GRiSP
Blueprint for a greener revolution

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Rice in the city
Greener rice
Quality matters in Africa
Your trusted broker and advisor for international commodities trade.

Farm and Trade Inc. is an international buyer and seller of rice with a vested interest in uniting sustainable cultivation and research techniques with ethical trade decisions. By combining world class analysis from all corners of the industry, Farm and Trade Inc. is the world’s premier broker of rice.

From field to fork, we have you covered.
Dr. Samarendra Mohanty (right) receives the donation on behalf of IRRI from TRT’s President/CEO Jeremy Zwinger.

Jeremy Zwinger
Publisher

In the next 50 years, what must we do as we move forward and what challenges lie ahead of us? The simple answer is to sustain the achievements seen in the last half a century, and even push for more advancement to increase our food supply. The world’s population will continue to grow dramatically. But, the amount of land used for food production is reaching its maximum capacity, and so we must focus on using land resources more efficiently, boosting yields, and reducing postharvest losses. Needless to say, we need to find new, better, and more sustainable ways to increase our food supply, and at the same time keep prices in check to ensure that everyone can still have access to food. Energy is yet another factor that must be considered on the road ahead as it will surely leave a trail, particularly in the cost of fertilizers, a valued input to boost yields.

Working diligently to make sure the world has ample food supplies and remains safe from fears of food shortages is a priority. One thing is certain: the challenges will be great. Nonetheless, we are also sure that some people will stand up to these challenges and some people will stand up to these challenges knowing that their sacrifices today will be rewarded after an arduous climb, and takes time to sit down, rest, and reflect on the journey. Perhaps, this is the last hurrah of this 50-year celebration. And so, allow me to once again humbly honor those who have dedicated their careers to propel great revolutions in agriculture. The time and effort they have devoted to ensure we have food on our plate is commendable. It is because of them that we—the rice industry and IRRI—now stand where we are, celebrating the many hard-won achievements in food production. So, what has occurred during the last 50 years? Prior to 1960, we were still "mentally" moving away from the destruction of World War II. At that time, the world had a great sense of rebuiling lives and a renewed sense of hope for a better future. The population then was around a staggering 3 billion and questions abounded concerning how to push for industrial and technological revolution, while at the same time sustaining agricultural growth to feed the growing number of people. Political turmoil and shifts in global power followed and brought about socioeconomic changes. Yet, in all of this, the world had to look forward to the progression of the human race. Problems will always be there, but humans have been blessed with the ability to solve challenges. I believe that we will continue to triumph over more challenges in the future.

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The Rice Trader (TRT) donated US$10,000 to IRRI during the TRT World Rice Conference in Phuket, Thailand, last 12-14 October. This amount is not much compared to the great wealth of others, but I am nonetheless glad to be able to give back to the institute that has given so much to the world.

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South Korea has released Anmi, a new pest- and disease-resistant japonica rice with high palatability. It is the latest output from Korea’s collaboration with IRRI to help Korean farmers boost rice production.

Anmi, meaning “safe and delicious rice” in Korean, has high resistance to a destructive rice pest—the brown planthopper (BPH)—as well as a range of diseases such as blast, bacterial blight, and rice stripe virus. It has an average milled rice yield potential of more than 5.8 tons per hectare, which is 11% more than the best check japonica variety, Huusaongolvyo, currently grown in Korea.

“We have been working on improving the resistance of japonica rice to brown planthoppers to help Korean farmers since 2002,” said IRRI plant breeder Dr. Kshirod Jena. “In 2004, we had a significant breakthrough when we bred rice to brown planthoppers to help Korean farmers boost rice output from Korea’s collaboration with IRRI.”

**Uganda to double rice production**

Uganda will surpass 400,000 tons of rice by 2025,” Agriculture Minister Hope Mwesigye said. And, by 2018, production is expected to triple.

The government considers rice a priority crop and key to alleviating poverty. Minister Mwesigye noted that the nation is becoming too dependent on a single crop. Rice is vulnerable to shifting global weather patterns, such as this year’s unseasonal rains linked to cooler sea-surface temperatures in the Pacific, known as the La Niña effect.

Rice is vital for feeding 1.5 billion people, and it accounts for 25% of the daily diet of 3 billion more people worldwide. Rail and road transportation, as well as the use of modern technology, are required to transport rice from the farm to the market.

**“M Miracle rice” finding proves we can never stop rice breeding**

Environmental changes are to blame for a 15% drop in the yield of “miracle rice”—also known as IR8—since the 1960s when it was first released and launched for its superior yields that helped avert famine across Asia at the time.

IRRI used to produce a maximum yield of 9.5 to 10.5 tons per hectare, significantly more than other varieties in the 1960s when average global rice yields were around only 2 tons per hectare. But, when grown today, IR8 can yield only around 8 tons per hectare, at most.

Dr. Shaobing Peng, a crop physiologist from the International Rice Research Institute (IRRI), and his team grew rice IR8 used to produce a maximum yield of 9.5 to 10.5 tons per hectare, significantly more than other varieties in the 1960s when average global rice yields were around only 2 tons per hectare. But, when grown today, IR8 can yield only around 8 tons per hectare, at most.

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The team wanted to know what caused the yield drop, and to test meetings to improve the IR8's yield potential. They found that it was due to a loss of allelic variation in the rice plant's genome, which led to a decrease in its yield potential.

Dr. Peng and his team compared the genomes of IR8 and a modern high-yielding rice variety, and found that IR8 had lost around 25% of its genetic diversity.

They also found that the loss of genetic diversity was due to the over-reliance on a single variety for rice breeding, which led to a lack of genetic variation in the rice crop. This, in turn, made the rice more susceptible to disease and environmental stress.

Their findings demonstrate the need for ongoing and “maintenance” breeding because it allows rice plants to cope with a changing environment.

The team's research is significant because it shows that rice breeding programs need to maintain genetic diversity to ensure the long-term sustainability of rice production.

The International Rice Research Institute (IRRI) has contributed an additional 42,872 samples of seeds from different types of rice to the Svalbard Global Seed Vault, dubbed the “Doomsday Vault,” to help secure the world's rice diversity.

IRRI first deposited 70,180 rice samples during the inauguration of the Vault in February 2008. “IRRI now has the largest number of samples of a single crop and its wild relatives, coming from the largest number of countries, stored in Svalbard,” said Dr. Ruaraidh Sackville Hamilton, head of IRRI’s International Rice Genebank (IRG).

The samples sent to Norway are duplicates of rice conserved at IRRI’s IRG in Los Baños in the Philippines. The IRG currently houses the largest collection of rice genetic diversity in the world, containing around 110,000 different types of rice.

**Innovative rice gene insecure in “Doomsday Vault”**

**Global rice to find wild crop genes**

The Global Crop Diversity Trust has launched a worldwide search for the wild relatives of 23 important food crops, including rice, to create a library of wild genes.

The work will take 10 years and the first collecting trips will start in 2011. “The seed and plant samples will be conserved at a number of sites around the world, including the Svalbard Global Seed Vault in Norway,” the government of Norway is giving US$50 million to fund the project.

**Indonesians urge to eat less rice**

The Indonesian government has launched an ambitious drive to wean people off rice.

Minister Mwesigye noted that 60% of rice consumed in Uganda is imported from China, India, and Vietnam. “We need to diversify our diets,” he said. “Indonesia produces 66 kinds of other carbohydrates, such as corn, sago, cassava, sweet potato, potato, and others.”

The government is concerned that rice production is being depleted due to intensive rice cropping properties due to intensive rice cropping and air pollution are all possible contributing factors,” he added.

According to Dr. Peng, the findings demonstrate the need for ongoing and “maintenance” breeding because it allows rice plants to cope with a changing environment.

Despite their limited progress in increasing rice yield potential, maintenance breeding efforts have had significant success in improving grain quality and maintaining rice yields despite substantial increases in diseases, insects, and environmental changes.

**Innovative rice gene insecure in “Doomsday Vault”**

The International Rice Research Institute (IRRI) and GrainPro, Inc. have signed a cooperation agreement to promote the conservation and dissemination of rice storage technologies in the Philippines to reduce postharvest losses that can be between 15% and 25% of rice harvests.

IRRI’s postharvest expert, Engr. Martin Gummert, said the agreement helps provide farmers, processors, and seed producers with cost-effective technologies that help reduce postharvest losses and maintain the quality of rice and seeds.

Since 2002, IRRI and GrainPro have informally cooperated to develop and verify small-scale airtight storage systems such as the “Superbag.”

**Black rice bran reduces inflammation**

A new study by the U.S. Department of Agriculture’s Western Regional Research Center in Albany, California, has claimed that black rice may help soothe the inflammation involved in allergies, asthma, and other diseases.

Experiments involving giving black rice bran to laboratory mice and h ined that the bran suppressed the release of histamine, which causes inflammation.

**Indian farmers adopt flood-tolerant rice at unprecedented rates**

Field-testing a rice variety normally takes 4–5 years before it is released and another 2–3 years before it reaches farmers. Through targeted dissemination, the International Rice Research Institute is helping Indian state governments identify specific flood-prone areas where seeds of submergence-tolerant rice can be distributed, without having to wait until it is multiplied and distributed in masse.
Nine IRRI scientists received the Merit Medal “for the cause of science and technology development of Vietnam.” The recipients were (from left to photo above) Robert Zeigler, director general; Achim Dobermann, deputy director general for research; Gurdev Khush, former IRRI rice breeder and principal scientist (1967-2001); To Phuc Tuong, principal scientist; Darshan Brar, head of PBGB; K.L. Hoang, senior scientist; Abdelbagi Ismail, senior plant physiologist; Grant Singleton, senior scientist; and Roland Buresh, principal scientist (not in photo). The Merit Medal “for the cause of agriculture and rural development of Vietnam” was given to William Padolina, deputy director general for operations; David Mackill, principal scientist; David Johnson and Martin Gummert, senior scientists; Sushil Dev, senior postdoc; and Julian Lapitan, head of National Programs Relations.

K.L. Hoang, senior scientist and insect ecologist, was honored by the Third World Academy of Science, an international organization that promotes scientific excellence for sustainable development in the South. Dr. Hoang has been cited for his significant contribution in pest management related to ecology, biodiversity, and education. He developed insect population models for understanding predator-prey and insect-plant relationships, and quantified food webs in rice ecosystems and the impact of pesticides on biodiversity. From his research to understand farmers’ decision-making processes, he designed communication campaigns and entertainment-education programs for farmers. Dr. Hoang is also one of the five newly elected fellows for agricultural sciences who will be inducted in the 22nd General Meeting of the CGIAR in Morocco in 2011.

Kyu-Seong Lee, director of the Korea Plant Industries Association Cambodia Center of the Rural Development Administration (RDA), Republic of Korea, received this year’s Senadhira Rice Research Award in recognition of his outstanding contributions to rice research and international cooperation in rice varietal development. The award is given to a leading Asian scientist working on rice research. The award ceremony took place at the International Rice Congress in Vietnam.

Dr. Lee is a former IRRI scientist who conducted seminal research on the genetics of resistance to bacterial blight in rice and, under the Germlasm for Utilization for Value Added (GUVA) project, produced quality seeds of japonica rice varieties for Korean farmers. He developed a collaborative project between RDA and IRRI aimed at developing more nutritious rice varieties for Korea and other countries. He has tirelessly promoted international collaboration between Korean scientists and scientists from IRRI and other rice-growing countries.

This course aims to develop the next generation of rice breeders adept in using modern tools to enhance the precision and efficiency of their breeding programs. It will provide the theoretical background on modern breeding methods and techniques, including the use of biotechnology; planning and information management tools and experimental techniques and software; the opportunity to share experiences with other rice breeders; and the latest updates on areas relevant to rice breeding and the worldwide exchange of rice genetic resources. Breeders and agronomists working on variety development or testing in the public and private sector are highly encouraged to attend.

Dr. Gregorio was appointed as deputy head of the Plant Breeding, Genetics, and Biotechnology (PBGB) Division effective 1 October. Dr. Gregorio’s primary responsibility in his new post is providing support to the head of PBGB in risk management and quality assurance activities, and in mentoring new staff. Dr. Gregorio will continue to be senior scientist and plant breeder for abiotic stresses such as salinity and zinc deficiency.

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**PEOPLE**

**Appointments**

Lloyd Le Page was recently appointed by the CGIAR Consortium Board as the first Consortium chief executive officer. Mr. Le Page, a British citizen, is currently leading the Sustainable Agriculture and Development Division of Pioneer Hi-Bred, a DuPont business. In this global role, he has primarily focused on working with small farmers and improving agricultural value chains in Africa and Asia. He brings with him a great deal of practical experience globally, regionally, and locally. He has gained the trust and confidence of many stakeholders of the CGIAR community and has been consulted by some of the centers in the development of Consortium Programs. Mr. Le Page is expected to lead the CGIAR in the implementation of its new business model.

Glenn Gregory was appointed as deputy head of the Plant Breeding, Genetics, and Biotechnology (PBGB) Division effective 1 October. Dr. Gregory’s primary responsibility in his new post is providing support to the head of PBGB in risk management and quality assurance activities, and in mentoring new staff. Dr. Gregory will continue to be senior scientist and plant breeder for abiotic stresses such as salinity and zinc deficiency.

**Awards and recognition**

IRRI and its staff members were honored at the 3rd International Rice Congress (IRC2010) held on 8-12 January-March 2011 in Hanoi, Vietnam. The Vietnamese government conferred upon IRRI the First Class Friendship Medal “for the cause of science and technology development in Vietnam.” The recipients were (from left to photo above) Robert Zeigler, director general; Achim Dobermann, deputy director general for research; Gurdev Khush, former IRRI rice breeder and principal scientist (1967-2001); To Phuc Tuong, principal scientist; Darshan Brar, head of PBGB; K.L. Hoang, senior scientist; Abdelbagi Ismail, senior plant physiologist; Grant Singleton, senior scientist; and Roland Buresh, principal scientist (not in photo). The Merit Medal “for the cause of agriculture and rural development of Vietnam” was given to William Padolina, deputy director general for operations; David Mackill, principal scientist; David Johnson and Martin Gummert, senior scientists; Sushil Dev, senior postdoc; and Julian Lapitan, head of National Programs Relations.

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Rice in the Global Economy: Strategic Research and Policy Issues for Food Security
Edited by Sushil Pandey, Derek Byerlee, Achim Dobermann, David Dawe, and Sushil Pandey
Published by the United Nations Food and Agriculture Organization
Published by the Ministry of Agriculture and Rural Development

Worldwide, rice is the most important food for the poor. It is grown on an approximately 155 million hectares and accounts for one-fifth of the global calorie supply. Although traditionally an Asian crop, rice has long been a staple in parts of Africa and Latin America, and its importance is growing in these regions.

The past decades have seen many changes that shape how rice will be produced in the future. These include rapid economic growth, especially in parts of Asia, rising wage rates, increasing diversification of diets, global climate change, and a greater integration of the food economy with other sectors of the global economy, including both energy and financial markets. In the context of these major global trends, a new vision for future rice farming, which will strategically position investments in rice research, technology delivery, and the design of policy reforms, needs to be developed.

Rice is a way of life for the Vietnamese. This staple crop is deeply rooted in the cultural heritage of the country. It not only contributes to national food security but also provides income and reduces poverty for the millions of people in rural Vietnam. The Doi Moi (renovation policy) in the mid-1980s marked Vietnam’s transition from a country suffering from food shortage to one of the largest rice producers in the world. The policy is significant as it granted farmers the right to own land and opened Vietnam’s economy to the free market. Investment in infrastructure and technology also helped further boost the country’s rice production capacity.

Since Vietnam developed its rice research and production, the country has been facing challenges of decreasing natural resources, particularly rice land and water, global climate change, and increasing population. While looking back at the country’s last 50 years of progress, the Ministry of Agriculture and Rural Development also geared to further improve and consolidate research, development, and agricultural policies to sustain long-term national food security, make the rice economy prosperous, and generate more income for rice farmers.

This book was officially launched during the Third International Rice Congress held last 8-12 November in Hanoi, Vietnam. View the launch at http://snipurl.com/y1v2v2k.

To order IRRI books online, please e-mail RiceworldBookstore@cgiar.org.

Vietnam: 50 Years of Rice Research and Production
Edited by Bui Ba Bong, Nguyen Van Bo, and Bui Chi Buu
Published by Agriculture Publishing House, Hanoi, Vietnam

For information on obtaining a copy of this book, contact the Publishing Department, Ministry of Information and Communication of Vietnam at http://snipurl.com/1kdb2k.

The Rice Crisis: Markets, Policies and Food Security
Edited by David Dawe
Published by the United Nations Food and Agriculture Organization

The rice crisis left important implications for future government trade and food security policies, as countries re-evaluate their reliance on potentially more volatile world markets to augment domestic supplies of staple foods.

This book examines how government policies caused the crisis and responding to the rising world prices, particularly that of rice, the world’s most important source of calories for poor Comparative case studies of policy reactions in different countries, principally across Asia, and including the U.S., provide the necessary understanding to be able to evaluate the impact of trade policies on the food security of poor farmers and consumers. These studies also provide important insights into the concerns of developing countries that are relevant for future international trade negotiations on key agricultural commodities. As a result, more appropriate policy can be put in place to ensure more stable food supplies in the future.

A Practical Field Guide to Weeds of Rice in Asia (Second Edition)
By B.P. Caton, M. Mortimer, J.E. Hill, and D.E. Johnson

This book is a comprehensive reference for farmers, extension agents, researchers, and others assessing weed control problems and, when possible, provide strategies for improving integrated weed management in rice systems. Hopefully, it will assist in better understanding the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the occurrence of weedy plants.

Research to Impact: Case Studies for Natural Resource Management for Irrigated Rice in Asia
Edited by Florence G. Pals, Gert R. Singleton, Madelina C. Castrillon, and Bill Hardy

The 2008 global rice crisis stimulated Asian governments to allocate more investments to rice research and extension to increase the rice supply, help rice-importing countries achieve rice self-sufficiency, and allow exporting countries to produce surplus stocks. Considering this staple’s political, economic, social, and cultural significance, a continued increase in rice productivity is critical in ensuring food security, reducing poverty and hunger, and enhancing environmental sustainability. Rice production, however, is challenged by declining water availability, the conversion of prime lands to alternate uses, the increasing problem of labor shortage, unpredictability of climate change, and widespread concern regarding the environment.

This book expands on agriculture to continue to play important roles in agricultural development to improve the lives and livelihoods of Asian farmers and consumers. Research generates technologies and good agricultural practices or best practices for natural resource management (NRM) to boost resource-poor farmers’ productivity and income. Extension provides mechanisms by which these technologies can be disseminated for wide-scale adoption by farmers.

The impacts of NRM technologies can be realized only when the technologies—rice farmers—practice them. Adopting agricultural technologies and best practices for NRM, however, remains a big challenge largely because most are knowledge-intensive technologies that cater to the needs of experts by farmers, and not physical products.

This book documents cross-country learning through case studies on the processes and methodologies employed from research to achieve impact by tackling the challenges of generating wide-scale adoption of NRM technologies in lowland irrigated agroecosystems.

To order IRRI books online, please e-mail RiceworldBookstore@cgiar.org.

To download on Google Book Search: http://snipurl.com/1ny57y.

Rodent Outbreaks: Ecology and Impacts
Edited by G.E. Singleton, S. Bohmian, P. Brown, and B. Hardy

The impacts of rodents in both developing and developed countries are legendary. Myths and dogma abound—imbedded in the language and culture of many societies. In many instances, societies’ “acceptance” of these outbreaks becomes the greatest challenge of crop protection specialists or conservation biologists. The reason why these episodic outbreaks have been so difficult to mange in the agricultural psyche from the sparsely populated uplands of Laos to the teeming hotspots of the Amazon. These agricultural lands of Europe is that the impacts are often staggering—ecologically, socially, and even politically.

This easy-to-use guide has information about the biology, ecology, herbicide resistance, and cultural control of these species. Its illustrations aid in early and accurate species identification.

The book is a comprehensive reference for farmers, extension agents, researchers, and others assessing weed control problems and, when possible, provide strategies for improving integrated weed management in rice systems. Hopefully, it will assist in better understanding the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the occurrence of weedy plants.

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The recent escalation of world food prices—particularly for cereals—prompted mass public indignation and demonstrations in many countries. The crisis left important implications for future government trade and food security policies, as countries re-evaluate their reliance on potentially more volatile world markets to augment domestic supplies of staple foods.

This book examines how government policies caused the crisis and responding to the rising world prices, particularly that of rice, the world’s most important source of calories for poor Comparative case studies of policy reactions in different countries, principally across Asia, and including the U.S., provide the necessary understanding to be able to evaluate the impact of trade policies on the food security of poor farmers and consumers. These studies also provide important insights into the concerns of developing countries that are relevant for future international trade negotiations on key agricultural commodities. As a result, more appropriate policy can be put in place to ensure more stable food supplies in the future.

A Practical Field Guide to Weeds of Rice in Asia (Second Edition)
By B.P. Caton, M. Mortimer, J.E. Hill, and D.E. Johnson

This book is a comprehensive reference for farmers, extension agents, researchers, and others assessing weed control problems and, when possible, provide strategies for improving integrated weed management in rice systems. Hopefully, it will assist in better understanding the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the occurrence of weedy plants.

To order IRRI books online, please e-mail RiceworldBookstore@cgiar.org.

To download on Google Book Search: http://snipurl.com/1ny57y.

Rodent Outbreaks: Ecology and Impacts
Edited by G.E. Singleton, S. Bohmian, P. Brown, and B. Hardy

The impacts of rodents in both developing and developed countries are legendary. Myths and dogma abound—imbedded in the language and culture of many societies. In many instances, societies’ “acceptance” of these outbreaks becomes the greatest challenge of crop protection specialists or conservation biologists. The reason why these episodic outbreaks have been so difficult to manage in the agricultural psyche from the sparsely populated uplands of Laos to the teeming hotspots of the Amazon. These agricultural lands of Europe is that the impacts are often staggering—ecologically, socially, and even politically.

This easy-to-use guide has information about the biology, ecology, herbicide resistance, and cultural control of these species. Its illustrations aid in early and accurate species identification.

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To download on Google Book Search: http://snipurl.com/1ny68f.

Rice in the Global Economy: Strategic Research and Policy Issues for Food Security
Edited by Sushil Pandey, Derek Byerlee, Achim Dobermann, David Dawe, and Sushil Pandey
Published by the United Nations Food and Agriculture Organization
Published by the Ministry of Agriculture and Rural Development

The Rice Crisis: Markets, Policies and Food Security
Edited by David Dawe
Published by the United Nations Food and Agriculture Organization

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Rice for future generations

by Lanie Reyes and Mia Aureus
photos by Lanie Reyes and Gene Netto

IRRI holds its Third International Rice Congress in Hanoi—
strengthening its commitment to ensure food security for
tomorrow’s generation

The International Rice Research Institute (IRRI), in partnership with AsiaCongress, held its Third International Rice Congress (IRC2010) on 8-12 November at the National Convention Center in Hanoi, Vietnam. Attended by more than 1,900 participants from more than 66 countries, the event could not have come at a more opportune time as the world once again faces a fork in the road to ensuring global food security.

During the opening of the IRC2010, Dr. Robert Zeigler, IRRI director general, noted that rice remains of utmost importance to the developing world, especially in Asia, but increasingly in Latin America and Africa, where rice is the fastest growing food staple.

“Projected demand for rice will outstrip supply in the near to medium term unless something is done to reverse the current trends of slow productivity growth and inefficient, often unsustainable management of natural resources,” Dr. Zeigler stressed.

“By 2050, it is our responsibility to increase global food production by 70% and to double food production in developing countries,” Vietnam’s Minister of Agriculture and Rural Development Cao Duc Phat said. “This is essential to feed the world’s fast-growing population.”

Vietnam’s Prime Minister Nguyen Tan Dung, however, pointed out that efforts to increase food security are currently threatened by industrialization and urbanization that have shrunk the area planted with rice, climate change, plant diseases, poor investments in agriculture, inefficient policies, and the use of crops for biofuels, among other challenges.

For International Fund for Agricultural Development President Kanayo Nwanze, the world is now standing at a crossroad. One road leads to a path of least resistance, through which people do nothing and risk creating a world replete with poverty, hunger, and social instability. The other leads to a path of action, through which people dare to act now and invest in agricultural and rural research and development to create a brighter future in which people can grow healthy and have better opportunities and choices in life.

Aply themed “Rice for future generations,” the IRC2010 signified a definite step toward the path of action. Both the public and private sector have rallied their support in pushing for better investments in agriculture. Through Vietnam’s Ministry of Agriculture and Rural Development, the Vietnamese government played a significant role as host for the event—highlighting Vietnam’s success story in pulling the country from a state of poverty after the Vietnam War in the 1950s to 1970s to a flourishing nation that now holds the title of the world’s second-largest rice exporter. Private companies, namely, Bayer, Syngenta, Kubota, Pioneer, and Lindsay Corporation, particularly served as partners of the event.

Dr. Zeigler said that it is the IRC2010’s hope to bring everyone together to advance rice science and its application to reduce poverty and hunger, improve human health and nutrition, and create a better environment.

The 28th International Rice Research Conference (IRRC28)—which was considered the heart of IRC2010—gathered the world’s top rice scientists to discuss the latest scientific breakthroughs in rice that aim to provide solutions to problems posed by climate change, plant diseases, industrialization and urbanization, and investment on the rice business infrastructure (see “The rise of rice on pages 16)

All participants were also invited to the Third International Rice Technology and Cultural Expo that featured the latest technologies, equipment, and machinery for rice farming, processing, research, and development.

Recognizing Asia’s crucial role in supplying rice to the world—as it

STREET SIGNS in Hanoi herald the IRC.

3. NORMAN UPHOFF of Cor- nell University (left) and James Hill (right), former IRRI agronomist and currently associate dean, International Programs, at UC-Davis, debated the System of Rice Intensiﬁ - cation (SRI).
4. CGIAR Consortium Board Chair Laurent Fédor de Con- tile (left) visits with IRRI Board of Trustees member Tony Fischer. Ms. Perrine del Castillo helped launch GRiSP during IRRI’s 50th birthday celebration and dinner.

1. DR. RANDY BARKER, an expert on crop- tivation and ﬂ urishing in the Greater Mekong Basin, from Cornell University (left) engages in a avid conversation with Dr. Randeep Singhal of the International Water Management Institute.
2. COFFEE BREAK is a chance for scientists to mingle with each other just like Dr. Mong Su Lin, UC-Davis plant scientist, and Dr. David Johnson, IRRI wheat scientist.
produces more than 90% of global rice—Asian ministers and their representatives gathered on 9 November to discuss the recent report titled Never an Empty Bowl: sustaining food security in Asia (see Asian pushes for sustainable food security on page 17). Finally, IRC2010 also provided the perfect avenue to officially launch the Global Rice Science Partnership (GRiSP), along with the book Rice in the Global Economy: Strategic Research and Policy Issues for Food Security (see book section on pages 10-11).

GRiSP is a mega-program that embodies the global effort to improve rice yields sustainably, lower food prices, and lift millions of people from poverty (see Blueprint for a greener revolution on pages 18-21). The launch of this program marks the beginning of a 5-year, nearly US$600 million endeavor. While GRiSP builds on existing research, development, and funding, it requires additional new financial support to raise annual funding for rice research from around $100 million in 2011 to $139 million in 2015 to fully realize its potential.

“With many difficulties and challenges still facing food security, achieving this goal will require the effort of every nation, and especially the active support from developed countries and international organizations.” Prime Minister Nguyen Tan Dung said. “We need coordinated action at regional levels as well as on a global scale.”

Dr. Eija Pehu, World Bank (WB) adviser for agriculture and rural development, referred to WB President Robert Zoellick’s “inclusive globalization” to emphasize the need for nations and people around the world to be more interactive, interconnected, and open in meeting these challenges. For

1. IFAD President Kanayo Nwanze explains the importance of investing in agricultural and rural research and development.
2. DR. Eija Pehu, World Bank adviser for agriculture and rural development, reminds the delegates of women’s and youth’s role in ensuring food security.
3. “THERE IS no better example than Vietnam of how a vibrant rice sector can service as the engine of growth for an agrarian society.” says Dr. Robert Zeigler, IRRI director general.
4. ML. Sam Dryden, director of the agricultural development program at the Bill & Melinda Gates Foundation explains why rice will once be just another commodity at the International Rice Policy and Investment Conference—a new feature in the IRC2010 program that highlights the importance of sound policy and wise investment for future global food security.
5. VIEITNAM PRIME Minister Nguyen Tan Dung acknowledges IRRI’s many scientific achievements and its assistance to and support for his country’s rice production over the past decades.
6. (from left to right) In front row, Dr. Nel Leveug, Dr. R.A. Stel, and Dr. Gillibrand Holmes at the back, Dr. Ken McHale and Dr. Glenn Gregorich, IRRI scientists, and Dr. S.K. Dubey, a scientist at the Indian Agricultural Research Institute, converse between sessions to brainstorm on an innovative way of breeding for the rice plant of the future.
7. Dr. Gordon Knab (left), former IRRI principal scientist and ISNAR World Food Prize laureate, shares his thoughts with some participants.

Dr. Pehu, three key tasks lie ahead: (1) keep the message of agriculture’s positive contribution to poverty reduction, economic growth, and environmental sustainability—including agriculture’s critical role in combating climate change—high on the agenda; (2) support existing research partnerships and build new ones in a multipolar world; and (3) champion innovation that builds on differences as a foundation of strength.

Moreover, along with IFAD President Nwanze echoed. “If we do not engage the world’s rural youth today—and lay the groundwork for profitable rural enterprises tomorrow—they will be driven to cities in search of other opportunities. If we allow this to happen, we will be left with no one to plow the fields that will feed the future.” Yes, the future belongs to the young farmers of today. And, it is only apt that the IRC2010 also signifies a renewed commitment the young people to pass on to them the torch of knowledge in rice science development that will sustain rice production for future generations.

IRRI’s IRC exhibit. PROFEssOR AND academician Dr. The Tadashi, well-known agriculturalist in Vietnam and known as the “father” of many high-yielding rice varieties (http://en.wikipedia.org/wiki/Tadashi), stands with the poster on rice and Vietnam at IRRI’s IRC exhibit.
Rice will never be just another commodity.

Much of the truth behind this simple statement can be discerned from the 2008 rice crisis that shook the world and triggered massive protests in Africa and parts of Asia. It revealed the fragile economic state of many families across the world that relied on this staple for daily nourishment. Rice, which has dwindled in significance after the successes of the Green Revolution, was suddenly catapulted again to a national priority and an international imperative—with several new challenges that will test the ability of the world to deliver food for the future.

Speakers at the first-ever International Rice Policy and Investment Conference (IRPIC) covered key issues on rice trade and the impact of policy and investment. This conference, organized in conjunction with the 28th International Rice Research Conference during the International Rice Congress 2010 held in Hanoi, Vietnam, 8-12 November, highlighted rice’s importance in both achieving food security and reducing poverty.

Considering that half of the world depends on rice, any tip in the balance of global rice production can cause ripple effects in the market that eventually hit poor farmers and consumers. Dr. Samarendra Mohanty, head of the International Rice Research Institute’s (IRRI) Social Sciences Division and IRPIC International Rice Research Institute’s coordinating author, pointed out that, over the past 15 years, many nations have moved toward food security by attaining rice self-sufficiency; nations have awakened to the truth that the agricultural sector demands as much attention as any other sector in the economic development process; hence, efforts to expand domestic production by increasing yield and providing better input subsidies have mushroomed in most countries.

Nations also saw a need to build their domestic stocks by increasing minimum support prices to encourage more farmers to plant, and, in some cases, governments such as India were compelled to protect their stocks by imposing an export ban. Trade restrictions, however, were often seen to distort the market and are therefore not healthy in the long run. Such market shocks, including calamities that drastically cut supplies, have brought a renewed focus on regional rice reserves to serve as a buffer. Plus, the challenge of a limited water and energy supply added two more constraints to production; these resources were previously assumed to be broadly available during the last Green Revolution. This has, in turn, made sustainability a recurring theme, as rice production’s impact on the environment was also considered in assessing policy and investment initiatives.

Increasing yield is the key

According to IRRI, the key to building the global rice supply lies in improving yield. In his outlook for 2020 and 2035, Dr. Mohanty noted that, in order for rice to supply the 9 billion people on the planet, the world needs to produce an additional 84 million tons of paddy in the next 10 years. This requires a 1.2% increase in yield every year compared with the current 0.8%. Dr. Mohanty added that, by 2035, without yield improvements, and available to rice must expand by much more so than to produce the additional 116 million tons that will be needed to keep the world sufficiently fed. But, little land is now available for expansion.

IRRI’s main thrust is to use innovative technology to develop new varieties that can provide better yield and thrive during drought, flooding, and salinity, among other extreme conditions.

Marker-assisted breeding and hybridization are two modern technologies that have been used to develop new rice varieties that have been adopted in major rice-growing countries. Genetically modified (GM) rice may also hold potential to safely deliver unique rice varieties that cannot be achieved through other breeding methods—although currently, no GM rice is commercially available.

Moreover, Dr. Thomas Reardon of Michigan State University pointed out that increasing yield does not necessarily lie only in developing new varieties (http://youtu.be/ExYjMGSL4). Sometimes, it just simply needs efficient postharvest and structural management. Poor postharvest practices can reduce yield by 15-20%. He also noted that moving away from long supply chains can help prevent a large amount of rice from being wasted. Citing China as an example, he said that 5% of production is lost just bringing rice from the farm to the plate.

Strength in policy and investment

To be able to obtain the necessary technologies, the rice sector calls for better policies and more investments. The Bill & Melinda Gates Foundation has recognized the strength that lies behind these two factors, and it has already put its financial support behind IRRI’s initiatives—most recently, the Global Rice Science Partnership (see Blueprint for a greener revolution on pages 18-21). Prahbu Pingali, deputy director of agricultural development at the Foundation, said that the Foundation believes that everyone should have a healthy, productive life, and IRRI’s innovative research is recognized as a vital tool that will catalyze a shift toward this vision. While investments start to come in, governments are further encouraged to do their fair share to implement more efficient policies that will sustain the development of these programs for the benefit of the present and future generations.

The Asia Society and the International Rice Research Institute (IRRI) task force report, Never an Empty Bowl: Sustaining Food Security in Asia, was the focus of the Ministerial Roundtable Meeting on rice at the Third International Rice Congress (IRC2010) in Hanoi, Vietnam, on September 9. The Ministerial Roundtable Meeting was chaired by Vietnam’s Minister of Agriculture and Rural Development Cao Duc Phat and IRRI Director General Robert Zeigler. Representing the Asia Society at the meeting was Dr. Peter Timmer, the task force’s principal advisor. Officials from 19 countries (Australia, Bangladesh, Cambodia, China, Egypt, France, India, Indonesia, Iran, Iraq, Italy, Laos, Malaysia, Myanmar, Nigeria, Saudi Arabia, Sri Lanka, Thailand, and Vietnam) wrote statements presented by Brunei Darussalam and Singapore) and seven international and aid organizations, including the World Bank, the International Fund for Agricultural Development, the UN Development Programme, and the Asian Development Bank, participated in the meeting.

Participants shared their insights into how the task force report fits into their own specific national and institutional food security plans and expressed unanimous support for the report’s findings and recommendations. All participants agreed that implementing the four major recommendations contained in the report is critical to achieving food security in the long term and improving access to affordable rice in Asia and throughout the world. The report specifically recommended raising and sustaining the productivity of rice farmers in ways that conserve water, land, and energy-intensive inputs, while also building resilience to the expected impacts of climate change; improving the environment for rural development, including farm and nonfarm activities locally, nationally, and regionally, with renunciation of long-run policies that lead productive lives even in the face of significant risks and vulnerabilities; and providing regional public goods for sustainable food security in Asia. One common theme that emerged from the meeting was how Asia’s growing population and economic development will impact the availability of rice for future generations. Participants widely agreed on the need for greater investments into strengthening the global rice economy, particularly in reducing rice market shocks, ensuring a healthy, productive life for millions of people, and reducing rice market shocks.

Asia pushes for sustainable food security

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GRiSP is an innovative and holistic work plan that seeks to improve international partnerships in rice research, its delivery, and impact

“A one finger cannot lift a pebble,” says an African proverb.

The significance of working together cannot be overemphasized—especially now, when the road to attaining food security and poverty alleviation is riddled with challenges such as decreasing agricultural lands, depleting natural resources, looming climate change, diseases, and poor investment in agriculture. It is for this reason that the International Rice Research Institute (IRRI), the Africa Rice Center (AfricaRice), the International Center for Tropical Agriculture (CIAT), and many other organizations have come together to design an innovative solution anchored on partnerships. Aptly named the Global Rice Science Partnership (GRiSP), this “mega program” aims to help billions of people around the world who largely depend on rice as their daily source of nourishment.

A global blueprint
GRiSP represents—for the first time ever—a single strategic blueprint for global rice research and how it can contribute more effectively to solving development challenges at the local, national, and regional levels. It is a Consultative Group on International Agricultural Research (CGIAR) Research Program (CRP) under the theme “sustainable crop productivity for global food security.” It streamlines current research for development of the CGIAR.

“The development of GRiSP has given a great impulse to the reform agenda of the CGIAR,” said Dr. Carlos Pèrez del Castillo, chair of the CGIAR Board, during the Third International Rice Congress (IRC2010) held in Hanoi, Vietnam, last 8-12 November, where GRiSP was formally launched. “International agricultural research has continuously played a key role in helping increase the world’s food production.”

As the first CRP to be approved, GRiSP illustrates rice’s importance as a staple food for the world’s growing population. For every 1 billion people added to the world’s population, 100 million tons of rice (paddy) need to be produced each year—with less land, less water, and less labor, in more eco-efficient production systems that are more resilient to climate change and that also contribute less to greenhouse gas emissions.

Experts project that demand for rice will continue to increase and will exceed supply in the near future. They say that an additional 8 million tons of rough rice need to be produced each year for the next 10 years. Unfortunately, the area planted to rice can no longer expand beyond the currently used 155 to 160 million hectares. The challenge is to reverse the current trends of slow productivity growth and inefficient, often unsustainable management of natural resources. The 2008 rice crisis is a grim reminder that steep and long-term price increases could wreak havoc on the lives of people and send dangerous terrors across the political and economic landscapes in the world’s most populous regions.

How rice is currently grown must be changed. Traditional rice systems have high environmental footprints that range from water to carbon footprints. Thus, rice needs to be produced with less tillage, less labor, less pesticide, with generally more efficient use of inputs such as nutrients and water, and with increased resilience to cope with climate change. Across the world, rice will have to tolerate extreme temperatures and survive droughts, floods, and salinity. The delta regions, from which much recent gain in production comes, will be particularly susceptible to rises in sea levels and stronger tropical storms.

In harmony with the CGIAR
The mission of GRiSP is synchronized with that of the CGIAR, that is, to reduce poverty and hunger, improve human health and nutrition, reduce the environmental footprint, and enhance ecosystem resilience of rice production systems through high-quality international rice research, partnership, and leadership.

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In harmony with the CGIAR's objectives, GRiSP laid out three specific aims: (1) to increase rice productivity and value for the poor in the context of a changing climate through accelerated demand-driven development of improved varieties and other technologies along the value chain; (2) to foster more sustainable rice-based production systems that use natural resources more efficiently, are adapted to climate change and are ecologically resilient, and have reduced environmental externalities; and (3) to improve the efficiency and equity of the rice sector through better and more accessible information, improved agricultural development and research policies, and strengthened delivery mechanisms.

Breaking the poverty cycle
To achieve its goals, GRiSP plans to foster high-quality, impact-oriented research and development activities in a global context. Strategically, the key point for farmers to enter into a virtuous circle is to raise the productivity and resource efficiency of rice production systems to unprecedented levels (see Fig. 1). Better income will enable farmers to invest more in diversification and sustainable management practices—improving their food security, nutrition, health, and the environment.

A business-like approach
GRiSP will be viewed through a business perspective in terms of the structure and implementation of its research agenda. For example, the socioeconomic and biophysical factors that drive farmers, agribusinesses, small entrepreneurs, consumers, and many other actors in the value chain will be thoroughly understood through research. This will provide innovative tools and information needed for evidence-based targeting in GRiSP research and development themes.
that focus on the development of new products, their adaptation, and adoption. Plus, some feedback on adoption patterns, constraints, and true impact can be usefully gleaned through this.

‘GRiSP will allow us to be more effective and efficient in creating impacts even with huge challenges,’ said Marco Wopereis, AfricaRice deputy director general. ‘But, we can guarantee faster results only if we know what we are doing, where and when, and with whom.’

It is also worthy to mention that gender is inherent in GRiSP’s objectives, and themes. And, capacity building in both rice science and extension is fully integrated to ensure adequate skilled personnel for future rice development.

An evolving alliance

‘Through GRiSP, CIAT will be reconnected with the rice community in Asia and Africa,’ said César Martínez, CIAT rice program leader, giving his perspective on GRiSP during the IRC2010.

He explained CIAT’s initial connection with Asia that dates back to 1967. At that time, Dr. Peter Jennings, an IRRI plant breeder, shifted with them IRRI varieties, which, according to him marked the Green Revolution in Latin America. But, with this reconnection through GRiSP, he mentioned some benefits such as sharing rice technologies and germplasm, and improving capacity building for Latin America.

As an evolving partnership, GRiSP will be led by IRRI, which also oversees the activities in Asia. It is supported by AfricaRice, which leads the work in Africa, and CIAT in the Latin America & Caribbean region. Other internationally-operating research organizations such as the French Agricultural Research Centre for International Development (CIRAD), French Research Institute for Development (IRD), and Japan International Research Center for Agricultural Sciences (JIRCAS) will play a strategic role in GRiSP.

Since partnerships are the main drivers for reaching its vision, GRiSP serves as the umbrella to strengthen and expand partnerships. At present, the six international centers and organizations in GRiSP (IRRI, AfricaRice, CIAT, JIRCAS, CIRAD, and IRD) have about 900 research and development partners worldwide.

Aside from strengthening existing partnerships, GRiSP also provides new opportunities for partnerships in research and development, bringing together its key players and stakeholders such as advanced research institutes and universities, national research, education, and extension systems; CGIAR centers; the private sector; and civil society organizations, among others (see Fig. 2). National rice research and development systems such as those of China, India, Japan, and Brazil will also significantly contribute to GRiSP by connecting their national research programs with GRiSP’s global themes.

GRiSP will expand its partnerships with civil society organizations such as nongovernment organizations and farmers’ associations, among other groups. Partnership with the private sector is also an integral part of GRiSP.

Furthermore, GRiSP will be linked in various ways with other CRPs. Through its own activities and through collaborative projects, co-investment from or in other CGIAR Research Programs, and active participation by IRRI, AfricaRice, and CIAT and their partners in other CGIAR Research Programs, GRiSP will be fully integrated in the Strategy and Results Framework of the CGIAR Consortium. Several other CGIAR centers such as the International Maize and Wheat Improvement Center (CIMMYT), International Food Policy Research Institute (IFPRI), International Livestock Research Institute (ILRI), International Water Management Institute (IWMI)—to name just a few—will be involved in GRiSP, related projects and activities, including regional and national initiatives that cut across different CRPs and systemwide programs such as the Generation Challenge Program.

Vision of success

GRiSP has a clear view of what it wants to see in the future. It laid out concrete and quantifiable key impacts to benefit the poor, the hungry, and the environment in the next 25 years.

By 2035, those living under the US$1.25 (PPP) poverty line will reduce their expenditures by $11 billion annually (holding consumption constant). Spending less while gaining more income would mean that 150 million people would be lifted above the $1.25 poverty line, reducing global poverty by 11%.

As rice becomes more available and its price goes down, 62 million undernourished people would be able to consume sufficient calories per day in Asia—thus reducing the number of hungry Asians by 12%.

For the environment, nearly 1 billion tons of carbon dioxide equivalent emissions will stay clear of Earth’s atmosphere.

Rice farmers will benefit from GRiSP through sharing of germplasm, technologies, and institutional capacity among hundreds of partner institutions.


Dr. Doubahern is the deputy director general for research at IRRI.
India's rice production has more than doubled since 1947, with cultivation switching from rainfed to direct-seeded rice. Moreover, there has been an increase in the percentage of hybrid rice. India has been able to achieve self-sufficiency in rice production, and now it is a net exporter, shipping rice to over 100 countries around the world. India is interested in partnering with IRRI to continue to play a key role in IRRI's work.

Dr. B.C. Vrakkingh, DRR project director for IRRI

“The IRRI-India collaboration is a success story. Through germplasm exchange, hybrid rice development, and capacity building, it helped India enhance its rice production and boosted the country’s productivity.”

“IRRI and India have been strategic partners improving the productivity of Indian rice-based systems ever since IRRI was established in 1960. We see India as a very important partner in the new Global Rice Science Partnership (GRISP) that was recently approved as the first mega-program in the CGIAR reform process.”

Dr. Robert Zeigler, IRRI director general

IRRI's work on rice in India began in 1967 and continues to this day. In collaboration with India, IRRI has been able to achieve a number of important milestones in rice production and research. Here are some highlights of IRRI's work in India:

- Development of the variety IR8, also known as “miracle rice,” which has improved rice production by 60% in India. This variety is still grown today.
- Development of semidwarf rice varieties in the early 1990s, which increased the area for rice production. The introduction of newly developed semidwarf modern varieties had been either released as varieties for commercial cultivation in India or used in Indian breeding programs through the International Network for Genetic Evaluation of Rice (INGER).
- Development of hybrid rice through a national network project funded by the United Nations Development Programme, the Asian Development Bank, and the World Bank. NARES researchers have conducted efforts, technical backstopping, access to IRRI’s genetic materials, and generous funding from donors allowed India to become the second country in the world, after China, to commercialize hybrid rice. The first set of hybrids was released in 1994 and, by 2016, 43 hybrids had been released in the country (see Hybridizing the world on pages 12-35 of Rice Today Vol. 9, No. 4). More than 70% of these hybrids have either one or both parents bred at IRRI. Because of the effective use of rice breeding materials, hybrid rice has been developed and disseminated rapidly in India. Today, hybrid rice occupies about 1.4 million hectares in the country and is poised for significant growth.

Rice production and management

Collaborative research between India and IRRI has greatly helped in streamlining rice production practices to make rice production not only profitable but also sustainable and environment-friendly. Some of these practices are resource-conserving technologies (laser-aided land leveling, zero or minimum tillage, drill and drum seeding, nitrogen fertilizer management using a leaf color chart), integrated weed management practices for direct-seeded rice, and integrated crop management practices.

The rainyland, lowland, and upland rice research consortium

Rice cultivation in rainfed lowland and upland areas, which is about 15 million hectares (40% of India’s 44 million hectares of harvested rice area), faces problems caused by flooding and drought. When rainfall rice research began in 1992, India was recognized as a key partner. It had one rice research center for rainyland, two for flood-prone areas, and five for rainfed lowland, along with two other main rice research centers. Under the upland and lowland rice research consortia, mechanisms for tolerance of submergence and drought were explained and tested under the All India Coordinated Trials and rice genetic materials were screened and selected.

Through IRAC and IRRI’s close collaboration, SUSB1—the gene that confers tolerance of submergence—was successfully introduced to high-yielding and popular Indian rice variety Swarna, which later led to the development of Swarna-Sub1 (see Suba rice on pages 26-31 of Rice Today Vol. 8, No. 2). Swarna-Sub1 can produce 3–3.5 tons per hectare of rice even if it has been submerged under water for up to 2 weeks. This variety has largely been released for commercial cultivation in the Indian states of Orissa and Uttar Pradesh. Sahbhagi dhan, a drought-tolerant rice variety, is also another innovation resulting from close collaboration between the Central Rainfed and Upland Rice Research Station (CRURRS) and IRRI. IRRI foresees that, in the next 5 years, more stress-tolerant rice varieties will be released in India.

Population: 1.2 billion
Total land area: 29 million sq km
Average rice yield: 3.2 tons per hectare
Total rice production: 13.3 million tons
Area planted to rice: 44.1 million hectares

Compiled by Paula Blanca Ferrer

Rice Today January-February 2011
For the past 50 years, rice yield in Asia has generally increased from year to year. However, when we look at stability, the numbers reflect variations in annual yield. The two maps below represent average rice yield and its stability during the 1960s (bottom left) and the 2000s (bottom right). A bivariate legend represents both these factors in each map. As yield increases, the color changes from brown to green, and then blue. Meanwhile, an increase in stability is represented by the transition of colors from dark to lighter shades.

The maps show the variation in rice yield trends across Asia. In the 1960s, the darker brown and green shades dominated since yield and yield stability were almost uniformly low. In the 2000s, however, these colors turned to lighter green and blue as yield clearly increased. Some regions, though, have stubbornly low interannual stability (darker shades) in yield, and hence in production.

The graphs on the right show the percentage of rice area in Asia in the 2000s that is cultivated under irrigated or rainfed conditions. We calculated these percentages for regions where the average yield was below 2, between 2 and 4, and above 4 tons per hectare (right) and for regions where yield stability was either low, medium, or high (far right). The presence of irrigation explains much of the spatial patterns in average yield—more irrigated area means higher yield. But, for yield stability, this is less of an issue. Stability from year to year is likely to be more related to other factors that also vary from year to year, such as drought, flooding, and pest and disease outbreaks.

Mr. Bruskiewicz is a student at Brent International School. He is in his graduating year and was a trainee at the IRRI Geographic Information Systems (GIS) lab. Mr. Rala is an associate scientist, while Ms. Villano is a researcher in GIS, Social Sciences Division. Dr. Nelson is a geographer in GIS.

Rice yield trends in Asia over the past 50 years
(by Kenneth Bruskiewicz, Arnel Rala, Lorena Villano, and Andrew Nelson)

Percentage of rice area under irrigated and rainfed conditions in the 2000s.

Average yield (t/ha) yield stability

Irrigated Rainfed

Low Medium High

<2 2–4 >4

Low Med

<2 2–4 >4

Stability

High Med Low

Yield (t/ha)
Fears of food shortages following the rice crisis in 2007 and 2008 have prompted a dramatic shift in global trade and in economic and food security policies. Nations have put more focus now on agriculture—a situation somewhat reminiscent of the events that led to the Green Revolution.

A cornerstone of the Green Revolution was the new varieties of cereal crops developed through the efforts of Norman Borlaug, the father of the Green Revolution. One of those varieties is IR8 rice, also known as “miracle rice,” developed 40 years ago at the International Rice Research Institute (IRRI). When grown with irrigation and nitrogen-rich fertilizers, IR8 produced more grains than traditional varieties. IR8 changed the world food situation according to Tom Hargrove, a former communicator at IRRI. Indeed, the looming famines did not materialize since miracle rice was introduced, as well as other food varieties (see Breeding history on pages 34-38 of Rice Today Vol. 5, No. 4).

The high price of a miracle
Modern rice varieties can yield significantly more than traditional rice varieties, but they require more nutrients in order to achieve their maximum yield potential. But, the heavy use of chemical fertilizers can place a toll on the environment. Some 30–80% of the nitrogen applied to farmland escapes and enters water systems and the atmosphere and increases the incidence of some disease vectors according to a paper written by Jules Pretty, professor and pro-vice-chancellor of environment and society at the University of Essex in Colchester, England, as well as author of several books on agricultural sustainability.

Commercial fertilizer to provide nutrients can be an additional cost to farmers if not used strategically such as through site-specific nutrient management (SSNM). During the Green Revolution, global use of pesticides rapidly increased to protect crops. But, excessive and indiscriminate pesticide use can adversely affect ecosystems and human health.

Endangered water
Agricultural irrigation, another leg on which the revolution stands, has also come under fire. Many experts believe that the global water supply is dwindling fast. Additional pressure from climate change, population growth, pollution, and higher industrial requirements is also contributing to a possible massive water crisis.

It is estimated that rice uses 30% of the fresh water for crops worldwide. In Asia, more than 80% of developed freshwater resources are used for irrigating rice. However, in 2025, it is estimated that 15–20 million hectares of irrigated rice will suffer from some
degree of water scarcity (see Every drop counts on pages 17-18 of Rice Today, Vol. 8, No. 3). It is therefore critical that we use our water resources wisely and efficiently.

An environment-friendly revolution
Can the world survive without the intensiﬁed agricultural practices espoused by the Green Revolution? Can agriculture continue to feed the world with fewer trade-offs?

The key is sustainable agricultural systems that are producing more output from the same area of land while contributing to the maintenance of clean water, carbon sequestration, food protection, groundwater recharge, and landscape amenity value, said Prof. Pretty.

Green Super Rice (GSR) for the Resource-Poor of Africa and Asia, a collaborative project between IRRI and the Chinese Academy of Agricultural Sciences (CAAS), offers a sustainable way of producing food for the growing population. Funded by the Bill & Melinda Gates Foundation (BMGF), the project aims to develop rice varieties that retain their stable, sustainable yield potential even when grown with fewer inputs or under unfavorable environmental conditions.

Green super rice
Headed by Zhikang Li, IRRI molecular geneticist and head of the GSR project, believers is possible to combine sustainable food production and environmental preservation through GSR varieties.

In the past, breeders at IRRI used only three recurrent parents, IR64, Teqing, and IR68552-5-3-2, a new plant type variety backcrossed with 205 donor parents. However, the GSR concept, which was well received and expanded in China under the China National Rice Molecular Breeding Network, uses 46 recurrent parents. Crosses were made with 500 donors, resulting in a bigger pool of available genes—each of which has also been submitted for complete genome re-sequencing to further strengthen the molecular breeding efforts of the GSR project.

At least 18 institutions and 125 molecular breeders are currently involved in this project. Each participating organization in China and IRRI is working with one or two recurrent parents and each one is subjecting all of its advanced backcross breeding populations to insect pests such as plant hoppers; diseases such as rice blast, bacterial leaf blight, bacterial leaf streak, sheath blight, tungro; and abiotic stresses such as drought, salinity, and flooding, among other environmental conditions that limit rice production.

In addition to the BMGF funding, the Chinese government invested more than US$20 million to give researchers the financial muscle to develop and deliver the needed GSR products to Asia and Africa.

Doing more with less
Rather than focusing on developing one variety for all, GSR can be custom-made to fit any target ecosystem. For example, GSR varieties can grow rapidly to compete strongly with weeds. Because they establish themselves much faster than the weeds, herbicide—a luxury for poor farmers—becomes unnecessary. These weed-tolerant GSR varieties performed well in field trials in Bangladesh and are now undergoing further testing.

Furthermore, the project has also identified drought-tolerant GSR lines with IR64 as the recurrent parent. For example, IR3142-II-19-B, a GSR line, performs better than Sahibbagi iban under drought and zero-input (which means no fertilizers and no pesticides, and only one manual weeding) conditions. (See Making rice less thirsty on pages 12-15 of Rice Today Vol. 8, No. 3.)

Re-packaging agriculture
In 2009, ﬁeld trials conducted in Indonesia, Vietnam, Laos, Cambodia, Pakistan, Bangladesh, Sri Lanka, and China showed several GSR varieties with different promising traits. Seeds of 56 GSR varieties with multiple resistance to rice blast, rice planthoppers, and gall midge were distributed to the GSR trial countries for more thorough evaluation.

Some 106 GSR varieties are now ready for seed exchange and germplasm distribution through the International Network for the Genetic Evaluation of Rice. These “ﬁnished products” include GSR materials that are drought-tolerant and suitable for rainfed lowlands, and inbreds and hybrids with multiple disease and insect pest resistance. GSR-IRRI also released drought-tolerant, salinity-tolerant, submergence-tolerant, and high-yielding varieties suitable for irrigated conditions.

The GSR project also promotes environment-friendly production technology such as SSNM (see Extension goes mobile on pages 29-30 of Rice Today Vol. 9, No. 4) and integrated crop management (ICM) to go with GSR varieties. SSNM provides information based on simple observations that enable rice farmers to tailor nutrient management to speciﬁc field conditions and optimally supply rice with essential nutrients at the right time (see Balancing fertilizer use and proﬁt on page 38 of Rice Today Vol. 7, No. 1). ICM is a crop production system based on a good understanding of the interactions between biology, environment, and land management. It aims to ensure food production that conserves and even enhances natural resources.

SPREADING GSR
The GSR project has held several discussions with policymakers and researchers, and training courses and workshops that focus on the technology. In Sri Lanka, for example, extension and seed agents have already been trained through the project on how GSR varieties can meet the needs of farmers from the target sites.

To ensure that farmers will have a sufﬁcient and steady source of GSR materials, the project has provided training to small- and medium-sized private companies in Bangladesh, Indonesia, Sri Lanka, Vietnam, and Pakistan.

Sowing greener alternatives
In recent years, rice scientists have been forced to face the additional challenge of balancing food security with preserving natural resources and protecting the environment. For IRRI, the key is a doubly green revolution: the development and diffusion of conventional environment-friendly agricultural practices and innovative varieties such as GSR.

“I strongly believe that, through GSR technology, it is possible to realize the highly efﬁcient use of germplasm resources while promoting sustainable agricultural development and protecting the environment for future generations,” Dr. Li. Prof. Pretty agrees. Productive and sustainable agricultural systems make the best of crop varieties and their agroecological and agronomic management, he said. “This new initiative from IRRI on GSR is welcome as it ﬁts these conditions and needs.”
**What’s cooking?**

**Sakkurarai Pongal**

A tasty Tamil confection

In a 4:36 video on YouTube at http://snipurl.com/1li8iu, Ms. Banu gives step-by-step instructions on how to prepare this delectable dish.

**Cooking directions**

1. Heat 1 tablespoon of butter in a pan over medium-high heat. The milk is allowed to boil and spill over the pot to symbolize overflowing abundance and future prosperity for the family.

2. Combine the cooked rice, dhal mixture, and brown sugar syrup while stirring slowly. Add the grated coconut and cardamom. Allow to boil for a few minutes. Set aside.

3. In a 1/4-cup measurement, add the grated cashews and raisins. Stir and use them as a garnish.

**Ingredients**

- Rice (uncooked) 1 cup
- Milk 1 cup
- Grated coconut 1/4 cup
- Jaggery (unrefined brown sugar) 300 grams
- Green gram or mungbean dhal 50 grams
- Cashews and raisins 20 grams
- Cardamom (crushed) 4 pieces
- Water 2 tablespoons

This recipe is good for four people.

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**Father of the Korean Green Revolution**

Kshirod K. Jena

The development of Tong-II rice was named as one of the most important scientific achievements in the 20th century in South Korea by Chosun Ilbo, one of the country’s highly respected newspapers. More importantly, Dr. Heu helped put rice on the table at a time when the Korean people didn’t know where their next meal would come from. He also demonstrated the power of plant breeding and unlocked the wide possibilities for the development of modern rice varieties.

“Successful cultivation of Tong-II-type rice set new milestones for future improvement of rice varieties in Korea and also offered practical opportunities to use indica germplasm in temperate countries,” Dr. Heu wrote.

Dr. Heu passed away on 24 November in Seoul at age 83 with his beloved wife, Hyuk-Mae Kwon, and children at his side. His death was mourned not only by his immediate family but by the whole nation because of the legacy that this legendary scientist left behind. His achievements in agriculture and in improving food security in his country will live forever.

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more than 1,100 delegates from around the world gathered in Des Moines, Iowa, last 13-15 October, to honor the 2010 World Food Prize (WFP) laureates David Bechamk and Jo Luck. There were also numerous side-events, including the Norman E. Borlaug International Symposium, which focused on “Taking it to the farmer: reaching the world’s smallholders,” and recognition of the International Rice Research Institute (IRRI) for its five decades of achievement and its historic bond to numerous WFP laureates.

During the symposium, Ambassador Kenneth Quinn, president of the World Food Prize Foundation, recognized IRRI’s 50th anniversary and its long list of achievements. He particularly noted the nine WFP laureates (see box, page 33), who have worked, served, or studied at IRRI, or have partnered with the Institute over the years.

Arvy Feldman and Maraife Calingacion, two Monsanto Beall-Borlaug International Program scholars, whom IRRI is currently hosting, attended the gatherings of their 12 fellow Beall-Borlaug scholars to compare notes on their work. Mr. Feldman (photo below left, a British-Indonesian, is involved in IRRI’s C4 rice project, which is looking to introduce characteristics of the C4 photosynthetic pathway of maize into tropical rice, which, if achieved, could significantly raise the potential yield of tropical rice. Ms. Calingacion (photo below center), a Filipina, is breaking new frontiers in phenotyping to understand the compounds that confer the quality traits of aroma, flavor, and taste in rice. In addition, an IRRI exhibit displayed posters on the work of Mr. Feldman and Ms. Calingacion, the Institute’s historic achievements, its most recent publications, and various historic videos about IRRI, including A kaleidoscope of achievements, recognition, and opinions, 1969-2010 (http://irri.blip.tv/file/3428017), and a 1994 dialogue between the head of the WFP, Norman Borlaug, and the second laureate, Robert Chandler, about their origins of IRRI (http://youtube/TW8hpF0tqOg).

During the Borlaug Dialogue, IRRI Director General Robert Zeigler joined in a conversation on Partnering with smallholders on strategies for food security (http://youtu.be/Hx7xJhSOMYQ) with (from left in photo below right) Gabriela Cruz, a fourth-generation farmer and president of the Portuguese Association for Soil Conservation; Jose Fernandez, U.S. assistant secretary of state for economics, energy, and business affairs; and Matt Kileler (far right), senior vice president for sustainability, Wal-Mart. Sean de Cleene, vice president of Yara International, was the moderator.

Dr. Zeigler pointed out, “A vast majority of the world’s rice production is supplied by very small-scale farmers—200 million farmers in Asia alone. However, what is extremely exciting from a research institute perspective is that farmers are getting access to tools of communication unlike before. This new accessible means of communication will completely revolutionize smallholder rice production on a global level.”

One of the keynote speakers, Jeff Raikes, CEO of the Bill & Melinda Gates Foundation (BMGF), talked about the package of six BMGF grants (totaling just over US$300 million) that span the agricultural value chain. “Two years in, these grants are having a direct impact on hundreds of thousands of farm families and are on track to reach their goals,” he stated. The example he gave was the BMGF grant for IRRI’s work on submergence-tolerant Sub1 rice. “By the end of this year, more than 400,000 farmers will be planting this rice and, by 2017, more than 20 million farmers will benefit from it, and that is tangible progress!” he added.

Another keynote speaker, Rajiv Shah, United States Agency for International Development (USAID) administrator, said, “We are working with the Consultative Group on International Agricultural Research (CGIAR) to support their new ‘mega-programs’ [of which the Global Rice Science Partnership (GRISPR) will be the first one to be funded starting in January 2011]. These programs focus on high-potential research into new seed varieties, effective agricultural policy reforms, and better water and soil management practices. We have doubled our investment in these mega-programs, making us [USAID] the single largest supporter of the CGIAR.”

Also, former U.N. Secretary-General Kofi Annan told the delegates that discrimination against women is hampering the development of agriculture in Africa, his native continent. “We cannot forget that the women who produce most of Africa’s food are particularly disadvantaged economically and socially,” said Annan, now chairman of the Alliance for a Green Revolution in Africa.

During the WFP ceremonies at the Iowa State Capitol on 14 October, Ms. Lauren Schefer of Mount Vernon, Iowa, was presented with the Elaine Szymoniak Award for her work as an intern at IRRI’s Grain Quality, Nutrition, and Posharcenter during the summer of 2009. Her experiments dealt mainly with sensory characteristics—amylose content, gel temperature, gel consistency, and texture.


David Beckam and Jo Luck received the 2010 World Food Prize for their landmark achievements in building Bread for the World and Heifer International into two of the world’s foremost grass-roots organizations leading the charge to end hunger and poverty for millions of people around the globe. In honoring them, the World Food Prize recognizes the critical efforts of NGOs in mobilizing and empowering everyday citizens to end hunger in communities around the world.
New risk elements and climate change dominated the proceedings of The Rice Trader’s (TRT) second World Rice Conference in Phuket, Thailand, 12-14 October 2010. In 2009, the market was rocked by the surge of Philippine demand after Typhoon Ketsana destroyed much of the country’s crops. The following year saw more nations struggle with the impacts of climate change. China first battled against drought during the early part of the year, and then with floods. Inclement weather also spread across the Asian region, bringing the worst floods in years to Pakistan and even to Thailand. Untimely rains also affected crop output in Cambodia and Indonesia. These tips in the balance of rice production pushed the rice industry. Consequently, India’s decision to stay out of the market sent prices significantly lower—compared to the price hikes induced by the series of Philippine tenders announced in the third quarter of 2009—during the early part of 2010.

In India’s place, however, Bangladesh and Indonesia came in with a large demand in tow. This has created a bullish scenario for 2011, even though India’s output has recovered on the back of a better monsoon in 2010. Indonesia and Bangladesh are expected to continue to play an active role in 2011 that should heat up the global markets as they purchase strategic stocks and supplies needed to sustain food security requirements and cool local markets where prices have been rising (as was the case for Indonesia in 2010).

Africa, in the meantime, was considered lucky to have stocked up on imported rice during the April to September 2010 period when prices were relatively lower. Interestingly, the dollar and euro revealed more volatility while prices for commodity futures and in energy markets rose during the second half of 2010. The behavior of the European currency showed the impact of debt issues in the region and how the fluctuations have affected the purchasing power of several African nations whose currencies were pegged to the euro. Risk was the key feature that has clouded even the best analyst’s crystal ball, making traders more cautious and reluctant in making buying and stocking decisions. Experts representing African demand also revealed more caution as African imports and consumption have grown considerably—even through the 2008 rice crisis—partially because of some policy initiatives that reduced the cost of importation and helped maintain rice’s affordability among the local population. Notably, trade representatives, such as Olam International, Atlas Trading and Shipping, Export Trading Co., and Regent International, all agreed that African consumers are becoming more sophisticated and are now more sensitive to the quality of their rice.

A changing retail environment that also sees some consolidation in the wholesale sector could offer new opportunities for investors and traders alike. Frédéric Lançon of the French Agricultural Research Centre for International Development (CIRAD), however, expressed concern about the investment challenges in production, marketing, and development of both infrastructure and African consumers (especially the poor who remain affected by higher food costs). He noted that although there is an increase in government and donor interest in supporting investments in rice production after the 2008 food crisis, the real challenge of building infrastructure and marketing (and distribution) channels for African rice, as well as the competitiveness of local production against imported alternatives, would reveal the full extent of Africa’s success in the long term.

More support for rice
In its effort to sustain support for rice research and development, TRT donated another US$10,000 to the International Rice Research Institute (IRRI). Mr. Zwinger, who is also the publisher of Rice Today, presented the check to Dr. Samarendra Mohanty, head of IRRI’s Social Sciences Division, who was also invited as a speaker at the conference. The other highlights of the event were the awarding of the second annual World’s Best Rice 2010 competition to International Rice & Products Co., Ltd., Thailand, for its Thai jasmine rice, and the presentation of the Lord of Rice Award to Chef Enrique Diaz.
Africa shifts its focus to producing quality rice to support local farmers and reduce the region’s dependence on rice imports

“The rice plant produces only rice seeds; it does not produce sand, stones, or other foreign materials,” Dr. Tareke Berhe from Ethiopia wryly observed, referring to the low quality of local rice sold in parts of sub-Saharan Africa.

Dr. Berhe, who has long been associated with rice development in the region, promotes “from plant to plate,” an approach that emphasizes the significance of all the components in the rice value chain, namely, input, supply, processing, and marketing. In Africa, rice has become an increasingly popular food as it is tasty and quick to cook. However, most of the rice eaten on the continent is actually imported from Asia. African-grown rice has failed to compete with imports because large-scale local rice production has been weak and urban consumers have preferred imported rice.

In Africa, rice has become an increasingly popular food as it is tasty and quick to cook. However, most of the rice eaten on the continent is actually imported from Asia. African-grown rice has failed to compete with imports because large-scale local rice production has been weak and urban consumers have preferred imported rice. One of the major challenges for Africa is how to produce sufficient and affordable rice that suits the preferences of its growing and increasingly urbanized population.

**Grain quality**

In the wake of the food crisis in 2008 that sparked riots in several African cities, several member countries of the Africa Rice Center (AfricaRice) adopted key policy measures recommended by the Center in 2007 to support the rice sector by ensuring farmers’ access to high-quality rice seed and other basic farm inputs.

Such support coupled with good weather contributed to an 18% increase in Africa’s rice production in 2008 compared with the 2009-10 crop season, the Food and Agriculture Organization of the United Nations estimated double-digit growth in rice production in several countries.

“This is good news; however, we should realize that it is not only the quantity but also the quality of African rice that is going to be crucial to allow it to compete with the imported rice from Asia,” stated Dr. John Manful, AfricaRice grain quality expert.

According to Dr. Manful, rice research in Africa has mostly focused on the development of technologies to increase production. “But rice, unlike most other cereals, is consumed as a whole grain,” he said. “Therefore, its physical properties such as size, shape, uniformity, and look are of utmost importance.”

Grain quality does not just depend on the variety of rice, but also on the crop production environment, harvesting, processing, and milling systems. Considerable amounts of rice produced get lost in inefficient postharvest systems in many African countries.

“Quantitative postharvest losses in rice in Africa are estimated to be between 15% and 25%, while qualitative losses, which are estimated by the price differential between imported and locally produced rice, range from 15% to 50%,” Dr. Manful explained. “It is important to reduce such losses and ensure a top-quality product that our consumers will want to buy.”

**Preference for imports**

Recent experiences in several countries in the region show that African consumers are becoming more demanding when it comes to their rice. For example, the Benin government has announced that it is planning to sell most of the rice (about 160,000 tons) produced this year to Nigeria, because domestic consumers prefer imported rice.

Similarly, Senegal produced about 500,000 tons of rice in 2009, but most urban consumers considered it inferior to imported rice. In many African countries, the urban populations tend to prefer imported rice. Bags of imported rice dominate shops and restaurants in cities, and local rice is difficult to find.

Locally milled rice is generally of poor quality and is consumed mainly in rural areas. Often, it tends to have stones and people don’t have time to clean their rice before cooking it. Even when it is of acceptable quality, it doesn’t sell well in cities, where consumers have been used to imported rice. For some people, eating imported rice has become a status symbol.

Support for local rice

Several countries, however, have started focusing on improving the milling, packaging, and marketing of local rice, and developing public awareness campaigns to promote it. In Ghana, for example, a marketing campaign called “Eat Ghana Rice” was recently launched to encourage people to buy local rice. The successful campaign included advertisements in newspapers, on radio, and on billboards showing the president eating local rice.

**Partnership with Japan**

Since the beginning of its establishment, AfricaRice has given importance to rice postharvest technology and grain quality management under this partnership.

AfricaRice continues to do research on the acceptability of new rice varieties among consumers and the efficiency of processing methods. Farmer-learning videos that address grain quality and processing have been developed and studies have shown their positive impacts on rural women.

As part of its new focus on demand issues, AfricaRice is trying to improve the quality of local rice by collaborating with farmers and processors to develop their capacity for processing, packaging, and branding of local rice.

Local rice auctions

An innovative program by Dr. Matty Demont, AfricaRice economist, and his team in Senegal, in collaboration with the University of Ghana, is conducting experimental auctions to find out consumers’ perceptions of the different types of rice and the price they would be willing to pay for them. Most of the women surveyed preferred the local quality rice and are willing to pay more for it.

As a development component of this research, in March 2010, AfricaRice organized a workshop in which stakeholders of the Senegalese rice sector were asked to construct a virtual enterprise with a strategic action plan for bringing a quality rice brand to the market.

Inspired by this experiment, 14 Senegalese rice importers launched a joint venture in November 2010 with producers and processors to promote and market Senegal rice. The company aims to buy all the rice grown in the Senegal River Valley—the main rice-growing area in the country—and then mill it and market it to Senegalese consumers.

“The company is planning to govern rice along the value chain through detailed quality contracts with milling factories and farmers,” explained Dr. Demont. “Our idea is that producers are helping farmers add value to the local rice, raise farmers’ incomes, improve rice quality, and expand the market for locally produced goods.”

1. **BRIGHTLY COLORED bags of imported rice dominate shops in many cities across Africa.**
2. **THE POOR quality of local rice is a major problem faced by rice consumers in many African countries.**
3. **DR. MANFUL John (left), AfricaRice grain quality expert, is passionate about the need to improve the quality of local rice.**
4. **EXPERIMENTAL AUCTIONS help scientists find out consumers’ perceptions about different types of rice and the price they would be willing to pay for them.**

**With support from USAID, AfricaRice has carried out a series of studies in collaboration with the Nigerian Institute of Social and Economic Research to better understand the factors explaining consumers’ shift to imported rice in Nigeria.**

**Issues related to rice quality and how this affects consumers’ preference for local and imported rice were also examined, as local rice was often cheaper by 30% or more than imported rice, mainly because of its lack of cleanliness.**

**The studies recommended a comprehensive approach to revitalize the Nigerian rice sector by improving the efficiency of farmers at the stages of production, processing, and marketing. They emphasized quality and branding to increase the competitiveness of local rice.**

**The comprehensive strategy was presented to the stakeholders and the Nigerian government. It was integrated as a major component of the country’s presidential initiative on rice production, processing, and export in Nigeria, which raised awareness on the need for public support to stimulate rice production and reduce dependence on imports.**

**Under this initiative, rice imports were subjected to a high import duty (over 100%) and subsidies were provided to facilitate access to seed (50%) and fertilizers (25%).**

**Partnership with Japan**

Since the beginning of its establishment, AfricaRice has given importance to rice postharvest technology and grain quality with support from Japan. The Japan International Cooperation Agency (JICA) helped establish a Grain Quality Laboratory in AfricaRice’s headquarters in Côte d’Ivoire and, for many years, JICA postharvest processing and grain quality experts were seconded to AfricaRice. More than 200 national scientists and extension agents were trained in rice postharvest technology and grain quality management under this partnership.

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**“The company is planning to govern rice along the value chain through detailed quality contracts with milling factories and farmers,” explained Dr. Demont. “Our idea is that producers are helping farmers add value to the local rice, raise farmers’ incomes, improve rice quality, and expand the market for locally produced goods.”**
Scientists embark on a quest to discover what makes rice resistant to rust disease and replicate the trait in other cereal crops.

When it comes to rice, a STEEL STEEL among cereal grasses, has long intrigued plant breeders and plant pathologists. The lack of rust resistance of modern rice varieties has been a major problem for rice production. For this reason, Dr. Leung emphasizes that a team approach is important to resolving this scientific puzzle and that it has important practical applications. “Understanding what constrains long-term immunity is good for all cereals,” says Dr. Leung. “We want to discover what genes render rice immune to rust. Such a genetic mechanism could also be useful for fighting rice diseases.” Sarah Neil Davidson, the associate director of the DRRW, agrees: “If we can identify the source of rust resistance in rice and transfer that to wheat, we will be able to avoid the boom-and-bust rust cycles that are so devastating to food security,” says Dr. Leung. “We will be able to take care of U99 and, perhaps, future U999.”

In other words, although the rust pathogens can induce a response from the rice plant, they cannot complete their spore-producing life cycle on rice,” says Dr. Leung.

A scientific puzzle

In the northwest region of China, yellow rust is the most serious problem for wheat production. For this reason, Drs. Kang and Wang focus on screening rice mutants that are sensitive to yellow rust. They have found that some mutants appear to allow a greater degree of colonization by yellow rust. The research team’s top priority in 2011 is to determine whether susceptibility to rust is genetically controlled. If so, these rust-sensitive mutants could reveal what genetic mechanisms are responsible for the immunity of rice to rust.

In 2010, in Turkey, Iran, Ethiopia, and other countries in Africa, the Middle East, and Asia, stripe rust, or yellow rust, has been the scourge of local farmers, disrupting yields and causing food shortages.

The increasing failure of the world’s wheat crop in the face of increasingly virulent forms of rust is good for all cereals,” says Dr. Leung.

In susceptible plants, rust cuts off the plants’ ability to photosynthesize nutrients in their leaves and transport nutrients in their stems. Infection by rust causes stems to weaken and plants to “lodge,” or fall over, making what little yield there is near impossible to harvest.

A dreaded plant disease

Wheat rust is one of the world’s most dreaded plant diseases. A source of plagues since Biblical times, rust devastated the wheat crop in North America as recently as 1933. Since 1998, Ug99, a form of stem rust, has been devastating wheat farmers’ fields in East Africa, and is even now marching toward the world’s breadbasket in the Middle East and South Asia, particularly India. It threatens to disrupt food security for the millions of people who depend upon wheat as a staple.

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Rat busters
by Rona Niña Mae Rojas

IRR’s rodent management team braves the rough mountains of the north to help farmers save their crops from rats

There was simply no turning back—literally—for the rodent management team from the International Rice Research Institute (IRRI) as they headed to the remote mountainous village of Belwang in Sadanga, Mountain Province, Philippines. Flanked by rock walls on one side and a steep drop on the other, the IRRI van carefully traversed the narrow roads that made every turn and swerve along the Cordillera Mountain Range in the Philippines a daring game with fate.

The group was led by rodent ecology expert and Irrigated Rice Research Consortium (IRRC) coordinator Grant Singleton. With him were PhD scholar Nyo Me Htwe and wildlife biologists Harvey Garcia and Vincent Sluydts.

Irony in the terraces
From Sadanga town proper, the IRRI group set out on foot for the village of Belwang. They were accompanied by Rolf Boller, project leader of the Belwang project. They were accompanied by local farmer Banawag and others from the local community.

Under the scorching midday sun, the herd had to travel for hours to reach the rice, but instead of stopping, they continued their journey. The terrain was hilly, and the group had to climb many steps to reach the village.

Belwang village is home to around 115 families who rely heavily on the village crops on a massive scale until harvest, which is usually harvested in just one season, from January to March. The interactive course planned to set these up in and around the community houses, and the community trap-barrier system (CTBS) was introduced to the farmers. The community trap-barrier system (CTBS) is a plastic fence that encircles the rice plot as bait to lure rats into it. Rats will follow the plastic fence into it, thereby entering the rice plot and becoming trapped. This simple solution is crucial considering that they need to overcome their current rodent problems. The training course also involved a detailed decision analysis of their existing crop management strategies, including rat-trapping methods. All farmers conducted weed clearing of planting areas and blocked burrows during land preparation, maximum tillering, and booting stages of the rice crop. They were introduced to the benefits of community action, such as synchronizing planting (planting at the same time), good hygiene in fields and the community trap-barrier system (CTBS). CTBS is a plastic fence surrounding a small plot of rice planted 2–3 weeks earlier than the surrounding crop, with traps set in the plastic. The farmers agreed to act as a community and seek assistance from the local government to buy rat traps. They planned to set these up in and around the village where heavy damage was observed.

For the next cropping season, the farmers will continue their past practices associated with the justice system. They agreed to act as a community and seek assistance from the local government to buy rat traps. They planned to set these up in and around the village where heavy damage was observed.

A mobilized community
Armeli with a better understanding of the benefits of community action, the farmers will continue their past practices. They agreed to act as a community and seek assistance from the local government to buy rat traps. They planned to set these up in and around the village where heavy damage was observed.

The outbreak
Through a farmer field school in agroforestry, the villages started organic farming of citrus fruits to take advantage of the mountain’s soil quality. The village had a successful run in its citrus fruit plantation for 3 years, helping boost farmers’ incomes.

Although damaged caused by rats were observed in the previous planting seasons, the rats didn’t start to attack the village crops on a massive scale until 2009, resulting in heavy losses to both rice and citrus farmers. As many as 27% of the citrus trees were damaged and, by 2010, rice yield losses reached an alarming 50–50.

DA and SADC then decided to seek help in tackling the chronic problem of rodent infestations. Mr. Boller got in touch with Dr. Singleton and asked him to train the farmers in Belwang.

Rats attack on pages 44–45 of Rice Today Vol. 8, No. 4
Belwang village is home to around 115 families who rely heavily on the produce from their land. Their main crop is heirloom rice, the native rice variety of the region (See The seed keeper’s treasure on pages 12–15 of Rice Today Vol. 9, No. 4), which is planted in just one season, from January to March, and harvested from July to September. According to local farmer Banawag Kadaatar, the season’s harvest is often just enough for their food for the next 6 months. Sometimes, a few farmers manage to plant glutinous rice, which is sold for export.

“The amount of rice yield depends on the size of your land and on whether or not there are rat infestations,” says Peter Dicang, a rice farmer. “If our stored rice is not enough, we are forced to buy rice from the National Food Authority using the money we get from selling glutinous rice.”

In the midst of the picturesque green surroundings, it is unfortunate that these farmers can barely eke out a living. To augment farmers’ income, the SADC and OPA-DA joined forces to help farmers in Belwang establish an agroforestry system.

Ms. Rojas is a communication and extension officer with the Irrigated Rice Research Consortium.

Rice Today January–March 2011
1. Dr. Grant Singleton (left) and Vincent Sluydts (right) hold up a sketch of the terraces in Belwang village to draw insights from farmers and help them identify their cropping patterns and practices. 2. HOLING UP a “good rat” caught during the trapping activity, Dr. Singleton shows the participants the physical characteristics of beneficial species Rattus everetti.

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Rice Today January-March 2011

Mention the island country Singapore and rice growing may not be the first activity that springs to mind. However, like most countries in Asia, rice is an indispensable food grain in Singapore, as it is not only a significant ingredient in local cuisines but it is also an integral part of the small nation’s culture and traditions.

In an effort to raise awareness about rice—how this cereal starts as seeds planted in plots to a steaming bowl of rice served in Singaporean dining—the Science Centre Singapore (SCS) and the International Rice Research Institute (IRRI), with support from the Lee Foundation, launched a rice exhibit and education program on World Food Day 2010 on 16 October.

Bearing the theme Rice and the Cycle of Life, the exhibit introduced Singaporeans to the rice plant’s anatomy, different rice varieties, tools and implements used in rice farming, and consumer products with rice as an ingredient. Visitors also got a chance to dehusk rice grains and create a rangoli, a traditional Indian floor decoration made from brightly colored rice flour. Moreover, SCS handed out illustrated booklets about rice and a 5-gram packet of IR64 seeds that included instructions on how to grow rice so people could try planting them at home with the family.

To supplement this informal learning, master teachers of geography from Singapore high schools also attended a training workshop conducted by SCS. Because of this, rice education has been officially incorporated into the school curriculum. These activities aimed to help Singaporean youngsters understand the relationship between their food and the environment—particularly climate change—and to inspire more young people to become plant scientists. Even though Singapore is a small country that does not grow rice commercially, its next generation of agriculture advocates has much to contribute to the future of rice research.

Ms. Shyam is a development officer with IRRI Fund Singapore.

1. Rangoli is traditional Indian art made from rice flour that is used to adorn Hindu homes. Elaborate and colorful patterns are used during festive occasions.
2. Rice farming and sorting implements used in rice production.
4. A Singaporean family tries to dehusk the rice samples at the exhibit.
5. Rice exhibit banner displayed at the Science Centre Singapore.
6. Children enjoy making their own rangoli patterns.
The global rice market: BOOM OR DOOM?

by Samarendu Mohanty

The global rice market is on the move again. In the last few months, rice prices have climbed back up after hitting a 2-year low in early August. The global rice price, which had dropped by $120 per ton as of 2 December from its August low of $434 per ton—an increase of nearly 30% in 4 months (see Fig. 1). The damage caused by inclement weather on the wet-season rice crop in Pakistan and in other rice-growing countries (Thailand, Myanmar, the Philippines, China, and South Korea) and supply concerns surrounding wheat and rice have provided the necessary spark to reverse the downward trend in the market. Pakistan’s rice crop, in particular, has been battered by floods— and the most recent USDA estimate points to a significantly lower production of 5.1 million tons compared with 6.8 million tons in 2009.

On the positive side, Australia is recovering from its multiyear drought, Vietnam, which the rice crop more or less disappeared in the last 5 years, but it is projected to produce more than 80,000,000 tons this year or nearly 50% higher than 2009-10 production. The most recent USDA estimate now puts global rice production at 451 million tons, that is, 9 million tons lower than was expected a few months ago. Nevertheless, this is still a good harvest considering it is 10 million tons higher than what was produced last year. This year, however, the consumption forecast is above 450 million tons; hence, this leaves nothing for inventory for the first time in 5 years.

Given the tightening of the current global supply and demand situation, some strengthening of rice prices was inevitable. Nothing, though, can truly explain such a steep rise in price within just a few months. This was echoed at the International Rice Policy and Investment Conference (IRPIC) held in conjunction with the Third International Rice Congress (IRC2010) in Hanoi, Vietnam, on 8-12 November (see the ‘Rice Facts’ on page 16). More significantly, however, the important question is, Where do prices go from here? As mentioned many times in my previous Rice Today articles, nobody can predict future rice prices. If somebody says he can, he is lying. Based on my “guessimate,” further downward revisions of the global rice and wheat supply may provide the necessary support for rice prices at this level, or even take them a little higher. But, Thailand and India can spoil the party and, in fact, exert downward pressure on the price if they decide to unload part of their procurement and mortgage stocks to open up storage space for the new crop.

Rising market instability
During the IRPIC, many distinguished speakers raised concerns about the growing instability in the global rice market. In the last 12 months, the price for Thai 5% broken rice soared to $900 per ton and dropped by nearly $150 once. Notably, the Thai 5% broken rice price increased by $98 per ton from $493 in November 2009 and then sank by almost $150 per ton between December 2009 and June 2010. The increased volatility in the global rice market could be partly due to the lingering hangover from the 2007-08 crisis—an overreaction of the market to supply-and-demand shock. Many also contend that the rising involvement of the government in trade since the 2007-08 rice crisis has added instability to the market because of a lack of openness in terms of trade. In most government-tender deals, the price paid and received for rice are kept under wrap. Traders have also started speculating on possible border policy shifts in major exporting and importing countries, thus generating more volatility in the market.

In a gauge of the level of instability in the rice market, let’s look at the current global wheat production that has been severely curtailed by weather problems in the major exporting countries such as Russia, Ukraine, Kazakhstan, and Canada. The 2010-11 global wheat production is estimated at 600 million tons lower than the previous year’s 680 million tons, a drop of near 7%.

In response, wheat prices have gone up to a level that is more appropriate for the lower available exportable supplies in major growing regions. Interestingly, a similar drop in global rice production may influence the major exporting countries, that is, a production shortfall of 30 million tons in Thailand, Vietnam, Pakistan, the United States, and India, would have caused mayhem in the global rice market, similar to what was witnessed in 2007-08 when rice prices rose to unprecedented $1,000 per ton.

Rising price volatility for rice, a staple for half of the world’s population and a source of livelihood for nearly a billion households, is also undesirable from the global food security perspective. As reported by Susanne, Kell, and Zeller, many past studies have established negative effects of price volatility on poverty reduction and agricultural productivity in low-income countries.1 This was evident during the 2008 food crisis when the number of people living below the poverty line increased by 100 million, especially when prices dropped in 2009, the poverty figure also declined. In Bangladesh, poverty headcount increased from 41.5% in 2006-07 to 45.9% in 2007-08 due to higher food prices.2 Moreover, volatility in rice prices also creates uncertainty in farmers’ expected returns, making them cautious in applying fertilizer, irrigation, and other necessary inputs, which negatively affects yield. The 2008-09 wet-season crop is a good example, in which farmers responded to high rice prices by applying expensive fertilizers to boost production but then ended up losing money because of the meltdown in commodity prices in the last quarter of 2008. During this period, rice prices dropped by a whopping $500 per ton and fertilizer prices, particularly for urea and ammonia, also plummeted by more than 60%.

What can be done realistically?
First of all, we need to see the free flow of rice across regions or countries without much government intervention as the size of the market is inversely linked to the level of volatility. In other words, a larger market is likely to absorb any shock better than a smaller market where prices will have to move farther up and down in response to any shock. However, considering the sensitivity of rice in rice-growing regions, it will be more realistic to take a few baby steps first toward fostering a market that has freer trade and less government intervention. Such developments will also encourage countries to move away from short-term fixes to more long-term sustainable development of infrastructure, markets, policies, and technology. As a first step toward stabilizing the global market, importing nations should not rush to secure domestic supply needs for the entire year at one time. The creation of a strategic rice reserve as a means for market stabilization has also picked up steam since the 2008 rice crisis. The objective of this reserve will be to keep the price in a desired band by procuring rice when the price falls below the lower limit and releasing the stored rice to the market when the price goes above the upper limit. This may sound simple and effective in managing market volatility and restoring the faith of importers, but the actual operation of such a reserve can be very expensive and controversial. For example, when the price is low, the procurement of rice by the strategic reserve to raise the price will not be acceptable to importing countries. On the other hand, when the price is high, exporters will object to the release of rice from the reserve to lower the price.

There has also been talk about developing a rice futures market to provide a platform for exporters and importers to hedge against price risk. The futures market would also help in improving the transparency of the price formation process. However, one of the major stumbling blocks in having a feasible global and regional futures market is the high degree of product differentiation across varieties, the origin and destination. For example, Pakistan or Indian basmati rice is very different from Thai 25% broken rice or japonica rice from East Asia. Even within a country, prices of different types of rice are not always highly correlated, as shown in Figure 2 for Thai Hom Mali Grade A and Thai 5% broken rice. Such differentiation of rice makes it extremely difficult to have a rice futures contract that will enable producers/traders of different types of rice to hedge against the price risk they face.

Looking ahead
Global rice demand is projected to grow at 1.2-1.3% each year in the medium term. Assuming there will be no further expansion in rice area, which is already at an all-time high, the current yield growth of less than 1% will not likely create a tight supply and demand situation more often than ever before. In addition, more frequent extreme weather because of climate change is expected to make the supply-demand imbalance even worse. On top of that, protectionist policies for rice-growing countries in the last few years are likely to complicate the market further. As indicated earlier, no silver bullet can fix this problem and baby steps should be taken to expand the trade volume and market openness. Different options, including the viability of a strategic reserve and a futures market, should be considered in great detail to determine whether or not they will be effective for market stabilization.2


Fig. 1. Price of Thai 5% broken rice (March 1998 to 2 Dec. 2010).

Source of raw data: The Pink Sheet, World Bank, and Rice Market Monitor, Food and Agriculture Organization.

Fig. 2. Prices of Thai fragrant 100% and Thai 5% broken rice (January 2005-November 2010). Source of raw data: The Pink Sheet, World Bank, and Rice Market Monitor, Food and Agriculture Organization.
Latin America has a tiny share in global rice production—only around 4% of the total. Now, rice is the most essential crop in almost all countries, not only as a staple food but also as a significant sector that contributes to economic growth and job creation. And, compared with other food grains, it is clearly more important in the diet of the poor.

Latin America is vastly diverse in its ecosystems for rice production. From the small farmers in coastal Ecuador or Guyana who continue to transplant or pregerminate seeds to the extensive rice growers in the Southern Cone (Argentina, southern Brazil, and Uruguay) who use high-tech no-till direct-seeding systems; from the hilly-upland subsistence farmers in the Andean region of Bolivia or northern Nicaragua to commercial producers in the fertile Eastern Plains of Colombia or Costa Rica, there are all kinds of intermediate ecosystems and forms of production.

International research has played a key role in improving rice production in the last 40 years, starting with the semidwarf materials developed during the Green Revolution in the late 1960s. Joint efforts of the International Rice Research Institute (IRRI) and the International Center for Tropical Agriculture (CIAT) were the driving force behind this revolutionary trend in agriculture. During the 1980s, strong national institutions appeared in several countries and helped create a regional network for research and development in rice. This concerted effort was consolidated in 1995 with the foundation of the Latin American Fund for Irrigated Rice (FLAR) as a public-private regional partnership based at CIAT. With FLAR’s support and the active involvement of farmers’ organizations, Latin America is working on a second Green Revolution in the region based on crop management and good agronomic practices (see Rice Today Vol. 6, No. 2).

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Revolutions in Latin America on page 38 of Rice Today Vol. 6, No. 2. International, regional, and local efforts have led to a continuous and dynamic improvement in rice production in Latin America—with the region demonstrating high yield growth in the last three decades. Since the late 1990s, however, collaboration among international centers and other institutions from different regions has declined steadily. IRRI’s support for Latin America diminished and contact with the African centers became minimal. But, in 2009, changes in the international centers’ governance sparked a revival of communication among centers. Institutes then started discussing and elaborating the program that has now come to be known as the Global Rice Science Partnership (GRiSP). This program provides an opportunity to re-engage Latin America as an active partner in the strategy to overcome the huge challenges facing world rice production—allowing the region to not only receive new scientific breakthroughs but also to share some of the interesting technology and production systems that Latin American farmers have already validated and adopted.

Investment in rice research in Latin America is very small compared with that in Asia and Africa. Hence, we anticipate that this partnership will bring in new and suitable technologies to the region. In turn, because urbanization across the world has limited agricultural expansion, Latin America could provide additional rice area to boost rice production since it is one of the few regions left in the world that still has plenty of natural resources, especially land and water.

Research programs at CIAT, FLAR, and several national institutes have accomplished good technological advances that could also be shared in this new global agenda. Strategies to increase yield potential in conventional varieties, using wild species to develop new improved cultivars, biotechnology breeding tools, rice transformation with a high-throughput platform, agronomy extension programs aimed at closing the yield gap, improving water-use efficiency, minimum- or no-till and direct-seeding systems, institutional innovations such as FLAR, among others, are areas that have good and validated technological products that may be useful on other continents.

FLAR, along with its more than 30 public- and private-associated institutions in 17 Latin American countries, is ready and eager to play an active role in this new global platform. While CIAT will be fully engaged in genetics, biotechnology, disease, and climate change research issues among others, FLAR, with its grass-roots network of local institutions, will focus on applied research and act as a bridge in bringing these new technologies to farmers.

Plugging Latin America into this global rice research agenda, coordinated by IRRI, will help the region improve rice production and meet its own local demand, as well as the world’s.

By: Gonzalo Zorrilla

Mr. Zorrilla is the executive director of FLAR.
Attend the Premier Rice Event in the Western Hemisphere
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