Rice Today

www.irri.org

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Machines of progress

Cambodia adopts postharvest technologies

Water harvesting in Latin America

California deals with climate change

Africa's "Marshall Plan"

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contents

RiceToday
Vol. 9, No. 3

On the cover:
The combine harvester, an iconic image of farming in progressive countries, is now a normal scene in Cambodia. Small combine harvesters were first introduced but, since Cambodia has large rice fields, medium (2-meter cutting width) and large (3-meter cutting width) combine harvesters have become more popular among Khmer farmers. Farmers have also adopted other postharvest technologies, which have improved rice quality and increased harvest milling output, among other benefits. To learn more, see pages 38–41.

Rice Today is published by The Rice Trader Inc. (TRT) in association with the International Rice Research Institute (IRRI).

TRT, for 20 years, has brought subscribers crucial, up-to-the-minute information on rice trade through its weekly publication, *The Rice Trader*. Acknowledged as the only source of confidential information about the rice market, this weekly summary of market data analysis has helped both the leading commercial rice companies and regional government officials make informed decisions, which are critical in today's market.

IRRI is the world's leading international rice research and training center. Based in the Philippines and with offices in 13 other 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 supported, in part, by members of the Consultative Group on International Agricultural Research (CGIAR – www.cgiar.org) and a range of other funding agencies.

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MOVING FORWARD WITH TECHNOLOGY

Farmers in the "texting capital" of the world—the Philippines—will soon receive nutrient management advice specifically tailored to their rice crops through their mobile phones. Dr. Roland Buresh, IRRI's principal scientist on nutrient and crop management for intensive rice-based cropping systems, has collaborated with the Philippine Department of Agriculture to establish this innovative system. In his *Grain of Truth* article, Buresh explains how farmers can use their phones to ask a series of simple questions concerning their rice paddy. Then, in less than 10 minutes, they will get an automated text reply recommending what amounts, sources, and timings of fertilizer are needed to maximize their paddy rice production.

In Cambodia, farmers are also keeping up with the advances in technology by adopting mechanical harvesters and dryers, among other postharvest technologies. In this issue, we learn how the technologies are spreading and being embraced by Cambodian rice farmers to reduce labor, save money and time, and improve the quantity and quality of grain available at the end of the day.

Rice Today also delves deeper into the controversial topic of "land grabs" for rice production, exploring the potential benefits and downsides to this approach to increase global rice production.

To note, land grabs will be one of the themes at the 3rd International Rice Congress 2010 (IRC2010), which will be held in Hanoi, Vietnam, from 8 to 12 November 2010. IRC2010 is the world's largest gathering of rice scientists, researchers, and technology experts and it is expected to attract thousands of international delegates. IRC2010 follows the Africa Rice Congress 2010, held in Mali in March this year. *Rice Today* reports on this Congress and its recommendations to boost Africa's rice sector, including a "Marshall Plan" for capacity building.

Apart from being a significant year for IRRI—as it marks the Institute's 50th anniversary—2010 is also the International Year of Biodiversity. Hence, it is quite timely that this issue explores the challenges farmers face in finding the perfect balance of biodiversity in their paddies to minimize losses caused by pests and weeds, reduce labor, supply additional food, and deliver ecosystem services such as nectar for bees.

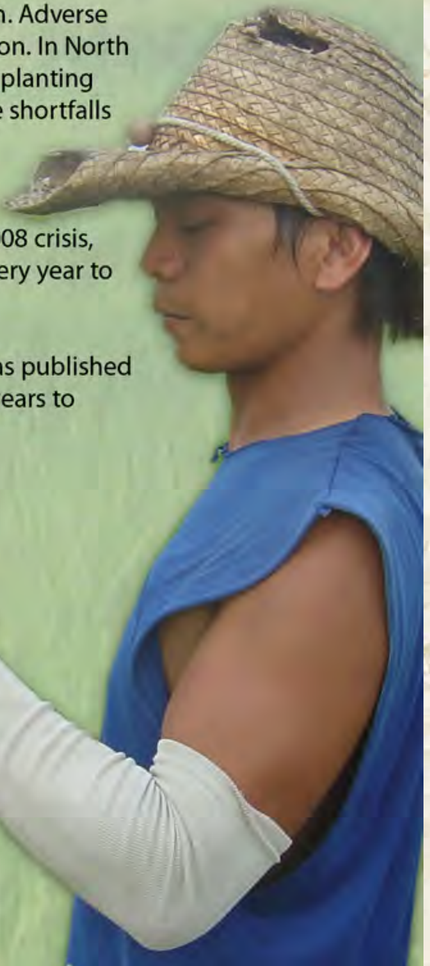
In keeping up with rice production in South America, we find that the MERCOSUR (Southern Common Market) region responsible for 85% of the continent's rice production faces a challenge this season. Adverse weather conditions have caused production to drop by an average of 8% compared with last season. In North America, particularly in California, farmers are also soaked in frustration, as rains have delayed the planting season. The inclement weather, coupled with the Golden State's water sales, is predicted to induce shortfalls in rice production.

Despite these changes in rice production, Dr. Samarendu Mohanty notes in this issue's *Rice Facts* that, "In the last few months, global rice prices have fallen by more than 25%." Reflecting on the 2008 crisis, Mohanty provides some insights into the market and the need to boost rice yields by 1.2–1.5% every year to ensure food security in Asia.

To help understand changes in rice production, IRRI's mapping team, led by Dr. Andrew Nelson, has published a map showing the different rice systems in South Asia. The team compared maps from different years to identify new rice production areas and places where rice has been replaced by other land uses.

And, as a final farewell, this issue's *Pioneer Interview* features Dr. Michael Jackson, who recently retired from IRRI after 19 years. He joined IRRI in 1991 to lead the International Rice Genebank, where he applied scientific best practice and harnessed the skills of the staff to build the Genebank into one of the world's best. He then applied his "systematic way of doing business" when he became the director for Program Planning and Communications in 2001 to improve project and contract management, and also donor relations. We know his influence will last beyond his 19 years. Thanks, Mike!

Sophie Clayton
Contributing writer



HIDDEN TREASURE*

In the last few months, I have visited Colombia, China, Singapore, the Philippines, and Panama. One thing I consistently heard during my travels was that the world is changing—and it's changing on many levels. One of these changes concerns the weather, which has grown more unpredictable. It would probably be better to leave the grand debate about "global warming" to the politicians and scientists, but the simple fact is that great shifts in the climate cycle are occurring and this troubles everyone. In California, for example, I had originally planned to write an article on drought-related farming issues following years of dryness in the state. But, by the time I got to writing, I had to change it to a report on the effects of the late wet season on the crops (see page 11). Interestingly, a massive reduction in California's crop will be caused by this cold, wet weather—along with a further 5% drop in output because of water sales that would result in no crops being planted on some farmlands. This is the fate of humans. We cannot control the weather any more than we can stop the world from turning.

Similarly, there is talk of the all-important (at least in terms of political and trade sentiment) situation in India and its upcoming monsoon. The Indian government had been rather brilliant in keeping stocks before the major drought happened last year and then holding on to the hope that this year would allow them to bounce back. If the monsoon proved to be better this time around, they would have pulled off one of the most interesting and riskiest plays on food storage in recent history. If not, the pundits (fairly or unfairly) would come out with economics showing that more buffer stocks are needed for a country as large as India and how this would impact future food storage strategies. But, given the prediction that a perfect monsoon is coming, perhaps everything will work out fine. For the people of India and the world, we pray that food production stays at a level that can meet all needs. As stated above, humans do not control the weather and predictions can be quite dangerous.

China is another point of interest. There has always been a belief that, at some point, China would need to import rice to feed its large population (around 1.3 billion). It has already imported other food commodities such as corn (maize). When China (or India) buys large quantities, the question becomes one of how a 30-million-metric-ton global rice trade deals with countries that have internal consumptions that are several times the size of global trade. The initial response would be to have them eat other food commodities (wheat, corn, etc.). However, economics would question whether consumers will or can easily shift between food items. But then again, would they have a choice since the export system of rice is yet to be fully developed? This is the crutch of a global food business that looks oversupplied and yet keeps 1.02 billion people on the brink of starvation by not allowing this "oversupply" to reach the people who need it. Food may not be as "abundant" as we all think.

Having said all this, the world—politically and in the trade—has sent food prices falling this year and one could question whether this is indeed a reflection of the reality that is mentioned above. Market sentiment currently rules, as the five major rice exporters already reveal 5% more trade this year; yet, financial issues facing Europe, plus the changing currency rates, reveal a hesitancy that dogs food markets. Such volatility can be harmful to longer-term investments in food output. There is no doubt that such investment decreases would also impact research. While all of us would like cheap food so that the developing nations can feed their people with ease, one cannot forget the long-term issues if prices are too low (lack of investment as seen in lengthy periods in the 1990s until the food crisis of 2008). It is the old economics lesson coming back to haunt us. The solution for low prices is low prices as this leads to a fall in supply (scarcity). Subsequently, when prices rise, the solution for high prices is high prices, as this delivers the investments needed to raise supply. In the end, one should probably fear low prices more than high prices as the world could once again lose focus of the idea that, without an ample food and water supply, markets quickly realize the value of all things scarce.

Jeremy Zwinger

Jeremy Zwinger
Publisher

* The opinions expressed here are those of the author and do not necessarily reflect the views of the International Rice Research Institute.

U.S. aids poor Asian farmers

JOHN R. LEEPER

PUDDLING in Malaysia.

In the face of unrelenting pressure on Asian rice farmers to grow more rice to feed the poorest people in the region, a US$300 million fund-raising campaign was launched on 22 April 2010 in the United States.

The campaign supports new breakthroughs in rice research and their delivery to rice farmers, educational and training scholarships, the building of world-class scientific facilities, and the protection of thousands of unique rice varieties.

These activities aim to help farmers grow more rice in an environmentally sustainable way, helping them feed their families and communities and boosting economies to improve the lives of Asia's millions of poor rice farmers and consumers.

Organized by the International Rice Research Institute (IRRI) to mark its 50th anniversary in 2010, the 5-year campaign has already raised more than $90 million, with just over $50 million provided by the Bill & Melinda Gates Foundation. "We are very grateful to the Bill & Melinda Gates Foundation for giving the campaign such a strong philanthropic start," said IRRI Director General Dr. Robert Zeigler. "Now we'd like to invite all those in the U.S. who care about the 3 billion people in Asia who depend on rice for life to join the campaign."

IRRI is partnering with the San Francisco-based Give2Asia, which will accept tax-deductible gifts from U.S.-based donors in support of the campaign, which will run until 2012.

Source: www.irri.org

Going mobile

ISAGANI SERRANO

SEALED WITH a handshake. *From left to right:* Department of Agriculture (DA) Agriculture Training Institute Director Asterio Saliot, DA Secretary Bernie Fondevilla, IRRI Director General Robert Zeigler, and Dr. Roland Buresh,IRRI's principal scientist.

After much anticipation, the ceremonious signing of the Memorandum of Agreement for the Interactive Voice Response (IVR) mobile extension service on nutrient management for rice between the International Rice Research Institute (IRRI) and the Philippine Department of Agriculture (DA) took place on 4 June 2010. This agreement marks a new age in digital extension services as DA Secretary Bernie Fondevilla comments, "I look forward to the day when Filipino farmers are tech-savvy."

This project will be piloted across five major rice-growing regions in the Philippines. It will allow farmers and extension workers to access fertilizer recommendations directly from the new Nutrient Manager decision tool through their mobile phones. The launch date for the service is targeted for mid-July—to coincide with IRRI's training program.

For more detailed information, see the *Grain of Truth* article on page 46 and watch for the next issue of *Rice Today*, which will feature a full-length article on the suite of Nutrient Manager digital extension tools.

Source: IRRI

Certified Crop Adviser program begins in India

The launch of a Certified Crop Adviser (CCA) program in South Asia is targeting the professional development of agronomists at private companies, nongovernment organizations, and public-sector agencies.

Certification is said to be an effective way to improve delivery of technical information, products, and services from agronomy professionals. The CCA program has begun in India, offering the first exam in November 2010. It will soon expand to Nepal, Pakistan, and Bangladesh.

Bringing the CCA program to South Asia is the result of collaboration with the American Society of Agronomy and the Cereal Systems Initiative for South Asia (CSISA).

Source: http://vertexcareer.com and http://nation.ittefaq.com

BRIEFLY

Hybrid and flood-tolerant rice hit Bangladesh

Four new varieties of rice have been released for Bangladesh's *aman* or wet season, when rice is planted before the monsoons in July and heavily depends on the rains for irrigation.

The new varieties are submergence-tolerant BRRI Dhan-51 and BRRI Dhan-52, and Hybrid-4 and Hira Dhan-10, both the first-ever hybrid rice varieties for the *aman* season.

The Bangladesh Rice Research Institute (BRRI), in collaboration with the International Rice Research Institute (IRRI), developed the two submergence-tolerant varieties. BRRI developed Hybrid-4 and a private company—Supreme Seed—developed Hira Dhan-10.

The National Seed Board has certified all four new varieties. Farmers can expect to get the seed within 2 years after seed production and marketing on a large scale take place. Farmers in some northern districts already have seeds of BRRI Dhan-51 and BRRI Dhan-52 as they have cultivated these two varieties on a trial basis in the last few years. Around 20,000 farmers in Sirajganj, Rangpur, Kurigram, and Gaibandha may cultivate these varieties this season, said Dr. Khairul Bashar, head of the Genetic Resources and Seed Division of BRRI.

Source: www.thedailystar.net

Hybrid rice gains acceptance in the Philippines

New varieties of hybrid rice introduced to the Philippines in 2010 have been met with increased market acceptance, a government official said.

Frisco M. Malabanan, director of the Agriculture Department's Ginintuang Masaganang Ani (GMA) Rice Program, told reporters that new hybrid rice varieties have been introduced this year by the Philippine Rice Research Institute (PhilRice) and its partners the International Rice Research Institute (IRRI), Bayer CropScience, Syngenta AG, Devgen NV, Pioneer Hi-Bred International, Inc., Bioseed Research Philippines, Inc., and Seedworks Philippines.

"These companies will not enter the local market and introduce new varieties if the technology is not commercially viable in the first place," Mr. Malabanan said.

Source: www.bworldonline.com

IRRI

HYBRID rice.

European Union drops GM rice test

The European Commission has officially repealed the regulation that requires U.S. long-grain rice to be tested for the Liberty Link 601 (LL601) genetically engineered trait on 11 June 2010. Citing in part the success of the U.S. rice industry's Seed Plan and the testing of rice seed and harvested rice, the repeal stated that the 2006 conditions that caused the emergency measures to be enacted no longer prevail. The Commission has directed all European Union member states to conduct unspecified random testing on U.S. long-grain rice for the LL601 trait.

In August 2006, trace amounts of the LL601 trait were found in the commercial long-grain crop. This decimated U.S. long-grain rice sales to the European Union—reducing exports from 300,000 tons in the previous marketing year to well below 100,000 tons in recent years.

Source: www.californiafarmer.com

K. OROU

AfricaRice develops new rice lines from *Oryza glaberrima*.

New research focuses on African rice

Long considered a poor cousin of Asian rice, African rice will be the focus of a major scientific initiative to break the yield ceiling in farmers' fields.

New findings from the Africa Rice Center (AfricaRice) counter the view that African rice, preferred by local consumers for its taste, is inherently lower yielding than Asian rice. They also confirm its remarkable adaptability to harsh growing conditions in Africa; hence, it is valuable in developing improved varieties suited to a changing climate.

African rice—scientifically known as *Oryza glaberrima*—is grown in scattered pockets of land in the region and it is already near the brink of extinction. Most African rice farmers have abandoned their native varieties for high-yielding Asian rice (*O. sativa*).

"African rice was initially ignored by mainstream research," said Dr. Koichi Futakuchi, an ecophysiologist at AfricaRice. "Later, when scientists realized that it had valuable characteristics, they began using it as a source for desirable traits to improve the higher yielding Asian rice. But now, for the first time, we're reversing the gene flow, extracting desirable traits from the Asian rice and transferring them into the African rice."

Source: www.eurekalert.org

For more news, visit
http://ricenews.irri.org

Recognized

Sushil Pandey, senior agricultural economist and program leader for Rice Policy Support and Impact Assessment for Rice Research at the International Rice Research Institute (IRRI), was awarded the title visiting professor in agricultural economics by the Huazhong Agricultural University (HAU) on 13 April 2010.

This title was conferred in recognition of his contribution to the development of a close partnership between HAU and IRRI during the past 10 years in economic studies of rice systems in China. The work covered economic analysis of drought and a study of upland development strategies for improved food security and environmental protection.

Crisanta Bueno, IRRI assistant scientist, was named winner of the 2009 Nationally Recruited Staff Award for Outstanding Scientific Achievement. She was honored for her two papers documenting a comprehensive and complex analysis of the higher performance of IRRI hybrids over IRRI inbreds.

Keeping up with IRRI staff

IRRI welcomed visiting research fellows **Ming Li**, **Manish Raorane**, and **D. Nageswara Rao**; internationally recruited scientist **Digna Manzanilla;** nationally recruited assistant scientists **Charo Pagdonsolan** and **Jeny Raviz;** postdoctoral fellows **Rosa Paula Cuevas**, **Rosemary Mutegi-Murori, Dule Zhao, Robert Coe**, and **Agnes Padre**; visitors and collaborators **Abhinav Jain, Mohamed Mubarak Ahamadeen Nagoor**, **Jianyuan Yang,** and **Yulia Goncharova**; and consultants **Monina Escalada** and **Michael Jackson.**

IRRI bid farewell to senior scientists **Thomas Metz** and **Rachid Serraj**, scientist **Yasukazu Hosen**, and visiting research fellows **Syed Jabbar**, **Nobuko Katayanagi**, **V. Ravichandran**, and **Kay Sumfleth**.

Michael Jackson retired from IRRI after almost 19 years of outstanding service to the organization. Dr. Jackson headed the Institute's Genetic Resources Center (GRC) for nearly 10 years before assuming the position of director for Program Planning and Communications (DPPC), formerly known as Program Planning and Coordination, in 2001. Dr. Jackson's appointment marked an important phase in IRRI's continued efforts to improve and develop its research program through sustained funding.

Former IRRI BOT member retires

Ronald Phillips, of the University of Minnesota, is retiring after 42 years with the faculty of the Department of Agronomy and Plant Genetics. Dr. Phillips served as a member of the IRRI Board of Trustees from 2004 to 2009.

Throughout his career, Dr. Phillips combined the techniques of plant genetics and molecular biology to enhance the understanding of basic biology of cereal crops and to improve these species by innovative methods. His research program at the University of Minnesota was one of the early programs in modern plant biotechnology related to agriculture.

Moving on

Sam Fujisaka passed away on 13 April 2010 in Cali, Colombia, after succumbing to pancreatic cancer. He was 60. Sam worked for IRRI as a visiting scientist and agricultural anthropologist from 1986 to 1994, and since worked in various capacities with the International Center for Tropical Agriculture in Colombia.

During his stay at IRRI, Sam advocated looking at farming from the point of view of farmers. He believed that IRRI and other national programs could benefit greatly by listening to farmers from the start rather than consulting them last. "We need to focus more on what farmers are doing long before IRRI came along," he said.

He will be remembered as an inspiring and highly respected scientist with tremendous commitment to his work.

TRAINING COURSES AT IRRI

Introduction to R: Data Manipulation and Statistical Analysis

IRRI IT Training Room, Los Baños, Philippines
26-30 July 2010

This course introduces participants to the basics of the R Statistical Computing Environment under Windows. The R Statistical Computing Environment is a free, open-source software that consists of a set of core modules that make up the R distribution, as well as more than 500 packages contributed from various sources. R is designed in a computer language that requires participants to work with a command-line interface—using the R language.

The course will provide lectures and hands-on practical exercises. Participants must be computer proficient and familiar with basic statistical methods, including hypothesis testing, analysis of variance and regression, and correlation analysis; or, they should have at least attended the Basic Experimental Designs and Data Analysis course.

Intermediate R: A New Course

IRRI IT Training Room, Los Baños, Philippines
23-27 August 2010

This course will include multiple linear regression, logistic regression and generalized linear models, principal component analysis, multidimensional scaling, cluster analysis, and meta-analysis. Attendance in the Introduction to R course is a prerequisite.

Rice Breeding Course

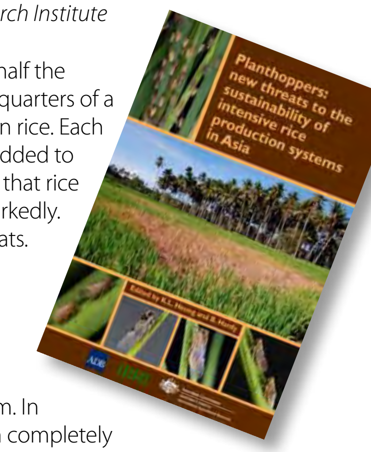
IRRI Training Center, Los Baños, Philippines
1-17 September 2010

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

For more details, contact Dr. Noel Magor, head, IRRI Training Center (IRRITraining@cgiar.org) or see **www.training.irri.org.**

Planthoppers: new threats to the sustainability of intensive rice production systems in Asia

Edited by K.L. Heong and B. Hardy
Published by International Rice Research Institute



Rice is the staple food for around half the world's people and about three-quarters of a billion of the world's poor depend on rice. Each year, 50 million rice consumers are added to the world population, which means that rice production will need to increase markedly. But rice production faces many threats.

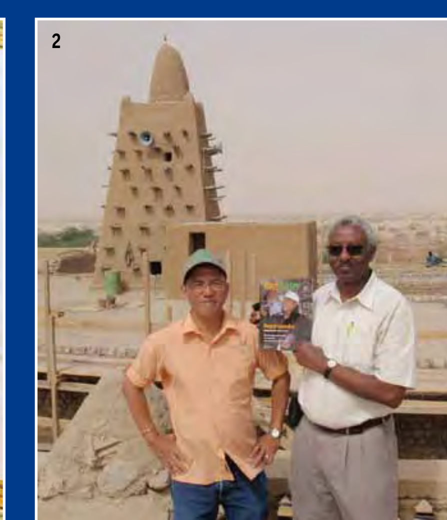
Rice planthoppers, brown and whitebacked planthoppers, and the small brown planthopper, are pests that are normally kept in check by naturally occurring biological control services in the rice ecosystem. In large populations, planthoppers can completely destroy crops, an effect called "hopper burn." In addition, planthoppers are known vectors of virus diseases: grassy stunt, ragged stunt, rice dwarf, rice black streak dwarf, and, more recently, southern rice black streak. Plants infected by these viruses become stunted and have zero yield.

Problems from all three species of planthoppers have intensified because of increased fertilizer and pesticide misuse, climate, changes in rice varieties (hybrid rice), and cropping patterns. Growing insecticide resistance, especially to imidacloprid and fipronil, is also a concern.

Planthoppers can be controlled by using integrated pest management, reducing unnecessary insecticide use, and breeding resistant varieties.

We hope that the information in this book will help in shifting paradigms in planthopper management and chart new sustainable approaches that will reduce the vulnerability of farmers' rice fields to hopper burn, virus infections, and economic losses. For more up-to-date information on rice planthoppers, visit http://ricehoppers.net/.

RiceToday around the world



1. THE GOLDEN year. Communication and Publications Services staff members celebrate IRRI's 50th anniversary.
2. ALL THE way to Timbuktu. (*left to right*) IRRI's plant breeder Glenn Gregorio and plant physiologist Abdelbagi Ismail take *Rice Today* to Djinguereber Mosque, Timbuktu, UNESCO World Heritage Site, Mali, Africa.

California climate change

by **Jeremy Zwinger** and **Kent Mckenzie**

A marketing and research perspective concerning the wet weather in California and its impact on rice production

From a rice marketing perspective

Six months ago, we planned to write an article about the dry weather in northern California and its impact on rice crops. To our surprise, however, by the time we got to writing this story, the drought that had beleaguered the state for almost 4 years had ended with the recent exit of El Niño. The arrival of La Niña phase has brought more rains (above the average rainfall in the rice valley), helping replenish water reservoirs.

One could say that the wet weather was a blessing—especially after suffering from drought since 2006. But, the timing of the rains has added a new twist to the issues faced by rice farmers in California. They must now deal with the "chaotic" or unpredictable nature of these rains.

RAIN CLOUDS cluster over a rice valley on 3 June 2010, which is unusual in California during this time of the year.

THE RICE TRADER

Rains in California came during the land preparation period, thus delaying operations. Crops were planted late as a result. Planting fell about 2–3 weeks behind the normal schedule, with a substantial percentage of seeds sown after 1 June, which is the generally accepted deadline for planting. This delay in planting caused more problems in the application of chemicals and nitrogen, as farmers rushed in planting the crops to catch up with the "normal" schedule.

The weather has remained wet, with sporadic rains mixed with cold spells. Consequently, there has not been enough heat to produce a good crop. To note, heavy rains in early June are an unusual occurrence. Because of such weather conditions, yields are expected to fall by 5–10% in the coming year. Many still hope that ideal conditions will return to help boost the crops to normal yields in the months ahead.

From a marketing perspective, these conditions have put California in a tight spot as it is the only origin of japonica rice left standing in the export market. Australia, a source of japonica rice before the drought wiped out much of its crop, estimates that it will produce approximately 200 thousand tons in 2010-11, but, with domestic usage pegged at around 400 thousand tons, Australia cannot be expected to return to exports any time soon. Egypt is another origin of the medium grain, but it remains reluctant to export. It will likely keep a lid on commercial exports, as it is 100 thousand tons less in exports on lower production. An export ban has reportedly been placed for 2010-11. Lastly, China remains focused on its internal needs, especially when its northern region—known for producing these round grains—is suffering from drought conditions.

Interestingly enough, the southern U.S. planting region for medium-grain rice (Arkansas, Louisiana, etc.) is said to be expecting a lower output (as much as 30–40%) in the coming year. California's water sale of about 5% of the industry's rice fields (23,000 acres or 9,308 hectares) has also subsequently decreased the harvestable area for 2010-11 crop production. The wet weather faced in California, along with the water sale, can possibly cause a 15% shortfall in production, making things difficult for regular importers of the grain.

Mr. Zwinger is the president and CEO of The Rice Trader Inc.

From a research perspective

Inasmuch as the recent rains in California have caused anxieties among producers, researchers, on the other hand, are more upbeat about the situation. Breeders, most especially, often use these occasions to engage in experiments that could help in developing new varieties that can weather such changes in the climate in the future. Naturally, scientists often seek different suboptimum production environments that allow them to identify superior or inferior lines to develop lines that will provide more stable yields over years of production. These may include making special nurseries to test for cold tolerance, disease, salinity, drought or flooding, and other conditions possible in different regions or locations. They do this at a considerable expense of time, effort, and cost. When a bad year is encountered in a specific region (such as the late cold spring this year in California) or even in a particular nursery, they take advantage of the screening treatment that the weather provides and make a special effort to collect data such as seedling vigor, stand establishment, early growth, cold response, cold-induced sterility, and delay in maturity. This practice can help identify or confirm a superior or inferior variety, line, or production practice.

The poor conditions for growing rice are not good for producers and can jeopardize the yield potential in nursery tests. Nevertheless, breeders do take advantage of this opportunity for selection. Long-time Rice Experiment Station breeder Carl Johnson used to say, "If you get lemons, make lemonade." He was always interested in how materials performed in a "rough environment," which frequently refers to our nurseries in cold locations. This spring is going to test how some of our newer releases will perform, and we will measure their production stability under nonoptimum spring conditions.

Dr. McKenzie is a plant breeder and director of the California Rice Experiment Station.

Back to basics

Story and photos by **John R. Leeper**

Improving yield by controlling weeds

Rice is a major food crop in the world and it would be safe to assume that it will remain the world's leading food crop, with more than half the world's population dependent on this cereal for nutrition and calories. The global supply of rice, however, is falling short of demand. Rice production under current inputs and technologies is expected to fail to meet the projected demand arising from population growth. Increasing area may help improve production, but boosting yields is more practical given the limited land resources.

The Green Revolution that started in the early 1960s specifically focused on increasing rough rice yields globally by developing new, improved, high-yielding conventional varieties. But, it may be well worth noting that improving yields can also be achieved through simple and practical means, such as weed control.

Early control

Roy Smith, a former weed scientist at the University of Arkansas, documented that early-season grass and mid- to late-season broadleaf weed and sedge infestations affected rice yields the most. They directly compete with rice for nutrients, sunlight, space, and water; contaminate harvested grains; and even interfere in harvesting activities. Weeds can also indirectly affect yield by serving as reservoirs for insect and disease infestations.

Although removing weeds can be delayed, early action is advisable. Controlling them late in the growing season, which involves hand weeding or ground application of herbicides, can damage the crop (when farmers walk through the field), hence reducing yields.

Crop rotation

Continuous cropping of rice is commonly practiced for many reasons around the world. This, however, is not good. Growing rice after rice creates an environment favorable to weeds, especially types most competitive to rice, that is, weedy rice and the *Echinochloa* species. Rotating with an upland crop such as soybean, peanut, melon, mungbean, or sweet potato helps prevent weeds from thriving in the fields. A soybean-rice rotation, for example, has been proven useful in reducing weed pressure and increasing yield. Weeds can be controlled using the herbicide glyphosate in Roundup Ready soybeans.[1] Rotating to a legume also has the added benefit of replenishing nitrogen in the soil.

Land leveling and flooding

Weed growth can also be managed better by adopting good land preparation and water management practices. Disking the field dry followed by flooding and puddling has been effective because the process levels the field, kills existing weeds, and removes the dirt clods that may otherwise remain above the water and become "islands," on which weeds can grow.

The ability to manipulate water within the paddy is critical. Water needs to be rapidly brought into the field—its depth maintained at an appropriate level—and removed when necessary. Soon after a flood is created, an anaerobic condition is established. Since most weeds will not grow under anaerobic conditions, the water acts as a preemergent herbicide.

Secrets in planting

Farmers could also keep in mind that every rice variety has an optimal planting rate,[2] at which it is most competitive with weeds. Planting too few seeds per hectare gives weeds space and time to grow and compete with rice. Hence, short-statured and semidwarf erect varieties need to be more densely planted to shade out and more aggressively compete with weeds. Furthermore, planting too few seeds per hectare forces rice plants to fill in more space by producing more tillers. If a rice plant produces a lot of tillers, the grains on the early tillers will ripen before the late ones and result in poor grain quality at the time of harvest.

Planting pregerminated seed onto exposed mud or into the water, then draining the field, is also a good practice as it gives the rice seeds a head start on germinating weeds. Once the rice has established a root system, it is beneficial to apply a preemergent herbicide in combination with a broad spectrum of contact herbicide before establishing a permanent flood within 36 hours. With this technique, the rice becomes less susceptible to preemergent herbicide injury and the emerged weeds are smaller, requiring less herbicide. Moreover, the application of preemergent herbicide combined with permanent flooding provides better residual weed suppression.

[1] Glyphosate-resistant soybeans.
[2] The best number of seeds that can be planted per area, allowing rice plants to later grow and maximize the space and prevent weed encroachment.

HAND SOWING pregerminated rice seeds into the mud is a common practice among small landholders in Thailand.

WOMEN IN Kerala, India, hand-transplant rice into the field.

Levee weed control

Levees can be constructed during each cropping or left as permanent structures in the rice fields. These embankments help manage water movement and depth. Oftentimes, however, weeds grow in these levees and become sources of seeds, pathogens, and insects that infect or infest current and future crops.

Permanent levees are typically not planted with rice, and yet have a diverse complex of weeds, including perennial weeds. Burndown herbicides are typically used to control weeds in these areas. However, permanent levees are not cleaned of weeds often enough in fear of herbicides drifting and contaminating rice crops.

Controlling weeds on temporary levees is also important. Moreover, leaving the levees weedy, especially during harvest time, can foul a mechanical harvester's cutting blade—slowing harvesting because the blade must often be cleaned of entangled weeds—and, again, contaminate the harvested rice, resulting in lower grade rice at the mill.

Unlike permanent levees, however, temporary levees within a field may or may not be planted with rice. One advantage to planting a temporary levee with rice is that, once the rice fills in, it can shade out and displace the weeds. Needless to say, the weeds on the levee need to be controlled before the rice fills in. In treating the weeds, farmers must bear in mind that the levee is an upland situation and the weeds may differ in both species and growth stage from the paddy weeds. So, this may require levees to be treated separately from the paddy with different herbicide combinations. Planting rice on temporary levees also has the added advantage of increasing yield per hectare.

Hand weeding

Among small landholders, hand weeding is the oldest and most common direct weed control method. It is considered an inefficient and tedious job as it requires farmers to enter the field many times and demands hundreds of labor-hours per hectare to finish. To make matters worse, some weeds such as *Echinochloa* and *Ischaemum spp.* mimic rice, making it more difficult for farmers to distinguish the rice from the weeds. In some processes of intensive hand weeding, the crop gets damaged, thus affecting yield.

An alternative to laboriously roguing the weedy rice plants from the paddy is to delay taking action until they begin to head. At that stage, the weedy rice is typically taller and more advanced than the rice crop. Simply cutting off the panicles before the weedy rice grains mature will eliminate those seeds from infesting future crops. The drawbacks to this practice, however, are that the weedy rice has already competed with the rice for resources and the late-stage rice gets damaged in the process of removing the weedy rice panicles.

Herbicide management

In the last 10 years, rice farmers have benefited from a succession of new herbicides introduced in the market. Although these products include different chemical classes and modes of action, they share attributes that differentiate them from earlier products (lower use rates, narrower spectra favoring control of larger grasses) that have shaped their use and driven shifts in the weed spectra. However, there is no magic bullet. Even with all their positive attributes, these chemistries have their weaknesses. Nevertheless, in spite of these and other problems, farmers have more recently tended not to worry about weeds in their rice until it has begun to tiller. In putting their trust in these new products, they have forgotten Dr. Smith's work showing the yield benefits of early weed control.

Incorporating the new chemistries into an early weed control strategy preserves their use. Properly mixing herbicides with varied modes of action and applying them early on smaller weeds is like giving the weeds a one-two punch, which thus provides better control than applying higher dosages of just one product.

Educated use

Two crucial factors ensure the educated use of herbicides: the first one is to understand the products' chemistries (type of activity: preemergent, contact, residual, etc.; weed control spectrum; and proper timing). The second involves application and coverage. It is always best to use a multiple-nozzle boom with the proper nozzle tips, and apply the appropriate amount of pressure.

Practical weed control is about getting back to the basics. Again, it is best to control weeds early; employ cultural, nonchemical controls when possible; and combine herbicides with different uses.

Using nonchemical cultural controls, which means reducing weed pressure, is always a sound practice. It reduces input costs and dependence on chemicals; hence, it is better for the environment, and saves on chemical herbicides.

Thus, controlling weeds early is a good practice from a yield enhancement perspective. It requires less herbicide to control smaller weeds—which is good for the environment and farmers' pockets.

Dr. Leeper has worked globally in rice for over 25 years focusing much of his effort on weed control tactics under different agronomic systems. He is currently the rice technology leader for RiceCo International, Inc.

For the full article, visit http://snipurl.com/xp43m

Catching the rains

by **Edward Pulver, Santiago Jaramillo, Sara Moreira,** and **Gonzalo Zorrilla**

Central America transforms its rainfed farms to irrigated systems through water harvesting

Although rice production in the Latin America and Caribbean (LAC) region is minor within the global context, rice is the most important food crop in the region. Annual production is approximately 26 million metric tons of paddy from a harvested area of more than 5.6 million hectares. The LAC region (including Mexico), however, has a net deficit of nearly 2 million tons. Production consists of a mixture of irrigated and rainfed ecologies, with irrigated rice occupying approximately 50% of the area but accounting for more than 70% of total production. The areas of major concern are Central America and Mexico, which have a net annual rice deficit of nearly 1.5 million tons of paddy. These countries, which usually incur deficits, depend on rainfed rice, similar to Africa and parts of Asia.

National programs in the region have released many varieties but yields remain low and unstable; hence, imports continue to soar. All countries in Central America have a rainy season that starts in May and extends until November, with a marked dry season during December to May. The dry season has very high solar radiation, often exceeding 20.9 megajoules per square meter per day, allowing yield potentials of 8–12 tons per hectare. In contrast, solar radiation during the rainy season varies between 13.8 and 15.5 megajoules per square meter per day, limiting yield to about 4 tons per hectare even with irrigation or improved crop management.

Most on-farm demonstration plots from the Latin American Fund for Irrigated Rice (FLAR) agronomy program showed that yields of 8–10 tons per hectare are feasible, but only during the dry season—provided there is irrigation. This limits the technology to only a few farmers who have irrigation and excludes a vast number of small rainfed rice growers who depend on rice and other food crops for income. FLAR, with its partners, the Mexican Rice Council, the Nicaraguan Rice Growers Association, SENUMISA Company in Costa Rica, and the International Center for Tropical Agriculture, with support from the Common Fund for Commodities (CFC), innovatively converted rainfed agriculture to irrigated production and took advantage of the vast hydrological resources. The transformation of rainfed agriculture to irrigated agriculture is based on water harvesting, in which excess rainwater during the period of high precipitation is captured and stored in reservoirs and then used for irrigation during the highly productive dry season.

This pilot project focuses on southern Mexico, Nicaragua, and Costa Rica, which represent the larger rainfed ecology in Latin America. Most countries in this region have vast quantities of renewable water, but failure to catch and maximize the use of excess rainwater for irrigation inhibits development and increases dependence on high-risk rainfed agriculture. Simple water-capturing techniques plus adequate storage can provide sufficient water resources for irrigation during the dry season. Catching and making use of rainwater *in situ*[1] is termed "rainwater harvesting." The captured water—stored in reservoirs—can be used to supplement irrigation in areas that suffer from periodic droughts or for production during the dry season when climatic conditions are more favorable for high yields.

Water harvesting is not new. The Americas have approximately 1 million hectares of irrigated rice grown per year in the temperate areas of southern Brazil and Uruguay using simple on-farm water catchments. Small-scale water harvesting and storage facilities should not be confused with large-scale irrigation schemes based on constructed river dams that form large lakes that often cannot be maintained and, as a result, harm the environment. Despite being simple small catchments, building these facilities needs attention to a location, which requires hydrogeological analysis and also topography, climate, and soil chemical and physical data.

The process starts with proper site selection that considers soil type, geology, topography, source of water supply, and public safety. The suitability of a catchment site depends on the ability of the soil in the area to hold water. Soil made of clay or silty clay is excellent for catchments and must contain at least 20% clay by weight to prevent excess seepage.

Land topography is the single most significant factor that influences the costs of constructing catchments. For simple economic reasons, catchments should be located where the largest storage volume can be obtained and where there will be less soil movement to build a small dam. A dam built between two ridges crossing a narrow section of a valley allows a relatively large area for the catchment to be constructed with minimal soil movement (Fig. 1). The size of the reservoir should be relative to the size of the watershed (drainage area). This allows runoff of excess water to the site. The information on hydrological balance, amount of runoff, and rate of infiltration is important for estimating the area required to fill the reservoir. Poor attention to water control structures is often the main cause of a dam failure. Dam construction begins with the construction of a cutoff trench immediately under the dam site that is filled with heavy clay and compacted to prevent excess seepage under the dam structure.

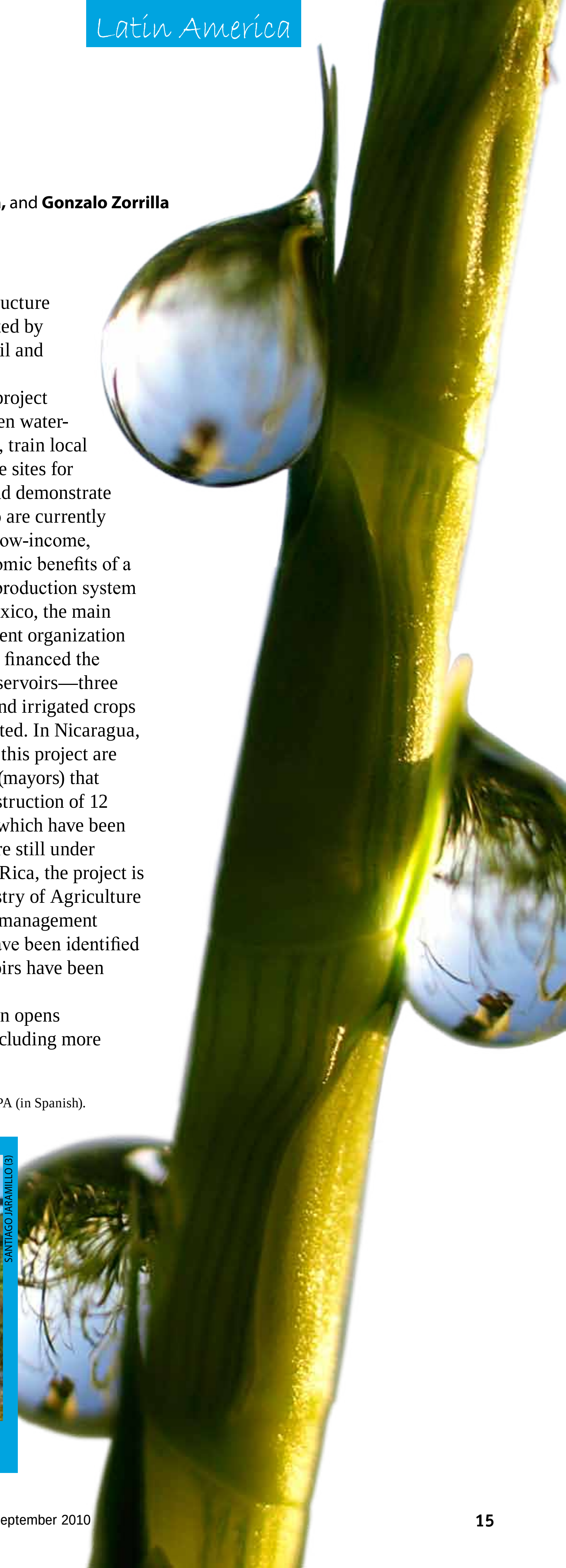
Gravity irrigation is facilitated by installing pipes (reinforced polyvinyl chloride pipes), which are embedded in concrete with reinforced metal bars, at the base of the dam. The opening of the tubing within the reservoir is fitted with a small filter structure to prevent the entry of debris that can clog the pipe. After installing the tubing, soil is compacted around the concrete structure and the dam is completed by continuous layers of soil and compacting.

This FLAR-CFC project aims to introduce proven water-capturing technologies, train local staff to identify suitable sites for catchment facilities, and demonstrate to small farmers—who are currently confined to high-risk, low-income, upland rice—the economic benefits of a diversified rice-based production system under irrigation. In Mexico, the main research and development organization of the government[2] has financed the construction of four reservoirs—three have been completed and irrigated crops have already been planted. In Nicaragua, the main supporters of this project are the local governments (mayors) that have helped in the construction of 12 pilot reservoirs, six of which have been completed, while six are still under construction. In Costa Rica, the project is supported by the Ministry of Agriculture and the national water management agency. Fifteen sites have been identified and designs for reservoirs have been prepared for all sites.

Access to irrigation opens many opportunities, including more

SANTIAGO JARAMILLO (3)

Fig.1. The process of constructing reservoirs for harvesting rain water in Jalapa, Nicaragua: (a) dam site before construction; (b) dam finished; (c) reservoir filled.



[1] A Latin word that means "in its usual environment."

[2] Ministry of Agriculture, Livestock, Rural Development, Fisheries, and Nutrition, or SAGARPA (in Spanish).

competitive rice production and diversification into several food crops and other income-generating enterprises, such as fish (Fig. 2). Many crops can be incorporated into a rice-based system, provided irrigation is available. Preliminary data from Nicaragua and Mexico show that bean yields 1.5–2.5 tons per hectare under irrigation—two to five times more than what farmers get from rainfed production. Maize is also highly productive under irrigation during the dry season and, based on initial data acquired from Nicaragua, it can yield 9 tons per hectare or more than triple the yields on the same farm under rainfed conditions. In addition to crops, small catchments offer a chance for fish production during the rainy season when reservoirs are being filled with rainwater.

Fig. 2. High-yielding irrigated agriculture: (a) rice; (b) farmer Joaquín González in Jalapa, Nicaragua, in his irrigated maize field; (c) harvesting beans; (d) fish production (tilapia).

Dr. Pulver is a U.S. native who currently works as the coordinator of FLAR's Water Harvesting Project in Central America. Engr. Jaramillo is a Colombian agronomist who is directly responsible for the construction of reservoirs, irrigated agriculture, and fish production. Engr. Moreira is a Nicaraguan systems engineer in charge of the project's administration and of the institutional coordination among local institutions. Engr. Zorrilla is an Uruguayan agronomist and is the executive director of FLAR.

Shift to rice? by Mairson R. Santana

Rising domestic demand for rice in Brazil, not to mention its lower cost of production, may soon see rice replace soybeans as the primary crop

The upland system in Brazil is responsible for two-thirds of the planted rice area and one-third of total actual rice production. This system has become vital in order to expand soybeans, maize, and cotton. Rice is planted during the first 2 years before the establishment of soybeans because it can withstand acidity and aluminum in the soil. A total of 1.3 million hectares of rice and 4.9 million hectares of soybean span over Brazil's states, namely, Mato Grosso, Rondônia, Pará, Maranhão, Piauí, Goiás, and Mato Grosso do Sul.

Upland rice production strongly depends on the dynamics of the soybean market—the main crop in the region. A decrease or increase in rice area depends on the price of soybeans every year. Because of a fair amount of area allotted to soybeans, farmers can rotate soybean with rice. Moreover, more than 20 million hectares of degraded pasture can also be used to produce rice. Needless to say, the potential to cultivate and increase rice production is very high as long as proper funding and good marketing strategies are in place. The regular rains from October to April allow farmers to plant a second crop on top of harvested soybean fields. Some farmers plant rice because it costs less to produce than producing soybean and maize. Moreover, growing rice can reduce nematodes in soybean areas, maximize areas for crop rotation, renew pastures, increase profitability, as well as meet consumer demand.

The challenge now is to increase production at a time when funding and liquidity are tight. Planting has reflected this low liquidity at the time of sale because of the use of "pirated" seeds. These seeds rob research and breeding of investments. This situation can, however, be improved through better price transparency, the availability of forward and futures contracts, as well as through efforts to grow export markets that leverage rice availability from the Rio Grande do Sul and Santa Catarina regions.

FIELD PLANTED with AN Cambará in Paracatu, Minas Gerais, Brazil.

Upland rice has returned to the limelight with the market release of variety AN Cambará, which meets the needs of Brazilian consumers. AN Cambará has good yield, is tolerant of drought and different soil types, has good fertility and consistent pH levels, and has excellent grain and cooking quality appropriate for the Brazilian market. Farmers also like the results of the yield capacity of AN Cambará and the more recent availability of hybrid AN 9001, which can yield 8–9 tons per hectare of rice in areas where soybeans can produce only 3.5 tons per hectare. These developments add new promise and potential to the ability of Brazil's rice production to meet rising domestic demand.

Mr. Santana is an agricultural engineer who currently works as the director of the commercial department of Agro Norte, the largest private seed company for upland rice in Brazil.

Pressure in the South

by Bruno Lanfranco

Lower rice output in the Southern Common Market (MERCOSUR) of Latin America signals new challenges to Brazil and its fellow rice-exporting countries in the bloc

Adverse weather conditions in late 2009 and in 2010 have left central and southern Brazil, Uruguay, northeastern Argentina, and southeastern Paraguay, where two-thirds of the area and more than 85% of the rice production are located, lower in rice output in 2010.

The problems started during the early fall of 2009 when a severe drought spread across the main rice areas of the region and prevented water reservoirs from filling up. This situation continued during winter, causing farmers to abort their initial expectations of increasing rice area. Rainfall in the middle of the planting season further harmed farming activities. When water reservoirs soon recovered, farmers contended with a lack of sunlight next in March 2010—a time when crops were flowering and filling the grains. Consequently, more than 100,000 hectares of the total rice area was lost in the Southern Common Market (MERCOSUR) region during the 2009-10 season. The total harvested area reached only 3.2 million hectares. Yields also suffered. In Uruguay, average yields fell by 11% to about 7.1 tons per hectare (compared with its normal average of 8 tons per hectare). Rio Grande do Sul, Brazil's largest rice-producing state, suffered as well when its yields dipped by 10.5%. In contrast, Argentina's rice production increased, but that was not enough to keep the MERCOSUR region's rice production from declining to 14.3 million tons, revealing an 8% reduction compared to the previous season (see Table 1).

Traders in the bloc

Uruguay is a highly specialized export-oriented rice producer, exporting about 95% of its annual production. It is the largest rice exporter of MERCOSUR and a leading exporter in the world (with a 2.7% market share of global exports). Uruguay's top five clients during the last trading season (March 2009 to February 2010) were Brazil, Iraq, Peru, Turkey, and Cyprus.

Paraguay traded 87% of its rice within the bloc, mainly to Brazil. Even as a traditional net importer, Brazil has become a significant exporter of parboiled rice, especially to Africa, which accounts for 75% of its exports (see Table 2).

Table 2. Volume of rice exported to destinations from March 2009 to February 2010 (thousand tons of paddy equivalent).

Country	MERCOSUR	Americas and Caribbean	Europe	Africa	Asia and rest of the world	Total exports
Brazil	4.5	86.2	90.2	618.5	29.2	828.6
	(0.5%)	(10.4%)	(10.9%)	(74.6%)	(3.5%)	(100.0%)
Uruguay	428.0	147.3	133.0	123.8	411.7	1,243.9
	(34.4%)	(11.8%)	(10.7%)	(10.0%)	(33.1%)	(100.0%)
Argentina	337.3	283.9	22.4	105.5	159.2	908.3
	(37.1%)	(31.3%)	(2.5%)	(11.6%)	(17.5%)	(100.0%)
Paraguay	140.8	15.1	0	5.9	0	161.7
	(87.1%)	(9.3%)	(0.0%)	(3.6%)	(0.0%)	(100.0%)
Total	**910.6**	**532.5**	**245.6**	**853.7**	**600.1**	**3,142.5**
	(29.0%)	**(16.9%)**	**(7.8%)**	**(27.2%)**	**(19.1%)**	**(100.0%)**

Source: Lanfranco, based on official data and personal communications.

DURING NORMAL years, average yields of irrigated rice in the Uruguay River basin are above 8 tons per hectare.

Challenge to Brazil

Brazil has the largest population in the region, putting its total domestic consumption at 12.5 million tons. For years, the country has relied on its MERCOSUR neighbors to supply its needs. This year, it is expected to incur a 1-million-ton deficit. This is bound to increase if Brazil continues to export more than 500,000 tons of rice (mainly to Africa). How Brazil copes with this deficit depends on the bloc's ability to meet its needs.

Given that the net production surplus of Uruguay, Argentina, and Paraguay is expected to reach 2.2 million tons (see Table 3), they should be able to meet Brazil's needs—in theory. But rising exports from the bloc that eat up 1.4 million tons of the surplus leave Brazil with only a little more than 800,000 tons of availability. Hence, it is possible for Brazil to turn to sources outside the region. The entry of cheap rice into Brazil mainly from Vietnam has caused farmers to propose an increase in the common external tariff for rice from 10% to 35% to protect the local rice industry.

To completely meet Brazil's demand in 2010, the other members of MERCOSUR must redirect at least 600,000 tons of their surpluses within the bloc. Relatively cheap alternatives only make this task more challenging. Brazil will likely import up to 200,000 tons of rice (paddy equivalent) from other exporters outside the bloc in the coming months.

Dr. Lanfranco is a senior researcher in the National Agricultural Research Institute of Uruguay.

Table 1. Rice area, yields, and production of paddy rice (2008-09 and 2009-10).

	2008-09 season			2009-10 season			
Country	Area harvested (t/ha)	Average yield (t/ha)	Paddy production (000 tons)	Area harvested (ha × 000)	Average yield (t/ha)	Paddy production (000 tons)	Change in production (%)
Brazil	2,909.0	4.33	12,602.5	2,793.6	4.11	11,485.9	–8.9
• North	386.7	2.42	936.3	399.1	2.49	992.8	6.0
• Northeast	720.4	1.49	1,075.9	687.3	1.54	1,059.7	–1.5
• Central-West	420.0	3.00	1,257.9	358.7	2.98	1,068.0	–15.1
• Southeast	82.9	2.61	216.0	78.5	2.65	207.9	–3.8
• South	1,299.0	7.02	9,116.4	1,270.0	6.42	8,157.5	10.5
Uruguay	160.3	8.01	1,287.2	159.7	7.09	1,148.5	–10.8
Argentina	204.0	6.66	1,358.0	211.6	6.20	1,375.4	1.3
Paraguay	50.0	6.20	310.0	55.0	5.50	302.5	–2.4
Total	**3,323.3**	**4.68**	**15,557.7**	**3,219.9**	**4.39**	**14,312.3**	**–8.0**

Source: Lanfranco, based on official data and personal communications.

Table 3. Supply-and-demand balance sheet for the 2010-11 trading season (thousand tons of paddy equivalent).

	Supply			Demand		
Country	Production	Imports	Total	Consumption	Exports	Total
Brazil	11,485.9	1,460.3	12,946.2	12,446.2	500.0	12,946.2
Uruguay	1,148.5	0.9	1,149.4	63.1	1,086.3	1,149.4
Argentina	1,375.4	4.9	1,380.3	401.3	979.0	1,380.3
Paraguay	302.5	0.6	303.1	172.3	130.8	303.1
Total	**14,312.3**	**1,466.7**	**15,779.0**	**13,082.9**	**2,696.1**	**15,779.0**

Source: Lanfranco, based on official data and personal communications.

Africa seeks "Marshall Plan"* for capacity building

by **Savitri Mohapatra**

African states work together to unlock the region's potential to increase rice production

In view of the severe lack of capacity in rice production, which is throttling the development of Africa's rice sector, participants at the Africa Rice Congress 2010 held in Bamako, Mali, in March 2010 called for a "Marshal Plan" to overcome this weakness.

The Congress brought together nearly 450 participants from 54 countries, particularly from Africa. The participants included rice farmers; seed producers; processors; input dealers; manufacturers of agricultural machinery; national rice research and extension systems; representatives from agricultural ministries, international and advanced research institutes, nongovernment organizations, and the donor community; and other development partners.

The participants took this opportunity to deliberate on strategies to significantly increase rice production in Africa, develop competitive and equitable rice value chains, reduce imports, and enhance regional trade. They enthusiastically supported the newly proposed Global Rice Science Partnership, an initiative of the Africa Rice Center (AfricaRice), the International Rice Research Institute (IRRI), and the International Center for Tropical Agriculture (CIAT) to harmonize national and international rice research agendas worldwide for increased impact in Africa.

R. RAMAN

RICE HAS become a strategic commodity in Africa.

Interestingly, the Congress highlighted that rice has become a strategic commodity that can potentially fuel economic growth and reduce hunger and poverty across the continent. Rice consumption in Africa is growing at 6–7% per year. To meet this demand, Africa imports close to 10 million tons each year, which is equivalent to one-third of the rice traded in the world market, and this costs US$4 billion in foreign exchange.

"Our studies show that the continent has sufficient land and water resources and favorable growth environments to close the gap between Africa's rice consumption and production, and that local rice production can be competitive vis-à-vis imported rice," said Papa Abdoulaye Seck, AfricaRice director general.

He underlined that the capacity of national programs has to be strengthened with support from regional and international organizations. "There has to be increased technological innovations supported by an appropriate policy environment," he added.

The Africa Rice Congress 2010, with a theme "Innovation and partnerships to realize Africa's rice potential," was organized by AfricaRice in collaboration with the national program—the Institut d'économie rurale (IER)—under the aegis of the Malian government.

Under the main theme, the topics included rice genetic diversity and improvement; ecological intensification and diversification of rice-based systems; developing competitive rice value chains; new alliances and tools for rural learning and innovations and policy implications; integrated management of pests, diseases, and weeds in rice-based systems; and rice physiology and modeling.

A major part of the Congress was a forum on "Investing in Africa's rice sector: opportunities and challenges," in which ways to increase investments in the rice sector in Africa particularly through innovative public-private partnerships were explored. Issues such as the need to increase investments for increasing the area under irrigation, improving rural infrastructure, and introducing agricultural mechanization were raised. The forum featured exhibitions of machinery, inputs, and rice products.

**Africa's "Marshall Plan" was largely inspired by the Europe Recovery Program, which was used to re-build Europe after the devastation caused by World War II.*

During the opening ceremony, on behalf of Mali's President Amadou Toumani Touré, Prime Minister Modibo Sidibé presented distinguished service awards to Drs. Jacques Diouf, Eugene Terry, and Kanayo Nwanze for their outstanding contributions to rice research and development in Africa during their respective terms as director general of AfricaRice.

Dr. Getachew Engida, AfricaRice Board chair, presented a plaque of appreciation to President Touré for his government's tremendous efforts to raise rice productivity through the Presidential Initiative on Rice in Mali, which has led to a 50% increase in rice production in the country. Awards for the best presentation per theme, the best poster, and the Most Promising Young Scientist were also presented.

At the end of the Congress, the following key recommendations were made to boost Africa's rice sector:

Investments in Africa's rice sector

1. Africa's rice farmers need to be involved in the definition and implementation of policies that modernize rice farming, lessen the burden on women, and turn it into a viable agribusiness, attractive to young people.
2. National and foreign investments are needed to unlock Africa's tremendous rice potential, while ensuring that this leads to win-win situations for all of Africa's rice farmers and consumers.
3. Sustainable intensification and diversification of rice-based production systems are necessary to meet the demand of Africa's population.
4. National seed regulatory bodies need to be established and/or strengthened to map and meet rice seed demand for target ecosystems and consumer preferences. They should ensure efficient varietal release mechanisms, link public- and private-sector seed producers, and establish functional and decentralized seed control systems.
5. Small-scale enterprises will need support to help them create and sustain a viable seed business. Private medium- and large-size seed companies should play an increasingly important role in high-input systems, especially for hybrid rice seed.
6. Regional economic communities should be strengthened to contribute to harmonizing seed legislation, and import tariffs, and regulating rice imports, in line with the Comprehensive Africa Agriculture Development Programme framework.
7. National governments should lead in promoting public-private partnerships across the rice value chain for adequate production, storage, processing, and distribution infrastructure to produce quality rice for the African market.
8. A global effort to develop targeted technological options to help African farmers to adapt and mitigate the effects of climate change is needed.

Investments in capacity building

9. A "Marshal Plan" by African governments and their development partners is needed to substantially strengthen the training and retention of new staff, while updating agricultural curricula in vocational training schools and universities and ensuring efficient spillover to actors in the rice value chain. Conducive working environments are required to retain an effective level of capacity in agriculture.
10. The Congress initiated the task force concept, a collective research-for-development effort on critical thematic areas in the rice sector, based on the principles of sustainability, buildup of critical mass, and ownership by national systems. AfricaRice was specifically asked to facilitate and animate these task forces.
11. The Congress endorsed the emergence of a Global Rice Science Partnership, an initiative of AfricaRice, IRRI, and CIAT, as part of the revamped Consultative Group on International Agricultural Research, to pool resources, build capacity, and align national and international research agendas, thus enabling greater efficiency and efficacy in rice research.


BOUBACARY CISSE

CONGRESS PARTICIPANTS visit the Office du Niger irrigation rice project in Mali.

WILD FOOD plants such as the water lily abound in northeast Thailand.

GISELLA CRUZ GARCÍA

Wild FOOD

by **Gisella Cruz García** and **Paul Peters**

Rice landscapes have offered farmers more than just rice; their wide array of wild food plants has proven to be an important source of livelihood

Rice fields are important for both rice production and the great biodiversity they possess. Paddy rice landscapes parallel some of the most diverse "natural" systems on Earth, having more than 100 useful associated plant species and an enormous diversity of insects, fish, invertebrates, birds, and small mammals. This biodiversity is essential to the livelihood of poor farmers, who largely depend on it as a "free" source of food, medicine, timber, fuel, and fodder, as well as for manufacturing domestic tools, utensils, and handicrafts. It is free because there is no need to "buy" biodiversity—which is crucial since poor farmers do not have enough money to buy their basic needs from the market.

Biodiversity in rice fields is vital in supporting farmers' livelihood and in regulating ecosystem processes and integrated pest management. As such, this rice landscape can be considered a multiresource agroecosystem. In current terms, the availability of such resources offers multiple ecosystem services.

The collection and consumption of wild food plants from agricultural landscapes have been documented in multiple cultural contexts, illustrating their importance to farming households throughout the world in many agrarian societies. Wild food plants are critical sources of nutrients, flavorings, and local medicinal remedies. They even serve as famine food in times of scarcity. Such plants, which provide a balanced diet, are essential to children and women, particularly those with scarce resources.

In northeast Thailand, the largest and poorest region of the country, wild food plants from rice fields have become essential in ensuring household food security among farmers. These wild food plants are herbs, shrubs, vines, and trees that grow in diverse habitats in the rice landscape. Nevertheless, 30% of these plants are regarded as "rice weeds," which some agronomists suggest should be removed.

Farmers in northeast Thailand also harvest insects, fish, birds, frogs, crabs, snails, and rats from their fields and include them in their diet—representing an important means of saving income. Wild foods (plants, animals, and mushrooms) are an important component of local dishes and the culinary tradition of this region. Furthermore, the economy of many families depends on the commercialization of these resources, which is mainly carried out by women.

Traditional farmers maintain diverse aquatic, semiaquatic, and terrestrial habitats that interact ecologically throughout the rice landscape. Hillocks, shelters, pond margins, roadsides, and tree rows are examples of terrestrial habitats. Dikes—which could be dry or flooded depending on rain/irrigation conditions—constitute semiaquatic habitats. Field ditches and water ponds remain flooded during most of the year, providing aquatic habitats for wildlife. Wild plant communities that consist of trees, shrubs, vines, bamboos, herbs, and/or aquatic plants are different for each of these habitats. The distribution of plant diversity is not only related to the species' water tolerance and life cycle, but also to the different degrees of management they have. The way farmers manage rice landscapes and wild food plants influences their abundance and distribution. Farmers mainly preserve culturally valued species, such as those that are key ingredients of important local dishes or that have multiple uses.

This situation is different in central Thailand, where rice production is more intense and the landscape more homogeneous. In this region, rice landscapes have fewer biodiversity-rich habitats (such as ponds, hillocks, tree rows, and shelters) than in northeast Thailand. The brown planthopper outbreak in 2010 affected the Central Plains of the country (known as the "rice bowl" of Thailand) because of the lack of natural enemies to the hopper, according to Dr. K.L. Heong, expert in integrated pest management at the International Rice Research Institute (IRRI). Biodiversity-rich habitats are important to local farmers and livelihoods because they are also home to the natural enemies in the fields.

In a village in Kalasin Province (northeast Thailand), more than 80 wild food plants are consumed, including tamarind and neem tree; aquatic plants such as water lily, water hyacinth, and water spinach; weeds such as false pepperwort ducklettuce and rice paddy herb (*Limnophila aromatica*); herbs such as amaranth (*Amaranthus viridis*); and vines such as the fetid passionflower (*Passiflora foetida*).

Nevertheless, in the last 20 years, many changes have affected the region such as the intensification of agriculture (including the introduction of agro-chemicals and mechanization), migration of the farming families' younger generation to urban areas to earn extra income, and deforestation. These changes may be a threat to the availability of wild food plants, which clearly are an important source of income that helps sustain livelihoods among poor farmers.

Overapplication of pesticide and herbicide

Biodiversity often puts farmers in a dilemma. On the one hand, they believe wild food plants are healthy; on the other hand, they know these plants are likely to be contaminated by pesticides applied in rice fields and are therefore unhealthy. Most farmers do not collect wild food plants during the 3 weeks following pesticide application. Some, however, have separate fields growing rice and wild food plant collections (where pesticides are not applied at all). A good example is water spinach, which grows in rice-field ditches, dikes, and ponds, and under dry and flooded conditions. This plant is an important component of the poor families' diet and is frequently consumed. Nevertheless, it can also be a weed and a target of common herbicides used in the area.

Migration, labor shortage, mechanization, and loss of biodiversity

In most rice-farming villages in Kalasin Province, many young people opt to move to the main cities to earn more income. This has caused serious labor shortages for rice cultivation. At the same time, mechanization, primarily aimed at saving time and labor, has been increasing. In the mechanization process, there is a clear trend toward landscape homogenization, which eliminates many habitats—such as hillocks and shelters—to facilitate the use of tractors. These areas provide the greatest biodiversity of vegetables, fruit trees, vines, and edible insects. This also results in the loss of a valuable food-medicine source for poor farmers.

Potential loss of traditional knowledge

The trends of modernization threaten traditional knowledge about wild food plant identification, management, preparation, and use. Young people's migration away from rural areas is disrupting common mechanisms of knowledge transfer, because village populations mostly consist of children and their grandparents (adults older than 50). Currently, children learn from their grandparents, but, in the near future, they are likely to leave the village as their parents did. Furthermore, children's food preferences are shifting to vegetables mostly consumed in the cities, for example, cucumber, tomato, lettuce, and carrot.

Given the importance of wild food plants from rice landscapes, the trends in the loss of biodiversity and traditional knowledge are alarming. To preserve wild food plants as a resource for local communities, a holistic and integrated approach to rice landscapes is vital in order to maximize the benefits for resource-poor farmers. In many traditional systems, rice is but one of the many harvests from rice fields. Hence, it is crucial to consider this for local livelihoods, food security, and the environment.

Ms. Cruz García is a biologist who is currently a PhD candidate at Wageningen University and Research Centre, The Netherlands. She has been working as an affiliate research scholar in IRRI's Crop and Environmental Sciences Division since 2007. Mr. Paul Peters is a private agronomist who specializes in tropical agriculture, soil fertility, and water management.

PAUL PETERS

FIELD DITCHES and water ponds provide aquatic habitats for wildlife.

Gonzalo Zorilla

Herons scatter as a farmer comes into his rice field to check the early rice irrigation in Malacatoya, Nicaragua.

For the want of rice

by **Adam Barclay**

The 2007-08 food crisis appears to have accelerated the acquisition by wealthy nations of large tracts of poorer countries' land for food production. Such investments could offer benefits on both sides, but, without appropriate regulations in place, local communities' livelihoods are threatened.

In 2008, the Saudi Binladin Group began negotiations with the Indonesian government to invest US$4.3 billion in 1.6 million hectares in Papua Province, primarily to grow basmati rice for export back to Saudi Arabia. In the same year, China negotiated to lease more than 1 million hectares of rice land in the Philippines. These were two of the largest of a host of similar plans put forward by interests from economically powerful nations that faced serious agricultural challenges in their respective countries and, in the wake of the 2007-08 food crisis, had lost faith in international food markets. And, the deals haven't been restricted to rice. Also in 2008, Korea's Daewoo Logistics Corporation brokered a deal for a 99-year lease on 1.3 million hectares in Madagascar (around half the country's arable land) to grow maize and oil palm.

It sounds like good business and potentially win-win. Wealthy governments or companies buy land and set up large-scale agricultural operations in poorer countries, which have land and water but not the resources, infrastructure, or technologies to do it themselves. With improved tools, the local farmers increase their productivity and get paid (relatively) well for their efforts. The foreign entities take the profits and food back home. The modern technologies and expertise remain in the host country, eventually trickling down to other farmers across the land, resulting in better production and increased wealth.

But not so fast.

To start with, you need to look at the reason behind these deals. In the case of rice, there's simply not enough on the planet. According to the International Rice Research Institute (IRRI), the supply-and-demand equation needs to be such that rice export prices stay around US$300 a ton in the long term (Fig. 1). At that level, poor farmers are able to make a profit but rice remains affordable for poor consumers. To achieve this, "Each year we need to produce an additional 8–10 million tons of rice more than in the previous year for the next 20 years," says IRRI Director General Robert Zeigler. Many rice-dependent countries need to supplement their own production to varying degrees by importing rice. In the 20–30 years up to 2008, thanks to a relatively reliable international market, importing was a safe policy. All that changed, however, during the food crisis of 2007-08, which saw rice export prices more than triple in barely a few months. Suddenly, rice imports became prohibitively expensive. Although things have settled over the past 2 years, prices remain substantially higher than they were before the crisis and many importing countries have had their faith in the market well and truly eroded.

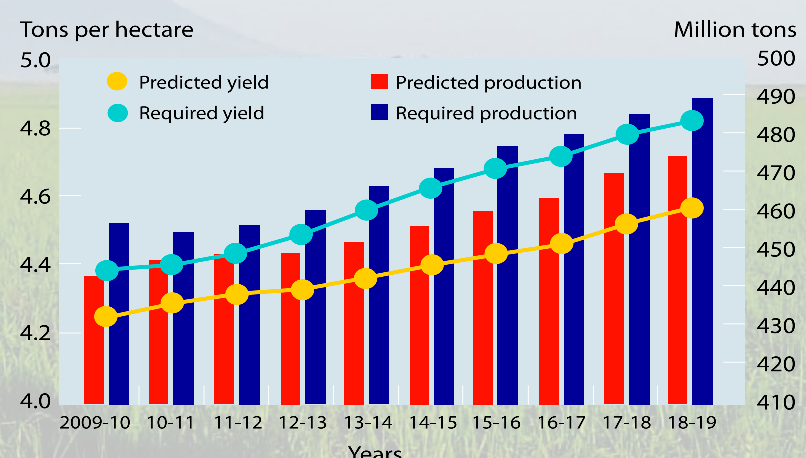


Fig. 1. The growth in production required for rice prices to remain around an affordable $300 per ton.
Data source: International Rice Research Institute

Support for agriculture

The silver lining in the food-crisis cloud has been a long-awaited reinvigoration of support for agricultural research and development. This is helping some importers increase their rice production domestically in several ways, including improved technologies to increase yields on existing rice land, irrigation schemes that allow two or even three crops to be grown per year instead of just one, and additional farming land that was previously unsuitable for rice production (e.g., through the use of salt-tolerant rice varieties). Other strategies—with more potential downsides—include converting to rice production natural ecosystems or land used for other agricultural activities.

Nevertheless, the level of support for public agricultural research remains well below that required to make a real and lasting difference. The Food and Agriculture Organization (FAO) of the United Nations has calculated that, to achieve the Millennium Development Goal of halving the world's hungry by 2015, funding of at least $30 billion is needed every year above the current levels of support for the agricultural sector in developing countries. With the share of international aid directed to agriculture trending downward in recent years (now below 5%; see Fig. 2), official development assistance offers a supplement at best.[1] On the other hand, some economically better-off countries are physically unable to sufficiently increase their domestic production. Countries such as China and several of the Gulf States—burdened variously by large populations, rapidly growing industrial and domestic sectors that put pressure on natural resources, or lack of water (along with a lack of confidence in international markets)—have both the need and the money to invest in rice production beyond their own borders.

Grab for lands

The idea of one country growing food in another in order to export it back home is nothing new. But, according to the International Food Policy Research Institute (IFPRI),[2] it's a phenomenon that has accelerated amid the aftershocks of the 2007-08 food crisis. The FAO estimates that foreign interests acquired up to 20 million hectares in Africa alone in 2007-09.[3] The Gulf States—which already import more than half their food and whose populations are projected to increase by 50% in the next 20 years—are the major investors at this stage, with China and South Korea also involved in significant deals.

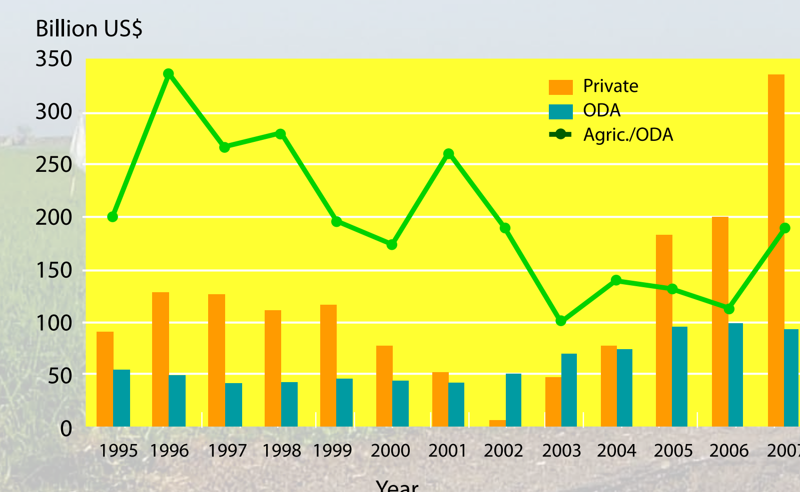


Fig. 2. Capital flows to developing countries.
Data source: Food and Agriculture Organization. ODA=official development assistance.

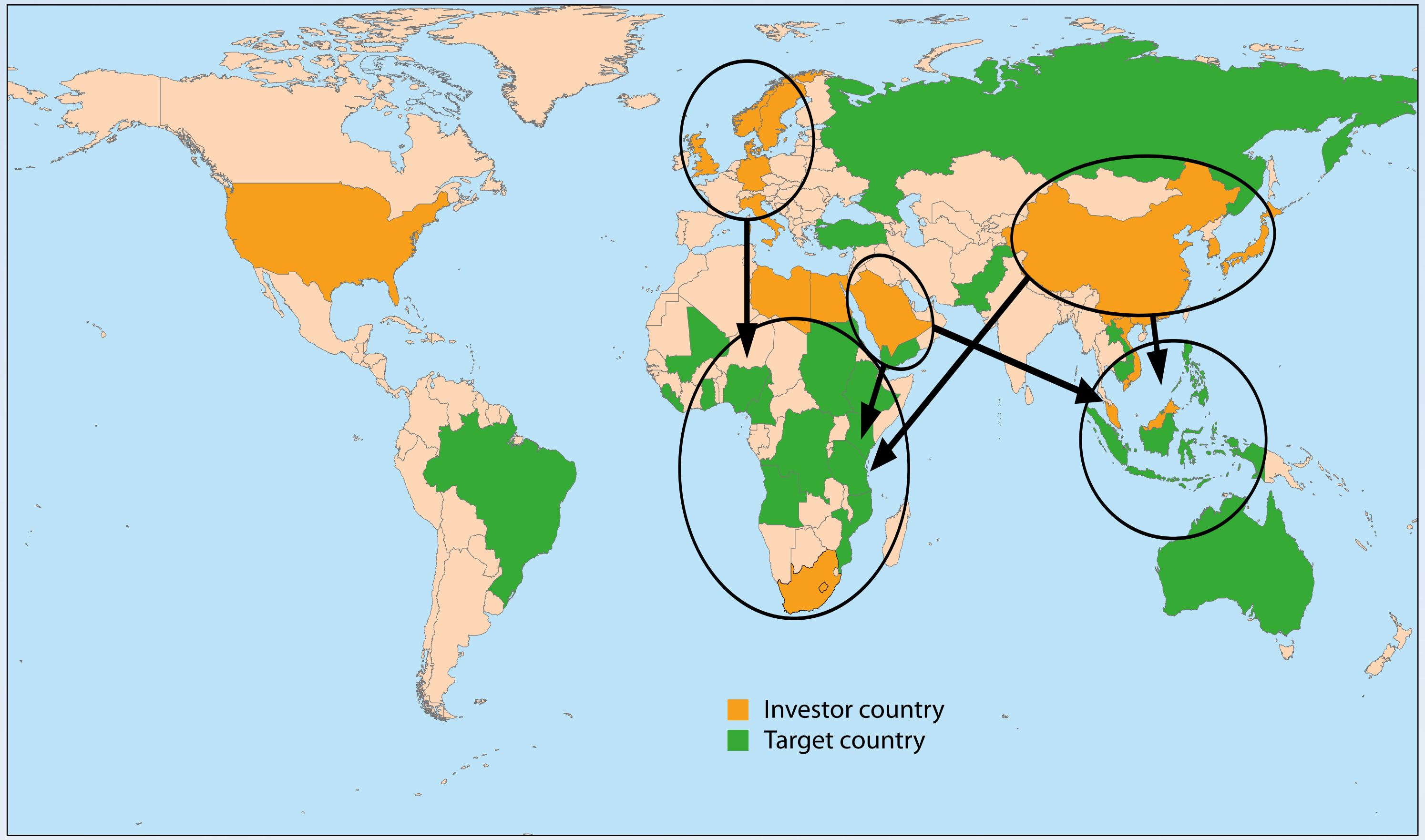


Fig. 3. Investors and target regions/countries in land investment for agriculture, 2006-09.
Data source: United Nations Conference on Trade and Development.

Africa remains the major target for land acquisitions but Southeast Asia and South America have also seen investor interest (Fig. 3). Recent investments have involved government-to-government, private sector-to-government, and private sector-to-private sector deals, along with agricultural investment funds that offer finance to private investors. Ironically, the desire to ensure food security and stable domestic prices was in itself a major reason behind the price rises, as major exporters restricted or banned exports and major importers scrambled to secure rice at almost any cost. The resulting problems—rising domestic prices (despite, or possibly because of, the attempts to avoid this) and civil unrest in several countries—reinforced in the minds of politicians the importance of ensuring adequate domestic supplies.

The potential for such projects to bring agricultural investment to countries that sorely need to increase their own production is undeniable. But, if things are done poorly, poor farmers in target countries can lose control over and even access to the land on which they depend for their livelihood. Further, it doesn't take too much to imagine a situation in which local communities dependent on rainfed agriculture struggle to produce sufficient food, while foreign interests export food grown on well-resourced, irrigated farm compounds. It's not a scenario likely to be accepted gracefully by the hungry.

Sure enough, the three land deals mentioned earlier—in Indonesia, the Philippines, and Madagascar—were all scrapped or postponed after public outrage and resistance from local communities. The Madagascar deal reportedly influenced the political unrest that engulfed the country and led to a change of government in 2009.

Code of conduct

To reap the potential benefits of international land acquisition and avoid win-lose results, there is general agreement that appropriate policies and enforceable regulations must be drawn up and followed strictly. As a starting point, IFPRI has suggested a code of conduct (see box). It is crucial that any such code rise above mere well-meaning statements that are largely ignored by the more powerful of the actors in any land deals. Existing legal frameworks—such as business laws adopted to prevent corruption in foreign direct investment—could serve as models for agricultural land acquisitions.

The FAO concurs,[3] pointing out that, in many of the recent major land deals, negotiations have been predominantly between the investor and the host-country government, with minimal consultation with local populations. Although the rights of small-scale landowners remain poorly documented (if at all), it is next to impossible for local communities to make claims on a legal basis. This situation is compounded by the fact that much land that may be considered "surplus" is not necessarily unused or unoccupied. Thus, there is an urgent need for better systems and processes to deal with land rights. For investors, adhering to fair regulations, which, in addition to land rights, would also consider labor and environmental standards, would not necessarily be an altruistic act. Deals brokered fairly would be more likely to avoid the public dissent seen recently and thus stand a better chance of succeeding.

A 2009 study,[4] commissioned by FAO and the International Fund for Agricultural Development and conducted by the International Institute for Environment and Development, reinforces the need for free, prior, and informed consent of local communities as a prerequisite for any land acquisition to proceed.

"In many countries, provisions for including local people in decision-making are usually absent or poorly implemented and this increases the risk of them losing access to land and other resources," says Sonja Vermeulen, one of the report's co-authors.

One suggestion is the development of a land-acquisition framework based on the Extractive Industries Transparency Initiative (EITI), which aims to strengthen governance and improve transparency and accountability in the oil, gas, and minerals sector of resource-rich, low-income countries. The EITI helps to reduce corruption through the verification and full publication of company payments and government revenues from oil, gas, and mining.

Given that international land acquisitions are unlikely to disappear, it is crucial that affected communities in target countries benefit from the deals. The potential for benefits is undeniable—if the deals are done well, the inflow of money and other resources along with new technologies and knowledge can result in improvement and increases in productivity and job creation, and even bring associated multiplier effects throughout both the agricultural sector and the communities at large. With the right processes in place, more food can be produced for domestic consumption, as well as for export.

The FAO,[3] however, warns that such benefits will fail to materialize if investment creates a closed system of advanced agriculture that local smallholders are unable to access or reproduce themselves. For example, highly mechanized production and the use of imported inputs may negate job creation and ongoing local investment, and unsustainable environmental practices, poorly monitored and policed, can cause land degradation and depletion of water resources. Nevertheless, there are also historical examples of long-term benefits, including improved technologies, marketing systems, and product quality.

IRRI, which is not involved in any projects on land acquisition for rice production, maintains that the long-term solution lies in countries increasing their own rice production, particularly on existing agricultural land (clearing uncultivated land is considered a last option).

Dr. Zeigler says that a range of strategies can achieve this in an environmentally benign way: "These include many technological innovations. However, more importantly, governments must negotiate terms that assure participation of the rural sector in any land development schemes. Likewise, there must be clear policies that provide for channeling some of the surplus production from development schemes to markets in the host country. That way, host countries can replace their own costly imports while the investor country assures its own supplies. We have been complaining for decades now that there has been insufficient investment in rural infrastructure in many developing countries. It will be a pity if we know such investments are forthcoming, yet we simply wring our hands in fear and fail to seize a real opportunity."

Mr. Barclay is a freelance writer based in Australia.

End notes:

[1] FAO (2009). From Land Grab to Win-Win: Seizing the Opportunities of International Investments in Agriculture. Economic and Social Perspectives Policy Brief 4, June 2009.

[2] J. von Braun and R. Meinzen-Dick (2009). "Land Grabbing" by Foreign Investors in Developing Countries: Risks and Opportunities. IFPRI Policy Brief, 13 April 2009.

[3] FAO (2009). Foreign direct investment – win-win or land grab? World Summit on Food Security Secretariat.

[4] L. Cotula, S. Vermeulen, R. Leonard, and J. Keeley (2009). Land Grab or Development Opportunity? Agricultural Investments and International Land Deals in Africa. International Institute for Environment and Development.

A code of conduct for international land acquisition*

The International Food Policy Research Institute (IFPRI) has drafted a code of conduct for international land acquisition for agricultural production. The code calls for

- *Transparency in negotiations.* Existing local landholders must be informed and involved in negotiations over land deals. Free, prior, and informed consent is the standard to be upheld. Particular efforts are required to protect the rights of indigenous and other marginalized ethnic groups. The media and civil society can play a key role in making information available to the public.
- *Respect for existing land rights, including customary and common property rights.* Those who lose land should be compensated and rehabilitated to an equivalent livelihood. The standards of the World Commission on Dams provide an example of such policies.
- *Sharing of benefits.* The local community should benefit, not lose, from foreign investments in agriculture. Leases are preferable to lump-sum compensation because they provide an ongoing revenue stream when land is taken away for other uses. Contract farming or out-grower schemes are even better because they leave smallholders in control of their land but still deliver output to the outside investor. Explicit measures are needed for enforcement if agreed-upon investment or compensation is not forthcoming.
- *Environmental sustainability.* Careful environmental impact assessment and monitoring are required to ensure sound and sustainable agricultural production practices that guard against depletion of soils, loss of critical biodiversity, increased greenhouse gas emissions, or significant diversion of water from other human or environmental uses.
- *Adherence to national trade policies.* When national food security is at risk (for instance, in case of an acute drought), domestic supplies should have priority. Foreign investors should not have a right to export during an acute national food crisis.

* Reproduced with permission from the International Food Policy Research Institute (www.ifpri.org). The original brief can be found at www.ifpri.org/publication/land-grabbing-foreign-investors-developing-countries.

IRRI@50 1960-2010

Hundreds join IRRI's alumni homecoming

Compiled by **Sophie Clayton**

MR. LUDOVICO Badoy, executive director of National Historical Institute (*right*), and Mr. Faustino Salacup, one of the IRRI Pioneers, unveil a historical marker at IRRI that designates the Institute as National Historic Site in the Philippines. IRRI Director General Robert Zeigler looks on.

CHRIS QUINTANA

More than 500 alumni of the International Rice Research Institute (IRRI) visited the headquarters in Los Baños, Laguna, Philippines, last April during IRRI's alumni homecoming celebrations. They traveled from the United States, Egypt, Papua New Guinea, Australia, and all across Asia, including India, Korea, China, Thailand, Vietnam, Cambodia, Laos, Indonesia, Sri Lanka, Japan, and Taiwan. And, of course, the largest contingency of alumni came from IRRI's host country, the Philippines.

IRRI alumnus Dr. Ronnie Coffman, international professor of plant breeding and genetics, and director of International Programs at Cornell University, said that the IRRI alumni homecoming "was a wonderful opportunity to reunite with old friends and colleagues but, more importantly, a forward-looking event that drew on the experience of IRRI's alumni in considering the future of rice research."

The positive energy of all the organizers, alumni, and current staff resulted in a week of vibrant activities and interactions. There were open houses to view research and other facilities, field site tours, a barrio fiesta, art exhibition, nostalgic display and videos, rice harvesting, presentations about IRRI and various science topics, and much more.

Two important ceremonial events were the unveiling of two sets of markers: the historical markers celebrating IRRI's 50th anniversary and the plaques listing IRRI's pioneers (the former board and staff members of IRRI who served from 1960 to 1962).

During the unveiling ceremony, Mr. Faustino Salacup, one of the IRRI pioneers, noted that, on the list, "You can see the names of individuals who have been recognized by national academies of science, professional societies, and international organizations for their contribution to the betterment of humanity."

IRRI would like to thank everyone who attended and contributed to IRRI's 50th anniversary alumni homecoming. It was a great success and we hope the Institute can continue to inspire and support its staff to generate innovative and practical science to improve the welfare of rice farmers and consumers worldwide while maintaining the environmental sustainability of rice production.

IRRI Board acknowledges its predecessors at the 50th anniversary meeting

IRRI's Board of Trustees held its annual meeting on 14 April 2010—exactly 50 years after the inaugural meeting of IRRI's Board in 1960. In commemoration of the first meeting of the Board, the current Board adopted a resolution dedicating the 50th anniversary meeting to the founding Board members. They committed to the following tasks:

- Recognize the vision and dedication of their pioneering efforts 50 years ago;
- Be grateful for the immeasurable benefits that have flowed from their efforts of helping millions of poor and hungry people all over the world;
- Celebrate the achievements in rice science over the past 50 years; and
- Commit to continuing the mission into the next 50 years and beyond.

Fifty years ago, the items on the Board meeting agenda included the installation of the Board, the appointment of the director general, the lease arrangement with the University of the Philippines, and the plans for building IRRI's facilities in Los Baños. On the agenda this April, the Board discussed the Consortium of the Consultative Group on International Agricultural Research centers, IRRI's research progress and directions, and administrative matters.

One thing has not changed, however. The IRRI Board still boasts a remarkable lineup of individuals from across Asia and the world, as it did 50 years ago. Only this time, the Board is pleased to have women members and representation from Africa—reflective of IRRI's development and the scope of its research.

To view on the Web selected photos on flickr and videos on YouTube of IRRI's various 50th anniversary events, go to http://snipurl.com/xtmol and http://snipurl.com/xtjoh, respectively.

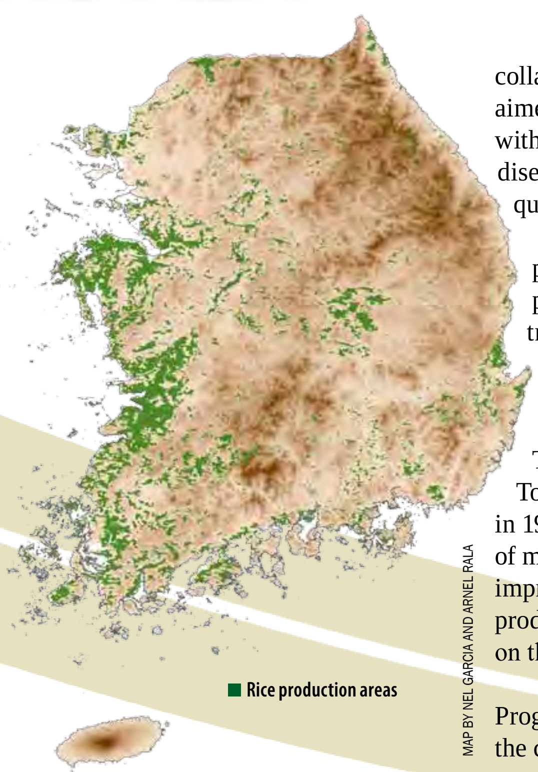
COUNTRY HIGHLIGHT:

IRRI in Korea

Compiled by **Mutya Frio**

South Korea, officially known as the Republic of Korea, boasts a remarkable rice cultivation history. By adopting high-yielding rice varieties and improved management techniques in the 1970s, South Korea did away with rice imports and turned itself into a self-sufficient rice producer.

In 2008, the country produced an average rice yield of 7.3 tons per hectare, feeding around 48 million of its people. Its advances in rice production technology and policies can be attributed to the Rural Development Administration (RDA), its agricultural research and extension arm, and also to its strategic partnership with the International Rice Research Institute (IRRI).



MAP BY NEL GARCIA AND ARNEL RALA

Korea-IRRI partnership

IRRI and RDA began their fruitful partnership in 1964 when they collaborated on a research project that aimed to breed improved rice varieties with cold and salt tolerance, pest and disease resistance, and better grain quality.

In 1968, Korean scientists and plant breeders at IRRI saw the potential of crossing and selecting a tropically grown indica and temperate japonica variety. This spawned the Tong-il variety, a cross of three varieties, namely, IR8, Yukara, and Taichung Native 1. The release of Tong-il and other IR8-derived varieties in 1972 delivered a record yield increase of more than 30%. From then on, the improvement in South Korea's rice production took off, putting the country on the road to becoming self-sufficient.

The Rapid Seed Multiplication Program in 1968 also helped accelerate the country's growth in rice cultivation.

South Korea: fast facts

Population	48.6 million[1]
Total land area	9.5 million hectares[2]
Average rice yield (2008)	7.3 tons per hectare[2]
Total rice production (2008)	6.9 million tons[2]
Area harvested (rice, 2008)	936,766 hectares[2]

[1]World Bank
[2]FAOSTAT

Seed materials of newly released rice varieties were propagated at IRRI during the winter season and then returned to South Korea for planting during the summer. By 1995, a total of 1,500 lines had been planted to advance a second generation of rice cultivation not normally feasible during the country's winter season. This process saves time, labor, and cost for developing rice varieties. More than 120 lines were also produced for small-scale seed increase. At this time, as many as 81 Korean scientists had been seconded to IRRI to supervise the off-season nurseries and seed multiplication.

Although the release of Tong-il and subsequent varieties promoted Korean rice production, breeding efforts were later directed to problem areas such as tolerance of low temperature and improved grain palatability.

Recognizing the constraints in rice tolerance of low temperature, IRRI and RDA established the Collaborative Project on Rice Cold Tolerance. Together, they conducted experiments at South Korea's Chuncheon Crop Experiment Station, which allowed for large-scale screening of potential new rice lines that have high tolerance of low temperature.

Exchanging plant genetic materials

To ensure the safe, fair, and free exchange of different types of rice and their characterization and adaptation, South Korea, along with IRRI, got involved in the International Network for the Genetic Evaluation of Rice (INGER). INGER is a 35-year-old partnership among national agricultural research and extension systems of rice-growing countries around the world and international agricultural research centers, such as IRRI.

INGER provides a global model for the exchange, evaluation, release, and use of genetic resources. The network abides by the International Treaty on Plant Genetic Resources for Food and Agriculture, a treaty that fosters international cooperation and open exchange of genetic resources.

With the exchange of elite breeding lines, five breeding lines from South Korea were released as varieties in Bhutan, China, and Guatemala, and were planted on a large scale. More than 174 Korean breeding lines and varieties had been used as donor parents in 26 countries for hybridization with local varieties.

In the early 1980s, for instance, Milyang 46 was bred in South Korea and

> **"South Korea, through the RDA, had remained not only a donor but also a vital partner through the years in providing not only scientific but also financial support to IRRI."**
>
> ***Dr. Robert Zeigler, director general, IRRI***

ISAGANI SERRANO

introduced to central China. It became a parent for popular hybrids such as Shanyou 10 and Shanyou 46 between 1980 and 1990. Shanyou 10 was widely planted in China, with a cumulative planted area of more than 2.2 million hectares from 1991 to 2004, whereas Shanyou 46 was planted on more than 3 million hectares from 1991 to 2004.

Developing japonica rice for the tropics

In 1991, IRRI and RDA sought to develop high-quality and high-yielding temperate japonica rice varieties for tropical environments (see *Made for the tropics* on pages 34-35 of *Rice Today* Vol. 9, No. 2). Hence, the Germplasm Utilization Value Added project paved the way for scientists to breed elite rice breeding lines that, in turn, provided the base materials for breeding two varieties of temperate japonica rice suited to the tropical conditions of the Philippines—NSIC Rc220 or IRRI 152 and NSIC Rc170 or IRRI 142, now called MS11.

Released in the Philippines in 2008, MS11 is a cross between two Korean varieties, namely, Jinmibeyo, which has high grain quality, and Cheolweon 46, which is highly resistant to pests and diseases in the tropics.

Recently, RDA ceremonially handed over MS11 to farmers for cultivation on the Philippine island of Bohol, at an event marking RDA and IRRI's long and productive collaboration.

Both IRRI 152 and MS11 were also approved for large-scale planting by the National Seed Industry Council of South Korea. It is expected that local cultivation of these high-quality lines will give farmers higher returns. Consumers as well can enjoy this semiglutinous rice at affordable prices.

The Temperate Rice Research Consortium

Scientists and researchers recognize that temperate rice improvement requires a broad approach. Hence, IRRI and RDA agreed that the most strategic way to address this is through a consortium.

The Temperate Rice Research Consortium (TRRC), which was established in 2007, is composed of national and international institutions formally organized to collaborate in research, training, and technology-generation activities. The TRRC connects scientists from various institutions and taps their expertise to establish multidisciplinary teams and share resources. Sharing common objectives, members of the consortium identify solutions to improve tolerance of and adaptation to biotic and abiotic stresses, yield potential, grain quality and nutrition, and water and nutrient management of temperate rice.

Building human resources

Apart from collaborative research, RDA and IRRI also work together to develop the capacity of farmers and extension workers in a way so that farm technologies can be transferred from the source to the end users.

Since 2002, more than 125 people from 17 Asian countries have learned from a two-week course on models of technology transfer in rice. Trainees were also exposed to contemporary rice technology and extension issues and have developed their capacity to critically analyze the components of successful research-extension linkages based on the Korean experience.

With courses conducted in South Korea, trainees had the opportunity to observe first-hand and learn from the country's best practices, and apply what they have learned directly to their respective countries. The courses showcased South Korea's successful and systematic technology transfer mechanism whereby multiple stakeholders are linked together to ensure rapid agricultural and rural development.

Meanwhile, IRRI has been supporting the academic training of Korean scholars. By 2009, 53 Korean scholars were able to pursue either a master's degree or a doctorate while working with IRRI and more than a hundred were on-the-job trainees or interns.

Continuing relations

RDA has had a productive partnership with IRRI—almost since the day it was founded—and there are no signs of slowing down.

As part of the opening day activities for IRRI's 50th anniversary Alumni Homecoming activities on 19 April, IRRI director general Robert Zeigler, Dr. Jae-Soo Kim, RDA administrator, and IRRI Board of Trustees chair Elizabeth Woods (*left to right* in photo) planted a tree to symbolize the fruitful partnership between IRRI and RDA (See http://snipurl.com/xto0t). Following the tree planting, a 2010-11 work plan was signed.

Both parties agreed to focus more on special projects for Asia. These efforts include developing drought-tolerant rice using marker-assisted backcrossing, developing rice varieties with tolerance of high temperatures, and improving the adaptability of Tong-il to tropical regions.

RDA has committed to providing US$2.09 million over the next two years for special projects in Asia such as Rice Technology Transfer Systems in Asia, cooperation, training for and support to INGER, and other ongoing projects.

Ms. Frio is a writer at IRRI.

"After 45 years of collaboration, RDA and IRRI have made a special contribution to the alleviation of poverty. As we have successfully done in South Korea, Asian countries should build an institutional model for agriculture by pursuing research and development on both local and international levels. The first and most important step in agricultural development should be initiated in the Asian region if we want to sustain efforts in helping feed our populations."

Dr. Jae-Soo Kim, administrator, Rural Development Administration

Conducted by Gene Hettel

GENE HETTEL (3)

Thank you, Margaret Thatcher!

Dr. Michael T. Jackson started his career in genetic resources in the UK and Latin America during the 1970s and '80s and then spent 19 eventful years at IRRI (1991-2010) in various capacities—germplasm specialist and the first head of the Genetic Resources Center (GRC, created in 1991); program leader for Rice Genetic Resources: Conservation, Safe Delivery, and Use; and then, in a complete turnabout, Director for Program Planning and Communications (DPPC).

As head of the GRC, he overhauled operations and procedures at the International Rice Genebank to meet FAO international genebank standards and to be regarded by the Commissioned External Reviewers of Center Genebanks "as a model for others to emulate." He led the collection of 27,000 wild and cultivated rice samples from underexplored regions in 22 countries in South and Southeast Asia, sub-Saharan Africa, and Central America. As DPPC, he played a key role in reinvigorating IRRI's resource mobilization efforts by setting up an efficient project management and coordination system that earned the confidence of the Institute's donors.

In mid-February 2010, my former boss discussed a wide range of subjects, mincing no words in typical "Mike Jackson" fashion.

Birds, maps, and genetic resources

I've always been interested in nature and in geography. As a young boy, I spent many hours bird watching and looking at maps. When I began to think about what to study at university, I thought it would be great to do a degree in zoology and take up ornithology as a career. But I came to realize there were very few posts in ornithology. In any case, my interest in plants grew. So, I attended the University of Southampton starting in 1967 and spent 3 years there, half the time on learning about landforms, glacial processes, river processes, etc., and the other half working on a full botany degree. After Southampton, I took a new one-year master-of-science course in plant genetic resources offered at the University of Birmingham. This fit into my interests at the time and my intention was to finish the course and find a job.

At the end of my first semester in early December 1970, Jack Hawkes, the head of the Department of Botany, asked me, "Mike, how would you like to go to Peru in South America for a year?" Well, I had always been fascinated with the map of South America. It's a huge continent of jungles and mountains. I had always wanted to visit Peru and here was the opportunity. So, I said, "When do I get the ticket?"

Best of both worlds

Well, it didn't quite work that quickly. Hawkes had gone to Peru as part of a USAID-North Carolina State University-Peru joint mission on potatoes. This had been set up in the mid-1960s and it was slowly being transformed into what would become the International Potato Center (CIP) in 1971. The soon-to-be director general of CIP, Dick Sawyer, was looking for funding and he'd been to the UK to talk with the people at what was later to become DfID (Department for International Development). He wanted somebody like me to go to Peru for one year to take over the management of the germplasm collection while he sent a young Peruvian to Birmingham for training.

What got in the way of me going immediately was the CGIAR (Consultative Group on International Agricultural Research). Because, in 1971, discussions were taking place to form what would become the CGIAR later in 1972 and DfID was still debating whether it should join this entity or whether it should continue to give funding on a bilateral basis. So, being delayed for 15 months, I started a PhD at the University of Birmingham funded by the UK government and eventually headed to Peru in January 1973.

I had the best of both worlds in many ways—I was employed by the International Potato Center and, at the same time, I was there doing my PhD in a country that I'd always wanted to visit. It was a marvelous time. I was 24 years old and, as they say, "the world is your oyster." My fiancée, now my wife, Stephanie, joined me in mid-1973 and we were married in Lima in October. I had responsibility for germplasm collecting and carrying out research on one section of the germplasm collection that CIP was maintaining.

Next stops: Central America and back in the UK

We went back to Birmingham in mid-1975, where I spent time writing and defending my thesis. I was making plans to go back to CIP, which had decided to send me to Central America to set up a program at Turrialba, Costa Rica, where there was a regional center called CATIE (Tropical Agricultural Research and Higher Education Center). CATIE hosted me for nearly 5 years, during which time I looked at the adaptation of potatoes to tropical conditions and got involved in a lot of plant pathology work. Bacterial wilt had become a very serious problem for potato cultivation in that environment, so I spent 3–4 years working on that disease.

At the end of 1980, I went back to Lima. A teaching position had become vacant at the University of Birmingham. Sawyer encouraged me to apply. I did, got the job, and returned to the UK in April 1981, where I set up a teaching program, mainly graduate teaching on genetic resources. I also set up fairly active research programs on potatoes and legume species. I had a good crop of PhD students who came through. It was an interesting time.

Thank you, Margaret Thatcher

I started to become restless toward the end of the 1980s, due in no small part to Margaret Thatcher and her government. In a sense, you can blame the fact that I came to IRRI on Margaret Thatcher. Her government was imposing a lot of measures on the university system. I was getting very uncomfortable with this and I started to question my role within the university system. I enjoyed the teaching, but advancement within the university system didn't necessarily take into account one's complete contribution.

So, one day out of the blue, an advertisement landed on my desk. I don't know who it came from—friend or foe. It was for the position of head of the newly set up Genetic Resources Center at IRRI. I put in an application in September 1990. I was called for an interview in the first week of January 1991. I was offered the job and I accepted and came here in July 1991. I came on my own and left the family back in the UK. I got myself settled in and then, toward the end of December 1991, the family joined me.

Building a top-class genetic resources program

I joined IRRI when I was in my early 40s and this really represented quite a challenge. It was both with excitement and some trepidation that we made the decision to move to Asia. It was also a concern because we had two daughters, at that time, who were 13 and 9 years old. We were taking them out of the education system in the UK and then were faced with putting them into really, I would say, an "alien" education system in an international school. As things turned out, that was not a problem and they both benefited enormously from the experience of living abroad, from attending international schools, and having a big circle of friends from wherever. I think that's really one of the positives that we take away from our years abroad—that multicultural experience for all of us.

The position had been advertised to bring together what, at that time, was called the International Rice Germplasm Center, which was the genebank; the International Network for Genetic Evaluation of Rice (INGER); and the Seed Health Unit, all into one entity to be known as the Genetic Resources Center. That was what I was interviewed for. Between the interview in January 1991 and arriving in July 1991, a decision had been made to take the Seed Health Unit out of the equation, which I think was a very wise move because, with both the genebank and INGER, you're managing seeds, you're distributing seeds, and receiving seeds. The Seed Health Unit ensures that things are done correctly. You don't want to be in a situation of being both gamekeeper and poacher, as it were, in the management of seeds.

We were given the opportunity, very excitingly, to renovate our facilities. There was a big renovation of facilities in the Institute under way during the early 1990s and I was able to persuade IRRI management to include the genebank in this renovation. For almost everything that the genebank did, we had a serious look at and the staff responded. And, in responding and in participating and taking ownership of what they did, we were able, at the same time, to get the majority of the staff positions upgraded, allowing the people to take responsibility and accept accountability.

Within about 4 years, we had what was clearly a top-class genetic resources program that was built on the very solid foundations of my predecessor, T.T. Chang, for whom the GRC was named in 2007. So, when we had a genebank review in 1996, it was clear that the IRRI Genebank came out way ahead of the other genebanks in the CGIAR. That good, positive review was due, in no small part, to the excellent staff in the Genetic Resources Center on the genebank side.

IRRI ARCHIVE

IN THE mid-1990s, Dr. Jackson shows IRRI's genebank facilities to Nong Duc Manh, then Vietnam National Assembly chairman.

Career changes while staying pretty much in place

I've been fortunate that I've actually had five careers, but I've only worked in three places. I had two careers at CIP, in Lima and the regional program; my career in Birmingham; and two careers at IRRI. When I joined IRRI, I said to myself, 10 years, that'll be about the right length of time. But, it is almost 19 years now and I'm still here!

In early 2001, Director General Ron Cantrell said to me: "You know, if a donor were to come to IRRI tomorrow and offer us US$5 million, I couldn't refuse it, but I'd have no idea how it would fit into the scheme of things. We really do not have much of an idea on what money we're raising and where and how it is being spent, etc. We really do need to bring some order to this whole process and we'd like you to set up a new unit at the director level." So, we came to an agreement and, on 1 May 2001, I started as Director for Program Planning and Communications (DPPC) and that's what I've been doing for the last 9 years.

In many respects, my new position was very different from running a genebank, but, in some ways, it was not. In order for a genebank to operate, you have to make sure that all the different elements, all the different processes, and the flows of information are integrated and work together. In the genebank, you manage seed samples, which we call accessions. Well, managing donor relations, managing projects, managing contracts, etc., are a little bit like running the genebank. Instead of seed packets, we have grants, we have projects, we have contracts, and all the information that flows between them. One of the important things that I think I brought to the genebank and to the DPPC was a systematic way of doing business.

GRAHAM MCLAREN

IN FEBRUARY 2010, Dr. Jackson completed his 355th and last scuba dive in the Philippines at Anilao on the Batangas coast.

Balancing work with private time

Working at IRRI is quite an intense experience. Some colleagues wonder how I've been able to manage this sort of life-work balance. I think that it is extremely important that anybody who comes to work at IRRI maintain a good balance between their work and their social life. And, I also intensely believe it's very important to have a private life. I remember when I came to IRRI in 1991, I told then Director General Klaus Lampe, "From 8 to 5, I'm IRRI's. After 5 o'clock in the afternoon and before 8 o'clock in the morning, that's my time." I share my time with the Institute on my terms and have maintained that over the time I'd been here and I kept a private life, which I think has kept this balance very important.

So, what to do [during non-IRRI time]? Well, I had never thought in my life that I would ever go scuba diving. But, with the coast so close, we would go down and have a look. I had never actually been snorkeling before we came to the Philippines. My first snorkeling experience was wonderful; I don't need to do anything else but snorkel for the rest of my time. Then, [daughter] Hannah took a dive course. In the early 1990s, there were large groups of IRRI staff who took the dive course together. And so in 1993, I thought I would give it a try and I haven't looked back. I've been diving there for 17 years and it's been a tremendous experience.

Leaving things better than they were found

I was joking with somebody a few weeks ago about when it's my time at the IRRI Guesthouse for the "hail and farewell." I was asked, "What do you want on your plaque?" I said, "Well, I can't particularly appreciate these long statements that go on forever about everything you did." I would like, if it were possible, for people to remember my contributions at IRRI in the following way: "He left things better than he found them."

In the genebank, we made significant changes in the ways that we manage rice germplasm in the field and in the screenhouse, in processing prior to the material going into the genebank, in our data management systems, etc. We built a series of operations that I think are world class and that the Institute should be proud of. I'm certainly proud of it. I think it was a good basis for my successor Ruaraidh Sackville Hamilton to come in and build on, much like I built on the foundation that T.T. Chang had established. Much of what we built in the 1990s is still in place.

And it goes without saying that the stability that we have brought to donor relations and fund-raising here at IRRI has put us ahead of the game—compared to many other institutions. And, yes, it will be with a sense of satisfaction, when I do finally come to leave the Institute in a few weeks time, that we put in place some solid foundations for which the Institute can continue to grow.

I will leave IRRI feeling that I made a contribution, feeling that I've left some things better than I found them, and having made some great friends in the process. I feel better for having worked at IRRI and I hope IRRI also appreciates the contributions that I've made.

Go to www.irri.org/publications/today/Jackson.asp for the full transcript of Dr. Jackson's far-ranging interview in which he discusses his frustrations in a complex organization, perspectives on five IRRI directors general, improving relationships with donors, looking to philanthropy for new funding sources, the "overrated" doomsday vault, IRRI's greatest challenges, a prolific publishing career, skiffling on the wall of the Beatles Museum, organizing some of IRRI's key 50th anniversary events, and playing Santa Claus.

Machines of progress

by **Lanie Reyes** and **Trina Leah Mendoza**

Cambodian farmers adopted IRRI's postharvest technology package, which improved the quality of their rice grains, increased their harvest's milling output, and allowed them to save on labor, time, and money

LANIE REYES (3)

A sea of newly harvested rice extends to the horizon in Battambang Province—the rice bowl of Cambodia. It was only the third week of February, just the beginning of the harvesting season for many Asian countries, but it seemed like harvest time was already over in Battambang.

As we drove farther along the dry and dusty roads of the province, a combine harvester suddenly appeared on the horizon. It cut through the rice stalks almost as effortlessly as mowing a backyard lawn with an operator sitting on top of a lawn mower. This is a stark contrast to the traditional backbreaking and tedious harvesting process, in which farmers bend to gather and slash stalks using razor-sharp sickles. Some collect and tie the stalks while others thresh, by hitting the rice plant on a piece of wood. Then the farmers winnow the paddy and let the trash blow away from it.

Farmers' chats to let their minds drift away from the scorching sun and the harrowing labor have been replaced by the whirring sound of the machine making its way through the rice fields.

The combine harvester, an iconic image of farming in progressive countries, is becoming the usual scene in Cambodia—a hint that labor shortage during harvest time is becoming a serious problem for Cambodian farmers.

A dynamo of change

When Martin Gummert, an agricultural engineer at the International Rice Research Institute (IRRI), visited Cambodia for the first time in 2001, it reminded him of Vietnam in the 1990s, when the mechanization of the country's agriculture was in its infancy. Its postharvest technology was at a very low stage. The milling industry was mismatched and outdated, and there was limited storage capacity. "Though there was a lot of poverty, I could sense the excitement of people trying to leave the past behind, grab every opportunity, move on, and develop," recalled Engr. Gummert.

Many years back, in 1988, Harry Nesbitt and Glenn Denning, two of IRRI's agricultural scientists, went to Cambodia to rebuild its rice production and "to breathe life back into the killing fields," as the country was ravaged by the Khmer Rouge under Pol Pot. (See *Towering legacies* Vol. 1, No. 1 of *Rice Today*.)

Since almost all traditional knowledge on rice farming had been lost, Drs. Nesbitt and Denning were there to basically build a whole new farming infrastructure and a system of agricultural research for Cambodians to carry on. In 2001, a newly established Cambodian Agricultural Research and Development Institute then took over—part of the social context of the dynamism, which Engr. Gummert observed.

CHRIS QUINTANA

MARTIN GUMMERT, an agricultural engineer at IRRI, advocates better postharvest management to improve the quality of rice and reduce losses caused by spoilage and pests.

Wind of inspiration

Cambodia's dynamic race to development specifically in rice production can be attributed to the tenacity of the Cambodians themselves. Their horrid history during the Khmer Rouge, 30 years back, seems to have faded in the background as they moved forward.

Pyseth Meas, a postharvest expert on rice, is one of the members of the new generation unfettered by the nation's challenging history. Instead, his past has become his inspiration. He vividly remembers growing up on a rice farm with his father, who was a government official before Pol Pot's regime. When he lost his father during the war, his mother raised him and his siblings by selling rice. He witnessed his mother's hard work and difficulty selling milled rice to consumers and traders. Like an imprint on his young mind, he was drawn to a profession that would ease the plight of those who depended on rice, such as his mother. Thus, he pursued a career in postharvest technology.

"I could see that this was where I could contribute more to my country—knowing that 85% of the Cambodian farmers are rice farmers," Dr. Meas said. "All of my life, I've wanted to do something for the Cambodian people, especially the farmers, because we rely on rice as our staple food and main source of income. So, when I became involved in a project on postharvest as a partner with IRRI, I was more than happy."

In 2005, the Postproduction Work Group (PPWG) under IRRI's Irrigated Rice Research Consortium, funded by the Swiss Agency for Development and Cooperation, pooled its resources together with the Asian Development Bank (ADB) and the Japan Fund for Poverty Reduction (JFPR) to fund the project Improving Poor Farmers' Livelihoods through Improved Rice Postharvest Technology. It was designed and initially led by Joseph Rickman, who was then the head of the Agricultural Engineering Unit at IRRI. When he moved to Africa in 2006, Engr. Gummert took the lead.

The project's goal was to demonstrate to some villages in Battambang and Prey Veng provinces that improved harvesting, drying, storage, and milling can help farmers increase incomes from rice harvests and improve the quality of grain and seeds throughout the postharvest chain.

In February 2006, farmers' and rice millers' needs were assessed through a survey. Hearing from the farmers themselves, the project team was able to determine that the farmers needed dryers, especially during the rainy season, when paddy quality was at a high risk of deteriorating quickly, and combine harvesters to solve the labor shortage.

The first line of defense

Since knowledge is the first line of defense in this case—against postharvest losses—the project team conducted a trainers' training in the same year to share their knowledge and expertise on improved postharvest options among the staff of the provincial agricultural extension services and their project counterpart in Cambodia. In the second half of 2006 and 2007, knowledge and skills in postharvest technologies smoothly cascaded to the farmers, as these trainers visited a total of eight villages. They taught and advised farmers regarding grain and seed quality, and safe storage options such as harvesting, threshing, cleaning, drying, hermetic storage, and milling.

Labor shortage

Just like in other countries, the young generations in rural farming areas move to the cities to find better jobs. With fewer hands, it is almost next to impossible to hold together the work on the farm. "Cultivating a hectare of land," according to Dr. Meas, "needs about 100–120 person-days. And, about 40% is spent on establishing the crop and another 40–45% for harvesting."

Small machine, huge effect

Then came the mini-combine harvester, also known as a mini-combine or simply combine. It fuses four operations (reaping, collecting, threshing, and cleaning) in one machine (see *Cleverly cutting costs in Cambodia*, Vol. 2, No. 2 on pages 5-6 of *Ripple*).

TRINA LEAH MENDOZA

"THE USE of machinery is imperative for Cambodia to become a rice exporter," said Dr. Pyseth Meas (*above left*), a Cambodian expert on rice. Cambodian farmer Net Kimyorn (*above right*) said that, with the use of a combine harvester, he can harvest the crop on time, with less labor, and at less cost. Seum Kouy (*left*), a farmer in Prey Stor Village, Prey Veng, said that, with an improved granary, her grains are protected from rain, insects, birds, and rats.

LANIE REYES (3)

CAMBODIAN FARMERS rest under a tree while waiting for the combine to load rice on a truck.

When the team brought in this small contraption from Vietnam, they had two reasons in mind: one, to reduce the high harvesting cost caused by a lack of labor and, two, to increase the quality of the grain.

After they showed how a mini-combine works to farmers in both Battambang and Prey Veng provinces, combines in different sizes have become a big hit.

Net Kimyorn of Boeng Pring Village in Battambang said, “My fields are already less prone to accidents like fire.”

In Cambodia, it was common for soon-to-be-harvested rice to catch fire, caused by lit cigarette butts thrown in the rice fields. Since harvest time falls during the summer season, rice fields are vulnerable to fires. Mr. Kimyorn recalled a fire in his community in 1993 when 98 hectares of rice fields were turned into ashes because a drunken man cooked rice near the fields. Lucky for Mr. Kimyorn, his rice fields were spared.

“Moreover, we can harvest the crop on time, with less labor, and at less cost,” Mr. Kimyorn said. “And, we do not rely on the climate anymore. Before, it took almost a month to harvest a crop. Now, it takes only a few days. Less likely for rain to come while we are harvesting.”

To manually harvest a hectare of rice field, a farmer needs to hire at least 25 persons. The farmer pays each one US$3–4 per day or spends $100–120 per hectare. Aside from it taking longer, the workers would still need to gather the crop for threshing.

Hiring a combine harvester with an operator, on the other hand, costs $90–100. Aside from the difference in cost, grain quality is better, and it doesn’t take so much time. A large combine harvester with a cutting width of 3 meters, for example, can harvest a hectare in only an hour.

Now, with less labor required in the field, Mr. Kimyorn and his family can devote their extra time to other income-generating activities such as fishing and selling noodles. Most of all, the family can spend more quality time with each other.

Competition benefits the farmers

There are even some cases wherein farmers do not need to do much after harvesting because, recently, buyers from Vietnam and Thailand have been purchasing rice directly from them.

According to Dr. Meas, though these purchases are informal and are not in good order, farmers benefit much from them. Without buyers crossing the border, farmers rely mostly on rice millers to buy their paddy. However, with competition, farmers can ask for a better price.

This does not mean, however, that drying is no longer needed. Some farmers dry and store their rice, then wait until the price is high before they sell it. This is when the information board greatly helps farmers. The use of information boards, as part of the holistic package of the PPWG of IRRI, gives up-to-date reports on the rice prices in the market, allowing farmers to plan the best time to sell their rice.

In addition, most farmers set aside an amount of rice for their family’s food until the next harvest and sell only the surplus. Thus, they still need the benefits from the mechanical drying technology.

Flatbed dryers

Bringing technology to farmers is important for them to see their options up close. Thus, in 2007, the team introduced mechanical drying in Cambodia, by installing the first flatbed dryer in Ballat Village, Battambang, in collaboration with the irrigators’ association.

When the farmers from the Po Chrey community in Prey Veng heard about the benefits of using mechanical dryers, they requested the project team to help them install a mechanical dryer in their village. The team assisted the community by providing a blower and rice husk furnace, while the farmers financed and installed the drying bin and the shed.

In early 2008, two dryers were installed in Po Chrey community: one was initially supported by the PPWG and the other was set up by the private company ABK in cooperation with the community. Dryers became so in demand that, by mid-2009, the number of dryers increased to nine. Now, the country already has 11 known dryers.

Before, Koul Savoeun, just like other farmers in Ballat Mancheay Village of Battambang Province, had no idea about moisture content. He relies only on his gut feeling in determining whether the paddy is dry or not. After learning about moisture content, he noticed that his grains became clean, had no bugs, and had better quality.

KOUL SAVOEUN, a Cambodian farmer, said that, because the quality of the rice grains dried through a mechanical dryer has improved, he can sell them at a higher price.

According to Mr. Savoeun, after milling, sun-dried rice is yellowish and has more broken grains than rice dried using the mechanical dryer. Since the quality of the grains dried through a mechanical dryer has improved, the price has stepped up also, from $23 per bag to $25 per bag (a bag contains 50 kilograms of rice).

Mr. Savoeun added that they no longer depend on the climate to dry their paddy. They can dry their paddy even during rainy days.

Storing the harvest

Even if grains are properly dried, this does not mean that farmers are free from potential postharvest losses. “In storage, losses to insects, rodents, and birds are estimated to be 5–10%," according to Engr. Gummert.

Rice stored in homes is as common as a spirit house standing in each front yard in Cambodia because a Khmer family secures its rice consumption until the next harvest. Others store grains to sell when the price is at its peak.

Seum Kouy, a farmer in Prey Stor Village, Prey Veng, said that with the improved granary—a technology also promoted by the project—her grains are protected from rain, insects, birds, and rats.

And, for grains stored as seeds, IRRI provides the hermetic “Super Bag,” which protects the germination ability of the seed (see *Fighting Asia’s postharvest problems*, Vol. 6, No. 1 of *Rice Today*).

RICE STORED in homes is as common as a spirit house in Cambodia.

Plausible promise

ADB has been funding a new project, Bringing about a Sustainable Agronomic Revolution in Rice Production in Asia by Reducing Preventable Pre– and Postharvest Losses, since 2009. It builds on the pilot activities of the ADB-JFPR-funded project, which ended in 2008, and aims to reduce postharvest losses by scaling out technologies that have been proven effective.

With the success of postharvest technologies in Cambodia, how did the team know that the technologies were mature enough to be released? “I think a technology is never mature enough to be released,” explained Engr. Gummert. “It’s always a process; you have to start with something. We call it a plausible promise, wherein the technology has the potential to solve a problem.”

Vietnam has commercially produced 6,000 mechanical dryers, being used in counties in the Mekong Delta. For the team, this is a hint that the technology is sound and could also be applicable in Cambodia. Hence, “it became a starting point to introduce the technology in another country, rather than initiating a research project to design a new dryer,” Engr. Gummert explained.

The combine was first introduced as mini or small. Its cutting edge of about 1 meter was just suited for small blocks of rice fields. “The reason was that it was cheap and affordable,” said Engr. Gummert. “We knew that it was limited in terms of capacity and it is not the technology that can treat all the needs of farmers.”

Now, farmers adapt the technology to their needs. Since Cambodia has bigger rice areas, medium (2-meter cutting width) and large combine harvesters (3-meter cutting width) have been imported from Thailand, Vietnam, and China.

Developing Cambodia’s potential

A United States Department of Agriculture report in 2009 says that Cambodia aims to double its rice production in 2015 and become a major exporter. According to Dr. Meas, the country already has a surplus for export even if its average rice production is only 2.7 tons per hectare and it has poor irrigation infrastructure (only 15% of its rice areas are irrigated). Thus, it has more potential to go up. “As far as I know, Thailand is already near its ceiling; I don’t think it has more space to climb up,” Dr. Meas added.

“If the country will use modern varieties along with improved irrigation infrastructure, let alone use postharvest technologies, the country may even triple its present rice production,” Dr. Meas confidently predicted.

Contribution to the country’s goal

It is hoped that postharvest technologies will help Cambodia attain its goals to be a major exporter and double its production in 2015. For Engr. Gummert, there are two ways in which better postharvest management can contribute to the country’s goal. First, Southeast Asia loses 15–25% of grains because of spoilage and pests. Reducing these losses will contribute to the country’s rice output. The other area is basically quality. “Better quality directly affects the ability to export rice because, to become a major exporter,” explained Engr. Gummert, “the country needs to produce quality consistently. And, only by using advanced postharvest technology can this be attained.”

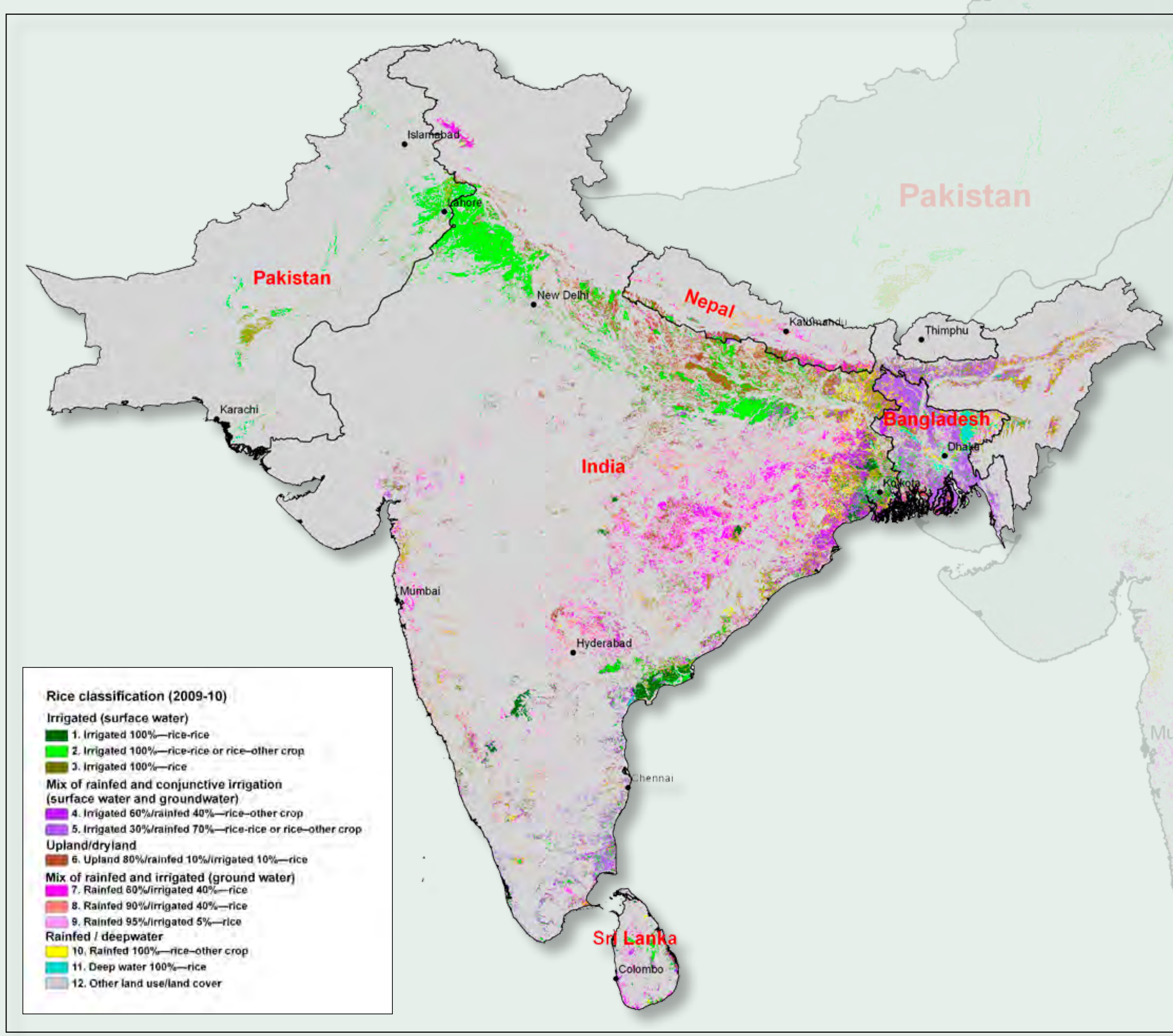
Cambodia cannot definitely rely on manual labor if it wants to be a major exporter some day. Dr. Meas explained that if a country, let us say the Philippines, wants rice from Cambodia, it prefers only one or two varieties. The same variety ripens at the same time. If manual labor is used to harvest, it is difficult to maintain the grain quality; and, because of labor shortages, it is impossible to harvest this variety at the same time. Some plants will be less mature, and others overripe.

“If the rice is less mature, it will have less milling output; if it is overripe, it will have a lot of breakage,” Dr. Meas explained. “Therefore, use of machinery is imperative for Cambodia to become an exporter.”

No doubt, combine harvesters and flatbed dryers, among other postharvest technologies, are radically transforming how farmers farm in Cambodia. It goes without saying that Cambodia is moving toward efficiency and modernity as it strives to increase rice production and leapfrogs to become a major rice exporter in Asia.

Mapping rice areas in South Asia

by **Murali Krishna Gumma, Andrew Nelson, Prasad S. Thenkabail, Amarendra N. Singh, Cornelia Garcia, Aileen Maunahan,** and **Lorena Villano**



Almost 40% of the world's harvested rice areas are in South Asia—home to 1.1 billion people (74% of the population) that survive on less than US$2.00 per day and 600 million people (40% of the population) that live on less than $1.25 a day. Furthermore, rice provides around 30% of the calories consumed by 1.48 billion South Asians.[1] These are just some of the statistics that reveal how rice farming is important for the region.

The poorest rice farmers produce their crop under rainfed conditions, in which drought, submergence, and poor soils drastically reduce yields and harm farmers' livelihoods. Recent advances in genetics and breeding have made the development of stress-tolerant rice varieties feasible and their cultivation can substantially contribute to poverty alleviation, especially in rainfed environments. If we can locate exactly where rice is cultivated and under what conditions, we will be able to identify the regions where new stress-tolerant rice varieties—being developed and promoted through the Stress-Tolerant Rice for Poor Farmers in Africa and South Asia (STRASA) and Green Super Rice (GSR) projects—will have maximum impacts on the livelihoods of resource-poor farmers.

In collaboration with the STRASA and GSR projects, we have developed a series of maps that accurately display the location and types of rice production in agroecosystems across six countries in South Asia.

We started with an extensive field survey across as many different rice systems as possible to describe the on-the-ground conditions in terms of the number of crops per season and whether the crops are rainfed or irrigated. We then acquired remotely sensed images of the entire region with a spatial resolution of around 20 hectares at regular intervals throughout the season. This time series of images was used to characterize the phenology—that is, the health of the plant in relation to its climatic conditions—at our survey sites to provide us with a set of "signatures" for the different rice agroecosystems.

Then, in connection with various remote-sensing analyses, we compared these signatures to the time series of vegetation vigor in each and every 20-hectare pixel across South Asia to create a rice map for the wet season (also known as the *kharif, aman, maha,* autumn, or fall season) for all South Asia. A subset of the survey data is kept back and used to validate and assess how accurate the map is. The mapped rice area is then compared against agricultural statistics and expert knowledge to confirm its reliability. We tested this methodology on the 2000-01 season since this was the most recent "good year" for rice cultivation in South Asia as no widespread droughts or flood events occurred during that season. Since the map has high accuracy (over 80% accuracy and a 94% agreement with district-level rice statistics), this encouraged us to apply the method to other years. Here, we present the map for the 2009-10 wet season, which we believe to be the most up-to-date and detailed map of rice cultivation areas in South Asia.

The map shows 11 classes of rice cultivation covering 50.6 million hectares.[2] The two major types are irrigated and rainfed. The irrigated classes account for 24.2 million hectares and are further described by their irrigation type, such as surface-water irrigation (from tanks, rivers, or reservoirs), groundwater irrigation (from wells or springs), and the cropping system, such as single rice, rice-rice, or rice–other crop systems. The rainfed classes account for 26.4 million hectares and include areas that have some occasional supplemental irrigation from groundwater sources as well as upland/dryland rice and deepwater rice areas as found in eastern Bangladesh.

The map shows a complex pattern, in terms of both where and how rice is cultivated. As expected, the dominant rice areas are in northern and eastern India, Bangladesh, the river systems of Pakistan, and the southern lowlands of Nepal. However, rice cultivation occurs in almost every region where there is arable land and a suitable climate. The variation in rice systems is equally diverse. There are some dominant trends such as the irrigated rice–other crops across northern India, the rice-rice areas east of Hyderabad in Andhra Pradesh, and the rainfed areas stretching between Kolkata and Hyderabad. But, there are also areas such as Bangladesh, the far northeast of India, southern India, and Sri Lanka where no single system dominates and several systems lie within close proximity.

This map is a useful output in itself, but it also forms the basis for further research. By producing rice area maps for different years, we can observe trends in rice area as producers move from one crop to another (e.g., from rice to sugarcane) or as land is converted to other uses. Examples of agricultural expansion include areas where stress-tolerant rice varieties permit farmers to cultivate land that they could not use before. Conversely, agricultural land can be lost when pressure to convert arable land to other uses, particularly for urban expansion and development, is high. We also use these maps to identify the extent, duration, and frequency of submergence and drought events during the growing season. When these maps are fully validated, they will be made available on the International Rice Research Institute's Web site as a valuable resource for mapping and monitoring the trends in rice cultivation across Asia.

Dr. Gumma is a postdoctoral fellow with IRRI's Geographic Information Systems (GIS), Social Sciences Division (SSD). Dr. Nelson is a geographer in GIS. Dr. Thenkabail is a research geographer in the U.S. Geological Survey. Dr. Singh works as a consultant for the STRASA project. Ms. Garcia is an associate graphic designer, while Ms. Maunahan and Ms. Villano are researchers at GIS, SSD.

[1] Based on World Bank 2005 data.

[2] This is the harvested wet-season area only. The harvested rice area across all seasons where there is more than one rice crop (*kharif* and *rabi* in India; *aman, boro,* and *aus* in Bangladesh; and *maha* and *yala* in Sri Lanka) is almost 60 million hectares.

The 2008 rice crisis: **Fluke or warning bell?**

by **Samarendu Mohanty**

The 2008 rice crisis seems to be a distant memory now, with rice prices slipping back to the precrisis level. In the last few months, global rice prices have fallen by more than 30%. Potential buyers have opted to stay on the sidelines, as they expect prices to drop even lower. Despite the free-falling global prices, however, rice in major domestic markets remains expensive. Hence, the real question now is, "What will happen to the global market in the next few months as we move into the thick of the wet-season rice crop?" The plain and simple answer is, "Nobody knows." Certainly, the impending monsoon will play a significant role in directing the trend in rice prices in the near term. Moreover, the drought in many Southeast Asian countries—particularly in Thailand and the Philippines—had some impact on the recently harvested dry-season rice crop, but it was not intense enough to cause any considerable change in the global rice market.

A technical analysis of the recent price trend suggests that Thai rice (5% broken) has been fluctuating between US$500 and $600 per ton for the last year and a half (November 2008 to April 2010). Technical experts refer to this as "market consolidation" and the range is termed the "consolidation zone." Once the market breaks out of the consolidation zone, prices can be expected to move away from this range significantly. If the breakout happens on the downside, prices can drop notably to a low level and vice versa. Fortunately or unfortunately (depending on whom to ask), the price of 5% broken in early June has fallen below the $500 support level and, since then, has dropped by more than $75 (Fig. 1). In the third week of June, the export quotation of 5% broken was $425 per ton. It remains to be seen how far down the price will fall before it stabilizes and moves upward.

The recent introduction of a price guarantee program in Thailand and the overflowing government warehouses in India and Thailand may add downward pressure on rice prices in the short run, barring some unexpected news that could change market perceptions. According to a report published in *Hindu Business Online*, public rice stocks in India as of 1 May 2010 were nearly 26 million tons, that is, 5 million tons higher than what they were on 1 May 2009. Despite a 10-million-ton shortfall in production in the 2009 *kharif* (wet) season and the domestic commitment to provide subsidized grains for 65 million families below the poverty line, the government has been able to procure enough to add 5 million tons to its already bulging stock.

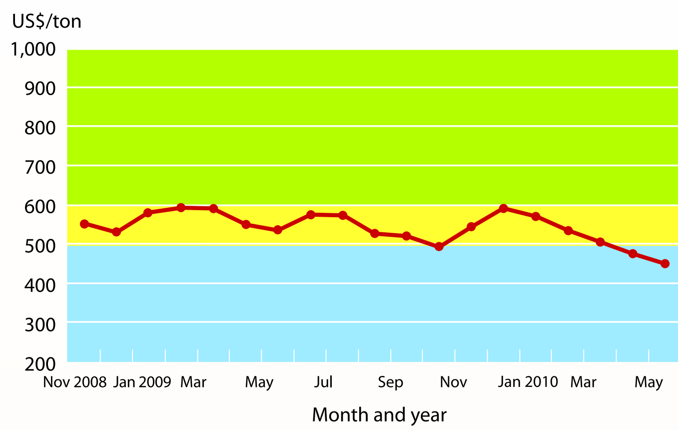


Fig. 1. Breakout from consolidation.
Data source: World Bank Pink Sheet and Thai Rice Exporters' Association.

In the case of Thailand, high pledging prices in the last 2 years have resulted in a significant rise in government stock holdings. This scheme contributed to the rise in market prices, pricing Thai rice out of the export market. However, under the newly introduced price guarantee program, participating farmers can sell their rice in the market at the prevailing price and get the difference between the guarantee and the market price from the government—definitely a move in the right direction in terms of making Thai rice more competitive in the global market and also in easing the pressure on government warehouses.

What does this mean for future rice food security?

The current situation brings back the burning question: Is the 2008 food crisis just a fluke and should the world go back to business as usual and not worry about the future of rice food security? Before answering this question, one needs to look at global rice supply-and-demand prospects in order to assess food security objectively. On the demand side, global per capita rice consumption has been more or less flat, with rising consumption in some countries offset by declining consumption in others. Outside Asia, where rice is not a staple, per capita consumption continues to rise steadily and the trend will likely continue in the foreseeable future. In the last two decades, per capita consumption in sub-Saharan Africa has increased by nearly 50%, from 15 kilograms in 1990 to 22 kilograms in 2010. Outside Asia and sub-Saharan Africa, rice has also gained in importance—as reflected in the changing consumption patterns—despite being a minor food grain. In the last five decades, per capita consumption has more than doubled, from 8.3 kilograms in 1960 to 18.3 kilograms in 2009. The past trend will very likely continue in the future as people continue to move toward a more balanced diet. Total rice consumption is projected to rise by an additional 25% by 2035.

Ultimately, the consumption pattern in Asian countries, which represent 90% of global rice consumption, will decide the future trend in rice consumption. Asian consumers are likely to move toward more balanced diets by adding more meat, poultry, vegetables, milk, and dairy products into their food basket as they become wealthier. In the last 20 years, unprecedented economic growth in most Asian countries has diversified the food basket. However, the rate of diversification has been slower than what was witnessed in Japan, South Korea, and Taiwan during the last few decades. Per capita rice consumption in China and India declined between 1990 and 2005 (see Fig. 2). But, the recent USDA statistics on Indian rice supply and use indicate that the trend in per capita consumption has reversed in the last 5 years, with a 5-kilogram increase between 2004-05 and 2008-09. In the case of Indonesia and Vietnam, per capita rice consumption increased between 1990 and 2000, but decreased between 2000 and 2005. Unlike these countries, per capita consumption continues to rise in the Philippines and Bangladesh. Based on these trends, it is evident that not all Asian countries will follow the Japanese and South Korean food consumption pattern as they become wealthier. Each country will be unique in the way it diversifies its consumption pattern as incomes rise.

Using population projections from the United Nations and income projections from the Food and Agricultural Policy Research Institute, global rice demand is expected to rise from 439 million tons in 2010 to 496 million tons in 2020 and further increase to 553 million tons in 2035. This shows an overall increase of 26% in the next 25 years. The rate of growth, however, will decline from 13% for the first 10 years to 11% in the next 15 years as population growth slows down and people diversify from rice to other foods. Among various rice-consuming regions, Asian rice consumption is projected to be 67% of the total increase, rising from 388 million tons in 2010 to 465 million tons in 2035 (Fig. 3). In addition, Africa will need 30 million tons more rice, which marks an increase of 130% from 2010 rice consumption. In the Americas, total rice consumption is projected to rise by 24% over the next 25 years.

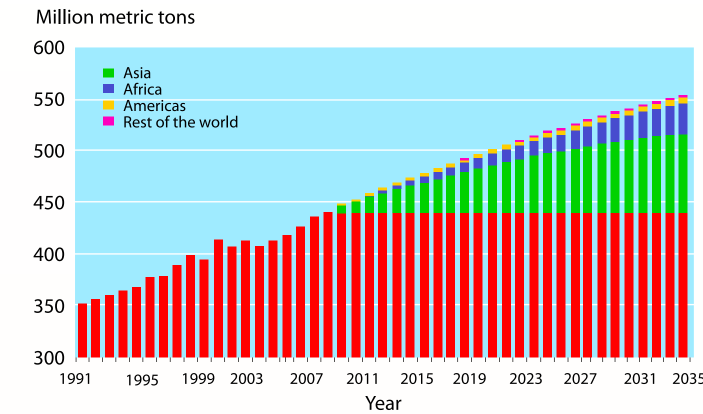


Fig. 3. Future rice needs.
Data source: IRRI Social Sciences Division.

On the supply front, expansion of rice area in traditional rice-growing regions of Asia is not a feasible option considering population growth and the pressure on rice lands from urbanization, climate change, and competition from other high-value agriculture. Although expanding rice land in a few Asian countries such as Myanmar and Cambodia is still possible, political and economic conditions need to be stable for that to occur. Beyond Asia, some parts of African and Latin American countries can also potentially expand rice production, but the underlying economics have to make sense before farmers start expanding rice production on a large scale. For example, Africa has responded to rising rice prices in recent years by expanding production by 40% in the last 5 years. Both area expansion and yield increase contribute equally to production growth. Rapid production expansion has also put a lid on the growth of imports, which increased rapidly from 2.5 million tons in 1990-91 to 7.1 million tons in 2001-02. Since then, rice imports have fluctuated between 7 and 8 million tons, coinciding with the steady increase in global rice prices that nearly doubled during the last decade.

Thus, global rice yields must rise much faster than what has been witnessed in the recent past to make rice available and affordable to the billions of poor consumers. Globally, farmers need to produce at least 8–10 million tons more paddy rice each year, which requires an annual increase of 1.2–1.5% over the coming decade that is equivalent to an average yield increase of more than 0.6 ton per hectare. Over the longer term, rice yield growth of 1.0–1.2% annually will be needed to feed the world and keep prices affordable even if global rice consumption growth is expected to slow down because of pressure on rice lands in the developing world caused by urbanization, climate change, and competition from other high-value agriculture.

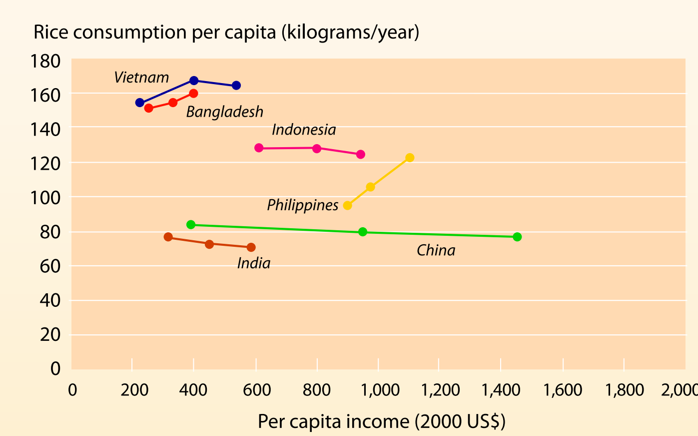


Fig. 2. Rice consumption versus income (1990-2005).
Data source: Food and Agriculture Organization and World Bank.

Precision agriculture for small-scale farmers

BY: ROLAND J. BURESH

Crop management has no such thing as a one-practice-fits-all solution. In fact, awareness is increasing throughout the world that crop management practices must be tailored to location-specific needs in order to produce more food with higher profitability and to reduce risks to the environment. This is particularly important for the application of nutrients to cereal crops because optimal amounts and sources of nutrients to meet the needs of the crop can vary, even across short distances within and among fields. If the application of nutrients as fertilizers is insufficient, it can result in loss of yield and profit, whereas applications in excess of crop needs not only reduce profit but can also increase risks to the environment.

In Europe, North America, Australia, and parts of South America, where agriculture is mechanized on a large scale, concerns about the environment and high cost of fertilizers relative to the value of harvested crop have resulted in "precision agriculture" technologies. Precision agriculture aims to better match fertilizer applications with the spatial and temporal needs of the crop for nutrients. In large-scale farming, sophisticated technologies often based on crop sensors, global positioning systems, or remote sensing are being developed and used to carry out precision agriculture. This is unsuitable to most Asian rice farming, where fields and the entire landholding of one farmer are typically small—usually fractions of a hectare up to only a few hectares. Thus, sophisticated sensors must be replaced with other means for rapid, cost-effective acquisition and processing of location-specific information for a field.

Computer-based decision tools with simple questions for farmers to answer and able to quickly provide a field-specific guideline (www.irri.org/nmrice) represent a cost-effective option for small-scale farmers to implement precision agriculture. But such tools must be readily accessible to extension workers and farmers in rural areas.

Computers are one option for accessing decision tools provided

either on a CD or via the Internet. But computers are not always readily accessible by small-scale farmers. Web-based mobile phones with Internet access provide another option but, again, not many farmers have such phones or Internet connectivity.

However, one alternative is available to many small-scale farmers: mobile phones with SMS (short message service) capability. With such mobile phones, text messaging and call centers are options for getting information to farmers. These require trained staff to handle texts and calls and ensure that accurate, timely, and consistent information is provided to farmers. Another way to reach many farmers with mobile phones is through interactive voice response (IVR).

With IVR, a farmer calls a phone number with a voice recording that presents a menu of questions about the farmer's rice field and growing conditions. The farmer answers each question by pressing an appropriate number on the keypad. Once all questions are answered, the farmer receives a text message with a guideline on the amounts, sources, and timings of fertilizer application for his or her specific rice field.

The Nutrient Manager decision tool for rice has already been released and used with CD and Web-based applications in the Philippines. To reach more farmers, especially those without computers, the Philippines has been selected as the country to develop and provide, through a partnership with the public and private sector, a mobile phone–based IVR application that sends farmers a text message with a field-specific fertilizer guideline based on information they provide about their rice field. This tool is set to be released in mid-2010. More information on this tool will be featured in the next issue of *Rice Today.*

Information technology and mobile phone applications could change the role of extension workers. In the future, they could become less of a technical expert on a topic such as nutrient management and more of an expert on where and how to access information—an important role in orienting farmers to new IT tools and how to effectively use them.

Mobile phones are already capable of wireless banking and connecting farmers to microfinancing and loans, and purchasing power they have never had before. Bringing precision agriculture with IT to small-scale farmers can open up opportunities for farmers to obtain a fertilizer recommendation via a text message and then use their phones to access suppliers of the fertilizer and financing options to purchase it.

Nutrient Manager decision tools to provide field-specific guidelines for rice, wheat, and maize are now under development for specific countries and crop-growing regions (www.irri.org/ssnm). Information technology and the use of mobile phones offer the opportunity to bring precision agriculture to small-scale farmers. The farmer becomes the "sensor" for rapid, cost-effective acquisition of location-specific information, the IVR and Nutrient Manager software become the processors of this information, and the mobile phone becomes the vehicle for fast and effective transmission of the information to farmers.

Precision agriculture, such as field-specific nutrient management, could become available to small-scale farmers at their fingertips within a few minutes.

Dr. Buresh is a principal scientist, specializing in nutrient and crop management for intensive rice-based cropping systems, at the International Rice Research Institute.

THE RICE TRADER

World Rice CONFERENCE 2010

12-14 October 2010, Hilton Arcadia Phuket Resort & Spa, Phuket, Thailand

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Following the success of the inaugural TRT World Rice Conference in 2009, The Rice Trader is pleased to invite delegates and members of the rice industry to Phuket, Thailand for the TRT World Rice Conference 2010—an event that is fast becoming the annual gathering for rice industry professionals from around the world.

This year's event comes with MORE!
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What's next after an action packed 2009? We have already seen India threaten to import and, subsequently, not import. Then, the Philippine tenders came early (Nov 2009), pushing the country to buy more rice than it did in 2009. Bangladesh has also returned to the market to import, and Indonesia leans toward importing as well as it continues to deal with a delayed crop and the effects of El Niño that would surely create an impact in the months ahead. Brazil, on the contrary, was a victim of untimely rains, which damaged harvests. Nonetheless, Brazil presses on to sustain its rice exports to Africa, particularly parboiled rice.

Interestingly, during the TRT World Rice Conference in Cebu last year, the Euro peaked in value (at 1.5 against the U.S. dollar). Since then, however, the Euro has weakened, creating an alarming impact on West Africa's purchasing power. All these have happened while the industry deals with the monsoon (the development of which would tell us more about India), droughts in Northern Vietnam and Southern China, and the El Niño that has left many unable to predict output. Add a cautious trade and buyer to this mix and we have an industry that is vulnerable to the swift moves in the price and business environment—and one that is already clearly living "hand-to-mouth."

Featuring a "who's who" line-up of speakers, the agenda is broken down into specific sessions that aim to deliver intelligence and offer an opportunity to meet with peers to gain insights regarding the current year and what lies ahead

SPEAKERS INCLUDE:

Jeremy Zwinger, President/CEO, The Rice Trader
Korbsook Iamsuri, President, The Rice Exporters Association, Thailand
Chanchai Rakthananon, President, Thai Rice Mills Association
Ed Schafer, Former U.S. Secretary of Agriculture
Dwight Roberts, President/CEO, U.S. Rice Producers Association
Dr. Bill Wilson, Professor, North Dakota State University
Senior Representative, Ministry of Industry and Trade, SR Vietnam
Dr. Bruno Lanfranco, Senior Researcher, National Agriculture Research Institute of Uruguay
Ludovico J. Jarina, Deputy Administrator, National Food Authority, Philippines
Sutarto Alimoeso, President Director, Perum Bulog
Tim de Mestre, Value Chain/Trade Consultant, SME Cambodia
Fuad Hamid Garib, Director, Garibsons (Pvt) Ltd
Henry Allard, Filhet-Allard Maritime
Richard Watts, Proprietor, HR Maritime, Switzerland
Dr. Samarendu Mohanty, Head and Senior Economist, Social Sciences Division, International Rice Research Institute
Dr. John Leeper, Head of Research and Development/Technology, RiceCo
Eduardo Libin, Vice President, Delta Technology, USA
Patricio Mendez del Villar, Collective Action, Policies & Markets, Centre de Coopération Internationale en Recherche, Agronomique pour le Développement (CIRAD)
Iain McAlpine, Trader, Atlas Trading & Shipping a Division of Grindrod Trading (Pty) Ltd.
Kalpesh Patel, Head (Rice Trading), Export Trading Co., Kenya
Spondon Phukan and Elhaj Thierno Sidy Barry, Regent International, Guinea
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