Rice in Latin America: past, present, and promising future

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Trends in global rice trade
Green revolutions 2.0 & 3.0: No farmer left behind
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IRRI is the world’s leading international rice research and training center. Based in the Philippines and with offices located in major rice-growing countries, IRRI is an autonomous, nonprofit institution focused on improving the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes, while preserving natural resources. It is one of the 15 nonprofit international research centers that are members of the CGIAR consortium (www.cgiar.org).

About the cover.

Veteran Peruvian rice grower Sharma Mejía plants a kiss on one of her grandchild, a potential next-generation farmer in the country’s Rioja Province. Read about her story and the rise of rice on Peru’s sacred ground beginning on page 23. (Photo by Adriana Varin Molin)

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Expanding horizons in rice

As we usher in the year 2015, Rice Today continues to survey the near and far horizons of the rice world and report on the latest on sustainable development, trade, and other issues that surround the favorite grain of half of humanity. So, what will the new year bring? We hope that it will bring more breakthroughs from rice scientists.

Rice Today will continue to examine the many issues that affect the rice industry across its value chain—from the overall economic and international trading conditions of rice and those that are alleviating poverty to resources and technologies that farmers are turning to for help with their rice growing.

In our first installment of 2015, we have a special set of six “ricetorical” pieces (pages 10-23) that chronicle the successes of breeding in Latin America and the Caribbean (LAC). We highlight the Latin American Fund for Irrigated Rice (FLAR) and its 20-year history of being the primary force behind the region’s rice technology development. We feature two women in LAC who have put wind in the sails of the rice revolution in the region. Read about A passion for growing rice in Venezuela, which is a testament to how the country is working hard to regain its strength through expanding innovation in LAC. Read about A four-decade quest to improve rice in Latin America and the Caribbean by scientists at the International Center for Tropical Agriculture (CIAT) who have been developing an ideal rice plant type for the region’s changing needs. Find out how a small country such as Uruguay has become an exporter in less than 100 years. (Read Uruguay rice: the secrets of a success story.) And finally, learn about the Rice of rice on Peru’s sacred ground as the country has become LAC’s most important producer after Brazil. All these success stories would not have been possible without the region’s spirit of working together and partnerships.

Elsewhere in this issue, Sam Mohanty, senior economist at the International Rice Research Institute (IRRI), looks at the current trends in the global rice market (pages 40-42). We also report on outcomes during the Global Rice Market and Trade Summit that took place in Bangkok, 28-29 October, Robert Zeigler, IRRI director general, added a new twist, suggesting that a three-phase Green Revolution series actually exists: (1) GR1.0, (2) GR2.0, and (3) GR3.0. He declared that GR2.0, which already started by his reckoning in July 2008, will be fruitful—and quicker than GR1.0—and that GR3.0, which will kick in around 2030, will stagger the imagination in what will be achieved. Read about Dr. Zeigler’s intriguing presentation and his insights in No farmer left behind (pages 32-33).

Bas Bouman, director of the Global Rice Science Partnership (GRiSP), shares concrete examples of GRiSP’s unprecedented successes worldwide in finding solutions to the problems in rice production, storage, and distribution through sharing of resources, ideas, and technologies among research development partners across the continents. Check his Grain of Truth—GRiSP Partnership for success on page 43.

As shown by the GRiSP model, breeders are combining forces to modernize programs for an efficient and effective delivery of improved varieties and biotechnology tools are being improved all the time in accuracy and usability. However, some of these tools remain needlessly inaccessible to farmers, according to Mark Lynam, a former GM-activist, who gave one of the plenary presentations at IRC2014. He advocates bringing about a food-secure world this century by using both conventional and transgenic techniques to contribute meaningfully in helping marginalized sectors of society, particularly poor women and children. See pages 30-31 for his thoughts as he asks, Where’s my GM rice?

On lighter notes, check out a Korean rice fable, “I am convinced that the rice will glue and enhance their networking capacities. Weedsbook, an open-access online tool, as well as how to make use of AFROweeds, an online weed management technology for rice-based systems. To achieve this goal, the project targets not only the farmers but also research and development partners and the private sector, among those involved in rice production.

Twenty-two R&D professionals and 15 weed science students were trained initially through a workshop at the Sokoine University of Agriculture in Morogoro. They learned some weed control and management practices and how to use AFROweeds, an online interactive weed identification tool, as well as how to make use of Weedsbook, an open-access online African rice weed science network to enhance their networking capacities. Blacksmilts drawn from all over the country took part in a training activity to fabricate rotary weeder, a machine to control weeds for lowland rice. It is hoped to make rotary weeder widely available to farmers at competitive prices.

To increase awareness among farmers, the project produced two farmer-to-farmer videos on labor-saving weed management technologies such as the rotary-hoe weeder and how to use herbicides safely and efficiently. The videos will be translated into four languages and distributed to at least 10,000 farmers and extension workers from the rice-growing areas in sub-Saharan Africa.

Source: http://africa-rising.net

New rice technologies to boost rice production in Africa

“R”otary-hoe weeder reduce weeding labor by 60–65% while herbicides reduce it by more than 80%,” said Jonne Rodenburg, a weed scientist at the Africa Rice Center (AfricaRice). “However, farmers do not always use the herbicides correctly and this can negatively affect their health and the environment.”

To help farmers in Tanzania learn how to use weed management technologies and boost their production, AfricaRice launched a project, Building local capacities in weed management for rice-based systems. To achieve this goal, the project targets not only the farmers but also research and development partners and the private sector, among those involved in rice production.

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Source: http://africa-rising.net

“M”aking innovations accessible to rice farmers could boost rice production, reduce imports, and increase food security in Africa.” This was the recurring message in a recently held workshop organized by the Africa Rice Center. Attended by stakeholders in the rice production sector from Benin and Togo, the workshop, Rice Innovation Fair of Scalable Technologies, aimed to identify areas of collaboration to help deliver technologies to benefit farmers in rural populations.

Eleven technologies were discussed during the workshop, including new rice varieties, a high-capacity threshers for rice, a mobile application called RiceAdvice that provides tips on rice farming, mechanical weeder that could reduce labor in rice production, and a localized farmer advice for nutrient management.

“I am convinced that the dissemination of the technology and know-how on a large scale would certainly increase local rice production, ensure food security, and improve the living standards of farmers,” said Daini Tsukahara, the Japanese ambassador to Benin.

Source: www.scidev.net

News

From the editor’s desk

Happy reading!
New partnership for rice development in Africa formed

The Program for Rice Development in Africa, a partnership initiative, has been recently created to tackle the problem of inadequate rice production in Africa. Also with an aim to benefit governments and rice farmers across the continent, the Program will start in 23 countries in sub-Saharan Africa and will work closely with key rice development institutions and organizations in the region such as the Africa Rice Center.

“We expect this initiative to contribute to reducing high food import bills and to have an impact on contribute to reducing high food production in Africa. Also with the aim of key national and international development and institutions, and initiatives to promote food security and rice self-sufficiency in Africa. – Bukar Tijani, FAO Africa regional representative.

Mr. Tijani added that the program will support synergies and comparative advantages, as well as lessons and experiences of key national and international institutions, and initiatives to promote food security and rice self-sufficiency in Africa.

Vietnam, IRRI to craft strategy to boost country’s rice industry

Vietnam’s Ministry of Agriculture and Rural Development (MARD) supported a national strategy designed to make production an even larger engine of inclusive economic growth. Agriculture Minister Cao Duc Phat (at right in photo with IRRI Director General Robert Zeigler) and Vice Minister Le Quoc Doanh convened a multistakeholder effort to refine key elements of the strategy, which includes developing rice varieties with high export value, adopting advanced crop management techniques, and more intensive use of machines and other technologies in rice farming.

Together with the top leadership of the International Rice Research Institute (IRRI) and other public and private sector partners, MARD seeks rapid and sustained growth of the agricultural sector, especially the rice subsector in which Vietnam is already a global leader. The rice industry serves as the foundation of Vietnam’s inclusive development success story.

Source: http://iri.org

Hybrid rice promoted for food sufficiency in the Philippines

With the Philippines being part of the Food Basket Pillar of the Brunei Darussalam, Indonesia, Malaysia, Philippines-East ASEAN Growth Area (BIMP-EAGA), the planting of hybrid rice is currently being promoted on the islands of Palawan and Mindanao in a bid to attain food sufficiency, not only in the Philippines but also for the ASEAN subregion.

According to the DA Agri-Pinny Rice Program, for the first quarter of 2014, the total area of hybrid rice plantations in the P-EAGA region was at 11,798 hectares.

Source: www.sunstar.com.ph

U.S. rice industry welcomes trade with Cuba

The U.S. Treasury’s Office of Foreign Assets Control (OFAC) has published the new trade norms with Cuba in the Federal Register. This follows U.S. President Barack Obama’s announcement to relax trade restrictions on food items that were in place as part of the 50-year embargo with Cuba. This would allow Cuban importers to make payment even while goods are in transit. The regulatory changes were welcomed by the U.S. rice industry as Cuba is one of the closest export destinations to the U.S. and imports about 50% of its annual rice consumption needs. Farmers in the U.S. rice-producing states of Arkansas and Louisiana would benefit most from the revised policy.

Up until now, U.S. government restrictions have limited the ability of the U.S. rice industry to compete in Cuba.

Source: www.riceplus.com

Preparing Nepal’s farmers for climate change

The Nepal government has launched three new improved varieties of paddy seeds—Sukhha dhan 4, Sukhha dhan 5, and Sukhha dhan 6—that are tolerant of extreme climatic changes. These varieties of paddy seeds, which can survive under stress and retain desirable grain quality, are likely to be released to farmers by June 2015.

These new varieties, also known as climate-ready rice, can tolerate drought for up to one and a half months and can grow under water-deficiency stresses. They have been recommended for the Tarai, inner Nepal, and river basin areas. Among these three rice varieties, Sukhha dhan 6 has the ability to re-grow even two weeks after submergence. It has an average yield of 4.4–5.5 tons per hectare and, under good irrigation conditions, the output can go up to 5.3 tons per hectare on average. The plant stands 125 cm tall and the maturity period is 120–125 days. Swarna-Sub1 and Sambha Mahnsuri-Sub1 rice varieties that are flood-tolerant have already been made available to farmers.

Source: www.ekantipur.com

Japan’s largest supermarket chain adds rice paddies to farming ventures

Aeon Co. plans to add rice fields to its farming portfolio, possibly making it the nation’s biggest corporate grower of the grain. Starting with 11 hectares of rice paddies leased from local farmers, its Aeon Agri Create Co. farming subsidiary will start producing the grain north of Tokyo in 2015, said Aeon spokesman Norihito Ikkai. Chiba-based Aeon aims to lease 100 hectares—almost 50 times the average farmer’s plot—by 2020. That would make it the biggest rice-producing company in the country, according to Arihiro Muroya, chief economist at Norinchukin Research Institute. Larger areas are farmed by cooperatives.

“We want to supply rice and vegetables to consumers at more affordable prices and in a stable way,” Ikkai said. “As Japanese farmers are aging and retiring, we can take over production through our farming subsidiary.”

Source: www.bloomberg.com
Government extends support for rice farmers in northern Ghana

The Northern Rural Growth Programme (NRGP) is advancing toward making rice a major export commodity in northern Ghana. Management of the NRGP is thereby encouraging smallholder farmers to adopt best farming techniques as a means of increasing the quality and production of rice. The program’s national coordinator, Roy Ayariga, said that the government was committed to rebranding northern Ghana as the country’s rice city. This, according to him, will attract Ghana as the country’s rice city.

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Says Björn Ole Sander, collaborative research scientist at the International Rice Research Institute, who is coordinating the effort. But AWD is not without controversy. Adopting the irrigation method will increase nitrous oxide emissions. Still, given that paddy rice does not produce much nitrous oxide to begin with, the decrease in methane, which the crop produces in heaps, will more than offset any increase in nitrous oxide, says Dr. Sander.

Source: www.citifmonline.com

Small-scale farmers deserve big share of climate funds: IFAD

As important food producers, small-scale farmers in the developing world should have a significant share of funds raised to help poorer countries adapt to climate change impacts and curb emissions, agriculture officials said at U.N. climate negotiations in Peru. Investment in easy-to-access weather information, extension services, improved disaster preparedness, and other cost-effective and efficient new technology could help small-scale farmers keep feeding themselves and their families, they said.

Farmers “are more than victims of climate change impacts,” said Gerrot Loganda, head of the Environment and Climate Change Division of the International Fund for Agricultural Development (IFAD).

Source: http://uk.reuters.com

JICA partners with Nigeria on rice

The Japan International Cooperation Agency (JICA) is partnering with Nigeria in developing the agricultural sector in rice production with more than 3,500 Nigerians benefitting from its training program abroad.

The chief representative of JICA, Mr. Seki Tetsuo, disclosed this at a one-day seminar titled “Agribusiness and Investment” organized by the JICA Alumni Association of Nigeria in Abuja. He explained that JICA specifically targeted the rice sector as a result of the comparative advantage that Japan has developed in rice production and processing over decades.

Source: http://allafrica.com

Vietnam eyes water-saving technology for its rice farms

Vietnam, along with Bangladesh and Colombia, recently partnered with the Climate and Clean Air Coalition (CCAC) to introduce large-scale application of alternate wetting and drying (AWD) technology (photos below), in which farmers periodically drain rice paddies rather than keeping them perpetually flooded. Aside from economic savings through lower water consumption and pumping costs, there is evidence that AWD can help crops perform better and improve soil conditions so that machines can operate more efficiently in the fields.

Source: www.scienced.net

Find and download IRRI books at http://books.irri.org

Books

When rice shakes the world: The importance of the first grain to world economic and political stability

by Milo Hamilton

Published by Advantage Media Group, 165 pages.

For millennia, rice has sealed the fate of dynasties and kingdoms in Asia but has remained only a cultural curiosity to Western financial markets.

Today, the food and agricultural markets of India and China are in motion. The history of agricultural change is littered with hunger, poverty, and failure. Will that curse pass itself on to this Asian generation? Or, is there a brighter future ahead of us?

China is rapidly becoming the wealthiest country in the world. China’s water shortages and its rice market are fault lines that finger their way beneath the surface of the world economy. These fault lines are sending out tremors that could shake the entire world in the next few years.

Rice is a little grain but a big deal in Asia. The Great Wall of China is cemented together with sticky rice. Rice uses up to 70% of the water resources of China. The crop’s 200 million farms feed 3 billion people. Yet, it is grown on an area the size of France.

Rice is the social cement of Asia and the rice farms of Asia may crack that ancient cement. This book explains the ancient yet curiously modern story of rice that binds feudal farms to the new super cities across China.

At the center of this story is the rice farmer, whose backbreaking labor feeds millions. In the next 15 years, millions of farmers must transition from landless serfs into modern business people skilled in all the technologies and versed in market risk. The rice world lies on the dark side of this digital earth. But, that world is turning rapidly toward the light.

Note: The book is available in bulk quantities and in customized versions at special discounts for corporate, institutional, and educational purposes. To learn more, please contact the Special Sales team at 1 866 775 1696, sales@advantage.com. Read about the author and buy the book at http://advantagefamily.com/milo-hamilton-bio.
Making rice more competitive in Latin America

For 20 years, FLAR has been the primary force behind the region’s rice technology development and it is looking forward to future challenges.

“Twenty years is nothing,” say the lyrics of a 1990s song. But, in 2015, as the Latin American Fund for Irrigated Rice (FLAR) celebrates its 20th anniversary, many of the Fund's members might not agree. For them, FLAR’s 20 years have been filled with achievement, and they’re looking forward to more.

From the 1960s to 1980s, international rice breeding in the Latin America and the Caribbean (LAC) region carried the brand of the International Center for Tropical Agriculture (CIAT). But, by the mid-1990s, funding for CIAT’s Rice Program had declined, and there was a lot of uncertainty about the future. This had many people worried, and for a good reason, because CIAT had contributed to the development of about 60% of the more than 400 improved varieties released in LAC.

Pioneering vision
Uncertainty and concern plus the pioneering vision of a few key people provided the necessary inputs for the groundbreaking creation of FLAR. Time has proven that they had the right idea.

CIAT took the initiative to create FLAR and soon won support for it from Colombia's National Rice Growers' Federation (Fedefarroz), Uruguay's National Agricultural Research Institute (INIA), Venezuela's Western Plains Association of Certified Seed Producers (Aproscello), and the Rice Institute of Rio Grande Do Sul (IRGA) in Brazil. The Fund has since evolved into a strong and fully regional organization, which encompasses 36 public and private sector partners in 17 countries, and it influences two-thirds of the 5.7 million hectares sown to paddy rice in LAC and about 80% of the 278 million tons produced.

Through FLAR, diverse actors — farmers’ associations, national agricultural research institutes, government ministries, seed companies, and the rice milling industry, together with CIAT to ensure that research and technology transfer meet the needs of its members. The two photos were taken when members of FLAR gathered during its first technical meeting in 1995.

Testimony to success
Every year, FLAR delivers elite rice germplasm to a network of 23 breeding programs, operated by about 150 rice breeders and technicians at more than 100 experimental stations. The 54 rice varieties released so far in 14 countries give a strong testimony to the success of FLAR’s breeding effort.

Juana Viruez, a rice breeder at the Center for Research on Tropical Agriculture in Bolivia, says that FLAR’s germplasm has been fundamentally important for her country. Of the 30 rice varieties released by the center, six were selected from FLAR nurseries, including MAC-38, the country’s most widely grown variety. Roberto Celi of Ecuador’s National Institute for Agricultural and Livestock Research (INIAP), explains how receiving advanced lines from FLAR saves time and resources in field evaluations. INIAP also uses FLAR materials as parental lines in its own crosses.

Rice breeding, however, is just part of FLAR’s portfolio. Partners in 12 countries work with the Fund to adopt the best agronomic practices for their agroecosystems. This work has had a direct impact on more than 500,000 hectares, with average rice yields increasing by 1.5 tons per hectare and production costs declining by 20-30%.

Mario Torres of Cindarroz, a consortium of 13 organizations working on rice research and development in Mexico, believes that new long-grained varieties, introduced by FLAR and released by the country’s National Institute for Research on Forests, Agriculture, and Livestock (INIFAP)—together with FLAR-supported work on rice agronomy—will make farmers more competitive. “Our goal is to reduce rice imports by 30% over the next 4 years,” says Mr. Torres.

With partners in Mexico and Nicaragua, FLAR has undertaken projects on water harvesting, which aim to switch from rainfed to irrigated rice production. This work has helped smallholder rice farmers to diversify their systems with maize, beans, livestock, and other options, thus boosting rural incomes and employment, among other benefits. Norman Oviedo, manager of SENUMISA, a private seed company in Costa Rica, suggests that “more should be done on water harvesting in my country and others in the region, where most rice-growing areas are rainfed, even though there’s huge potential to capture runoff water from the rains for irrigation.”

Looking forward
From its inception, FLAR has been an integral part of CIAT, and CIAT has always been a Fund member. The rice research of the two organizations is complementary and more closely aligned than ever with the needs of the end users of the technologies that are delivered.

But it pays to be cautious: FLAR’s past successes with its partners provide no guarantee of future success. In the face of climate change, low yields, pest problems, land degradation, high production costs, inadequate infrastructure, and adverse policies, LAC’s rice sector needs more investment, more partnerships, and more innovation. This is crucial for making rice production more competitive.

Competitiveness is the central theme of the XII International Rice Conference for Latin America and the Caribbean, being held in February 2015 at Porto Alegre, Brazil. Organized by IRGA, CIAT, GRiSP, and FLAR, this is the region’s biggest rice science meeting and also the occasion on which the Fund is celebrating its 20th anniversary.

The organizers couldn’t have chosen a more appropriate theme: “horizons for competitiveness.” The message is that we look forward to seizing new opportunities, no matter how difficult the current situation may seem. FLAR will be there to help bring these opportunities within the reach of all of its members.
A tale of two women leading rice revolutions in Latin America

by Adriana Varón Molina

Patricia Guzmán (left) and Salomé Tupa deliver on the promise of women’s hard-earned leadership in a traditionally male-dominated rice sector

Salomé Tupa took a sip of hot coffee, hoping it would help her cope with the suffocating heat, as she listened intently to her colleague Patricia Guzmán, who was delivering the welcome remarks at an event for rice researchers. It was the opening session of the technical committee meeting and rice selection workshop for the tropics, held by the Latin American Fund for Irrigated Rice (FLAR) with representatives of its member organizations, at Colombia’s National Rice Growers’ Federation (Fedearroz) in Villavicencio. Along with Ms. Tupa and Ms. Guzmán, plant breeders and researchers from all over Latin America came in search of the best rice varieties for further testing in their home countries.

The making of a Colombian comeback

Addressing an audience of more than 50 scientists, Ms. Guzmán emphasized the importance of improved production technologies, easing access to credit for farmers, and more training for technicians. She spoke with the confidence that her 25 years of work in the rice sector have given her and with the responsibility that comes with being the technical manager for Colombia’s principal rice growers’ association.

Ms. Guzmán’s words were clear and convincing. After the session, she retired to a provisional office; her permanent workplace is in Bogotá, 115 kilometers from Villavicencio. She answered emails, accepted invitations to give more presentations, arranged a meeting with her boss, and organized visits to various Fedearroz experiment stations and farmers’ fields for follow-up on her organization’s new flagship initiative—Amtec—the Spanish acronym for a name that means “modern technology adoption.”

Ms. Guzmán studied agronomy at the University of Tolima and earned her master’s degree in agricultural science, with emphasis on plant pathology, from the National University. Her work with Fedearroz started in 1988. For 15 years, her job was to combat disease problems through research and technology transfer. Later she took on the challenge of managing a business, Central de Granos de Ciénaga (Cocle Grain Central), in Panama. But, like “the good child” of a traditional Colombian saying, Patricia eventually came home, returning to Fedearroz in January 2015 as technical manager, the first woman to occupy this post in the organization’s 70-year history.

Ms. Guzmán readily admits that these have been tough times. Over the past 5 years, Colombia’s average rice yield has dropped by 1 ton per hectare, from 6.2 to 5.3 tons (although 2014 saw a slight increase in productivity). Part of the problem is the rice sector’s vulnerability to the effects of climate change.

In the face of this challenge, Ms. Guzmán has shown leadership, visiting other rice-producing countries, building alliances with international and national organizations, and working closely with the Colombian government to find ways to raise yields and raising yields on around 438,000 hectares sown to rice in this country. She has also achieved national self-sufficiency in rice and then within 8 years be ready to penetrate international markets,” said Ms. Guzmán. “To this end, she’ll keep working with Colombia’s rice growers in their fields, because “that’s where the problems are and also the solutions.”

Breathing new life into a Bolivian rice growers’ association

The technical discussions in Villavicencio lasted 2 days giving rice researchers a good overview of recent advances and strategic improvement for Latin America. Over the next 3 days theory gave way to practice as the Santa Rosa experiment station, where the challenge was held, became an epicenter for the selection of elite rice lines. That’s when Ms. Tupa came to life. She didn’t care anymore about the 30-degree heat; as the sky cleared, she immersed herself in the rice fields and began feeling right at home.

Accompanied by her colleague James Cabrera, Ms. Tupa made the rounds of the experimental plots. Her mission: to identify rice varieties that might give good results on Bolivian soil. Like Ms. Guzmán, she went about this task with the assurance gained from 25 years of working in the rice sector and also with the responsibility that comes with leading Bolivia’s most important rice growers’ organization, the National Association of Rice Cooperatives (Fenca).

Before taking up her current post and while still working in support of Fenca’s technical management, Ms. Tupa was invited to visit South Korea. During her 21-day trip, she had a close-up look at the extraordinary experience of Korean rice growers. This encouraged her to accept the offer of a new leadership role in her own country’s struggling rice sector.

The immediate challenge was getting the nearly extinct association back on its feet. The year 2012 was the most difficult in Fenca’s 50-year history. Of the 60 cooperatives that originally made up the association, only 10 remained. In a race against time, Ms. Tupa began to organize events to build strategic alliances with public and private sector organizations, both locally and abroad; and to show Fenca members, both former ones and those remaining, that the association was by no means a lost cause. One of her main projects, as the first woman to lead Fenca, is to train member cooperatives in the six steps that make up FLAR’s initiative on improved crop management for higher yields.

“Rice sector had to either transform itself or die,” says Ms. Tupa, who was born in the city of Potosí but grew up in Santa Cruz de la Sierra, where she earned a bachelor’s degree in agriculture at the Bolivian Evangelical University. “We couldn’t keep on making the same mistakes. We had to learn more about new technology for precision crop management, about options for helping farmers obtain credit, and about working as a team to move ahead.”

Ms. Tupa inherited her commitment to rice production from her parents; farming is in her blood. That’s why, in addition to leading Fenca, she also finds time to tend to her own 50-hectare farm, which she tills to upland rice. Her husband and two small children claim their share of her time as well. But she’ll keep working to regain credibility and confidence among the cooperatives that have said goodbye to Fenca.

Delivering on the promise of women’s leadership

These are the challenges and achievements of Patricia Guzmán and Salomé Tupa. While living and working on distant lands, they are united by a shared commitment: to deliver on the promise of women’s hard-earned leadership in Latin America’s traditionally male-dominated rice sector.

“Rice sector had to either transform itself or die,” says Ms. Tupa, who was born in the city of Potosí but grew up in Santa Cruz de la Sierra, where she earned a bachelor’s degree in agriculture at the Bolivian Evangelical University. “We couldn’t keep on making the same mistakes. We had to learn more about new technology for precision crop management, about options for helping farmers obtain credit, and about working as a team to move ahead.”

Ms. Varón Molina is communications coordinator for Latin America and the Caribbean at CIAT.
Feeding a way to increase rice production in the country with the largest petroleum reserves in the world—and thus ample means to pay for imports—has posed a colossal challenge for Venezuela’s farmers over the last 4 decades. Today, they produce about 1 million tons of paddy rice annually—down 300,000 tons from 8 years ago. But the country’s rice sector is working hard to regain its strength of an earlier period, when it not only met the rice consumed domestically—about 1.2 million tons. According to Fuaz Kassen, the president of the National Rice Foundation (Fundarroz), who boosted his average rice yield from 5 tons per hectare to 9–11 tons. “We’ve gone from three rice harvests annually to two or just one, and we’re using newer machinery.”

Mr. Terán is following Mr. Cicconetti’s footsteps. Four years ago, he began rotating crops on his farm, La Célimene: irrigated rice in the dry season and rainfed maize in the rainy season. Mr. Terán now harvests 8 tons of rice and 5 tons of maize per hectare. But still, he has set his sights on the goal of raising the yield of both crops by 2 tons per hectare.

“Before, people called me the ‘crazy neighbor.’ They were convinced that the new technologies would fail,” says Mr. Terán, who has been farming for 25 years. “There are still some small-scale farmers in this area who are reluctant to change, but there are also a lot more crazy neighbors like me.”

Racing to close yield gaps

In Venezuela’s race to raise rice productivity and close yield gaps, various organizations deserve recognition for their efforts in support of this work. FLAR, the International Center for Tropical Agriculture (CIAT), and several national organizations—including Fundarroz, the Western Plains Association of Certified Seed Producers (Aproscello), the Venezuelan Federation of Rice Producers’ Associations (Fevearroz), the Danac Foundation, and other public and private sector actors—have joined forces, using their respective experiences with innovation in technology development, genetic improvement, and marketing to restore the country’s self-sufficiency in rice.

 Apart from giving Venezuela plenty of “black gold,” nature has provided it with other riches as well, including fertile land, abundant water, and an ideal climate. These, together with new technologies, should suffice to allow innovative rice growers to regain control of the nation’s food security, win back former clients, and open new pathways toward rice exports.

Ms. Varón Molina is communications coordinator for Latin America and the Caribbean at CIAT.
A four-decade quest to improve rice in Latin America and the Caribbean

by Edgar Torres

For four decades, rice scientists at the International Centre for Tropical Agriculture (CIAT) have been developing an ideal rice plant type for the region’s farming needs.

The past 40 years have seen major advances in rice improvement for the unique and diverse growing conditions of Latin America and the Caribbean (LAC). The Rice Program of CIAT has contributed greatly, working in collaboration with its many national partners.

In search of an ideal grain
Each new rice variety is an expression of the ideal plant type that the breeder has in mind. This is one of the insights that guided the work of renowned rice scientist Peter Jennings, who led CIAT’s research on the crop in its early years. During a four-decade quest to boost yield potential, CIAT breeders and their partners developed hundreds of rice varieties—some of which demonstrate the steady genetic gains in yield amounting to 3.4 tons per hectare—and accruing over 52 years between the release of CICA 8 in 1978 and the development of the elite line CT21375 in 2010. This finding comes from an experiment for measuring the amount of increase in performance that is achieved through artificial genetic improvement (or genetic gain) programs designed by the author and Camila Rebollo, a rice physiologist, at CIAT in Palmira, Colombia. The idea was to evaluate 17 rice varieties (see Figure) grown under the same conditions and agronomic management for two seasons. The experiment showed genetic gains in yield (an annual average of 106 kilograms per hectare) as well as changes in other traits that characterize the plant types developed over four decades. The resulting rice plants produced more total biomass, are higher yielding, and are more efficient because they waste less energy on unproductive tillers. Instead, these plants produce stems that mostly develop large and fertile panicles with more grains.

The plant type that has guided much of the work of CIAT’s Rice Program since its beginnings was developed at the International Rice Research Institute (IRRI) in the early 1960s and reached CIAT through the variety IR8 (see Breeding history on page 34-38, Vol 5, No. 4 of Rice Today). The design of this plant type allows more sunlight and less lodging (or falling over), and responds efficiently to fertilizer.

In 2002, Dr. Jennings and other researchers proposed to develop another plant type based on results obtained by CIAT’s Rice Program through selection under direct seeding. This plant type has an adequate number of panicles containing more full grains, while staying green longer, thus increasing its productive period, and it has greater height. This experiment showed that combining several traits can effectively raise yield potential in rice—a key aim of CGIAR’s IRRI-Globe Global Rice Science Partnership (GRiSP). Segregated populations were moved between CIAT headquarters in Palmira—where rice is transplanted, complete irrigation is used, and conditions are very favorable for high yield—and Santa Rosa—where direct seeding is used and rice is grown under rainfed conditions with more stresses, in general, to enable the plants to adapt to wider environments. The results were excellent.

Outwitting rice diseases
CIAT’s Rice Program has devoted considerable effort to combating pest and disease threats, especially rice hoja blanca virus and rice blast (caused by the fungus Pyricularia oryzae). Genes conferring resistance to hoja blanca were found in tropical japonica varieties such as Takao Iku 18 and its offspring, Colombia 1, as well as in African lines, such as IRAT 120. Just as critical were the methods developed to check rice for resistance to both the virus and its insect vector under controlled conditions.

Dealing with rice blast required an innovative approach designed by Dr. Jennings, which involved combining desirable traits, known as gene pyramiding, through multiple crosses between diverse sources of resistance from plants from different locations. The idea was to combine different genes that had evolved with the pathogen separately, making the pathogen unable to accumulate all of the virulence genes needed to overcome disease resistance. In addition, rice plants will be selected for resistance under a wider fungus diversity at the Santa Rosa experiment station in Villavicencio, Colombia—a “hotspot” site with exceedingly high levels of rice blast—that has optimal conditions for disease development.

Segregated populations were moved between CIAT headquarters in Palmira—where rice is transplanted, complete irrigation is used, and conditions are very favorable for high yield—and Santa Rosa—where direct seeding is used and rice is grown under rainfed conditions with more stresses, in general, to enable the plants to adapt to wider environments. The results were excellent.

Innovators in abundance
Breeding rice for resistance to rice blast under direct seeding in favorable upland environments led to several innovations. One was a system for detecting rice blast, developed and improved by Dr. Carlos Bruzzone, Dr. Edward Pulver, Dr. Jennings, and other researchers.

Dr. César Martínez and Dr. Surapong Sarkarung devised an approach for selecting rice in uplands with acid soils. Dr. Martínez also developed superior line using wild rice relatives, such as Oryza rufipogon. Dr. James Gibbons contributed to this work with his system for detecting rice blast, which has since been improved.

Dr. Elcio Guimarães, CIAT’s regional research director for LAC, and Dr. Ivar Chatel undertook rice improvement through recurrent selection, using methods developed by the Brazilian Agricultural Research Corporation (Embrapa) and French Center for Agricultural Research for Development (CIRAD).

Manuel Rosero, Federico Cuevas, and Luis Eduardo Berrio disseminated thousands of improved varieties and crosses, including IR 8, IR 22, IR 64, CICA 8, ORYZICA 1, ORYZICA 3, ORYZICA 9, ORYZICA 95, and ORYZICA 195. In the 1990s, the author directed the development of blast-resistant varieties. Economist Luis Sanint conceived and played a critical role in creating the Latin American Fund for Irrigated Rice (FLAR), which works with rice organizations across the region through plant breeding and other activities in an integrated approach designed to make the sector more competitive.

Tangible results of CIAT’s and FLAR’s ongoing collaboration with Colombia’s National Rice Growers Federation (Fedearroz), which focuses on improving yields, grain quality, and disease resistance, while stabilizing production, and with varieties such as Fedearroz 50, Fedearroz 60, and Fedearroz 1274. Edgar Corredor, Pompilio Gutiérrez, James Gibeaut, Carlos Rebollo, and Luis Berrio all contributed importantly to this work.

Recent years have placed new demands on rice research, including greater resilience in the face of the impacts of climate change, higher yield potential, and superb grain quality, which are critical for meeting rice sectors overall. A new generation of rice researchers has arisen to confront these challenges, benefitting from new tools and more abundant information. Even so, they still look to the past for inspiration in confronting future challenges.

Edgar Torres is leader of the Rice Program at CIAT.
URUGUAYAN RICE: the secrets of a success story

by Gonzalo Zorrilla

Competitiveness is the name of the game for Uruguayan rice farmers

 Uruguay is a small country in the Southern Cone of South America, located in a corner between the Río de la Plata and the Atlantic Ocean. Rolling hills, excellent natural grasslands, and temperate climate have made the country a perfect place for beef, wool, and dairy production, while typical temperate agriculture has been a tradition since the early period of the Spanish colonization. The country’s traditional products are wheat, barley, sunflower, and maize, with soybean growing continuously since the early years of grasses and legumes, which rotate with pastures, with a typical size of 300 hectares. Rice is planted in no-till planters that are adapted for planting over levees. The country’s rice production is extensively mechanized, with an average farm size of 300 hectares. Rice is planted in rotation with pastures, with a typical rotation of two years of rice and three years of grasses and legumes, which allow for highly productive cattle farming. Low-intensity rotation system improves sustainability because it reduces pest and disease pressure and maintains good soil conditions. This crop technology package is carefully followed by most farmers. The national average yield reached 8 tons per hectare in the last five years, with top farmers surpassing 10 tons per hectare (Fig. 2).

Well-organized farmers’ and millers’ groups, sound government policies, and an articulated research and innovation system brought the institutional framework to success. This has become possible even without any kind of subsidy, without a domestic market to rely on (Uruguay’s local market is only 5% of the rice it produces per year), and depending on highly volatile international markets (95% of the rice is exported). Competitiveness is the name of the game for Uruguayan rice farmers and the race is never over. Now, they are figuring out how to profit with increasing production costs and weaker rice prices, and pressing for new technologies to further increase yield potential.

Mr. Zorrilla is the director of the National Research Program at the National Institute of Agricultural Research in Uruguay and a member of the Rice Today editorial board.
César Puerto’s half-hectare rice plot yields him 3 tons of grain each harvest. Mr. Puerto has dedicated 30 of his 32 years to growing rice. It provides a living for him, his brother, sister-in-law, and two nieces, who help sow and harvest the crop on this small farm, located at the end of a dusty road. His neighbor, veteran grower Marina Mejía, with 30 hectares, produces 300–500 tons of rice each season. Mrs. Mejía has been working her land for nearly 3 decades. “Thanks to rice, I’ve been able to raise my four children and nine grandchildren,” she says proudly. (See cover photo of her sons and nine grandchildren.) With rice, Mrs. Mejía has been able to raise her four children and nine grandchildren. “Thanks to rice, I’ve been able to raise my four children and nine grandchildren,” she says proudly. (See cover photo of her sons and nine grandchildren.)

About 380,000 hectares are sown to the crop in this country, with an average yield of 7.7 tons per hectare, which is well above the regional average of 5 tons, says Orlando Palacios, head of the National Rice Program at Peru’s National Institute for Innovation in Agriculture (INIA). In coastal areas, such as Piura and Arequipa, some growers obtain yields as high as 16 tons per hectare—among the highest in the world.

Secrets to success

So, what’s the secret to Peru’s abundant rice harvests? For César and Doña Marina, the answer is clear. “This is sacred ground—so rich in nutrients that we don’t have to apply much fertilizer,” says César, who also believes that La Esperanza, the variety he’s been planting for years (and whose name means “hope”), plays a big role in the success of rice on his land. Looking beyond local perceptions, plant breeders such as Carlos Bruzzone, the director for research and development at Hacienda El Potrero SAC, a company producing certified rice seed, cite other reasons for Peru’s high rice yields. Significantly, 84% of the area sown to the crop is irrigated, and it is also favored by high amounts of sunlight and limited rainfall. On an estimated 50% of the irrigated area, climatic conditions are just right for high yields. Dr. Bruzzone further believes that transplanting of seedlings, the method used most commonly to sow rice in Peru, contributes importantly to rising output.

Eduardo Graterol, the executive director of the Latin American Fund for Irrigated Rice (FLAR), cites other factors, particularly the adoption of modern varieties with high yield potential and resistance to pests and diseases, together with tolerance of environmental stresses as well as the use of certified seed on about 50% of the cultivated area.

Dreaming of exports

James Pinedo is the president of the Rice Producers Association of Jaén and San Ignacio, which has 88 members. All members have the same dream: that a part of the nearly 100,000 tons of rice their farms produce each year will someday cross national frontiers. “Our biggest ambition is to export rice and to do so directly with intermediaries,” says Mr. Pinedo.

According to INIA, it is within Peru’s capacity to produce some surplus for export. Currently, between 300,000 and 350,000 tons of white rice are already being exported informally to neighboring countries. Nonetheless, to fulfill the export ambitions, small- and medium-scale growers, who have less than 20 hectares and are estimated to account for 66.9% of the country’s rice production, together with large producers, representing 31.1%, will need to meet certain quality conditions in order to compete internationally.

For Edgar Torres, the leader of the Rice Program at the International Center for Tropical Agriculture (CIAT), it’s important for the rice sector to invest more crop management practices that help realize the genetic potential of improved varieties that are already available, and that of new hybrids, which CIAT and FLAR are developing through the Hybrid Rice Consortium for Latin America and in Peru with Hacienda El Potrero. Dr. Torres also emphasizes the need for more site-specific crop management (based on big-data approaches to the use of soil and other data) as a strategy for boosting rice yields to 3 tons per hectare above the regional average, while adapting production to the impacts of climate change. “Already high yields and the innovative capacity of Peru’s farmers and the private sector are key conditions for making our production more competitive,” says Jonatan Requejo, manager of Hacienda El Potrero. “The challenge ahead is to strengthen the ability of the rice industry to open windows for exports.”

In addition, growers need new production technology and farm machinery plus the support of national and local government to make credit, training, and technical support more widely available in rural areas.

Beyond potato

Per capita consumption of rice in Peru is high at 60 kilograms per year, on average. Rice has surpassed potato and is the preferred food on Peruvian menus today. About 7% of the rice consumed is imported, with Uruguay supplying 81% of the imports, Brazil 9%, Argentina 6%, and the rest coming from other countries. “Peru imports rice for class A markets with high prices,” says Mr. Requejo. “We don’t have varieties that can compete with imported rice, which varies between 80,000 and 150,000 tons per year.” For now, the scientists will continue to release new varieties—and, in the future, rice hybrids—that can surpass the varieties IR43 and IR88 through their current breeding work at CIAT and subvert the rule in Peru’s rice fields. In the meantime, small, medium, and large producers will continue building knowledge and investing resources for them to take advantage of the hidden potentials of Peruvian soils.

Ms. Varín Molina is a communications coordinator for Latin America and the Caribbean at CIAT.
In the Piura area of northeastern Peru, rice growers regularly obtain yields as high as 16 tons per hectare—among the highest in the world. According to researchers, this is the result of high solar radiation, low rainfall, and (in a departure from common practice in Latin America, where direct seeding predominates) transplanting of rice seedlings in irrigated fields.
Husband and wife Joven and Lydia Ganapin are happy to try some seeds distributed by IRRI. Ms. Corolita Tormo, municipal agricultural officer of San Juan in Leyte, receives some seeds of NSIC 2013 Rc44SR from Paul Maturan, IRRI associate scientist. 1. Dr. Francisco Dayap, the superintendent of Babatngon Experiment Station in Leyte (right), shares some good management practices with Joven Ganapin.

Bouncing back from typhoon Haiyan

A family of farmers bounces back from a disaster by growing a high-yielding rice variety and vegetables.

Life after the storm

For this farming couple, everything about Haiyan is now a faint memory. Thirteen months later, all the debris is gone. There’s almost no trace of the scars the super typhoon left in Babatngon, 33 kilometers away from the provincial capital, Tacloban. Life has returned to normal.

Lydia excused herself to attend to someone who wanted to buy from her small store, which doubles as their home. At first glance, it seems that they have no neighbors. The village was silent. One could hear only the swishing and swooshing sound of a neighboring farmer harvesting his rice.

Joven harvested his rice earlier. His house was filled with sacks of rice—some milled, others not. He proudly showed the grains of NSIC 2013 Rc44SR, a high-yielding newly released rice variety, fondly called “344” by the couple. The rice is said to be special for some good reasons. He raved about the quality of his newly harvested grain just like a father would of his newborn baby. He excitedly mentioned the long grains and “basmati-like” traits and that it is tasty and has a good aroma, and how the cooked rice doesn’t harden easily when it becomes cold. His wife praised the variety’s 60% milling recovery and that they were able to harvest a little bit more than 6 tons per hectare.

A profitable variety

Joven does not regret trying 344, which was introduced by Paul Maturan, an associate scientist at the International Rice Research Institute (IRRI) through the Philippines Department of Agriculture and IRRI project Accelerating the Development and Adoption of Next-Generation Rice Varieties for the Major Ecosystems in the Philippines (Next-Gen). Mr. Maturan said that his mission for the Next-Gen project was to share the seeds of new rice varieties, such as NSIC 2013 Rc44SR, with other marginal farmers in Leyte and other rice-growing areas in the Philippines.

At Joven’s request, Lydia pulled out her records of how much they profited from 344. Lydia was very detailed in jotting down expenses and computing the profit, which is not surprising for entrepreneurs like them. Her records showed that they have harvested 75 sacks of rice, with 15 sacks used as rent payment to their landowner. Some were used for paying the harvesters and some went for the rent of a threshing machine. In the end, they had 46 sacks of rice left. Multiplied by 46 kilos per sack at about US$0.39 per kilo, the couple made $459 in profit.

Joven liked 344 so much that he did not sell all the harvest from this variety. He set aside 13 sacks for family consumption and for sowing. Mr. Maturan then decided to buy one sack of 344 from Joven to add to his seed stock to be distributed to farmers in Abuyog, Kananga, and Hinuganan, Leyte.

Overcoming adversity

The couple said that they were able to bounce back after Haiyan because of farming. Aside from rice, they grew vegetable crops—sweet corn, sweet bell pepper, eggplants, and string beans—that they planted in rotation to avoid diseases and pests. Crop rotation is a practice they learned from Dr. Francisco Dayap, the superintendent of Babatngon Experiment Station, one of the research stations of the Department of Agriculture, Regional Field Office VIII and located just two kilometers away from Joven’s farm.

Since the vegetables can be harvested in 40 to 65 days, they have something to tide them over until the next rice harvest.

During interviews with the farmers, municipal agricultural officers in Leyte did not identify the lack of seeds suitable to the area as the main problem. Farmers usually plant whatever seeds are available or distributed to them even if these seeds have not been tested for the local areas. Mr. Maturan said that the new DA-IRRI Next-Gen project is currently conducting field trials for farmers to select the most adoptable new varieties and establish an efficient seed production and distribution system.

Mr. Gerry Bauya, the municipal agricultural officer in Abuyog, said that they have not heard of rice that can tolerate flooding, salinity, or drought. He said they need such varieties because 210 hectares of their rice areas are flood-prone while some 30 hectares have problems with salinity. In Kananga, Ms. Maria Cristina Aras, agricultural technologist, said the problem of farmers in their municipality is stem borer infestation. She added that the white stem borer is the most destructive because its larval stage can last up to 32 days.

The Next-Gen project is also targeting remote and marginal rice areas with similar problems. In line with the mission of the Global Rice Science Partnership, the project aims to speed up the introduction and adoption of higher-yielding rice varieties and hybrids that have resistance to or tolerance of pests and diseases and environment-related stresses such as drought, flooding, and salinity.

A collaboration between IRRI, the Philippine Department of Agriculture, Philippine Rice Research Institute, and the University of the Philippines Los Banos, the project is expected to help the country attain rice self-sufficiency under the Food Staples and Sufficiency Program. Aside from the sharing of advanced breeding methods, expertise, and germplasm, another strategy of the project is “a modified farmers’ participatory varietal selection scheme and improved seed system that can make these new rice varieties and hybrids more widely available to Filipino farmers,” Glenn Gregorio, IRRI plant breeder, said.

“Multi-environment trials (MET) of the newly developed rice lines in many different environments will greatly improve the quality of materials going through the National Cooperative Tests, leading to the release of a better and improved next generation of varieties and hybrids,” Dr. Gregorio added.

“Developing and promoting effective technologies through SARD is a viable option to attain the government’s goal of self-sufficiency,” Dr. Dayap said. A DA document indicates that, at today’s rate of population growth, the country’s average rice yields must rise to at least 4.75 tons per hectare to attain self-sufficiency.

“Hopefully, through this partnership, varietal development programs and continuous availability of high-quality seeds can support the goal of rice self-sufficiency of the country,” Dr. Dayap said.

Ms. Reyes is the managing editor of Rice Today.

For more on Typhoon Haiyan, see http://tinyurl.com/Haiyan-Super-Typhoon.
Rice fables: Korea

A long time ago, two brothers together owned a rice field, which was the only inheritance they received from their parents, who passed away because of old age.

These two brothers knew how their parents had valued the land, so they cared for it the way their parents did. They worked together to grow rice from plowing the soil to sowing the seeds, from weeding until the rice was ready for harvest. They were diligent and industrious; they worked on the farm from dawn till dusk. Come harvest time, their labor came into fruition. They had a very bountiful harvest, the largest in the village.

They divided the harvest equally. As soon as night came, he found his way in the dark carrying a heavy sack of rice and placed it above his younger brother’s pile of rice.

The next morning he was surprised to see that the height of his pile of rice seemed to be the same. He counted the number of sacks and wondered why the number did not change.

“I think we miscounted them when we first divided the sacks of rice between us,” he said to his younger brother.

Thinking about his younger brother, who will be starting to build a family, he decided to carry another sack of rice to add to his brother’s stack that night.

The next morning, he went to his barn to check how many more would be left should he decide to sell some. He was shocked to know that the number was still the same. He asked his son to count it for him and to and behold he arrived at the same number. “Well,” he said, “I’ll just carry a sack of rice to my younger brother again tonight.”

After dinner, he again loaded another sack of rice on his back and started walking on the same road to his brother’s place. The moon shone so bright that night and he could clearly see the pathway to his brother’s place. As he was halfway to his destination, he saw a silhouette of a man who seemed to be carrying a bulky load. As the shadow came nearer, the moonlight revealed the familiar face of his younger brother.

As soon as their eyes met, they both called out to each other: “Why brother!” They heartily laughed together as they both understood the mystery of the unchanging number of their respective stacks of rice. Happy to see each other, they unloaded their sacks of rice, sat down, and talked. The older brother found out that his younger brother was also thinking the same way. He thought of his older brother having many children and thus his family would consume more rice than he would. Surely his older brother could use some of his rice.

It is said that the story of the loving ways of these two brothers was the talk of the village. It spread from village to village until it reached far and wide.

Ms. Shim-Chin likes telling stories, an activity she enjoyed when she was a preschool teacher in South Korea. She temporarily gave up her job in Korea to join her husband, IRRI plant breeder Jong Hyoun Chin, and their children in the Philippines. She devotes some of her free time to painting.

The good brothers

This rice fable centers on fraternal love, a value that many Koreans have considered important for a very long time.
Direction

- Wash uncooked rice in a pot with water. Do this three times. Add enough water to cover the rice. Add 3 tablespoons of salt and soak for 15 minutes.
- After soaking for 15 minutes, remove the rice and drain the water.
- Add the shredded chicken and rice, and mix well.
- Cover and cook for about 45 minutes.
- After 10 minutes, add 3 tablespoons of rose water (optional).
- Wrap the lid with a clean towel or cloth, and cover the pan to absorb the water forming from the steam.

Cooking is a relaxing and enjoyable hobby for Iman. As a nutritionist, he likes to add new twists and variations to traditional dishes. His favorite cuisines are Middle Eastern, Indian, Russian, Turkish, and Thai. Tah Chin saffron rice and chicken, based on his grandmother’s recipe, is his favorite Persian dish.

Watch Iman prepare the sampahera Persian rice dish in an 11-minute video on YouTube at http://youtube/kIcIqXeoOq4.
We don’t have to choose whether GM or not—we will be out in the field delivering benefits to farmers. And, I hope these benefits to farmers will also be benefits to consumers and benefits to the environment. Rice is too important a crop to be locked out of the biotechnology revolution. For the sake of more than 3 billion rice consumers, and for the sake of the world’s environment, we can and must use this technology when appropriate to make farming more productive and more environmentally sustainable.

Mr. Lynas, an author and environmental campaigner, has written several books on the environment. He is now working on a project promoting food security and environmental sustainability with the Cornell Alliance for Science at Cornell University’s Office of International Programs at the College of Agriculture and Life Sciences. See 10 minutes with Mark Lynas at http://tinyurl.com/Lynas-IRC-plenary.

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Green Revolutions 2.0 & 3.0: No farmer left behind

by Gene Hettel

Green Revolutions GR2.0 and GR3.0 will benefit the poorest of the poor who, for various reasons, did not reap rewards of the first one

Several million of the world’s poorest farmers are already adopting one of the first new technologies of the second Green Revolution (GR2.0)—flood-tolerant rice! This was the optimistic pronouncement of Robert Zeigler, director general of the International Rice Research Institute (IRRI), during his keynote address to kick off the 4th International Rice Congress (IRC2014) in Bangkok on 28 October 2014.

More than 1,500 delegates from 69 countries (photo) attended the week-long IRC, touted as the Olympics of countries attended the week-long event. More than 1,500 delegates from 69 countries (photo) attended the week-long IRC, touted as the Olympics of countries attended the week-long event.

Start of GR2.0 pinpointed

It is thanks to one farmer, Mr. Asha Ram Pal from the Indian state of Uttar Pradesh, that Dr. Zeigler pinpoints, at least in his opinion, the exact start of GR2.0. It was 31.07.2008 (1:17 in the afternoon of 31 July 2008)—the exact moment in time when, ignoring the advice of his neighbors by showing faith in the science, Mr. Pal decided not to plow under his severely flood-ravaged and sick-looking rice crop on his 1-hectare field that had been submerged for around 17 days across two floods. Well, those rice plants with the flood-tolerance gene recovered to yield 4.5 tons, a good yield for any rained paddy in the world!

“This was—unambiguously—the start of GR2.0,” Dr. Zeigler said, “because for any agricultural revolution to be successful, farmers must adopt the product of the science. Since then, Sub1 rice varieties have spread like wildfire in eastern India and other regions where flooding is a perennial problem for farmers growing their crop in such marginal environments.”

According to the internationally respected plant pathologist who has led IRRI for the last 9 years, the new technology can be attributed primarily to high-level and high-quality science—science publishable in the top scientific journals in the world—brought to bear on the problems in farmers’ fields.

Indeed, one scientific study indicated that “the scheduled castes are likely to be a major beneficiary from the spread of Swarna-Sub1 in India.”1 “When I read this last paragraph of the study, I literally got goose bumps,” he told the delegates.

“The scheduled castes are the lowest of the low. So, this technology—the most exquisite research from some of the finest laboratories in the world—is significantly benefiting the poorest of the poor. Now if that is not scientific revolution, I don’t know what is. It gives me great pride to be a scientist and to be associated with the people who have done this work.”

GR3.0 will stagger the imagination

“GR2.0’s run will be fruitful—and quicker than GR1.0—particularly for farmers in marginal weather-stressed environments,” Dr. Zeigler predicted. He said there is a very wide array of diseases, previously thought to be absolutely insurmountable, that researchers can now address more rapidly using the scientific tools coming out of parallel high-science revolutions in genomics, molecular biology, and plant physiology.

According to Dr. Zeigler, GR2.0 is allowing researchers to successfully meet great challenges with unprecedented research efforts that will result in unparalleled impact—ranging from mining the rice genomes and wild relatives of rice for needed traits to developing climate-ready rice and from fighting human malnutrition with more nutritious rice to better management of water and nutrient resources in farmers’ fields.

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“GR3.0 will stagger the imagination “GR2.0’s run will be fruitful—and quicker than GR1.0—particularly


2 http://tinyurl.com/Jennings-Pioneer.

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“Over the next 10 to 20 years, during which GR2.0 will phase into GR3.0, we will seize opportunities for sustainable rice production in ways that will stagger our imagination,” he confidently forecasted. In another bold prediction, he envisions the start of GR3.0 sometime around 2030 when farmers start planting yield plateau-busting C4 and nitrogen-fixing rice varieties and consumers begin finding broad-based nutritious rice in the marketplace.

Summarizing the GR series
Dr. Zeigler summarized for the delegates what he calls the ongoing Green Revolution Series. “GR1.0, which basically built a high-yield plant architecture adapted to the low-stress environments, is justly criticized for benefitting only farmers in those relatively stress-free areas,” he said. “GR2.0 is incorporating tolerance to severe stresses and additional nutritional value and ultimately, as already mentioned, is leaving no farmer behind. GR3.0 will accelerate the evolution of the rice plant itself. It will effectively produce designer rice by leaving no Oryza species untapped.”

Young scientists will lead the charge
During a media briefing following his keynote, Dr. Zeigler told reporters that leading the charge of the science-based GR2.0 and 3.0 is the next crop of vibrant, intelligent, and caring young scientists. They are in league with IRRI through the Global Rice Science Partnership (GRiSP) and its five rice-breeding hubs in Asia, Africa, and Latin America. Many attended their first-ever International Rice Congress in Bangkok. Twenty-nine of these young rice scientists were chosen to present their research during the science sessions and they were formally recognized for this notable achievement during the IRC gala dinner (photo above).

“The future of rice science is at stake because without new blood in the experiment plots and laboratories, the outlook for a continuing GR2.0 would be grim and there wouldn’t even be a GR3.0,” he warned reporters.

Mr. Hettel is editor-in-chief of Rice Today.

The far-ranging IRC2014 scientific program had something for everyone including plenary sessions, symposia, and poster sessions on the latest advances in rice research and technologies coming out of GR2.0 and what is on the drawing boards for GR3.0.

The week-long agenda also included a temperate rice conference, a workshop on drip irrigation, and an investors’ forum on nature and success of agricultural research. Held under the patronage of the Royal Government of Thailand, specifically the Ministry of Agriculture and Cooperatives, IRC2014 was organized by IRRI and Kenes MP Asia Pte. Ltd.

A great wrap-up of the milestone event has been put together by Michael Jackson, chair of the IRC Science Committee. It can be found on his blog at http://tinyurl.com/IRC2014-wrap-up.


Spreading the good news about rice: IRC2014 wrap-up
The global rice market is driven by factors that may radically change how rice is traded in the future.

What is the true price of rice? Do we have enough rice to feed the growing population? Where will the rice in the future come from? What drives the global rice market? What are the game changers? These were just some of the questions raised by economists and other participants at the Global Rice Market and Trade Summit in Bangkok, Thailand, on 27-29 October 2014.

Government policies, climate change, increasing population, migration of farmers to cities, and the rising middle class are some of the game changers in the global rice market that echoed among the speakers during the Summit.

Climate change

There was a noted concern on the projected impact of climate change on agriculture. Most agreed that rising sea levels, increasing soil salinity in farm areas, higher temperatures, and more frequent occurrence of floods and droughts will have great adverse effects on rice production.

In Asia, large areas of rice are grown in low-lying deltas and coastal areas such as the Mekong River Delta in Vietnam and the Ganges basin in Bangladesh and India. A 1-meter rise in sea level could wipe out these prime rice production areas.

With increasing sea levels, saltwater could penetrate more inland areas and contribute to soil salinity, thus radically reducing rice yields as most rice varieties are only moderately tolerant of salt.

Increases in temperatures will also decrease rice output. A study at the International Rice Research Institute (IRRI) indicates that a rise in nighttime temperature by 1 degree Celsius could reduce rice yields by about 10% while many varieties are sensitive to higher daytime temperature.

About 20 million hectares of the world’s rice-growing area are at risk of occasionally being flooded, particularly in major rice-producing countries such as India and Bangladesh.

Although more research is needed to tackle the challenges posed by climate change, IRRI has already developed several climate-smart rice varieties that have made huge impacts in unfavorable environments in Asia and Africa. IRRI Director General Robert Zeigler said the second Green Revolution is benefiting the marginalized sector of society—the poorest of poor farmers—who live in areas most vulnerable to climate change (see Green revolutions 2.0 and 3.0: No farmer left behind on pages 32-35).

Booming population

There will be more mouths to feed in the future. The population is increasing, particularly in South Asia, where most of the world’s rice supply is grown. “Thirty percent of the global population growth in the next 5 years will be coming from this region,” said Dr. Suthad Setboonsarng, a Thai economist and currently member of the IRRI Board of Trustees. In addition, the number of nontraditional rice eaters is rising, especially in African countries.

With global rice demand estimated to increase from 439 million tons in 2010 to 555 million tons in 2035, rice production must be able to keep up if world market prices are to be stabilized at affordable levels for billions of rice consumers.

Rising urbanization

The changing economic structure of Asia and the increasing number of its middle class will have an influence on the international rice market. “The higher the income of the people, the more diversified are their diets,” said Dr. David Dawe, FAO senior economist. “This change will have an effect on the demand for rice.”

And, 50% of this change is coming from India and China, according to Dr. Setboonsarng. China’s economic progress will result in mass outmigration from farms to cities. The rural migration will be massive, according to Milo Hamilton, senior agricultural economist and co-founder of Firstgrain.com. More than 250 million people in China will leave their farms and move into cities in the next 15 years. In China alone, 1 billion more people will live an urban life by 2030. This phenomenon is also occurring in other parts of Asia. Southeast Asian farmers are leaving rural areas for better wages in cities. For example, Cambodians in rural areas are migrating to the cities of Thailand to work in construction or in factories.

A worrisome question is who would be left on rice farms to feed the ever-growing cities that need increasing quantities of food, said Mr. Hamilton. “This is a double whammy on the rice market—increase in urban consumption and reduction of rural food sector workers,” added Dr. Setboonsarng.

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Water and rice

According to Dr. Setboonsarng, the expansion of urbanization in Asia is leading to an increase in domestic consumption of water, which will compete with the use of water for agricultural production, especially rice production. It is a fact that rice is the most water-intensive crop. "Water, a limited resource, is diminishing," Dr. Setboonsarng said. "The groundwater used to irrigate rice in countries such as Bangladesh, India, and China is stressed because of the expansion of irrigation."

Mr. Hamilton said that rice production is more like water conversion. When one trades rice, one is also trading water. Samarendra Mohanty, IRRI senior economist, said that "when the government of India is subsidizing rice production, it is, in one way or another, subsidizing the water need of the country that buys the rice." It is said that China has the capacity to produce more rice if it wants to, but, unlike India, it is conserving its water by importing rice.

This goes back to the issue of finding the true value of rice. Mr. Hamilton said that water, itself, is not usually priced but what is priced is the cost of obtaining the water. How we put a price on rice is akin to how we put a price on water. Water scarcity will have an effect on where the rice is coming from in the future. According to Mr. Hamilton, rice will be coming from countries whose water resource has not yet been depleted.

A political commodity

Since rice is the staple food of more than half of humanity, it is easy to understand that it is a political commodity. Governments will do everything possible to make rice available to their constituents. They have done a lot of things to control its price so their constituents or "voters" can still afford it, or buying from farmers at a higher price to encourage farmers to produce it. Where the price of rice spiked during 2007-08, riots erupted in different corners of the world and posed tremendous challenges to many governments.

Government policies

The rice price crisis was a wake-up call for many governments. Many created policy interventions to prevent food crises from occurring again. For rice-importing countries such as the Philippines, Indonesia, and Malaysia, the policy is self-sufficiency. The Philippines is doing its best to increase its rice production through its Food Staples Sufficiency Program, at the same time encouraging its citizens to diversify their diets by eating carbohydrate alternatives such as sweet potato and cassava. In addition, the Philippine government launched national campaigns discouraging consumers from wasting rice.

But, "government interventions in the form of rice policies often hide the true price of rice," said Dr. Mohanty. For example, the rice-purchasing scheme in Thailand made the price of its rice less affordable—and less competitive—in the international rice market. India’s policy on rice subsidy makes rice production cheap for farmers so they can sell rice at a low price. With India’s low price, plus its bumper crop in 2013, it temporarily displaced Thailand as the top rice exporter in the world.

"The government intervention in rice policies is two-pronged," explained Dr. Setboonsarng. "Most governments control the price of food, including rice, to keep the price low. At the same time, they subsidize the producer, especially the farmers to enable them to keep up with the production. And as a consequence, the indirect recipient of subsidies to farmers is, in fact, the rice consumer, not only in one’s own country but also in other countries. For the domestic rice market, low rice prices discourage production in the whole rice value chain—from production and marketing to storage and distribution."

What does that mean to the international rice market? "As both the exporter and importer control the consumer price of rice and subsidize rice farmers, the supply curve of rice is shifted and lowers the price and quantity traded in the international market," Dr. Setboonsarng added. "As a result, the world rice market becomes small and volatile. Moreover, the self-sufficiency policy of most rice-importing countries adds to the uncertainty."

Lack of transparency

"Another reason for uncertainty is the lack of reliable information," said Bruce Tolentino, IRRI's deputy director general for communication and partnerships. "Uncertainty in the global rice market leads to speculation, and speculation can lead to confusion and panic." He also emphasized the importance of transparency as a key to a stable global rice market.

"In fact, the root cause of the 160% price increase during the 2007-08 rice crisis was not the lack of supply but a lack of transparency," Dr. Zeigler pointed out. "And, those hundreds of millions of people who suffered were the poorest of the poor. That became the wake-up call for us.

"For many, they think that the wake-up call was to pay attention to production technologies," he continued. "But for us, we needed to understand what was going on in the rice trade and what we could do to make a difference."

Over the years, IRRI has been focusing its expertise on what drives the global market and the kind of information required to attain a stable environment. The Institute has been gathering data and information on the socioeconomic aspects of rice: how much rice is needed, what it takes to grow a good crop, what a good rice crop is, and what it costs to produce it.

"The underlying foundation is that IRRI is viewed as an honest broker," said Dr. Zeigler. "We don't have a dog in the fight in rice trade.

This allows us to provide unbiased and accurate information on rice production.

IRRI has been developing state-of-the-art tools to provide timely and accurate estimates of rice production in Asia. "We have a suite of technologies on board," he said. "First, we have a much better way of estimating the realizable yield of the rice crop using a crop growth model, a technology that we have been developing for the last 25 years. We have an extraordinarily accurate assessment of what a rice paddy is going to do."

Dr. Zeigler added that, through satellite imagery, data can be gathered and processed in real time to obtain a good assessment of actual rice production. The real breakthrough is that IRRI now uses radar imagery, which can provide superior penetration capability through any type of weather condition, and this can be used in daytime or nighttime.

He explained that, unlike before, because the rice crop is produced during the monsoon season, all we got were beautiful pictures of clouds. With radar imagery, IRRI can obtain a very good assessment of rice distribution. It can collect data on soil, water, and temperature and even obtain a very good estimate of the area, and determine the time when rice was planted. And, combining all these with crop growth data, we can estimate the harvest. This timely and accurate information will remove much uncertainty around production. Rice demand can be estimated by income growth and distribution, and government policy, among other data," Dr. Zeigler said. "As a rice research institute, IRRI can help in providing highly accurate information on the rice crop. Having a good understanding of both the supply and demand side of the equation is an important part of having a stable rice trade."

IRRI's expanding role

Indeed, IRRI has an important role to play in the development of rice policies. A number of interventions that governments have made, although reasonable in the short term, such as making sure that rice is available so that people will not have riots on the streets, have long-term adverse impacts.

"According to Dr. Zeigler, organizations such as IRRI and the International Food Policy Research Institute are well placed to help governments work through the implications of their policy choices. Those policy choices will have a dramatic impact on rice trade—locally, regionally, and in the overall global rice market.

"From our perspective, we see a transition from a strictly research orientation attending to the issues around how to produce more and better rice in a more sustainable way as a good starting point for moving to a much richer engagement with the global community," he said. "We think that it is increasingly important that we bring an unbiased point of view to the table to help provide the information that the global community needs to make an open and transparent rice trade."

Ms. Reyes is the managing editor of Rice Today.
Historically, a small amount of rice is traded globally compared with other crops such as wheat, corn (maize), and soybeans. However, after remaining stagnant for almost two and a half decades, rice trade expanded in the late 1980s in the wake of trade liberalization in many countries and the General Agreement on Tariffs and Trade in 1994. Global rice trade now stands at around 42 million tons compared with 10–12 million tons in the late ’80s. The current trade accounts for nearly 9% of global production compared with 4% in the late ’80s (Fig. 1).

Structure of global rice trade
Rice is a political commodity in the majority of Asian countries and its price is an important parameter of government performance. Thus, it becomes imperative for policymakers to control rice trade flow for domestic rice market to be stable. State agencies are involved in controlling the flow of rice in and out of countries and, in many cases, they also take part in importing/exporting rice through government-to-government (G-G) contracts.

State agencies in many rice-consuming countries such as the National Food Authority of the Philippines, the Bureau of Logistics of Indonesia, and BERNAS of Malaysia are solely in charge of importing rice into their respective countries. Similarly, state agencies in many exporting countries are also involved in rice exports through G-G contracts. For example, Vietnam exported in excess of 400,000 tons of rice monthly in 2013 and 2014 through G-G sales to Indonesia, the Philippines, Malaysia, and other Asian and African countries (2014 World Rice Conference, Cambodia). The extent of the hold of the governments in rice trade was evident during the 2007-08 rice crisis when exporting countries such as India and Vietnam enforced an export ban, and importing countries such as the Philippines, Indonesia, and Nigeria scrambled to stockpile rice for domestic food security.

The rice export market is highly concentrated with the top five rice exporters accounting for 80% of global rice trade. Of the five top exporters, four (Thailand, India, Vietnam, and Pakistan) are from Asia. Thailand has occupied the top spot for the most part of the past four decades. For these Asian rice-exporting countries, rice is still the most important staple, and domestic food security and strategic reserve is extremely important. Unlike the high concentration in export market, the import side is quite fragmented. The top five rice importers account for around 30% of the total trade and the top ten account for less than 50% of total imports. Many of the major importers, including the current top importer, China, are from Asia and account for a quarter of the total trade. The other major importing regions are the Middle East and Africa, with nearly half of the total global trade. These two are the fastest growing rice markets, with the trade volume doubling from 10 to 20 million tons in the past decade.

Types of rice traded
Global rice trade can be broadly divided into fragrant and nonfragrant rice. The fragrant rice market includes basmati and jasmine rice while the nonfragrant rice market includes white, parboiled, and glutinous rice. In the case of basmati trade, India and Pakistan export 100% of this rice to all parts of the world, with Middle Eastern countries as the major destinations, followed by the European Union. In the past 15 years, the global trade of basmati rice has grown from 1 to more than 4 million tons, with India capturing almost all the market expansion while Pakistan’s market share declined from 50% to less than 20% during the same period. For the jasmine rice market, Thailand used to dominate with an almost 100% market share a decade ago. But, Vietnam and Cambodia have made significant inroads into the market in recent years, with Thailand’s share dropping below 50%. Vietnam has evolved to become the biggest competitor for Thai Hommali jasmine rice, with nearly 40% of the market share. But, despite its rising market share, Vietnamese jasmine still sells for a hefty discount in the market. The average spread between Thai Hommali and Vietnamese jasmine has been around US$400 per ton ($1,000 per ton for Thai Hommali vs. $600 per ton for Vietnamese jasmine) in recent years. In the past decade, the volume of jasmine trade was growing at a small’space from 1.7 million tons in 2005 to 2.5 million tons in 2013 (Source: The Rice Trader). The major markets for jasmine rice are the United States, China, Hong Kong, Singapore, Ghana, Côte d’Ivoire, and Malaysia. In addition, 600–700 thousand tons of 100% broken jasmine rice, primarily Thai Hommali, are mostly exported to three West African countries, namely, Senegal, Côte d’Ivoire, and Ghana.

In the case of white and parboiled rice, the market is segregated based on the percentage of broken rice (major types are 5%, 15%, 25%, and 100%). All major exporters are involved in white rice trading to all parts of the world. On the contrary, the majority of parboiled rice originates from India and Thailand, with African and Middle Eastern countries as its main destinations.

Future trends
Since the 2007-08 rice crisis, many rice-consuming countries have been reluctant to depend on imported rice and have rolled out measures to improve self-sufficiency. Many rice-importing countries have initiated programs to expand their...
rice production and reduce their dependence on foreign rice. Both India and China have also emerged as major players in the global rice market in the past few years with India’s unprecedented rise to the top of the export chart and China’s unexpected rise to the top of the import chart (Fig. 2). In 2012, India displaced Thailand from the top spot by exporting 10.4 million tons of rice vis-à-vis 6.9 million tons for Thailand. Like India, nobody expected China to become the largest importer of rice in the world, displacing Nigeria, with 3.5 million tons of imports in 2013.

India’s lifting of its export ban on the nonbasmati market in late 2011 after a 4-year gap, burgeoning domestic stocks, and a weak rupee supported India’s exports in the past two years. But, earlier in 2014, Thailand stopped the rice pledging scheme and has regained the majority of markets lost to India in 2012. Thailand recaptured the top spot in 2014 and is expected to further strengthen its position in 2015.

Despite all these uncertainties, the global rice trade will continue to rise in the future. The rising popularity of rice in many non-Asian countries, including parts of Africa and the Middle East, is likely to greatly contribute to the uptrend in rice trade. A lot depends on Africa, where rice consumption is expected to grow much faster than in any other region in the world. Based on our projections, 112 million tons of additional rice will be needed globally by 2040 and nearly 40% of this additional demand will be coming from Africa. If African production growth cannot keep pace with its rising consumption, then the continent will emerge as a growing importer of rice from Asia. Many Asian countries are likely to simultaneously export and import different types of rice as consumers diversify their diet and create demand for different types of rice. China, however, remains the biggest question mark in the rice market. It appears that the rapidly rising costs of production, pressure on rice area from competing crops, and water shortages are likely to make imported rice an attractive option for Chinese traders. In addition, the demand for different types of rice such as sticky rice from Vietnam, jasmine rice from Thailand, and long-grain rice from Pakistan is growing as Chinese consumers diversify their consumption habit with rising income. As long as the Chinese government is not strongly determined on self-sufficiency and allows imported rice to enter the country, it is reasonable to assume that Chinese imports will steadily rise in the near to medium term. On the export side, the current major exporters (India, Thailand, Vietnam, and Pakistan) will continue to dominate the market, while Myanmar and Cambodia have the potential to upgrade their rice sectors and become bigger exporters in the future.

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I n 2015, the Global Rice Science Partnership (GRiSP) enters its fifth year, and it is gearing up to develop a phase II proposal for 2017 and beyond. Thus, this is a good time to take stock of GRiSP’s accomplishments so far and discuss where we want to go next.

To recall, GRiSP is a CGIAR Research Program led by the International Rice Research Institute (IRRI) and coordinated by six research-for-development organizations: IRRI, Africa Rice Center (AfricaRice), the International Center for Tropical Agriculture (CIAT), Centre de Coopération Internationale en Recherche Agronomique pour le Développement (Cirad), Institut de Recherche pour le Développement (IRD), and the Japan International Research Center for Agricultural Sciences (JIRCAS).

These six organizations have fully aligned their rice R&D activities and share the same vision, mission, objectives, and R&D structure. Under the umbrella of GRiSP, they bring together more than 900 partners from academia, the public and private sector, and civil society with a stake in the rice development sector. Their joint mission is to reduce poverty and hunger, improve human health and nutrition, reduce the environmental footprint, and enhance ecosystem resilience of rice production systems.

To gauge the achievements and success of GRiSP so far, we need to ask the following questions: “What did the collective of research organizations achieve that they would not have achieved without GRiSP?” And “What has been the added value of the partnership approach?”

And the truth is—when traveling back in time, it is clear that crop simulation models, which have been developed at IRRI and by Wageningen University in the Netherlands, to explore the impacts of weather conditions and climate change on rice production. GRiSP facilitated this through exchange visits and by organizing training courses. In Africa and Asia, GRiSP scientists from AfricaRice, IRRI, and the national systems are developing rice management advisory tools delivered through mobile phones and Internet applications. GRiSP-sponsored workshops and exchange visits catalyzed collaboration across continents on topics such as agronomy, innovation platforms, postharvest, value adding, grain quality, and rice supply and demand analyses. Specialized expertise on rice diseases at Cirad and IRD is being tapped to help solve rice disease problems in Africa, while JIRCAS strengthens GRiSP with new discoveries of genetic traits such as those available through GRiSP Back in the Philippines, IRRI has tested hybrid parental lines from Latin America and germplasm from Africa, thus broadening the genetic base for improvement.

Moreover, a global network of phenotyping platforms—in Africa, Asia, Australia, Europe, and North and South America—characterizes novel germplasm under a wide range of environmental conditions, using standardized protocols and sharing data for genome-wide analyses. Also in other fields, such as agronomy and natural resource management, ideas, tools, and technologies are shared and co-developed. In Latin America, partners at CIAT in Colombia and the National Institute of Agricultural Research (INIA) in Uruguay are applying crop growth simulation models, which have been developed at IRRI and by Wageningen University in the Netherlands, to explore the impacts of weather conditions and climate change on rice production.
Brunei Builds its 1st National Rice Mill

Completely Supplied and Engineered by Satake

A stable supply of food has always been a priority for countries like Brunei Darussalam where land for agriculture is limited. When the country decided to pursue 100% self-sufficiency in rice supply as a national policy, it chose Satake equipment for the processing system, because of its reliability, stability and superior performance.

Satake has supplied a complete set of 30TPD rice mills, with design and engineering also provided by Satake.

The official inauguration ceremony was held on August 20, 2014. (For more details, please contact Satake at the address below.)