Preuss, vice president of the Asian Development Bank; Dr. Robert Bertram and Sahara Moon Chapotin of the United States Agency for International Development; members of the World Bank Mission Team; Mr. David Bergvinson of the Bill & Melinda Gates Foundation; Prof. Yuan Longping, director general of the China National Hybrid Rice Research and Development Center; Dr. Larry Vanderhoef, chancellor, University of California–Davis; and Mr. Jaime Augusto Zobel de Ayala II of the Ayala Corporation. The Visitors Office prepared more than 300 specialized programs compared with 200 in 2006.

The Visitors Office also arranged programs for media visits and interviews, including those of Ms. Constance Cheng of CNN International; Ms. Carmel Crimmins, deputy bureau chief of Reuters; and Mr. Jonathan Hamilton, senior correspondent, National Public Radio, Washington, D.C.

In February 2007, Visitors and Information Services (VIS) was reorganized as Events, Visitors, and Information Services (EVIS). The Visitors Office, together with the newly added Events team, handled affairs such as the dedication of the T.T. Chang Genetic Resources Center and other workshops and conferences inside the Institute.

In July 2007, EVIS again was reorganized; it became a separate independent unit under the direct supervision of Deputy Director General William G. Padolina of Operations and Support Services (OSS). Three staff members were retained in this unit.

**Workshops, conferences, and meetings**

During 2007, IRRI hosted or cohosted 28 regional and international conferences, workshops, and symposia (VIS Table 2). Some 1,091 delegates from 53 countries participated in regional and international workshops.

**Media exposure**

**Philippine media:** *Manila Times, Manila Bulletin, GMA 7, Philippine Daily Inquirer*


Nineteen press releases were issued in 2007:

- Once were rice fields: Asia’s rice farmers battle devastating typhoons (15 January)
- Rice research hub for Greater Mekong Subregion opens in Laos (23 January)
- Female rice researcher wins international award for innovative biodiversity study in Thailand (27 February)
- New agreement helps permanently protect the world’s thousands of rice varieties (12 March)
- New agreement to boost rice production, avoid food shortages in Indonesia (30 March)
- Rice Camp 2007 (3 April)
- Mekong countries band together along the river of rice (3 April)
- Scientific infrastructure vital for helping the poor (26 April)
- New knowledge improves rice quality (7 May)
- Coping with climate change—the continuing battle to feed the world’s rice consumers (6 July)
- African rice production gets major boost (16 August)
- World’s largest alliance of international agricultural researchers chooses pioneering Chinese scientist as new leader (22 August)
- Asia-Pacific nations urged to study biofuels more carefully (29 August)
- Chair change (26 September)
- Important rice production system under pressure (8 October)
- Rice-producing nations call for increased focus on production (17 October)
- The China challenge—how to feed one-fifth of humanity (23 October)
- New hybrid rice group aims to raise rice yields in the tropics (9 November)
- Relevance of rice research recognized (4 December)

In conjunction with CPS, four issues of *Rice Today* were published and distributed to 2,616 recipients. Four online IRRI Hotlines were released to 2,583 recipients.
### Distinguished visitors in 2007

**Legislators and government officials**


**Hon. Atanu Purkayastha**, Secretary, Department of Agriculture, Government of West Bengal, India, 23-28 Feb.

11 **Staff Members** from Irrigation and Drainage Department, Ministry of Water and Irrigation, Republic of Kenya, 9 Mar.

**Dr. Koich Kadowaki**, Program Officer of the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan, 13-14 Apr.

**Ms. Junko Kumada**, Grant Managing Officer, MAFF, 13-14 Apr.

**Hon. Subas Pani**, Secretary, Ministry of Rural Development, India, 1 Jun.


**Mr. T.M. Abeyawickrema**, Secretary, Ministry of Agriculture, Sri Lanka, 2 Jun.

**Mr. V.K. Nanayakkara**, Director, Agrarian Research and Training Institute, Sri Lanka, 2 Jun.


**Dr. Kandeh Yumkella**, Director General, United Nations Industrial Development Organization (UNIDO) and Party, 13 Jul.


**Hon. Ruth Asmundson**, Mayor, Davis City, California, USA, 16 Aug.


**Dr. Dennis Araullo**, Assistant Secretary, Department of Agriculture, 27 Sep.

**Dr. Frisco Malabanan**, GMA Rice Program Director, Philippines, Department of Agriculture, 27 Sep.


**Delegation** from the National Planning Commission and the Ministry of Agriculture and Cooperatives, Government of Nepal, 19 Nov.

**Representatives from various organizations**

**Ms. Delia Ivanoff**, Senior Supervising Environmental Scientist, South Florida Water Management District, 11 Jan.

**Dr. Thomas Matthew**, Professor, Union Christian College, India, Fellow, United Board for Christian Higher Education in Asia (UBCHEA), and Party, 12 Jan.

**Prof. Yuan Longping**, Director General, China National Hybrid Rice Research and Development Centre, Changsha, Hunan, China and Party, 13 Jan.

**Nine Provincial Agricultural Officers and Coordinators** of the Autonomous Region in Muslim Mindanao, 13 Jan.

**Mr. Ramon Alikpala**, Executive Director, National Water Resources Board, 16 Jan.

### VIS Table 1. IRRI visitors, by group, in 2007.

<table>
<thead>
<tr>
<th>Visitor group</th>
<th>Philippines</th>
<th>Asia</th>
<th>Africa</th>
<th>Australasia</th>
<th>Europe</th>
<th>Latin America</th>
<th>North America</th>
<th>USA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>40,213</td>
<td>575</td>
<td>4</td>
<td>20</td>
<td>5</td>
<td>43</td>
<td>16</td>
<td>339</td>
<td>40,860</td>
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<tr>
<td>Conference participants</td>
<td>146</td>
<td>118</td>
<td>8</td>
<td>17</td>
<td>20</td>
<td>13</td>
<td>1</td>
<td>16</td>
<td>339</td>
</tr>
<tr>
<td>Nongovernment organizations</td>
<td>145</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donors</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Government officials/politicians/officers</td>
<td>517</td>
<td>172</td>
<td>5</td>
<td>2</td>
<td>696</td>
<td></td>
<td></td>
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<tr>
<td>Farmers</td>
<td>607</td>
<td>160</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>778</td>
<td></td>
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<tr>
<td>Faculty members/parents</td>
<td>667</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>30</td>
<td>650</td>
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<tr>
<td>Scientists, researchers</td>
<td>470</td>
<td>211</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>13</td>
<td>724</td>
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<tr>
<td>Private sector</td>
<td>894</td>
<td>346</td>
<td>1</td>
<td>11</td>
<td>16</td>
<td>5</td>
<td>2</td>
<td>14</td>
<td>1,289</td>
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<td>UN agencies, CGIAR, TAC, etc.</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>16</td>
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<tr>
<td>Diplomatic corps</td>
<td>29</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>41</td>
<td></td>
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<td>Media</td>
<td>4</td>
<td>38</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>62</td>
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<td>Religious groups</td>
<td>7</td>
<td>23</td>
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<td>7</td>
<td>10</td>
<td>53</td>
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<tr>
<td>Tourists</td>
<td>168</td>
<td>64</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>240</td>
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<tr>
<td>Others</td>
<td>676</td>
<td>40</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>9</td>
<td>731</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>44,519</strong></td>
<td><strong>1,927</strong></td>
<td><strong>17</strong></td>
<td><strong>53</strong></td>
<td><strong>106</strong></td>
<td><strong>30</strong></td>
<td><strong>19</strong></td>
<td><strong>1,162</strong></td>
<td><strong>46,833</strong></td>
</tr>
<tr>
<td>Date</td>
<td>Title</td>
<td>Venue</td>
<td>Participants (no.)</td>
<td>Countries represented (no.)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19-23 Feb</td>
<td>GCP Genotyping Data Quality Workshop</td>
<td>IRRI</td>
<td>16</td>
<td>8</td>
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<tr>
<td>21-23 Feb</td>
<td>6th Annual Meeting of the Consortium for Unfavorable Rice Environments</td>
<td>Laos</td>
<td>72</td>
<td>11</td>
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<tr>
<td>14-16 Mar</td>
<td>Workshop on Quantitative Genetics and Statistical Methodology in Support of Germplasm Conservation and Crop Improvement</td>
<td>IRRI</td>
<td>34</td>
<td>5</td>
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<tr>
<td>20-21 Mar</td>
<td>Workshop on Site-specific Nutrient Management for Rice</td>
<td>Indonesia</td>
<td>38</td>
<td>2</td>
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<tr>
<td>22-23 Mar</td>
<td>Indonesia-IRRI Workplan Meeting</td>
<td>Indonesia</td>
<td>100</td>
<td>2</td>
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<td>26-30 Mar</td>
<td>ICIS Mini Workshop</td>
<td>IRRI</td>
<td>14</td>
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<tr>
<td>27-30 Mar</td>
<td>Cool Rice for a Warmer World Workshop</td>
<td>China</td>
<td>70</td>
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<td>10-13 Apr</td>
<td>Peer Review Team of 2006 CGIAR Center’s Financial Statements</td>
<td>IRRI</td>
<td>6</td>
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<tr>
<td>16-18 Apr</td>
<td>IRRI Board of Trustees Meeting</td>
<td>IRRI</td>
<td>14</td>
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<tr>
<td>17-19 Apr</td>
<td>Clearing Old Hurdles with New Science: Improving Rice Grain Quality</td>
<td>IRRI</td>
<td>71</td>
<td>28</td>
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<tr>
<td>25-27 Apr</td>
<td>Workshop on Low-cost Gene-based Technologies for MAS application in Rice and Maize</td>
<td>India</td>
<td>44</td>
<td>9</td>
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<tr>
<td>23 Apr</td>
<td>Center-commissioned External Review (CCER) on Management Services</td>
<td>IRRI</td>
<td>3</td>
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<tr>
<td>2-3 May</td>
<td>Temperate Rice Research Consortium</td>
<td>Korea</td>
<td>41</td>
<td>11</td>
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<tr>
<td>13 Jun</td>
<td>Research to Impact Workshop</td>
<td>Philippines</td>
<td>26</td>
<td>1</td>
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<tr>
<td>13-14 Jun</td>
<td>Planning Workshop on the Implementation Plans to Disseminate Submergence-tolerant Rice Varieties and associated New Production Practices to Southeast Asia</td>
<td>IRRI</td>
<td>50</td>
<td>9</td>
<td></td>
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<tr>
<td>17-18 Jul</td>
<td>Strategic Communication/Risk Communication Workshop for Golden Rice</td>
<td>IRRI</td>
<td>27</td>
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<tr>
<td>6-17 Aug</td>
<td>Rice Technology Transfer System in Asia</td>
<td>South Korea</td>
<td>26</td>
<td>11</td>
<td></td>
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</tr>
</tbody>
</table>

**Total** 1,147 261
Dr. John Skerritt, Deputy Director, Australian Centre for International Agricultural Research (ACIAR), 18 Jan.

Mr. Kohei Kunioka, Mr. Taiki Kawasaki and Mr. Tsuyoshi Onishi, Hokkaido, Kuriyama Town, Japan, 18 Jan.

Dr. Bill Niebur, Director, Pioneer Hi-Bred International, Inc., 19 Jan.


Dr. Paul M.H. Sun, Chair of the Board, Asian Vegetable Research and Development Center (AVRDC), Taiwan, and Party, 23 Jan.

Delegates from the Guangdong Provincial Department of Science and Technology, China, 23 Jan.

Dr. Ralph Brower, Director of the Center for Civic and Nonprofit Leadership, Florida State University, 26 Jan.

Dr. Raul de Guzman, Former Chancellor of UP Los Baños, and Party, 26 Jan.

Provincial Rural Improvement Club Federation of Quirino, Cagayan Valley, 1 Feb.

Nine Employees from East West Seed Group of Companies, 2 Feb.

Mr. Seah Hong Kiat, Country Director, SingTel Philippines, Inc., 5 Feb.

Dr. Philip Pardey, Director, International Science and Technology Practice and Policy Center; Professor, Department of Applied Economics, University of Minnesota, 8-9 Feb.

Dr. Hermann Eiselen, Co-Founder, Eiselen-Foundation Ulm, 15 Feb.

Dr. Larry Vanderhoef, Chancellor, University of California–Davis, and Party, 15-17 Feb.

Dr. Lars Jonsson, Associate Researcher, Uppsala University, Sweden, 21 Feb.

Delegation from Michigan State University (MSU) and International Food Policy Research Institute (IFPRI), 21 Feb.

Ms. Elizabeth Roxas, Executive Director, Environmental Broadcast Circle, and Party, 28 Feb.

Women Farmers, San Ildefonso, Bulacan, 8 Mar.

Ivan W. Buddenhagen, Plant Pathologist, University of California, Davis, 9 Mar.


Researchers from the Max Planck Institute of Molecular Plant Physiology (Golm, Germany), 20-22 Mar.

Mr. Seong Dal Lee, Marketing Manager, DuPont Crop Protection, Korea, and Party, 22 Mar.

Dr. H.S. (Deep) Saini, Dean, Faculty of Environmental Studies, University of Waterloo, Canada, 10-12 Apr.

Dr. Ki Whan Chung, Director of Korea Rural Economic Institute, 11 Apr.

Ms. Ursula Schäfer-Preuss, Vice President, Knowledge Management and Sustainable Development, Asian Development Bank, 12 Apr.

Dr. Takashi Kumashiro, Leader of the New Project (DREB Project), Japan International Research Center for Agricultural Sciences (JIRCAS), 13-14 Apr.

Dr. Jillian Lenné, New Member, IRRI Board of Trustees; Consultant, Agricultural Research for Development, DFID Research into Use Program, Co-Editor in Chief, Field Crops Research and Visiting Professor of Agrobiodiversity, University of Greenwich, United Kingdom, 15-18 Apr.

Mr. M. Syeduzzaman, New Member, IRRI Board of Trustees; Chairman, Bank of Asia Limited, BOC Bangladesh Ltd., Bangladesh Rice Foundation and Credit Rating Agency of Bangladesh; Vice Chairman, Infrastructure and Industrial Development Finance Company, 15-18 Apr.

Spouses of the members of the IRRI Board of Trustees 16-18 Apr.

Dr. John Dixon, Director, Social Sciences Division, CIMMYT, Mexico, 18 Apr.

Dr. Ravi Kumar, Dr. Alan Scott, and Dr. Sant Virmani, Advanta Limited, Bangalore, India, 19-20 Apr.

Dr. Eduardo Gratenol, Rice Breeder and Geneticist, Fundacion Danac, Valenzuela, 20 Apr.

Delegation from Acharya N.G. Ranga Agricultural University (ANGRAU), India, 30 Apr.

Dr. S.P. Tiwari, Deputy Director General – Education/Crop Science, Indian Council of Agricultural Research (ICAR), India, 5-7 May.
Raf Sanga and Rean Tirol, Members of WWF-Philippines, 10 May.

Dr. Jonathan Walker, Assistant Professor of Geography, Coordinator, Asian Studies Program; and Director, Philippine Mabuhay Study Abroad Program, James Madison University, 15 May.

Ms. Anna Price, Recipient of 2006 Australian National Committee on Irrigation and Drainage (ANCID) National Program for Sustainable Irrigation (NPSI) Travel Fellowship, 21 May.

Dr. Samsul Huda, Associate Professor, University of Western Sydney, Australia, 5 Jun.

Dr. Taro Sasaki, Researcher, International Cooperation Center for Agricultural Education (ICCAE), 5-6 Jun.

Nuffield Australia Farming Scholars, 12-13 Jun.

Mr. Ralph Leonard, Brakeley Ltd., 12-14 Jun.

Dr. Curt Clausen, Sales Operations Director, Pioneer International Operations, and Party, 13-14 Jun

Delegates from the Institute of Food Technology, 18 Jun.

Mr. Santos Tan, Head of Special Projects Division, Tan Yan Kee Founation, Inc., and Party, 21 Jun.


Representatives and Distributors from GrainPro, Inc., 12 Jul.

Delegation from Korea Research Foundation, 12 Jul.

Prof. Kazuyuki Inubushi, Vice Dean, Faculty of Horticulture, Chiba University, 17 Jul.

Ms. Joanna Kane-Potaka, Head of Information Marketing and Management, Biodiversity International, 16 Jul.

Representatives from the Member Countries of the Association of South East Asian Nations (ASEAN) Working Group on Agricultural Training and Extension (AWGATE), 20 Jul.

Mr. Jaime Augusto Zobel de Ayala II, Chairman and CEO, Ayala Corporation, 7 Aug.

Mr. Liu Jian, Vice Chairman, State Council Leading Group for Poverty Alleviation and Development, and Party, 10 Aug.

Mr. Kikuchi Tsukahara, President and Chief Executive Officer, Domer Inc., 12-13 Aug.

Prof. Hiroshi Kayahara, Professor Emeritus, Sinshu University, 12-13 Aug.

Dr. Kejiro Otsuka, Chairman, IRRI Board of Trustees, 12-13 Aug.

Dr. Kenji Yoshinaga, Toyo University, and Party, 16 Aug.


Prof. Dr. Numchai Thanupon, Vice President for International Affairs, Maejo University, Thailand, and Party, 23 Aug.

Prof. Du Ying, Vice Chairman, National Development and Reform Commission, China, and Party, 27 Aug.

Dr. S. Raghuvardhan Reddy, Vice-Chancellor, Acharya N.G. Ranga Agricultural University (ANGRAU), Hyderabad, India, 27-28 Aug.

Prof. Dr. Numchai Thanupon, Vice President for International Affairs, Maejo University, Thailand, 28 Aug.

30 Farmer Leader Participants in the 2007 Regional Farmers’ Exchange Program, 28 Aug.

Mr. Erik Hartmann, Strategic Partner Development, Google, Singapore, 31 Aug.

Mr. Bhola Man Singh Basnet, Principal Scientist, Chief Communication, Publication and Documentation Division, Nepal Agricultural Research Council, 31 Aug-2 Sep.

Mr. Kikuichi Tsukahara, President and Chief Executive Officer, Domer Inc., 1-3 Sep.

Mr. Masao Shiina, President, Medical Doma, 1-3 Sep.

Dr. Kejiro Otsuka, Chairman of the Board of Trustees, 1-3 Sep.

Mr. Rassoulou Diallo, Senior Program Officer with the Standards Council, Canada, 6 Sep.

Mr. Jeremy Tager, International Campaigner, GREEN-PEACE, Southeast Asia, 12 Sep.

Dr. Jagadeesha Gouda, Senior Rice Breeder, Seed Works India, Hyderabad, India, 13 Sep.


Dr. Gurbachan Singh, Director, Central Soil Salinity Research Institute, India, 17-24 Sep.
Difficult to interpret as the data is not structured in a readable format.

H.E. Lim Kheng Hua, Ambassador of the Republic of Singapore to the Philippines, 23 Apr.

Mr. Chakorn Suchiva, Minister of the Royal Thailand Embassy, and party, 27 Apr.


Mr. Qiu, First Secretary for Agriculture Affairs, Embassy of the People’s Republic of China, 9 Jun.

Mr. Xijun Deng, chargé d’Affaires, Embassy of the People’s Republic of China to the Philippines, and Party, 17 Aug.

Emiko Purdy, Agricultural Counselor and David Wolf, Agricultural Attaché, Embassy of the United States, Manila, 15 Sep.

H.E. Dr. Armindo Maia, Ambassador of Timor-Leste to the Philippines, and party, 28 Sep.

H.E. Jong Ki Hong, Ambassador of the Republic of Korea to the Philippines, and party, 19 Oct.

Media

101 East – Programmes, Al Jazeera English (Asia Bureau), 12-13 Feb.


Mr. Patrick Barta, Wall Street Journal, 28 Jun.


Mr. Funakoshi Mika, Kyodo News Manila Bureau, 2 Oct.

Dr. Cary Fowler, executive director, Global Crop Diversity Trust; Mr. Laurent Cibien and Mr. Allain Guillon, ARTE TV, 6-10 Dec.

Ms. Carmel Crimmins, deputy bureau chief, Reuters, 13 Dec.

INFORMATION AND TECHNOLOGY SERVICES

In collaboration with Communication and Publications Services (CPS), public access to IRRI’s rice research information was boosted by a close but explicitly nonexclusive relationship with Google. Around 300 IRRI scientific publications and counting, which have been scanned at 300 dpi and given optical character recognition treatment at 99% accuracy by CPS, are now available through Google Book Search. Full-text search is featured in a special IRRI section at http://books.irri.org (see screen capture on next page). Downloading of most of these files in pdf format is also available.

IRRI received a grant to place “sponsored links” on Google search engine results pages for searches containing specific keywords or phrases. A Google search on “rice science” displays an advertisement that links to a landing page on the IRRI Web page, for example. The keywords can be monitored and optimized in order to improve the dissemination of IRRI’s publicly available knowledge products.

IRRI’s image collection on Flickr continues to attract significant interest. During 2007, images from the collection were displayed 68,250 times. Since all images are placed in the public domain using a Creative Commons license deed, we have seen interesting uses of our photos. For example, the 2008 “Friends of the Earth International” calendar featured a (properly attributed) IRRI photograph on the front cover.

Similar partnerships with other service providers are being forged. A free nonprofit version of the hosted Salesforce.com customer relationship management system is in pilot test for the administration of IRRI’s alumni information and for donor relationships. Registered IRRI alumni have access to several applications, including e-mail at www.irrialumni.org.

In partnership with the Advanced Science and Technology Institute of the Philippine Department of Science and Technology (ASTI/DOST), the institutional network infrastructure was re-engineered to a multihoming network. The result is that connections to (and from) research partners that are joined to regional and/or national academic backbones are many times faster.

The campus networks of the University of the Philippines Los Baños and the University of the Philippines Open University were connected to IRRI’s high-capacity connection with the local research network (Preginet). For business continuity purposes, a new, buried-conduit fiber-optic cable segment was put in place.

Several ITS technical professional staff were trained in Linux and other open-source-related software, opening up the possibility to use these where appropriate. Network engineering skills were
addressed as well. A project with the World Vegetable Center (AVRDC) in Taiwan has a senior ITS team member based part-time at the AVRDC campus in Taiwan to look at information technology options for both centers. In a similar contract with the CGIAR’s CIO office, a senior IRRI ITS software engineer is working on the development of a common CGIAR medium-term plan system.

**SEED HEALTH UNIT**

**Phytosanitary certification**

The Seed Health Unit issued 393 phytosanitary certificates covering 34,711 seedlots (1,216.5 kg) and sent to 56 countries worldwide from January to December 2007 (SHU Table 1). By region (see world map on next page), East Asia received 91 rice seed shipments (15,896 seedlots weighing 443.2 kg); Europe, 59 shipments (1,587 seedlots, 100.4 kg); Latin America, 14 shipments (315 seedlots, 2.1 kg); North America, 39 shipments (2.047 seedlots, 48.2 kg); Oceania, 17 shipments (1,046 seedlots, 9.3 kg); South Asia, 43 shipments (3,795 seedlots, 76.6 kg); Southeast Asia, 103 shipments (6,988 seedlots, 390.6 kg); sub-Saharan Africa, 11 shipments (2,768 seedlots, 137.3 kg); West Africa, 4 shipments (42 seedlots, 0.9 kg); and West Asia and North Africa, 12 shipments (227 seedlots, 7.8 kg).

The exported rice seeds originated from different organizational units: Crop and Environmental Sciences Division (CESD), 14 shipments (392 seedlots...
weighing 63.8 kg); Genetic Resources Center (GRC), 142 shipments (6,613 seedlots, 337.8 kg); Grain Quality, Nutrition, and Postharvest Center (GQNPC), 67 shipments (1,889 seedlots, 66.1 kg); and Plant Breeding, Genetics, and Biotechnology (PBGB), 170 shipments (25,817 seedlots, 748.8 kg) (SHU Table 2).

The different pathogens detected with corresponding detection level and affected seedlots are shown in SHU Figure 1 and SHU Table 3. Routine seed health tests conducted on 2,185 nontreated, outgoing seedlots showed that Curvularia spp. affected 93.7% of the seedlots, followed by Trichoconis padwickii (90.6%), Phoma spp. (71.6%), Sarocladium oryzae (69.9%), Nigrospora spp. (52.9%), Fusarium moniliforme (33.5%), Bipolaris oryzae (23.9%), Microdochium oryzae (15.9%), Tilletia barclayana (6.5%), Aphelenchoides besseyi (5.3%), and Pyricularia oryzae (1.5%). All exported rice seeds were cleaned for objects of quarantine importance, tested for health, and treated with prescribed ASEAN standard seed treatment for rice—hot water at 52–57 °C for 15 min. This was followed by fungicide slurry treatment with benomyl and mancozeb, both at 0.1% by seed weight, except for countries that do not allow seed treatment. Fumigation with phosphine was also administered to all outgoing seeds.

Sixty-six phytosanitary certificates covering 37,820 seedlots (969.3 kg) were also issued to the International Network for Genetic Evaluation of Rice (INGER) for its nursery rice seed distribution to 37 countries worldwide (SHU Table 4). By region, East Asia received 15 shipments (3,305 seedlots weighing 68.8 kg); Europe, 3 shipments (665 seedlots, 17.8 kg); Latin America, 5 shipments (1,153 seedlots, 29.4 kg); South Asia, 14 shipments (15,931 seedlots weighing 363.9 kg); Southeast Asia, 17 shipments (10,966 seedlots, 349.5 kg), sub-Saharan Africa, 7 shipments (2,049 seedlots, 53.3 kg); West Africa, 1 shipment (1,700 seedlots, 36.0 kg); West Asia and North Africa, 4 shipments (2,051 seedlots, 50.6 kg).

Post-entry clearance

Forty incoming rice seed shipments (covering 4,543 seedlots and weighing 543.0 kg) from 17 countries worldwide were also processed for post-entry clearance (SHU Table 5). The highest total number of rice seed shipments originated from Southeast Asia, with 16 (covering 429 seedlots and weighing 171.2 kg), while the highest total number of seedlots and total weight originated from East Asia, with 3,412 seedlots weighing 327.2 kg. The consignees of these seed shipments are shown in SHU Table 6. PBGB received the highest number of incoming rice seed shipments, with 21 (3,325 seedlots weighing 136.2 kg), followed by GQNPC with 14 shipments (226 seedlots weighing 96.3 kg), CESD with 3 shipments (192 seedlots weighing 1.4 kg), and GRC with 2 shipments (800 seedlots weighing 309.0 kg).

SHU Tables 7a and 7b show the results of post-entry examination conducted on 1,421 incoming seedlots. Of the visually inspected seedlots, none were contaminated with weed seeds, 1.2% had seeds with soil, and 0.1% was damaged by insects, mainly by Sitophilus granarius. In terms of general quality, 1,378 seedlots (97.0%) were under category 3. The seed health tests on 89 incoming nontreated rice seedlots showed that Curvularia spp. affected 89.9%, followed by T. padwickii (67.4%), Phoma spp.
(57.3%), T. barclayana (38.2%), B. oryzae (28.1%), S. oryzae (20.2%), Nigrospora spp. (18.0%), F. moniliforme (15.7%), M. oryzae (5.6%), and A. besseyi (2.3%) (SHU-Figure 2 and SHU Table 8). The results also show that none of the incoming seedlots were infected with P. oryzae. The prescribed ASEAN standard treatments were applied to all incoming seeds.

Crop health inspections

Crop health inspections were conducted on post-entry quarantine areas and on GRC, PBGB, CESD, and GQNPC seed multiplication plots during the 2007 dry and wet seasons at three different crop stages. SHU Table 9 shows the different diseases observed with corresponding percentage prevalence. For incoming materials planted during the dry season, the most prevalent disease observed at the seedling stage was Sclerotium seedling blight (2.1%), whereas the most prevalent disease observed during tillering and maturity stages was tungro with 7.0% and 4.5%, respectively. During the wet season, no diseases were observed at the seedling stage. The most prevalent disease observed at tillering was tungro (2.2%); at maturity, it was bacterial leaf streak (0.8%).

On the other hand, for materials planted in the multiplication plots during the dry season, the most prevalent disease observed at the seedling stage was Sclerotium seedling blight (11.6%). The most prevalent disease observed during the tillering stage was tungro (10.9%) while that during the maturity stage was bacterial leaf streak (2.0%). During the wet season, the most prevalent disease of seedlings was leaf blast (1.8%). The most prevalent disease observed during the tillering stage was tungro (7.9%). With mature crops, the most prevalent disease observed was sheath blight (1.7%).

Advance testing for GRC seeds

A total of 3,840 GRC seedlots were processed for health status before storage. The different fungi detected with corresponding detection level and affected seedlots are shown in SHU Table 10. Routine seed health testing on these untreated seedlots revealed that Curvularia spp. affected 100% of the seedlots, followed by Phoma spp. (99.0%), T. padwickii (94.4%), S. oryzae (47.3%), Nigrospora spp. (41.3%), B. oryzae (13.9%), F. moniliforme (11.3%), M. oryzae (7.5%), A. besseyi (5.1%), P. oryzae (0.1%), and T. barclayana (0.1%).

Nonseed biological materials and soil samples

Outgoing (exported). Through the Seed Health Unit, a total of 87 shipments covering 5,291 samples were processed for phytosanitary certification and sent to 17 countries worldwide (SHU Table 11). By region, East Asia received 22 shipments covering 1,330 samples; Europe received 26 shipments covering 1,926 samples; Latin America received 1 shipment covering 12 samples; North America received 18 shipments covering 1,522 samples; Oceania received 2 shipments covering 13 samples; South Asia received 2 shipments covering 129 samples; Southeast Asia received 12 shipments covering 78 samples; sub-Saharan Africa received 3 shipments covering 209 samples; and West Asia and North Africa received 1 shipment covering 72 samples. SHU Table 12 shows the sources and total number of nonseed biological material and soil sample shipments exported by IRRI. The nature and corresponding number of samples sent by different organizational units are also shown.
## SHU Table 1. Distribution of rice seeds exported by IRRI, by region and by country, 2007.

<table>
<thead>
<tr>
<th>Region/country</th>
<th>Total shipments (no.)</th>
<th>Total seedlots (no.)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East Asia (4)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>12</td>
<td>242</td>
<td>1.4</td>
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<tr>
<td>Korea (South)</td>
<td>11</td>
<td>7,213</td>
<td>361.2</td>
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<tr>
<td>China</td>
<td>62</td>
<td>8,364</td>
<td>76.7</td>
</tr>
<tr>
<td>Taiwan</td>
<td>6</td>
<td>77</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
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<td><strong>15,896</strong></td>
<td><strong>443.2</strong></td>
</tr>
<tr>
<td><strong>Europe (14)</strong></td>
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<td></td>
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</tr>
<tr>
<td>Belgium</td>
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<td>110</td>
<td>0.4</td>
</tr>
<tr>
<td>Czech Republic</td>
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<td>9</td>
<td>0.03</td>
</tr>
<tr>
<td>Denmark</td>
<td>4</td>
<td>625</td>
<td>21.0</td>
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<tr>
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<tr>
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<td>58</td>
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</tr>
<tr>
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<tr>
<td>Netherlands</td>
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<tr>
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<td>33</td>
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</tr>
<tr>
<td>Romania</td>
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<tr>
<td>Spain</td>
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<td>48</td>
<td>1.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>21</td>
<td>0.03</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>17</td>
<td>163</td>
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<tr>
<td>Uzbekistan</td>
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<td>21</td>
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<td><strong>Subtotal</strong></td>
<td><strong>59</strong></td>
<td><strong>1,587</strong></td>
<td><strong>100.4</strong></td>
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<td><strong>Latin America (8)</strong></td>
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<td>84</td>
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<td>Brazil</td>
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<tr>
<td>Colombia</td>
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<td>55</td>
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<tr>
<td>Cuba</td>
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<tr>
<td>Guyana</td>
<td>1</td>
<td>38</td>
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<tr>
<td>Peru</td>
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<td>7</td>
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<tr>
<td>Uruguay</td>
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<td>0.07</td>
</tr>
<tr>
<td>Venezuela</td>
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<td>0.09</td>
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<td><strong>Subtotal</strong></td>
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<td><strong>315</strong></td>
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</tr>
<tr>
<td>Canada</td>
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<td>87</td>
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<tr>
<td>USA</td>
<td>31</td>
<td>1,960</td>
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<td><strong>Subtotal</strong></td>
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<td><strong>2,047</strong></td>
<td><strong>48.2</strong></td>
</tr>
<tr>
<td><strong>Oceania (3)</strong></td>
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<td></td>
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</tr>
<tr>
<td>Australia</td>
<td>14</td>
<td>923</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>393</strong></td>
<td><strong>34,711</strong></td>
<td><strong>1,216.5</strong></td>
</tr>
</tbody>
</table>

### Region/country

<table>
<thead>
<tr>
<th>Region/country</th>
<th>Total shipments (no.)</th>
<th>Total seedlots (no.)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>2</td>
<td>122</td>
<td>4.6</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>17</strong></td>
<td><strong>1,046</strong></td>
<td><strong>9.3</strong></td>
</tr>
<tr>
<td>South Asia (6)</td>
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<tr>
<td>Bangladesh</td>
<td>7</td>
<td>233</td>
<td>9.8</td>
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<tr>
<td>Bhutan</td>
<td>1</td>
<td>351</td>
<td>14.0</td>
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<tr>
<td>India</td>
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<td>37.9</td>
</tr>
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<td>Nepal</td>
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<td>402</td>
<td>11.1</td>
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<td>Pakistan</td>
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<td>134</td>
<td>3.8</td>
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<tr>
<td>Sri Lanka</td>
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<td>21</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
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<td><strong>3,795</strong></td>
<td><strong>76.6</strong></td>
</tr>
<tr>
<td>Southeast Asia (8)</td>
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</tr>
<tr>
<td>Cambodia</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Indonesia</td>
<td>5</td>
<td>195</td>
<td>7.6</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>6</td>
<td>213</td>
<td>11.8</td>
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<tr>
<td>Malaysia</td>
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<td>Philippines</td>
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<tr>
<td>Thailand</td>
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<td>89</td>
<td>5.5</td>
</tr>
<tr>
<td>Vietnam</td>
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<td>47.0</td>
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<td><strong>Subtotal</strong></td>
<td><strong>103</strong></td>
<td><strong>6,988</strong></td>
<td><strong>390.6</strong></td>
</tr>
<tr>
<td>Sub-Saharan Africa (7)</td>
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<td>4.4</td>
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<tr>
<td>Ghana</td>
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<td>77</td>
<td>0.8</td>
</tr>
<tr>
<td>Mauritius</td>
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<td>57</td>
<td>2.3</td>
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<tr>
<td>Mozambique</td>
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<td>963</td>
<td>65.9</td>
</tr>
<tr>
<td>Nigeria</td>
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<td>1,394</td>
<td>57.2</td>
</tr>
<tr>
<td>Republic of Guinea</td>
<td>1</td>
<td>50</td>
<td>0.7</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1</td>
<td>97</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>11</strong></td>
<td><strong>2,768</strong></td>
<td><strong>137.3</strong></td>
</tr>
<tr>
<td>West Africa (1)</td>
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<td></td>
</tr>
<tr>
<td>Benin</td>
<td>4</td>
<td>42</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>4</strong></td>
<td><strong>42</strong></td>
<td><strong>0.9</strong></td>
</tr>
<tr>
<td>West Asia and North Africa (3)</td>
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<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>5</td>
<td>40</td>
<td>0.5</td>
</tr>
<tr>
<td>Iran</td>
<td>6</td>
<td>127</td>
<td>5.9</td>
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<tr>
<td>Turkey</td>
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<td>60</td>
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</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>12</strong></td>
<td><strong>227</strong></td>
<td><strong>7.8</strong></td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>393</strong></td>
<td><strong>34,711</strong></td>
<td><strong>1,216.5</strong></td>
</tr>
</tbody>
</table>
### SHU Table 3. Seedborne pathogens detected on untreated outgoing rice seeds that received phytosanitary certification (January to December 2007).

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Affected seedlots (%)</th>
<th>Detection level (%)</th>
<th>Mean value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichoconis padwickii</td>
<td>90.6</td>
<td>1–59</td>
<td>9.7</td>
</tr>
<tr>
<td>Curvularia spp.</td>
<td>93.7</td>
<td>1–83</td>
<td>12.8</td>
</tr>
<tr>
<td>Sarocladium oryzae</td>
<td>69.9</td>
<td>1–70</td>
<td>4.5</td>
</tr>
<tr>
<td>Microdochium oryzae</td>
<td>15.9</td>
<td>1–14</td>
<td>1.2</td>
</tr>
<tr>
<td>Fusarium moniliforme</td>
<td>33.5</td>
<td>1–14</td>
<td>1.5</td>
</tr>
<tr>
<td>Bipolaris oryzae</td>
<td>23.9</td>
<td>1–12</td>
<td>1.2</td>
</tr>
<tr>
<td>Phoma spp.</td>
<td>71.6</td>
<td>1–76</td>
<td>7.9</td>
</tr>
<tr>
<td>Pyricularia oryzae</td>
<td>1.5</td>
<td>1–17</td>
<td>1.9</td>
</tr>
<tr>
<td>Nigrospora spp.</td>
<td>52.9</td>
<td>1–58</td>
<td>6.6</td>
</tr>
<tr>
<td>Tilletia barclayana</td>
<td>6.5</td>
<td>1–58</td>
<td>7.1</td>
</tr>
<tr>
<td>Aphelechnoides besseyi²</td>
<td>5.3</td>
<td>1–20</td>
<td>2.8</td>
</tr>
</tbody>
</table>

¹Based on seeds/seedlot that could be used for testing (n = 2,185).
²Actual nematode count using sedimentation test.
### SHU Table 5. Origin and corresponding total number of shipments, total number of seedlots, and total weight (kg) of rice seeds imported by IRRI (January to December 2007).

<table>
<thead>
<tr>
<th>Region/country</th>
<th>Total shipments (no.)</th>
<th>Total seedlots (no.)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia (3)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Korea S</td>
<td>4</td>
<td>2,661</td>
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<td>China</td>
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<td>750</td>
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<tr>
<td>Taiwan</td>
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<td>0.01</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
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<td><strong>3,412</strong></td>
<td><strong>327.2</strong></td>
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<td>Latin America (2)</td>
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<tr>
<td>Brazil</td>
<td>1</td>
<td>16</td>
<td>0.8</td>
</tr>
<tr>
<td>Colombia</td>
<td>2</td>
<td>351</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>3</strong></td>
<td><strong>367</strong></td>
<td><strong>5.4</strong></td>
</tr>
<tr>
<td>Oceania (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>5</td>
<td>73</td>
<td>30.9</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>5</strong></td>
<td><strong>73</strong></td>
<td><strong>30.9</strong></td>
</tr>
<tr>
<td>South Asia (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>3</td>
<td>168</td>
<td>1.5</td>
</tr>
<tr>
<td>India</td>
<td>2</td>
<td>9</td>
<td>1.8</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2</td>
<td>6</td>
<td>0.8</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>1</td>
<td>78</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>8</strong></td>
<td><strong>261</strong></td>
<td><strong>8.0</strong></td>
</tr>
<tr>
<td>Southeast Asia (6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>5</td>
<td>315</td>
<td>7.0</td>
</tr>
<tr>
<td>Laos</td>
<td>2</td>
<td>60</td>
<td>58.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>Philippines</td>
<td>3</td>
<td>18</td>
<td>101.6</td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>Vietnam</td>
<td>3</td>
<td>27</td>
<td>2.42</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>16</strong></td>
<td><strong>429</strong></td>
<td><strong>171.2</strong></td>
</tr>
<tr>
<td>West Asia &amp; North Africa (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>1</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>0.2</strong></td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>40</strong></td>
<td><strong>4,543</strong></td>
<td><strong>543.0</strong></td>
</tr>
</tbody>
</table>

---

### SHU Table 6. Consignees and corresponding total number of shipments, total number of seedlots, and weight (kg) of imported rice seeds (January to December 2007).

<table>
<thead>
<tr>
<th>Organizational unit</th>
<th>Total shipments (no.)</th>
<th>Total seedlots (no.)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop and Environmental Sciences Division (CESD)</td>
<td>3</td>
<td>192</td>
<td>1.4</td>
</tr>
<tr>
<td>Genetic Resources Center (GRC)</td>
<td>2</td>
<td>800</td>
<td>309.0</td>
</tr>
<tr>
<td>Grain Quality, Nutrition, and Postharvest Center (GCNPC)</td>
<td>14</td>
<td>226</td>
<td>96.3</td>
</tr>
<tr>
<td>Plant Breeding, Genetics and Biotechnology (PBGB)</td>
<td>21</td>
<td>3,325</td>
<td>136.2</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>40</strong></td>
<td><strong>4,543</strong></td>
<td><strong>543.0</strong></td>
</tr>
</tbody>
</table>

---

### SHU Table 7a. Result of visual inspection conducted on incoming rice seeds received by SHU for post-entry clearance (January to December 2007).

<table>
<thead>
<tr>
<th>Observation</th>
<th>Infested seedlots (no.)</th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed-contaminated</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Damaged by insects</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td><em>Sitophilus oryzae</em></td>
<td>26</td>
<td>1.8</td>
</tr>
<tr>
<td><em>Sitophilus granarius</em></td>
<td>28</td>
<td>2.0</td>
</tr>
<tr>
<td><em>Rhizopertha dominica</em></td>
<td>10</td>
<td>0.7</td>
</tr>
<tr>
<td><em>Cryptolestes ferrugineus</em></td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Seeds with soil</td>
<td>17</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*Based on 1,421 seedlots visually inspected.

---

### SHU Table 7b. General quality of imported rice seeds received by SHU for post-entry clearance.

<table>
<thead>
<tr>
<th>General quality*</th>
<th>Seedlots (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>5</td>
</tr>
<tr>
<td>Category 2</td>
<td>19</td>
</tr>
<tr>
<td>Category 3</td>
<td>1,378</td>
</tr>
<tr>
<td>Category 4</td>
<td>19</td>
</tr>
</tbody>
</table>

*Based on 1,421 seedlots visually inspected.

---

### SHU Table 8. Seedborne pathogens detected on incoming rice seeds received by SHU for post-entry clearance (January to December 2007).

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Affected seedlots (%)</th>
<th>Detection level (%)</th>
<th>Mean value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Trichoconis padwickii</em></td>
<td>67.4</td>
<td>1 – 24</td>
<td>16.1</td>
</tr>
<tr>
<td><em>Curvularia</em> spp.</td>
<td>89.9</td>
<td>1 – 65</td>
<td>8.2</td>
</tr>
<tr>
<td><em>Sarocladium oryzae</em></td>
<td>20.2</td>
<td>1 – 16</td>
<td>4.6</td>
</tr>
<tr>
<td><em>Microdochium oryzae</em></td>
<td>5.6</td>
<td>1 – 1</td>
<td>1.0</td>
</tr>
<tr>
<td><em>Fusarium moniliforme</em></td>
<td>15.7</td>
<td>1 – 3</td>
<td>1.2</td>
</tr>
<tr>
<td><em>Bipolaris oryzae</em></td>
<td>28.1</td>
<td>1 – 7</td>
<td>1.7</td>
</tr>
<tr>
<td><em>Phoma</em> spp.</td>
<td>57.3</td>
<td>1 – 20</td>
<td>4.2</td>
</tr>
<tr>
<td><em>Pyricularia oryzae</em></td>
<td>0.0</td>
<td>1 – 1</td>
<td>0.0</td>
</tr>
<tr>
<td><em>Nigrospora</em> spp.</td>
<td>18.0</td>
<td>1 – 8</td>
<td>2.0</td>
</tr>
<tr>
<td><em>Tilletia barleyana</em></td>
<td>38.2</td>
<td>1 – 83</td>
<td>279</td>
</tr>
<tr>
<td><em>Aphelenchoides besseyi</em></td>
<td>2.3</td>
<td>1 – 2</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Actual nematode count based on 200 seeds/seedlot (n = 89).
### SHU Table 9. Diseases observed and corresponding percent prevalence during the three different crop stages of incoming and outgoing rice, 2007 dry and wet seasons.

<table>
<thead>
<tr>
<th>Crop stage/disease observed</th>
<th>Incoming</th>
<th>null</th>
<th>Outgoing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dry season</td>
<td>Wet season</td>
<td>Dry season</td>
</tr>
<tr>
<td></td>
<td>Diseased entries (no.)</td>
<td>%</td>
<td>Diseased entries (no.)</td>
</tr>
<tr>
<td>Seedling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sclerotium seedling blight</td>
<td>159</td>
<td>2.1</td>
<td>0051</td>
</tr>
<tr>
<td>Bacterial stripe</td>
<td>1</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Leaf blast</td>
<td>0</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Entries without disease</td>
<td>7,358</td>
<td>97.9</td>
<td>367</td>
</tr>
<tr>
<td>Total entries inspected</td>
<td>7,518</td>
<td>92.9</td>
<td>367</td>
</tr>
<tr>
<td>Tilling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tungro</td>
<td>280</td>
<td>7.0</td>
<td>80</td>
</tr>
<tr>
<td>Yellow dwarf</td>
<td>3</td>
<td>0.07</td>
<td>4</td>
</tr>
<tr>
<td>Leaf scald</td>
<td>0</td>
<td>0.0</td>
<td>40</td>
</tr>
<tr>
<td>Bakanae</td>
<td>1</td>
<td>0.02</td>
<td>3</td>
</tr>
<tr>
<td>Leaf blast</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Entries without disease</td>
<td>3,722</td>
<td>92.9</td>
<td>359</td>
</tr>
<tr>
<td>Total entries inspected</td>
<td>4,006</td>
<td>92.9</td>
<td>367</td>
</tr>
<tr>
<td>Maturity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tungro</td>
<td>171</td>
<td>4.5</td>
<td>7</td>
</tr>
<tr>
<td>Bacterial leaf streak</td>
<td>0</td>
<td>0.0</td>
<td>3</td>
</tr>
<tr>
<td>Sheath blight</td>
<td>1</td>
<td>0.03</td>
<td>0</td>
</tr>
<tr>
<td>Leaf scald</td>
<td>0</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Sheath rot</td>
<td>29</td>
<td>0.8</td>
<td>35</td>
</tr>
<tr>
<td>Narrow brown leaf spot</td>
<td>0</td>
<td>0.0</td>
<td>76</td>
</tr>
<tr>
<td>Yellow dwarf</td>
<td>2</td>
<td>0.05</td>
<td>00</td>
</tr>
<tr>
<td>Leaf blast</td>
<td>0</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Neck blast</td>
<td>0</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Bacterial leaf blight</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
</tr>
<tr>
<td>False smut</td>
<td>0</td>
<td>0.0</td>
<td>00</td>
</tr>
<tr>
<td>Entries without disease</td>
<td>3,642</td>
<td>94.8</td>
<td>363</td>
</tr>
<tr>
<td>Total entries inspected</td>
<td>3,844</td>
<td>94.8</td>
<td>367</td>
</tr>
</tbody>
</table>

*aDiseases observed on plants originating from incoming seeds were not of an introduced nature.*

### SHU Table 10. Routine seed health test results of untreated Genetic Resources Center (GRC) rice seeds for long- and medium-term storage.

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Affected seedlots (%)</th>
<th>Detection level (%)</th>
<th>Mean value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichoconis padwickii</td>
<td>94.43</td>
<td>1 – 46</td>
<td>8.15</td>
</tr>
<tr>
<td>Curvularia spp.</td>
<td>100.00</td>
<td>1 – 64</td>
<td>14.45</td>
</tr>
<tr>
<td>Sarocladium oryzae</td>
<td>47.29</td>
<td>1 – 50</td>
<td>2.66</td>
</tr>
<tr>
<td>Microdochium oryzae</td>
<td>7.53</td>
<td>1 – 19</td>
<td>1.51</td>
</tr>
<tr>
<td>Fusarium moniliforme</td>
<td>11.30</td>
<td>1 – 5</td>
<td>1.39</td>
</tr>
<tr>
<td>Bipolaris oryzae</td>
<td>13.88</td>
<td>1 – 4</td>
<td>1.31</td>
</tr>
<tr>
<td>Phoma spp.</td>
<td>98.98</td>
<td>1 – 84</td>
<td>11.62</td>
</tr>
<tr>
<td>Pyricularia oryzae</td>
<td>0.13</td>
<td>1 – 4</td>
<td>1.80</td>
</tr>
<tr>
<td>Nigrospora spp.</td>
<td>41.33</td>
<td>1 – 30</td>
<td>2.89</td>
</tr>
<tr>
<td>Tilletia barclayana</td>
<td>0.05</td>
<td>1 – 2</td>
<td>1.50</td>
</tr>
<tr>
<td>Apheplenchoides besseyia</td>
<td>5.10</td>
<td>1 – 245</td>
<td>4.39</td>
</tr>
</tbody>
</table>

*aBased on 200 seeds/seedlot that could be used for testing (n = 3,840).*

*bActual nematode count using sedimentation test.*
<table>
<thead>
<tr>
<th>Region/country/nature of materials</th>
<th>Total shipment (no.)</th>
<th>Total samples (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East Asia (3)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Rice seed tissues</td>
<td>1</td>
<td>188</td>
</tr>
<tr>
<td>RNA</td>
<td>2</td>
<td>66</td>
</tr>
<tr>
<td>Soil</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>Virus-infected plants</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td><strong>Korea (South)</strong></td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>DNA</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>DNA and commercial primers</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>DNA and DNA primers</td>
<td>3</td>
<td>103</td>
</tr>
<tr>
<td>DNA and nucleic acid primers</td>
<td>2</td>
<td>56</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial blight strains</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>DNA</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rice roots and shoots</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>RNA</td>
<td>3</td>
<td>294</td>
</tr>
<tr>
<td>RNA and molecular biology kit</td>
<td>1</td>
<td>336</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>22</td>
<td>1,330</td>
</tr>
<tr>
<td><strong>Europe (4)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aeschynomone</em> seeds</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>DNA</td>
<td>1</td>
<td>1,143</td>
</tr>
<tr>
<td>DNA, RNA, and cDNA</td>
<td>1</td>
<td>288</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhizoctonia solani</em> isolates</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rice husk and rice straw</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rice leaves</td>
<td>3</td>
<td>154</td>
</tr>
<tr>
<td>Rice shoots</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>Rice straw</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rice straw and rice hulls</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>RNA</td>
<td>4</td>
<td>56</td>
</tr>
<tr>
<td><strong>Netherlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice straw</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SHU Table 11. Distribution by region, country, and nature of materials, with corresponding total number of shipments and total number of samples of nonseed biological materials exported by IRRI, 2007.**

<table>
<thead>
<tr>
<th>Region/country/nature of materials</th>
<th>Total shipment (no.)</th>
<th>Total samples (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Fungal samples</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Rat blood</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Rat blood and tail samples</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>RNA</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Soil</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>26</strong></td>
<td><strong>1,926</strong></td>
</tr>
<tr>
<td><strong>Latin America (1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venezuela</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td><strong>North America (1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antisera</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>DNA</td>
<td>9</td>
<td>1,327</td>
</tr>
<tr>
<td>DNA and RNA</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Rice leaves</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Soil</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vegetative tillers</td>
<td>5</td>
<td>154</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>18</strong></td>
<td><strong>1,522</strong></td>
</tr>
<tr>
<td><strong>Oceania (1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>DNA and nucleic acid primers</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>2</strong></td>
<td><strong>13</strong></td>
</tr>
<tr>
<td><strong>South Asia (1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNA</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>Rice leaves</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>2</strong></td>
<td><strong>129</strong></td>
</tr>
<tr>
<td><strong>Southeast Asia (4)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taq polymerase enzymes</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Philippines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azolla</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Bacterial grain rot samples</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>1</td>
<td>12</td>
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**Grand total** 87 5,291
SHU Table 12. Sources of nonseed biological materials exported by IRRI, 2007.

<table>
<thead>
<tr>
<th>Organizational unit/nature of materials</th>
<th>Total shipments (no.)</th>
<th>Total samples (no.)</th>
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<tbody>
<tr>
<td>Crop and Environmental Sciences Division</td>
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<tr>
<td>Aeschynomene seeds</td>
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<tr>
<td>Azola</td>
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<tr>
<td>DNA and commercial primers</td>
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<tr>
<td>DNA and DNA primers</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Rat blood</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Rat blood and tail samples</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>Rice husk and rice straw</td>
<td>1</td>
<td>8</td>
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<tr>
<td>Rice leaves</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Rice straw</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>RNA</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Sesbania seeds</td>
<td>1</td>
<td>13</td>
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<tr>
<td>Soil</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>15</strong></td>
<td><strong>366</strong></td>
</tr>
<tr>
<td>Genetic Resources Center</td>
<td></td>
<td></td>
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<tr>
<td>DNA</td>
<td>9</td>
<td>2,342</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>9</strong></td>
<td><strong>2,342</strong></td>
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<tr>
<td>Plant Breeding, Genetics, and Biotechnology</td>
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<tr>
<td>Antisera</td>
<td>5</td>
<td>20</td>
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<td>Antisera and virus-infected tissues</td>
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<td>Bacterial blight strains</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Bacterial grain rot samples</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bacterial isolates</td>
<td>7</td>
<td>96</td>
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<td>DNA</td>
<td>8</td>
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<td>73</td>
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<tr>
<td>DNA and nucleic acid primers</td>
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<td>56</td>
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<tr>
<td>DNA, RNA, and cDNA</td>
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<td>288</td>
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<tr>
<td>Fungal samples</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>59</strong></td>
<td><strong>2,464</strong></td>
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<tr>
<td><strong>Grand total</strong></td>
<td><strong>87</strong></td>
<td><strong>5,291</strong></td>
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</table>

SHU Table 13. Origin, nature of materials, total number of shipments, and total number of samples of imported nonseed biological materials, 2007.

<table>
<thead>
<tr>
<th>Region/country</th>
<th>Total shipments (no.)</th>
<th>Total samples (no.)</th>
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<tbody>
<tr>
<td>Europe (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerbera, cherry laurel, poplar, and wheat grains (ground)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Lucerne, cherry laurel, aubergine, and oak leaves (ground)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Lucerne, Kiwi leaf, green pea, and wheat grains (ground)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Lucerne, oil palm leaf, mango leaf, and cherry leaf (ground)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Soil</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>8</strong></td>
<td><strong>32</strong></td>
</tr>
<tr>
<td>North America (1)</td>
<td></td>
<td></td>
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<tr>
<td>USA</td>
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<td></td>
</tr>
<tr>
<td>Soil</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>South Asia (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>2</td>
<td>137</td>
</tr>
<tr>
<td>Sorghum seeds and pearl millet</td>
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<td>36</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>3</strong></td>
<td><strong>173</strong></td>
</tr>
<tr>
<td>Southeast Asia (5)</td>
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<td></td>
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<tr>
<td>Cambodia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice leaves</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNA</td>
<td>1</td>
<td>186</td>
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<tr>
<td>Lao PDR</td>
<td></td>
<td></td>
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<tr>
<td>Rice leaves</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>7</strong></td>
<td><strong>695</strong></td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>19</strong></td>
<td><strong>930</strong></td>
</tr>
</tbody>
</table>

HOMEMADE and commercial 1 72  
Taq polymerase, PCR buffer, magnesium chloride, DNA ladder, dNTPs, ribonuclease  
Rhizoctonia solani isolates 1 1  
Rice leaves 5 241  
Rice roots and shoots 1 20  
Rice seed tissues 1 188  
Rice shoots 1 74  
RNA 9 418  
RNA and commercial molecular biology kit components and commercial  
PCR reagents  
Taq polymerase enzymes 2 20  
Taq polymerase, SYBR safe gel stain 1 23  
1000x in DMSO, 400 ul, DNA ladder, and dNTPs  
Vegetative tillers 5 154  
Virus-infected plants 1 10  
**Subtotal** 59 2,464
CESD sent 15 shipments covering 366 samples; GQNPC sent 4 shipments covering 119 samples; GRC sent 9 shipments covering 2,342 samples; and PBGB sent 59 shipments covering 2,464 samples.

Incoming (imported). Nineteen shipments covering 930 samples coming from four regions were also processed for post-entry clearance (SHU Table 13). The highest number of shipments originated from Europe (8), while the highest number of samples originated from Southeast Asia (695). SHU Table 14 shows the recipient organizational unit, nature of incoming materials with corresponding total number of shipments, and total number of samples. The recipients of these incoming materials were CESD, with 15 shipments covering 768 samples, which consisted of various materials; GQNPC with 1 shipment covering 33 rice leaf samples; and PBGB with 3 shipments covering 129 samples, which consisted of various materials.

Workshops, training courses, and visitors
SHU also participated in various training/workshops coordinated by the Training Center: the Rice Camp with 20 high school students from Thailand and the Philippines; Agriculture Research: Design and Management for Bangladesh with eight Bangladeshi and two Filipino research officers; Rice Research to Production Course with 28 participants from 12 countries; F, Seed Pathology Training Course with two researchers from PhilRice; General Plant Quarantine Training with 35 plant quarantine officers as participants; Rice Breeding Course (first offering) with 23 participants from five countries; Rice Breeding Course (second offering) with 27 participants from 15 countries; and Upland Rice Variety Selection Techniques (for African countries) with nine participants and one JICA expert/evaluator.

Other visitors were two BS students from Kyungpook University, South Korea; participants of the ISTA-APSA-FAO Seed Quality Training Course, with 18 trainees from 10 countries, two trainers from ISTA, and four NSQSTC representatives; a consultant from the Central Advisory Service on Intellectual Property (CAS-IP), CGIAR; two research managers from the Institute of Environment and Sustainable Development Agriculture, Chinese Academy of Agricultural Sciences; an intern from the 2007 World Food Prize Foundation; a representative of the Intellectual Property Resource for Agriculture; the former president of Huazhong Agricultural University, Wuhan, Hubei, China, and two colleagues; and participants (including curators/managers) of the International Coconut Genebank Workshop.

### Grain Quality, Nutrition, and Postharvest Center

**Grain quality evaluation services**

In 2007, GQNPC continued to provide grain quality evaluation services to IRRI’s rice breeding programs and other projects. A total of 60,909 analyses were performed on 25,358 samples.
Of the total analyses, 77.5% were done on breeders’ lines collected from the pedigree nurseries and 14% from replicated yield trials, advanced yield trials, and hybridization blocks. About 8.5% of this year’s quality evaluation service was also carried out for other research programs (GRC, Germplasm Utility Value-added Project, and CESD).

Cooking and eating quality evaluation comprised 50% of analyses done on breeders’ lines, whereas milling yield potential, physical quality, and sensory evaluation constituted 37%, 9%, and 4% of the analyses, respectively.

**International Network for Quality Rice**

The INQR, which was formed electronically in 2006, is a platform for collaborators to compile, share, develop new knowledge and materials, and set universal standard methods for the characterization and quantification of traits of rice quality. Quality traits transcend the borders of germplasm classes, so members come from rice-producing countries in tropical and subtropical regions. The INQR collaborates with scientists who investigate issues that relate to rice quality and attempts to develop new science into outputs that increase our knowledge of rice quality and our capacity to measure it. Through the network, NARES in every rice-growing country have access to new methods and are, likewise, able to participate in the development of these new methods.

As one of its founding members, IRRI through the support of GQNPC, hosted the first INQR workshop entitled “Clearing Old Hurdles with New Science: Improving Rice Grain Quality” held 17-19 April 2007. The event, co-chaired by the head of IRRI’s GQNPC, Dr. Melissa Fitzgerald, and Dr. Christine Bergman of the University of Nevada, attracted 71 cereal chemists and other experts from more than 20 nations. The latest research findings in several new areas were presented, including:

- Breeding for better quality and genetically mapping specific quality traits in rice such as taste and aroma.
- Cooking and eating qualities of rice and how to measure sensory qualities more accurately.
- Role of important substances such as starch and amylose in cooking rice and how they are measured. Five working groups or task forces were also formed during the workshop:
  - Amylose
  - Measuring physical quality
  - Quantifying sensory quality
  - Aromatic compounds
  - Nutritional quality

**Progress in our ability to accurately measure amylose.** Any progress on accurately measuring amylose will enable breeders to use amylose values to predict quality more reliably. To understand the factors involved in the variability of amylose values obtained by different laboratories, an amylose project was started in November 2006. Flour of 17 varieties was sent to 28 rice quality laboratories around the world and each measured amylose content, in duplicate and on 2 days, using the method they routinely use in their laboratory. Details of the method each analyst used were also collected through a questionnaire. The values and method information were all returned to IRRI for analysis and the results were presented and discussed in the INQR workshop held in April.

First, the amylose project clearly showed extreme variability in the amylose value each method returns; much of the variability can be explained by the type of standard used by each group. Three types of standards were used: a standard curve generated from different concentrations of potato amylose; a standard curve generated using three calibrated rice varieties; and a standard curve generated from a mixture of potato amylose and rice amylpectin. Values obtained from methods using potato amylose as the standard curve were highly variable and were always the highest and lowest value for each sample. Values obtained using rice varieties that were directly or indirectly calibrated with potato amylose using the ISO 6647 standard reference method showed much smaller variability between laboratories.

Second, the two waxy varieties in the sample set ranged in amylose from 0 to 12%, despite having no chains longer than DP (degrees of polymerization) 110 by SEC. This indicates that amylpectin is contributing to the reading and it contributes differently in each method.

Third, two fractions of starch are based on solubility in hot water. After debranching the starch in each fraction, we found chains that are short like amylpectin and chains that are long like amylose.

Recommendations were made for a second round, which started immediately after the workshop. Again, flour of 17 varieties was sent to 43 laboratories around the world, including most of those involved in the first round, and to some new members of the amylose task force. In the second round, however, a set of four calibrated rice flour (with high, intermediate, and low amylose content, and a waxy rice) was sent along with the samples for generat-
ing the calibration curve. The screeners were also instructed to follow the amylose procedure based on the ISO/CD 6647-2.2 method. To confirm the interference of amyllopectin, screeners were asked to collect absorbance readings at two wavelength settings (620 and 720 nm) at two different times (immediately and 30 min after addition of chemical reagents). About 85% have sent in their results and data are currently being collated and analyzed.

Metabolomic profiling for components of yield and fragrance. The project brings together the world’s best scientists for metabolomic profiling of volatile compounds and soluble compounds. The beauty for us is that aroma in rice is a collection of volatile compounds. We have now formed the Aroma Task Force, and the people in that group come from programs dealing with aromatic rice. We have now supplied our collaborator, the META-PHOR (Metabolomic Technology Applications for Plants, Health, and Outreach, led by Plant Research International) project, with 26 samples of aromatic rice varieties from Central, South, and Southeast Asia, and Australia. It would be absolutely splendid if we could begin to sort out the difference between jasmine and basmati. Every 6 months, the META-PHOR scientists get together and report on their findings. In May 2008, the meeting will be in Laos, and they will be reporting on the volatile compounds in our rice.

Developing molecular markers to enable selection against chalk in rice. Grain appearance is largely determined by endosperm opacity or chalkiness. Consumers prefer rice with a translucent endosperm and, hence, the greater the chalkiness, the lower the market acceptability. Grains with chalkiness are also more prone to breakage during milling. To understand this chalkiness in rice and thereby assist IRRI and NARES breeders in developing chalk-free rice, a project funded by ACIAR started in May 2007. Within the span of 5 years, the project aims to

- Discover genetic segments and allelic variation in tropical and temperate germplasm that lead to low chalk independently of environmental conditions,
- Design markers to search for variability in the genetic segments associated with chalk in diverse germplasm,
- Develop and validate markers for low chalk to enable incorporation of favorable alleles into agronomically superior germplasm that will ultimately be delivered to NARES, and
- Deliver markers to our Australian collaborators for validation and optimization in the temperate japonica genetic background.

Improving the capacity of indica rice-breeding programs to measure the traits of physical quality of grain. This ongoing 2-year project involves collaboration between IRRI (through GQNPC) and FOSS Analytical AB, Sweden, to enhance research methods and procedures for measuring length, width, chalk, cracking, and head rice in long and medium slender brown and polished grains of rice. We will collect 100 samples of long and medium slender grains of rice covering the main varieties in those groups coming from at least five countries in the INQR group. Images of these grain samples will be collected using existing equipment and sorted for calibration work using FOSS software CIV 2.0 Cervitec Image Viewer. When sorting the samples, the definition of chalk, broken, and head rice, as used by the INQR group and proposed by IRRI, will be applied. For its part, FOSS will develop the application and validate the calibration that will eventually be supplied to IRRI and other institutions that have contributed to the project.

Training
In line with GQNPC’s mission to impart new knowledge on efficient and cost-effective methods of evaluating rice quality and nutrition to NARES breeders and young scientists, we conducted and participated in the following training courses:

- Rice Breeding Course: Laying the Foundation for the Second Green Revolution held 1-12 Oct 2007
- Hybrid Rice Training for Pioneer Hi-Bred, Inc. (two batches held in 2007)
- Rice: Research to Production Course
- Rice Camp
- Training for visiting scientists/breeders from NARES
- On-the-job training for undergraduate chemistry students.
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>APAARI</td>
<td>Asia-Pacific Association of Agricultural Research Institutions</td>
</tr>
<tr>
<td>ARI</td>
<td>advanced research institute</td>
</tr>
<tr>
<td>ASL</td>
<td>Analytical Service Laboratories</td>
</tr>
<tr>
<td>AVC</td>
<td>Arakan Valley Complex</td>
</tr>
<tr>
<td>AWD</td>
<td>alternate wetting-and-drying (technology)</td>
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<tr>
<td>BMGF</td>
<td>Bill &amp; Melinda Gates Foundation</td>
</tr>
<tr>
<td>BOT</td>
<td>Board of Trustees</td>
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<td>BRAC</td>
<td>Bangladesh Rural Advancement Committee</td>
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<td>CAAS</td>
<td>Chinese Academy of Agricultural Sciences</td>
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<td>CESD</td>
<td>Crop and Environmental Sciences Division</td>
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<td>CGIAR</td>
<td>Consultative Group on International Agricultural Research</td>
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<td>Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture) (Colombia)</td>
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<tr>
<td>CIMMYT</td>
<td>Centro Internacional de Mejoramiento de Maíz y Trigo (International Maize and Wheat Improvement Center) (Mexico)</td>
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<tr>
<td>CIRAD</td>
<td>Centre de coopération en recherche agronomique pour le développement (France)</td>
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<td>CKB</td>
<td>Cereal Knowledge Bank</td>
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<td>CLRRI</td>
<td>Cuu Long Delta Rice Research Institute</td>
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<td>CNRM</td>
<td>crop and natural resource management</td>
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<tr>
<td>CORRA</td>
<td>Council for Partnerships on Rice Research in Asia</td>
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<tr>
<td>CPS</td>
<td>Communication and Publications Services</td>
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<td>CRIL</td>
<td>IRRI-CIMMYT Crop Research Informatics Laboratory</td>
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<tr>
<td>CURE</td>
<td>Consortium for Unfavorable Rice Environments</td>
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<tr>
<td>DDG-OSS</td>
<td>Deputy Director General for Operations and Support Services</td>
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<tr>
<td>DDG-R</td>
<td>Deputy Director General for Research</td>
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<tr>
<td>EMS</td>
<td>environmental management system</td>
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<td>ES</td>
<td>Experiment Station</td>
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<td>ESA</td>
<td>East and Southern Africa</td>
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<tr>
<td>EVIS</td>
<td>Events, Visitors, and Information Services (formerly VIS, Visitors and Information Services)</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>Indian Council of Agricultural Research</td>
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<td>International Crop Information System</td>
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<td>ICM</td>
<td>integrated crop management</td>
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<td>ICOP</td>
<td>in-country outreach program</td>
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<td>ICRI SAT</td>
<td>International Crops Research Institute for the Semi-arid Tropics (India)</td>
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<tr>
<td>ICRAF</td>
<td>World Agroforestry Center</td>
</tr>
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<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<tr>
<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
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<tr>
<td>IMIS</td>
<td>International Maize Information System</td>
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<td>International Network for Genetic Evaluation of Rice</td>
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<tr>
<td>INQR</td>
<td>International Network for Quality Rice</td>
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<tr>
<td>IPM</td>
<td>integrated pest management</td>
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<td>IPSA</td>
<td>Intensive Production Systems in Asia</td>
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<tr>
<td>IRIS</td>
<td>International Rice Information System</td>
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<tr>
<td>IRRC</td>
<td>Irrigated Rice Research Consortium</td>
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<td>IRRN</td>
<td>International Rice Research Notes</td>
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<td>Information Technology Services</td>
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<td>IWIS3</td>
<td>International Wheat Information System v3</td>
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<td>JIRCAS</td>
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<tr>
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<td>Ministry of Agriculture and Rural Development (Vietnam)</td>
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<td>marker-assisted selection</td>
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<td>nongovernmental organization</td>
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<tr>
<td>NIAS</td>
<td>National Institute for Agrobiological Sciences (Japan)</td>
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<tr>
<td>NICS</td>
<td>National Institute of Crop Science (Korea)</td>
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<td>NIL</td>
<td>near-isogenic line</td>
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<tr>
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<td>National Nutrition Council (Philippines)</td>
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<tr>
<td>NRM</td>
<td>natural resource management</td>
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<td>NRS</td>
<td>nationally recruited staff</td>
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<tr>
<td>PBGB</td>
<td>Plant Breeding, Genetics, and Biotechnology (Division)</td>
</tr>
<tr>
<td>Philrice</td>
<td>Philippine Rice Research Institute</td>
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<tr>
<td>PNRI</td>
<td>Philippine Nuclear Research Institute</td>
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<td>quantitative trait loci</td>
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<td>rice breeding courses</td>
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<td>resource-conserving technologies</td>
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<td>RDA</td>
<td>Rural Development Administration (Korea)</td>
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<td>RKB</td>
<td>Rice Knowledge Bank</td>
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<td>RWC</td>
<td>Rice-Wheat Consortium</td>
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<td>System-wide Genetic Resources Programme</td>
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<td>SHU</td>
<td>Seed Health Unit</td>
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<td>single nucleotide polymorphism</td>
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<td>Temperate Rice Research Consortium</td>
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<td>University of Agricultural Sciences (India)</td>
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<tr>
<td>UPLB</td>
<td>University of the Philippines Los Baños</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>WARDA</td>
<td>Africa Rice Center 🌽️</td>
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January

- Dr. Arvind Kumar joined as scientist, plant breeding, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Inez Slamet-Loedin rejoined as shuttle scientist, Intellectual Property Management Unit.
- Dr. Jianliang Huang joined as visiting research fellow, Crop and Environmental Sciences Division.
- Dr. Kazutoshi Okuno joined as consultant, T.T. Chang Genetic Resources Center, and left after completion of his assignment.
- Dr. Achim Dobermann joined as consultant, Office of the Deputy Director General for Research.
- Dr. D.K. Grover joined as visiting research fellow, Social Sciences Division, and left after completion of his assignment.
- Dr. Youn-Sang Cho joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Dongcheng Liu joined as visiting research fellow, Crop and Environmental Sciences Division.
- Dr. Bhagirath Chauhan joined as postdoctoral fellow, Crop and Environmental Sciences Division.
- Mr. Chua Gia Thuy joined as consultant, Crop and Environmental Sciences Division.
- Dr. Harold Conklin, consultant, Office of the Director General, left after completion of his assignment.
- Dr. Zenaida Sumalde, consultant, Social Sciences Division, left after completion of her assignment.

February

- Mr. Jun-Hyeon Cho joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Mark Bell joined as consultant, International Programs Management Office, and left after completion of his assignment.
- Dr. Bhanudeb Bagchi joined as consultant, Social Sciences Division.
- Dr. Peter Mitchell joined as consultant, Crop and Environmental Sciences Division.
- Dr. Binying Fu, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.
- Mr. Zaff Bogkurt joined as consultant, Information Technology Services.
- Mr. Carlos Zandamela joined as consultant, International Programs Management Office.
- Dr. Dongcheng Liu, visiting research fellow, Crop and Environmental Sciences Division, left after completion of his assignment.
- Mr. Greg Fanslow, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.
- Mr. Sam Bona, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.
- Dr. On Gia Hoa joined as consultant, Grain Quality, Nutrition, and Postharvest Center.
- Dr. Steven Cork joined as consultant, Crop and Environmental Sciences Division, and left after completion of his assignment.

March

- Dr. Kumi Yasunobu, IRS seconded from JIRCAS, Social Sciences Division, left.
- Mr. Jonas Rune joined as consultant, Social Sciences Division.
- Mr. An-Soo Lee joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Seung-Kyung Kim joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.
- Dr. Woon-Goo Ha joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.
- Dr. Gloria Despacio-Reyes joined as consultant, Plant Breeding, Genetics, and Biotechnology Division.
- Mr. Paul O’Nolan joined as consultant, Information Technology Services.
- Mr. Abu Nasar Md. Mahfuzur Rahman joined as consultant, Social Sciences Division.
- Dr. Surapong Sarkarung joined as consultant, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.
- Dr. Surapong Sarkarung rejoined as consultant, IRRI’s East and Southern Regional Office (based in Maputo, Mozambique).
- Ms. Joyce Gorsuch joined as consultant, Social Sciences Division.
- Dr. Zenaida Sumalde rejoined as consultant, Social Sciences Division.
Mr. Geert Claessens joined as consultant, International Programs Management Office.

Dr. Peter Mitchell, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.

Dr. Mark Bell rejoined as consultant, International Programs Management Office.

Mr. Chua Gia Thuy, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.

Dr. Jianliang Huang, visiting research fellow, Crop and Environmental Sciences Division, left after completion of his assignment.

Dr. Olivier Panaud, collaborative research scientist, Crop and Environmental Sciences Division, left after completion of his assignment.

Dr. Eung-Gi Jeong, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.

Dr. You-Chun Song joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.

Dr. Nguyen Tri Khiem joined as consultant, Social Sciences Division.

Dr. Kil-Young Yun joined as visiting research fellow, Crop Research Informatics Laboratory.

Ms. Fatemeh Habibi joined as visiting research fellow, Grain Quality, Nutrition, and Postharvest Center.

Dr. Jian-Long Xu joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

Dr. Monina Escalada joined as consultant, Crop and Environmental Sciences Division.

Dr. Agnes Rola joined as consultant, Social Sciences Division.

Dr. Edgar Paski joined as consultant, Crop and Environmental Sciences Division, and left after completion of his assignment.

Dr. Twng W. Mew joined as consultant, Office of the Deputy Director General for Research.

Dr. Gyeong-Rae Cho joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.

Dr. Zenaida Sumalde, consultant, Social Sciences Division, left after completion of her assignment.

Dr. Jong-Hee Lee, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.

Mr. Geert Claessens, consultant, International Programs Management Office, left after completion of his assignment.

Dr. Xuemei Ji, postdoctoral fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of her assignment.

May

Dr. Inez Slamet-Loedin, shuttle scientist, Intellectual Property Management Unit, left.

Dr. Shigeki Yokoyama joined as IRS seconded from JIRCAS, Social Sciences Division.

Dr. Zenaida Sumalde rejoined as consultant, Social Sciences Division, and left after completion of her assignment.

Dr. Kenneth Schoenly joined as consultant, Crop and Environmental Sciences Division.

Dr. W.M.H. Jaim joined as consultant, Intellectual Property Management Unit.

Dr. Shijun Ding joined as consultant, Social Sciences Division, and left after completion of his assignment.

Dr. Muhammad Farooq joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

Mr. Michael David Padua joined as consultant, Crop and Environmental Sciences Division, and left after completion of his assignment.

Dr. Len Wade joined as consultant, Crop and Environmental Sciences Division.
Staff Changes

**June**
- Dr. Mahabub Hossain, head, Social Sciences Division, retired.
- Dr. Hung-Goo Hwang, senior scientist, plant breeding (seconded from RDA), Plant Breeding, Genetics and Biotechnology Division, left.
- Dr. Zahirul Islam, international research fellow, Social Sciences Division, left.
- Dr. Gail Langellotto joined as collaborative research scientist, Crop and Environmental Sciences Division.
- Dr. Dirk de Waele joined as consultant, Crop and Environmental Sciences Division, and left after completion of his assignment.
- Dr. Randolph Barker joined as consultant, Social Sciences Division.
- Mr. Anthony Joseph Ryan joined as consultant, Grain Quality, Nutrition, and Postharvest Center.
- Ms. Yoke Sau Cheng Metz joined as consultant, Training Center.
- Ms. Alexis Faulkner joined as consultant, Training Center.
- Ms. Judith Buresh joined as consultant, Training Center.
- Ms. Charmian Sackville Hamilton joined as consultant, Training Center.
- Dr. Andrew Powell joined as consultant, Intellectual Property Management Unit.
- Mr. Abu Nasar Md. Mahfuzur Rahman, consultant, Social Sciences Division, left after completion of his assignment. Later, he rejoined as consultant, in the same division.
- Mr. Oeun Sophat, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.
- Dr. Len Wade, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.
- Mr. Khuon Kompheak, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.
- Dr. Kil-Young Yun, visiting research fellow, Crop Research Informatics Laboratory, left after completion of his assignment.
- Dr. Peter Mitchell rejoined as consultant, Crop and Environmental Sciences Division, and left after completion of his assignment.

**July**
- Dr. Kyu-Seong Lee joined as IRS seconded from RDA, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Thomas Metz was appointed as senior scientist, research informatics, IRRI-CIMMYT Crop Research Informatics Laboratory.
- Dr. Ren Wang, deputy director general for research, left.
- Mr. Kwame Akuffo-Akoto, director for management services, left.
- Dr. Jagdish K. Ladha, senior scientist, soil science and coordinator, Rice-Wheat Consortium, and country representative for India, went on study leave.
- Dr. Surapong Sarkarung rejoined as consultant, IRRI’s East and Southern Regional Office (based in Maputo, Mozambique).
- Dr. Alberto Barrion joined as consultant, Crop and Environmental Sciences Division.
- Dr. Romeo Labios joined as consultant, Plant Breeding, Genetics, and Biotechnology Division.
- Dr. Nguyen Nga joined as consultant, Crop and Environmental Sciences Division.
- Mr. Young-Bok Kim joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.
- Mr. Anthony Joseph Ryan, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.
- Ms. Fatemeh Habibi, visiting research fellow, Grain Quality, Nutrition, and Postharvest Center, left after completion of her assignment.
Staff Changes

• Dr. Gail Langellotto, collaborative research scientist, Crop and Environmental Sciences Division, left after completion of her assignment.

• Mr. Jonas Rune, consultant, Social Sciences Division, left after completion of his assignment.

• Dr. Andrew Powell, consultant, Intellectual Property Management Unit, left after completion of his assignment.

• Dr. Geethanjali Subramaniam, collaborative research fellow, left after completion of her assignment.

• Dr. Jian-Long Xu, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.

• Dr. Alberto Barrion, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.

• Dr. Manoranjan Mondal, postdoctoral fellow, Crop and Environmental Sciences Division, resigned.

• U Ba Hein, consultant, International Programs Management Office, left after completion of his assignment.

• Mr. Prom Chan Rasmey, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.

August

• Dr. Zakaria L. Kanyeka joined as regional plant breeder for East and Southern Africa Region, International Programs Management Unit.

• Dr. Achim Dobermann, consultant, Office of the Deputy Director General for Research, left after completion of his assignment.

September

• Dr. Minu Joseph, postdoctoral fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of her assignment.

• Dr. Ngo The Dan, consultant, International Programs Management Office, left after completion of his assignment.

• Dr. Achim Dobermann joined as Program 2 and IRRI-CIMMYT Alliance Project IPSA Leader, Crop and Environmental Sciences Division.

• Mr. Norman A. Macdonald joined as director for management services.

• Dr. Vethaiya Balasubramanian joined as consultant, International Programs Management Office.

• Ms. Xiaoli Sun, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of her assignment.

• Dr. Manoranjan Mondal joined as consultant, Crop and Environmental Sciences Division.

• Dr. Mark Bell, consultant, International Programs Management Office, left after completion of his assignment.

• Dr. Depeender Grewal, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment. He rejoined as postdoctoral fellow, in the same division.

• Dr. Kamal Paudyal joined as consultant, Social Sciences Division.

• Dr. Lewis Ziska joined as consultant, Crop and Environmental Sciences Division, left after completion of his assignment.

• Mr. Young-Bok Kim, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.

• Dr. Krishna Jagadish joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

October

• Dr. Larry Harrington joined as consultant, International Programs Management Office.

• Dr. Yann H. Chemin joined as postdoctoral fellow, Social Sciences Division.

• Dr. Dilantha Gunawardana joined as postdoctoral fellow, Crop and Environmental Sciences Division.

• Dr. Dirk de Waele rejoined as consultant, Crop and Environmental Sciences Division.

• Mr. David Shires joined as consultant, Training Center.

• Dr. Depeender Grewal, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment. He rejoined as postdoctoral fellow, in the same division.

November

• Dr. Yongming Gao joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

• Mr. Gordon MacNeil joined as consultant, Office of the Director for Management Services, left after completion of his assignment.

• Dr. Ki-Young Kim joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.
Staff Changes

ogy Division, and left after completion of his assignment.

- Dr. Choon-Song Kim joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

- Dr. Suk-Man Kim joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

- Dr. Jianliang Huang rejoined as visiting research fellow, Crop and Environmental Sciences Division.

- Dr. Dirk de Waele, consultant, Crop and Environmental Sciences Division, left after completion of his assignment.

- Ms. Yoke Sau Cheng Metz, consultant, Training Center, left after completion of her assignment.

- Ms. Ma. Victoria DV Gummert, consultant, Training Center, left after completion of her assignment.

- Ms. Alexis Faulkner, consultant, Training Center, left after completion of her assignment.

- Ms. Judith Buresh, consultant, Training Center, left after completion of her assignment.

- Ms. Charmian Sackville Hamilton, consultant, Training Center, left after completion of her assignment.

- Dr. Agnes Rola, consultant, Social Sciences Division, left after completion of her assignment.

- Dr. Ton Gia Hoa, consultant, Grain Quality, Nutrition, and Postharvest Center, left after completion of his assignment.

December

- Dr. Jaehwan Roh joined as visiting research fellow, Crop and Environmental Sciences Division.

- Dr. Bining Fu joined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

- Dr. Debdutt Behura joined as consultant, Social Sciences Division, and left after completion of her assignment.

- Dr. Youn-Sang Cho rejoined as visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division.

- Mr. Do-Yeong Kwak joined as visiting research fellow, Crop and Environmental Sciences Division.

- Ms. Bui Tuyet Nga joined as consultant, Grain Quality, Nutrition, and Postharvest Center.

- Dr. Martin Kropff joined as consultant, Office of the Director General, and left after completion of his assignment.

- Dr. O-Young Jeong, visiting research fellow, Plant Breeding, Genetics, and Biotechnology Division, and left after completion of his assignment.

- Dr. Aparna Das, postdoctoral fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of her assignment.

- Dr. Xiaochun Lu, postdoctoral fellow, Plant Breeding, Genetics, and Biotechnology Division, left after completion of his assignment.

- Dr. Vethaiya Balasubramanian, consultant, International Programs Management Office, left after completion of his assignment.

- Dr. Gloria Despacio-Reyes, consultant, Plant Breeding, Genetics, and Biotechnology Division, left after completion of her assignment.

- Dr. Monina Escalada, consultant, Crop and Environmental Sciences Division, left after completion of her assignment.

- Dr. W.M.H. Jaim, consultant, Intellectual Property Management Unit, left after completion of his assignment.
Annual rainfall for year 2007 was 2,056 mm for the IRRI dryland (upland) site and 1,878 mm for the wetland (lowland) site (Table). These values were 7 mm lower than the long-term average rainfall for the dryland site and 117 mm lower for the wetland site. In terms of monthly rainfall, Los Baños experienced exceptionally high rainfall (nearly twice of the long-term average) in August and November and exceptionally low rainfall (considerably less than the average) in April, June, and September of 2007 (Fig. 1). The wettest day at IRRI occurred 21 November with more than 400 mm rainfall per day due to the passing of typhoons Lando and Mina. The longest recorded continuous wet spell was 16 d (18 Sep–3 Oct) at the dryland and wetland sites. The longest continuous dry spell was 15 d at the dryland site (5–19 Apr) and 20 d (6–25 Apr) at the wetland site.

Mean monthly solar radiation reached a peak in April (more than 20 MJ m⁻² d⁻¹) and the lowest record of 10.9 MJ m⁻² d⁻¹ was noted in December (Fig. 2). The months of November and December had exceptionally low records of solar radiation. The annual average duration of bright sunshine was about 6.3 h d⁻¹ (Table). The highest monthly mean value was 10.0 h d⁻¹ in April and it declined to low value of 3.9 h d⁻¹ in November. The longest record of sunshine at Los Baños was on 25 April with 12.1 h of bright sunshine.

Maximum temperature reached its highest monthly mean value (Fig. 3) in May (34.0 ºC), then declined to its lowest monthly mean value in December (29.2 ºC). The hottest day in Los Baños was on 17 May with 36.5 ºC of recorded maximum temperature at the dryland site and 12 May with 35.0 ºC at the wetland site. The seasonal pattern of minimum temperatures was more stable than the pattern of the maximum temperatures. The coldest days for 2007 were on 10 February and 29 March with 19.8 ºC in the dryland site and on 4 February with 19.5 ºC in the wetland site.

Midday vapor pressure deficit was consistently higher in the dryland site than in the wetland site (Fig. 4). Mean early morning relative humidity ranged from 80 to 88% in the dryland site and 79 to 87% in the wetland site (Table).

Daily mean windspeed, measured at 2-m height was 1.6 m s⁻¹ for the dryland site and 1.4 m s⁻¹ in the wetland site (Table). Windspeed was generally low (<2.0 m s⁻¹), except during typhoons. The highest windspeed was recorded during Typhoon Ineng (3.5 m s⁻¹ at the dryland site on 5 Oct), which exceeded the windspeed of Mina (2.6 m s⁻¹; 25 Nov) at the wetland site).

Because of a slightly higher air temperature, higher amount of rainfall, and higher vapor pressure deficit at midday, free water evaporation at the dryland site was slightly higher than at the wetland site (Table). Open-pan evaporation totals were 1,742 mm at the dryland site and 1,635 mm at the wetland site. These values were 96 mm lower than the long-term evaporation total at the dryland site and 42 mm lower at the wetland sites (Table).

Thirteen cyclones (including nine typhoons) passed through the Philippines’ area of responsibility (PAR). Typhoon Lando (19 – 22 Nov) came back and reentered the PAR on 26−28 Nov and merged with typhoon Mina (20−27 Nov). The last cyclone for 2007 had no major impact in Los Baños.
Monthly weather data for the IRRI dryland (14° 08’ N, 121° 15’ E) and wetland sites (14° 11’ N, 121° 15’ E), 2007.

<table>
<thead>
<tr>
<th>Site</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual total or daily average</th>
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</thead>
<tbody>
<tr>
<td><strong>Rainfall (mm mo⁻¹)</strong></td>
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<td></td>
<td></td>
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<td>37</td>
<td>6</td>
<td>57</td>
<td>64</td>
<td>220</td>
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<td>142</td>
<td>220</td>
<td>449</td>
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<td>27</td>
<td>40</td>
<td>40</td>
<td>138</td>
<td>230</td>
<td>307</td>
<td>227</td>
<td>243</td>
<td>303</td>
<td>231</td>
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<td>1995</td>
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<tr>
<td><strong>Solar radiation (MJ m⁻² d⁻¹)</strong></td>
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<tr>
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<td>13.2</td>
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<td>19.7</td>
<td>20.2</td>
<td>18.8</td>
<td>16.7</td>
<td>17.3</td>
<td>14.1</td>
<td>14.9</td>
<td>13.2</td>
<td>12.0</td>
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<td>17.0</td>
<td>19.4</td>
<td>19.9</td>
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<td>12.8</td>
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<td>15.4</td>
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<tr>
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<td>20.1</td>
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<td>20.0</td>
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<td><strong>Relative humidity (%)</strong></td>
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<tr>
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*Long-term averages refer to wetland site from 1979 to 2006.*
Fig. 1. Monthly rainfall and potential evapotranspiration in 2007 and long-term averages.

Fig. 2. Mean monthly solar radiation with 10 and 90% probability of occurrence derived from long-term averages. IRRI, 2007.

Fig. 3. Monthly maximum and minimum air temperature in 2007 and long-term averages. IRRI, 2007.

Fig. 4. Midday vapor pressure deficit at the dryland and wetland sites. IRRI, 2007.