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**Rice Today**  
International Rice Research Institute

October 2003, Vol. 2 No. 2

**Breeding for nutrition:  
More goodness  
from staple crops**

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**Precious cargo:  
Seeds of Life  
for East Timor**

**Year of life**

**Looking forward to International Year of Rice 2004**

IRRI

Rice  
Science  
for a Better  
World



Half of the world's rice harvest

is consumed by the farm families

that grew it. Higher crop productivity

helps improve their household

food security and livelihood

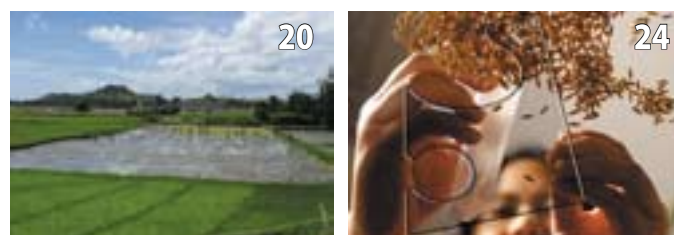


Rice is  
**Life**

INTERNATIONAL YEAR OF RICE 2004



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*Rice Today* is published by the International Rice Research Institute (IRRI), the world's leading international rice research and training center. Based in the Philippines and with offices in 11 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. IRRI is one of 16 Future Harvest centers funded by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private donor agencies.

For more information, visit the Web sites of the CGIAR ([www.cgiar.org](http://www.cgiar.org)) or Future Harvest Foundation ([www.futureharvest.org](http://www.futureharvest.org)). Future Harvest Foundation is a nonprofit organization that builds awareness and supports food and environmental research for a world with less poverty, a healthier human family, well-nourished children and a better environment. Future Harvest Foundation supports research, promotes partnerships and

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sponsors projects that bring the results of agricultural research to rural communities, farmers and families in Africa, Latin America and Asia.

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## Spray reduction campaign expands into Vietnam's Red River Delta



PHU THANH STUDIO HCMC

TEAM MEMBERS (from right) Nguyen Huu Huan, M.M. Escalada, Vo Mai (Mr. Huan's predecessor) and K.L. Heong seen with their Golden Rice Award 2002 from the Vietnamese government.

An award-winning campaign that promises to help protect a million rice farmers in the Red River Delta from needless exposure to insecticides was formally inaugurated in Vietnam as part of World Environment Day 2004 in June. The campaign, jointly run by a team of Vietnamese, Philippine and Malaysian scientists, builds on a groundbreaking effort that has already sharply reduced pesticide misuse in Vietnam's Mekong Delta (see *Rice Today* Vol. 2, No. 1, page 5).

The team's long-running collaborative effort in Vietnam is led by K.L. Heong, a Malaysian senior entomologist at IRRI; M.M.

Escalada, a communications professor at the Philippines' Leyte State University, now seconded to IRRI; and Nguyen Huu Huan, the vice director general of Vietnam's Plant Protection Department. Last year, the team won the \$25,000 Saint Andrews Prize for Environment and pledged to use the money to extend the pesticide-reduction effort to the Red River Delta.

Launched in 1994, the research and subsequent campaign clearly identified the damage caused by insecticide overuse, which kills predator insects and so encourages the pests that they would otherwise help control, and developed new ways of communicating this information to farmers. After persuading almost 2 million rice growers in the Mekong Delta to cut back on insecticides, the partners launched in 2001 a similar campaign in central Thailand's Sing Buri Province.

The research team found that farmers spray in early crop stages because of highly visible but yield-neutral damage caused by leaf-feeders, a practice encouraged by aggressive pesticide marketing that plays to farmers' often misplaced fears. "What appeared to motivate farmers to spray insecticides during the early stages were misconceptions and overestimations of losses due to pests," Dr. Heong explained, adding that the group set out to find ways, especially through mass media such as radio, to motivate farmers to spray less.

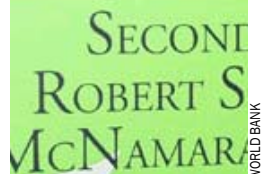
"We got a group of actors to play out a series of brief comedies, using rustic situations and solid scientific facts to make the audience laugh," Dr. Heong explained. "We were pleasantly surprised to find that these simple, humorous messages fixed themselves in the minds of thousands of farmers."

## McNamara Seminar in Japan

The Consultative Group on International Agricultural Research (CGIAR) and the Tokyo office of the World Bank held the second annual Robert S. McNamara Seminar in Tokyo on 2 July.

This year's seminar, which attracted more than 300 people, addressed the theme "The role of agriculture and agricultural research in generating growth and post-disaster reconstruction." Mr. McNamara argued forcefully for Japan to increase its funding to the CGIAR. Former Japanese Prime Minister Ryutaro Hashimoto gave the keynote address on *Agriculture and Human Security*. The directors general of three CGIAR centers spoke, as did Keiji Otsuka, who will become chair of IRRI's Board of Trustees in January (see page 29).

The seminars acknowledged the contribution of Mr. McNamara, a founding father of the CGIAR and former U.S. secretary of defense (1961–68) and president of the World Bank (1968–81).



DR. OTSUKA in Tokyo.

## New IR64 line tolerates acid soil

IRRI and the Cuu Long Delta Rice Research Institute (CLRRI) in Vietnam have used wide hybridization to transfer into popular variety IR64 the ability of *Oryza rufipogon*, a wild relative of cultivated rice, to grow in acid sulfate soils. A backcrossing program produced 460 breeding lines for selection in acid sulfate and nontarget conditions through CLRRI's yield-testing network. The Ministry of Agriculture and Rural Development has released one line as national variety AS996 for commercial cultivation in Vietnam.

"This variety resembles IR64 in most characteristics and is resistant to brown planthopper and blast disease," said IRRI plant breeder Darshan Brar. "Besides maturing 5–10 days earlier than IR64, it is suitable for moderately acid sulfate soils." AS996 is popular with farmers and currently occupies 100,000 ha in Vietnam. Recognizing the popularity of AS996 in less favorable areas, the Vietnam Union of Science and Technology Association recently awarded CLRRI the Vietnam Fund for Supporting Technological Creations (VIFOTEC) prize.



TRAINING CENTER

OPTIONS FOR DELIVERY: 38 participants from seven Asian countries received certificates in March for completing the course "Developing integrated nutrient management options for delivery." Roland Buresh, IRRI soil scientist and course resource person (second row, sixth from right), said course activities included lectures, field visits, discussions and action-plan preparation.



## Australia pledges \$10.7 million to support world's genebanks



Australia confirmed its leading role in biodiversity conservation in May, when the Australian Agency for International Development pledged A\$16.5 million (US\$10.7 million) for the Global Conservation Trust. Led by the Consultative Group on International Agricultural Research and the Food and Agriculture Organization of the United Nations, the trust seeks to raise an endowment of \$260 million to support crop diversity collections, including the Genetic Resources Center at IRRI, in perpetuity.

Operating within the framework of the International Treaty on Plant Genetic Resources

for Food and Agriculture, the trust had earlier received commitments totaling \$25 million from the governments of the U.S., Switzerland, Egypt and Colombia, and the UN and Gatsby Foundations.

The new pledge "indicates an unprecedented acknowledgment by Australia of the importance of the world's crop diversity collections," said Tim Fischer, chairman of the Crawford Fund, an initiative of the Australian Academy of Technological Sciences and Engineering. "A further significant pledge from grain producers, through the Grains Research and Development Corporation, puts Australia in

the proud position of being a major player in the international effort to conserve the world's crop diversity."

Some 1,470 genebanks the world over house seed samples of crops and their wild relatives.

"Many of these collections are seriously underfunded, jeopardizing the ongoing security of agriculture and the world's ability to feed itself," said Mr. Fischer. "These genebanks have proved invaluable in restoring agricultural production in war-torn countries such as Cambodia, Afghanistan and East Timor by providing seeds originating in those countries to farmers for planting. It is almost certain that genebanks holding samples of Iraqi materials will be called upon to restore them to Iraq."

"The conservation of crop diversity is a little-known necessity for meeting the most fundamental need of humankind — the need for food," said Geoffrey Hawtin, interim executive secretary of the Global Conservation Trust. "This globally significant conservation effort is far more than a warehousing exercise. The whole purpose of carefully collecting, documenting, studying and conserving crop resources is to make them easier to use and thus more useful. Genebanks distribute hundreds of thousands of samples from their collections each year upon request from scientists, breeders and farmers all over the world for their use in research and crop improvement."

For more on the Global Conservation Trust, visit [www.startwithaseed.org](http://www.startwithaseed.org).

## Saving water in the Philippines

More than 600 farmers, irrigation managers, local dignitaries, Department of Agriculture personnel and extension agents descended on Paniqui, in the Philippine province of Tarlac, on 12 March as Secretary of Agriculture Luis P. Lorenzo, Jr., introduced IRRI's aerobic rice technologies. The aerobic rice project develops technologies to grow rice as a dry-field crop producing high, sustainable yields under favorable conditions while using much less water. It is a joint effort of farmers, the Philippine Rice Research Institute (PhilRice), the National Irrigation Authority and IRRI.

"Aerobic rice is just one technology we hope will help rice farmers deal with this new challenge," said IRRI Director General Ronald Cantrell. He went on to explain that IRRI's host country is especially well placed to exploit the latest water-saving technologies because some improved upland varieties developed by IRRI, the University of the Philippines Los Baños and PhilRice are well adapted to aerobic production. These include *Apo* and *UPLR1-5*.



**PLANNING IN PAKISTAN:** Ren Wang, deputy director general for research (first row, fourth from right), led a delegation of IRRI scientists to Islamabad for the IRRI-Pakistan Work Plan Meeting in March. IRRI and the Pakistan Agricultural Research Council (PARC) agreed to develop joint project proposals for competitive grants on rice research and to seek funding for a large national program of broadened partnerships. Also agreed was a proposal to establish a country node of the Rice Knowledge Bank at the Directorate of Scientific Information of the National Agricultural Research Center (NARC) in Islamabad. Attending the meeting with Dr. Wang were PARC Chairman Badaruddin Soomro; NARC Director General N.I. Hashmi; M. Ashraf of the Crop Sciences Division of PARC; M. Salim, PARC's national coordinator for rice; directors of key PARC institutes; and IRRI scientists John Bennett, Abdelbagi Ismail and Parminder Virk.

## World Bank evaluates agricultural research group

The Operations Evaluation Department (OED) of the World Bank released last spring a meta-evaluation of the Consultative Group on International Agricultural Research (CGIAR), IRRI's parent organization. The OED concluded that "the CGIAR has been a unique instrument of international cooperation. Its productivity-enhancing research has had sizable impacts on reducing poverty by increasing employment, raising incomes, lowering food prices and releasing land from cropping."

While observing that "further improvements in sustainable agricultural productivity are critical to meet the international community's millennium development goal of halving poverty by 2015," the report noted that "overall CGIAR funding has stagnated in nominal terms, declined in real terms, and become increasingly restricted over the past decade."

The OED recognized that the changing nature of funding has driven a "transformation of the CGIAR's authorizing environment from being science-driven to being

donor-driven, and a shift in the system from producing global and regional public goods toward providing national and local services." It added: "Today, donors' preferences are largely determining resource allocations independently of [the system's] medium- and longer-term priority setting."

The OED concluded: "The governance of the CGIAR should be reconfigured to promote greater efficiency, tougher priority setting, and scientific excellence without sacrificing legitimacy and ownership. The strategic priorities of the CGIAR should respond more actively to changes in the global research context, giving more prominence to basic plant breeding and germplasm improvement, and reshaping natural resource management research in the areas of the CGIAR's comparative advantage to focus tightly on productivity enhancement and sustainable use of natural resources for the benefit of developing countries."

The evaluation is available online at [www.worldbank.org/oed/cgiar](http://www.worldbank.org/oed/cgiar).

### BAGGED IN KOREA:

In a South Korean supermarket, IRRI Director General Ronald Cantrell inspects rice labeled free of genetically modified organisms.



PAM CANTRELL

Dr. Cantrell was in Korea in June with IRRI pathologist Hei Leung to sign a 3-year funding memorandum of agreement with the Rural Development Administration (RDA). Receiving Dr. Cantrell were Young-Wook Kim, RDA administrator; Hyun-Pal Moon, deputy administrator; Seok-Dong Kim, director general for research and development; and Dae-Geun Oh, International Technical Cooperation Center director. At the RDA's National Crop Experiment Station, H.G. Hwang, Rice Genetics and Breeding Division director, discussed strengthening pest and disease resistance in premium japonica rice varieties. Drs. Cantrell and Leung also visited the National Institute of Agricultural Biotechnology of the RDA, where Director General Ho-Il Kim described the institute's participation in the International Rice Genome Sequencing Project.

### Briefly

#### \$31 million for African rice

The African Development Bank approved in July US\$31 million in loans and grants, reported IRINnews Africa, to further the New Rices for Africa (NERICA) program led by the West Africa Rice Development Association (WARDA) – The Africa Rice Center. High-yielding upland rice varieties are forecast to raise rice production in seven West African countries enough to reduce their food imports by \$100 million per year. The new funds are for small loans to farmers to enable them to buy seed. Meanwhile, WARDA unveiled a plan for a phased return to its headquarters in Bouaké, Côte d'Ivoire, which it evacuated in September 2002 because of civil war.

#### Crop-livestock collaboration

IRRI and the International Livestock Research Institute (ILRI), together with the national agricultural research and extension systems of five countries in Southeast Asia, are undertaking a collaborative project on "Sustainable food-feed systems and improved livelihoods of the poor in rainfed lowland areas." Collaborators include the Cambodian Agricultural Institute; the Research Institute for Rice and Research Institute for Animal Production in Indonesia; the Philippine Rice Research Institute and Central Luzon State University; Khon Kaen University in Thailand; and Cantho University and Vietnam Agricultural Sci-

### Briefly

ence Institute. Mercy Sombilla of IRRI coordinates the project in collaboration with Lucy Lapar of ILRI.

#### Functional genomics online

The International Rice Functional Genomics Consortium launched its Web site in May. The consortium, modeled on the International Rice Genome Sequencing Project, chose in January IRRI pathologist Hei Leung to chair an interim steering committee of scientists representing 18 institutions in 10 countries, including IRRI and the International Center for Tropical Agriculture. The URL is [www.iris.irri.org/IRFGC](http://www.iris.irri.org/IRFGC).



#### Interim agreement in force

Bringing germplasm exchange in line with the forthcoming International Treaty on Plant Genetic Resources for Food and Agriculture took a step forward recently with the implementation of an interim material transfer agreement (MTA) for the distribution of in-trust germplasm. As the treaty's future governing body will likely take several years to develop a new standard MTA, the Food and Agriculture Organization (FAO) Commission on Genetic Resources for Food and Agriculture revised the old FAO MTA to produce a broadly acceptable stop-gap

### Briefly

agreement. All genebanks in the Consultative Group on International Agricultural Research started using it on 1 May.

#### Tungro quelled in Iloilo

Participatory research has helped farmers overcome tungro infestation in Iloilo Province of the Philippines. In February, Dapitsaka Program Coordinator Elias Sandig said the 2,000 ha of paddy that had been infested with tungro 4 years ago now show no sign of the disease. The Dapitsaka Program began in 2000 when IRRI and the Philippine Rice Research Institute responded to requests for help from the provincial governor following severe tungro infestation. The institutes recommended 12 varieties for farmers to try in affected towns. The new strains introduced on pilot farms are tungro-resistant wide hybridizations of IR64 that retain the popular cultivar's high yield and good eating quality.

#### Crops into Africa?

An external program and management review has recommended that the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) move its headquarters from India to Africa to help focus its research on the problems of that continent. The review panel said that "ICRISAT must find a way of accomplishing the same successes in Africa as it has achieved in Asia." Plant breeding and



## The way forward for rice research in India

IRRI Director General Ronald Cantrell visited Delhi for 5 days in February and March for discussions on the future of IRRI's partnership with India. Meeting with Ajit Singh, union agriculture minister, and Mangala Rai, director general of the Indian Council of Agricultural Research (ICAR) and secretary of the Department of Agricultural Research and Education, Dr. Cantrell discussed the relevance of scientific developments in rice genomics, the science of isolating gene function.

"India has a world-class rice research sector very professionally led by ICAR," Dr. Cantrell said. "If you combine this expertise with the latest tools becoming available via functional genomics, then the Indian rice sector can look forward to some very exciting developments over the next few years."

Building on last year's historic sequencing of the rice genome, the Indian rice research community has moved quickly to further develop collaborative partnerships

focused on functional-genomic approaches to tackling the problems facing Indian rice farmers, such as drought.

"Drought and improved stress tolerance are the highest priorities of the rice researchers in functional genomics," Dr. Cantrell explained. "ICAR, especially under the new leadership of Dr. Rai, is focused on the challenges."

Dr. Cantrell reported that activities under way in collaboration with IRRI include the setting up of a National Consortium



AN INDIAN FARMER presents a token of friendship to IRRI's director general.

on Rice Functional Genomics that will coordinate research in India and develop a database of donor rice varieties highlighting traits of agronomic importance.

### Briefly

genomics activities would remain in India. The institute's Board of Trustees was expected to respond to the controversial recommendation in September.

#### Breeders receive plaque

The Philippine National Seed Industry Council, Philippine Rice Research Institute, and Rice Technical Working Group presented a plaque of appreciation to IRRI's Plant Breeding, Genetics and Biochemistry Division for five rice varieties released in 2002. The presentation took place during the annual rice varietal improvement group meeting in April, to which division head David Mackill led the IRRI delegation. Two of the released varieties are for irrigated fields, two are hybrids and one is a stop-gap variety for tungro hot spots (see item opposite).

#### New library links

At a meeting on Global Knowledge Sharing held in Washington, D.C., in March, library and information services in the Consultative Group on International Agricultural Research (CGIAR) agreed to collaborate to broaden the dissemination of knowledge created by the CGIAR and its partners. Representatives signed a memorandum of understanding to create the CGIAR Libraries and Information Services Consortium combining the 16 centers and secretariat. Meanwhile, the IRRI library in June joined LibraryLink, an online union catalog of

### Briefly

the Filipiniana holdings of libraries in the Philippines. Started in 1999 by the Ayala Foundation, the site has evolved from a simple online search facility into a portal for Filipiniana materials and libraries. With the addition of IRRI, LibraryLink ([www.librarylink.org.ph](http://www.librarylink.org.ph)) now searches through the Filipiniana catalogs of 65 institutions.

#### Doi Moi in demand

The Vietnamese National Assembly ordered 100 copies, for distribution to deputies, of the Vietnamese-language version of the book *Doi Moi in the Mountains*, which reports on research conducted in Bac Kan Province by the IRRI-supported Mountain Agrarian Systems Program. "They said it is relevant to the priorities set by the National Assembly for the mountainous areas of Vietnam and, more broadly, to the government's poverty alleviation efforts," reported Jean-Christophe Castella, coeditor of the book, which is also available in English (visit [irripub@cgiar.org](mailto:irripub@cgiar.org)).

#### Philippine National Rice Summit

IRRI participated in May in the Philippines' first-ever National Rice Summit in Quezon City. Sponsored by the Philippine Peasants Institute, the summit brought together 150 farmers, 32 speakers from IRRI and other research institutions, and 88 representatives of government and nongovernmental

### Briefly

organizations. A summit declaration called for a new National Small Rice Farmers' Council and the declaration of National Rice Day in May.

#### Iran-IRRI work plan agreed

The Agricultural Research and Education Organization of the Iranian Ministry of Jihad-e-Agriculture and IRRI signed a collaborative work plan for 2003-04 in March. The parties agreed to collaborate in the areas of rice breeding (for drought, salinity, heat and cold tolerance), mechanization, crop-loss reduction, water management, soil nutrient management, pest and disease control, training and exchange of scientists, and to continue cooperating through the International Network for Genetic Evaluation of Rice. Project coordinator for IRRI is Abdelbagi M. Ismail. Iran has committed funding support for the approved work plan.

#### Communicators elect board

ACE Philippines, the newly constituted affiliate of the U.S.-based Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences (ACE), recently elected its first Board of Directors. President of the seven-member board is Roger Barroga of the Philippine Rice Research Institute, and vice president is Kathy Lopez of IRRI. The mission of ACE Philippines is to enhance professionalism and skills.

# Two top scientific journals publish calls for more public funding of rice research

The leading scientific journals *Nature* and *Science* both published calls in early May urging renewed financial support for IRRI.

“Despite rumors to the contrary, the role of the International Rice Research Institute is as important as ever,” begins an editorial in the 1 May issue of *Nature* (Vol. 423) entitled *Rice Institute Needs Strong Support*. However, it adds, “In the three years from 2001 to 2003, IRRI’s annual core funding dropped by 26%, and similar cuts are expected in the future.”



“It is essential that support for IRRI be mobilized,” states the *Nature* editorial. “Researchers there, where research that spurred the Green Revolution

was carried out, sometimes hear their success in producing abundant, high-yielding rice as a justification for cutting their budget, as if to say ‘your job is over.’ But the institute’s job is not over — it has just begun.”

In the same week, the 2 May issue of *Science* (Vol. 300) ran a broader look at the Green Revolution and the role played by IRRI and the other 15 international agricultural research centers (IARCs)



in the Consultative Group on International Agricultural Research. In summarizing the findings of their book *Assessing the Impact of the Green Revolution, 1960 to 2000*, R.E. Evenson and D. Gollin write that “the IARCs will have an important role to play in generating and sustaining future advances in agricultural technology for the developing world.”

The *Science* authors add, “The budgets of many IARCs, not to mention many of their national program counterparts, have declined sharply in real terms over the past decade.” This has come about, the authors surmise, in part because development agen-

cies, “perhaps eager to find shortcuts to development, have tended to shift funding away from agricultural research and toward other priorities.”

The articles in both journals recount the successes of publicly funded agricultural research, especially the high-yielding modern crop varieties at the heart of the Green Revolution. Drs. Evenson and Gollin point out that the contributions made by modern varieties (MVs) have increased over time.

“Gains from MVs were larger in the 1980s and 1990s than in the preceding two decades — despite popular perceptions that the Green Revolution was effectively over by this time,” they write. “Overall, the productivity data suggest that the Green Revolution is best understood not as a one-time jump in production, occurring in the late 1960s, but rather as a long-term increase in the trend growth rate of productivity. This was because successive generations of MVs were developed, each contributing gains over previous generations. [...] The end result ... is that virtually all consumers in the world have benefited from lower food prices.”

Had there been no Green Revolution, the authors add, “prices would have remained constant or risen modestly.” As a result, “caloric intake per capita in the developing world would have been 13.3 to 14.4 percent lower, and the proportion of children malnourished would have been from 6.1 to 7.9 percent higher. Put in perspective, this suggests that the Green Revolution succeeded in raising the health status of 32 to 42 million preschool children. Infant and child mortality would have been considerably higher in developing countries as well.”

The *Nature* editorialist concedes that “there is now more than enough rice to go around” following a 2.5-fold improvement in rice yield per hectare since the 1960s. But the writer goes on to report that the “eastern regions of India, suffering floods and soil alkalinity, struggle to meet their own needs despite the abundance of rice produced in the well-irrigated Punjab region. Telling people to redistribute rice won’t help much. Local growers need to be able to look after themselves — for them, research into productivity continues to play an essential role.”

Drs. Evenson and Gollin agree with the *Nature* editorial about the need to extend the benefits of the Green Revolution to those who have been left behind because they inhabit fragile agroecological zones. “The challenge

for the coming decades is to find ways to reach these farmers with improved technologies,” they write. “For many, future green revolutions hold out the best, and perhaps the only, hope for an escape from poverty.”

“Yet the prospects for continued green revolutions are mixed,” they continue. “On the one hand, the research pipeline for the plant sciences is full. Basic science has generated enormous advances in our understanding of plant growth and morphology, stress tolerance, pathogen resistance, and many other fields of science. This understanding should lead in due course to improvements in agricultural technologies. But, on the other hand, IARCs and NARS [national agricultural research systems] are faced with numerous challenges to their survival” in terms of curtailed funding.

*Nature* picks up the thread regarding how the recent sequencing of the rice genome, detailing the genetic heritage that guides the plant’s development, affords new opportunities to rice scientists working to crack such daunting challenges as drought tolerance.

“Researchers hope to tap the secrets of the rice genome to meet these challenges



— a good bet, considering the unexplored biodiversity in the rice germ stocks,” the editorialist writes, recapitulating a 3-page news feature in the week-earlier, 24 April, issue of *Nature* (Vol. 422). “But there

are significant obstacles to bringing genomic science to bear on farmers’ practices. IRRI, whose rice lines have been bred into over a third of the new lines produced worldwide since the 1960s, is well positioned to take up that challenge.”

In the news feature, entitled *A Recipe for Revolution?*, David Cyranoski, the journal’s Asian-Pacific correspondent, reports that a central obstacle to progress in “the tricky task of turning our new knowledge of the rice genome into agricultural and economic gains” is that “genome researchers and breeders are speaking different languages.” He adds, “IRRI ... hopes to play a key role in bridging the gap between genome researchers and plant breeders.”



# March of progress for enhanced nutrition



Last March saw the publication of at least two papers in scientific journals detailing major progress in research to improve the micronutrient content of rice through biofortification. Biofortification, the focus of a challenge program recently launched by the Consultative Group on International Agricultural Research (see page 24), combines molecular techniques and conventional plant breeding to cre-

ate crops with heightened micronutrient content that can help alleviate nutritional disorders.

The world's most prevalent nutritional disorder is anemia. This debilitating condition is caused by a lack of iron in the diet — in which, for more than two-thirds of humanity, rice is the single largest source of calories. Although brown rice is generally high in iron, the polishing removes the outer layers of the grain and causes considerable loss of iron and other micronutrients.

The journal *Plant Science* published in its March 2003 issue (Vol. 164, No. 3, pages 371–378) a paper entitled *Enhanced iron and zinc accumulation in transgenic rice with the ferritin gene*. In it, IIRRI researchers and their collaborators in Japan report that they have introduced an iron-enhancing ferritin gene to indica rice in such a way that it expresses itself in the rice endosperm. Thus, after polishing, the rice grains contain 3 times more iron than usual.

“This is the most significant increase in iron ever achieved in an indica rice variety,” said IIRRI plant biotechnologist Swapan Datta, rice crop leader of the Challenge Program on Biofortification, the paper’s corresponding author and husband of Karabi Datta, one

of eight other authors. “It could have significant benefits for the 3.5 billion people in the world who have iron-deficient diets.”

Several of the same authors, including the two Drs. Datta, produced a paper that appeared in the March 2003 issue of *Plant Biotechnology Journal* (Vol. 1, No. 2, pages 81–90). The paper, entitled *Bioengineered ‘golden’ indica rice cultivars with beta-carotene metabolism in the endosperm with hygromycin and mannose selection systems*, officially announces IIRRI’s development of indica varieties rich in provitamin A-rich Golden Rice adapted for the tropics.

Swapan Datta reports that IIRRI scientists have in fact bioengineered several Asian indica varieties with genes for beta-carotene



biosynthesis. Selected lines — including genotypes of IR64 (the most popular variety in Asia), BR29 (a popular Bangladeshi variety), and *Mot Bui* and *Nang Hong Cho Dao* (popular Vietnamese varieties) — show expression of beta-carotene, the precursor of vitamin A, in otherwise normal plants. He adds that they did so using a non-antibiotic marker gene.

“This is significant if further progress is to be made in

developing nutritious rice, including bioengineered high-iron rice,” says Dr. Datta, citing negative perceptions on the use of antibiotic resistance genes in transgenic plants. Public acceptance will likely be more forthcoming, he says, for foods made from transgenic plants developed with non-antibiotic marker genes.

A program of safety and bioavailability tests means that indica Golden Rice is still some 4–6 years away from release to farmers. 🍚

## Also...

A study reported in *Science* (Vol. 299) shows that a surprisingly high percentage of the improvement in U.S. crop yields over the last 2 decades was due to **climate change**, not to farm management. The finding suggests that food production in the U.S. — and perhaps elsewhere — may be more vulnerable to shifts in climate than was previously suspected. The article quotes Ken Cassman, an agronomist formerly at IIRRI and now at the University of Nebraska, observing that “yield trends in the U.S. have global implications” for food security.

- *The New York Times* published on 20 July an 1,800-word editorial by Andrés Martínez entitled *Harvesting Poverty: The Rigged Trade Game* that is a searing indictment of Western **agricultural subsidies** and trade barriers.

- The University of Queensland received a grant worth A\$1 million (US\$600,000) to carry out research aimed at developing varieties of **drought-tolerant rice** for rainfed areas of Cambodia, Laos and Thailand, Agence France Presse reported in late April.

- IIRRI was featured in a 2-part series entitled *ASIA: Poverty and Rice* on **Radio Australia** Asia Pacific Program. Interviewer Kanaha Sabapathy presented the program, which is available online at [www.abc.net.au/ra/asiapac/programs/s895266.htm](http://www.abc.net.au/ra/asiapac/programs/s895266.htm).

- A profile of the **IIRRI Library** and Documentation Service appeared in the December 2002 issue of *Asia Library News* (delayed until May 2003), the official journal of the Bangkok-based Asia Library & Information Virtual Association.

- The government of Myanmar announced in April that it would soon stop buying paddy directly from farmers. The **liberalized policy**, part of a shift toward a market-oriented economy, frees farmers to sell their whole crop to the highest bidder and opens the way for Myanmar to resume exports of rice.

- The project director of the Directorate of Rice Research in Hyderabad, India, in May reportedly called upon rice researchers to refrain from transgenic research on **basmati rice**. In a press release, B. Mishra expressed fear that tinkering with the high-value grain would jeopardize national interests.



# Year of life

**T**he mid-Sixties put Asia through changes. Late 1965 brought the onset of seemingly endless upheaval in Indonesia during which President Suharto unseated President Sukarno — a memorable backdrop to the Mel Gibson movie *The Year of Living Dangerously*. In the Philippines, the 2-day-old presidency of Ferdinand Marcos bounced into New Year's Day 1966 on the knee of its campaign slogan, “Progress is a grain of rice.”

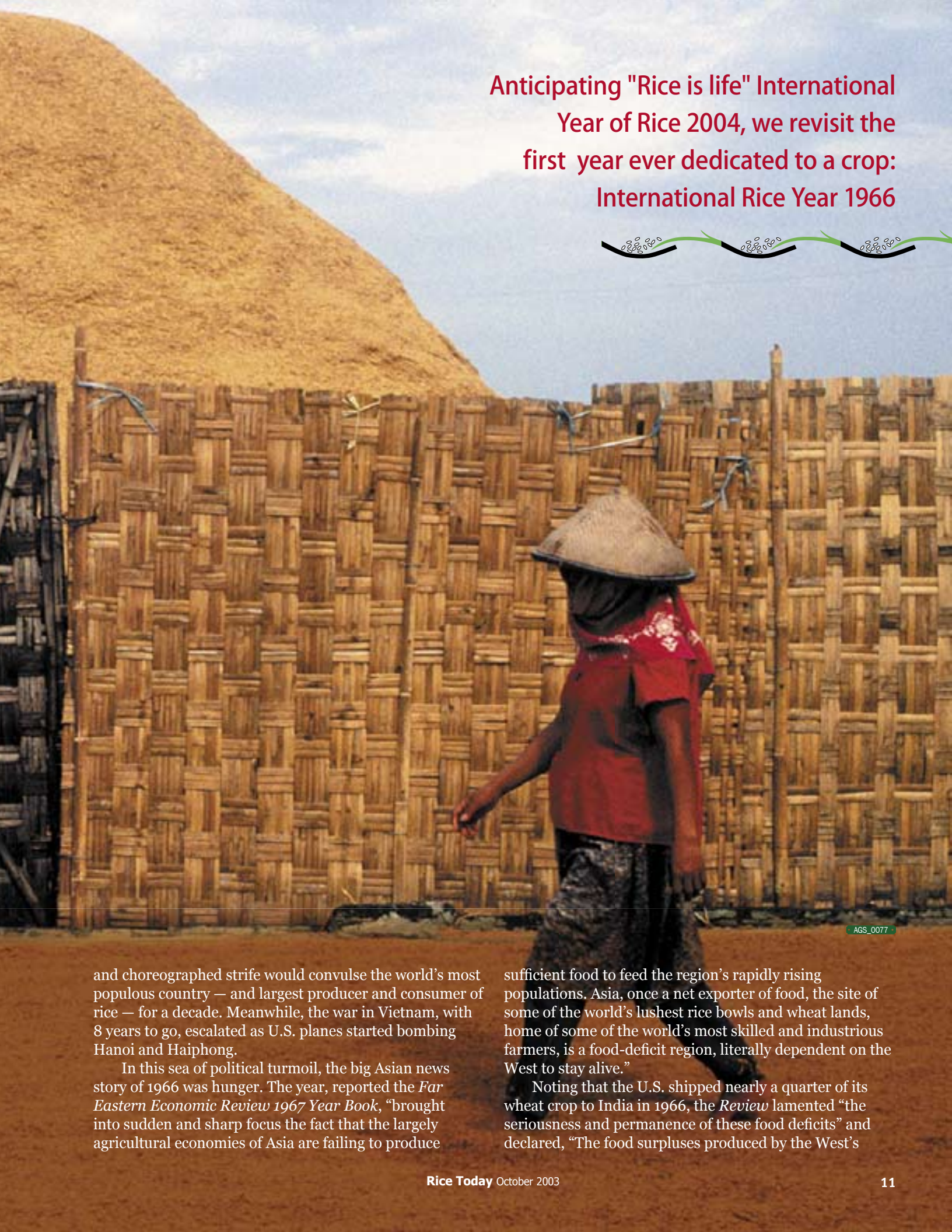
In the South Pacific, El Niño stirred from half a century of slumber. Monsoon rains failed across Asia,

ruining harvests and rocketing international rice prices to 10-year highs. In January 1966, as New Delhi installed Indira Gandhi as prime minister, the U.S. “Central Intelligence Agency forecast ‘widespread starvation’ in India,” reports Nick Cullather of Indiana University’s Department of History. “The pope appealed to the world for help as students rioted in Bengal and Communist unions paralyzed Calcutta with a general strike.”

In China, Chairman Mao launched his Great Proletarian Cultural Revolution, whose mélange of chaotic



Anticipating "Rice is life" International  
Year of Rice 2004, we revisit the  
first year ever dedicated to a crop:  
International Rice Year 1966



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and choreographed strife would convulse the world's most populous country — and largest producer and consumer of rice — for a decade. Meanwhile, the war in Vietnam, with 8 years to go, escalated as U.S. planes started bombing Hanoi and Haiphong.

In this sea of political turmoil, the big Asian news story of 1966 was hunger. The year, reported the *Far Eastern Economic Review 1967 Year Book*, "brought into sudden and sharp focus the fact that the largely agricultural economies of Asia are failing to produce

sufficient food to feed the region's rapidly rising populations. Asia, once a net exporter of food, the site of some of the world's lushest rice bowls and wheat lands, home of some of the world's most skilled and industrious farmers, is a food-deficit region, literally dependent on the West to stay alive."

Noting that the U.S. shipped nearly a quarter of its wheat crop to India in 1966, the *Review* lamented "the seriousness and permanence of these food deficits" and declared, "The food surpluses produced by the West's



farmers provide the rising populations with their only real hope of being fed for the rest of the 20th century.”

The *Review* continued: “The tragedy of the food situation in Asia was underlined by the fact that, in the year dedicated by FAO [Food and Agriculture Organization of the United Nations] as International Rice Year, grave shortages of rice supplies developed. [...] Asia this year has had to struggle hard to fill its rice bowls.

[...] The only heartening development on the Asian food scene was the appearance of some positive signs that the official agencies responsible are willing to change their approach and give agriculture the priority that it deserves in the war on poverty.”

The “first draft of history” (as the late *Washington Post* publisher, Philip Graham, described journalism) rarely gets everything right, especially when gazing into a crystal ball. In the event, almost all Asian countries regained the ability to feed themselves long before the end of the century, thanks largely to the “heartening development” of a greater focus on agriculture — and in no small way to a related occurrence reported in the *Review's* cautiously upbeat assessment of the Philippines.

### Promising factor

“The most promising factor behind rising hopes for a vastly increased rice harvest in the next several years was the discovery of a new variety of rice called IR8-288-3 by the International Rice Research Institute at Los Baños,” it stated. “This ‘Miracle Rice’ was found to outyield all other varieties in the tropics. [...] Since this variety could be harvested in 120 days, in irrigated farms it could be planted 3 times a year.”

IRRI’s official launch of IR8 on 28 November marked 1966 as the start in Asia of the Green Revolution, a term

### Images of life

The modern photos illustrating this special section, by IRRI photographer Ariel Javellana, represent only a small fraction of the rice-related images by him and others that will soon be available from AsianGrain.Com. After 31 October, visit [www.AsianGrain.com](http://www.AsianGrain.com) and search by photographer or subject — or go straight to the file number printed beside each photo.

coined 2 years later by William S. Gaud, administrator of the U.S. Agency for International Development (USAID, see page 27). “The institute advertised IR8 as a cosmopolitan rice, able to produce high yields throughout tropical Asia,” writes Dr. Cullather in *Miracles of Modernization: The Green Revolution and the Apotheosis of Technology*, scheduled for

publication in *Diplomatic History* early next year. “‘IR8 was to tropical rices what the Model T Ford was to automobiles,’ a pamphlet later explained, ‘a rugged variety that could go almost anywhere.’”

Other events contributed to making 1966 a red-letter year for rice — albeit one in which traces of International Rice Year are inconspicuous. Difficult to gauge 37 years later is the extent to which the year designation focused people’s attention on rice and helped to set in motion the Green Revolution.

The objective of International Rice Year was to encourage concerted efforts to promote rice and improve understanding of the world’s most widely eaten grain, especially in the context of its role in furthering the UN’s existing Freedom From Hunger campaign.

“When the idea of declaring an International Rice Year was first proposed, a number of the representatives of national governments ... expressed some reluctance to putting a ‘year tag’ on any one crop,” said O.E. Fischnich, assistant director general of FAO, in an address to the International Rice Commission (IRC) meeting in New Delhi, which set aside 5 October 1966 for a day-long Special International Rice Year Program. “Never before had any agricultural commodity been [designated] as the ‘crop of the year.’ However, as the proposal was more fully discussed; as



INTERNATIONAL RICE YEAR 1966. The year tag took its theme from the UN’s existing Freedom From Hunger campaign. Delegates to the FAO ad hoc Conference on Agricultural Extension in Asia and the Far East in Tokyo in November 1966 posed during a postconference tour of Kubota Iron and Machinery Works in Osaka.



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## A job begun but not done

How supporting rice research serves people, communities and the environment.

- Most of the world's poor live in rice-producing Asia. Many are poor rice farmers, and even more are poor rural rice consumers who are either landless or raise other crops. Rice is so central to their daily lives that any solution to global poverty must include rice research.
- The poorest of the poor in Asia spend 20–40% of their income on rice. Making rice cheaper will lighten this burden and free up rural funds for job creation in dynamic, diversified rural economies.
- Rice typically earns half of the income of Asian rice-farming households. Rice research that increases yields directly improves the productivity of these poor households, paving a sustainable path out of poverty.
- Rice provides more than half of the calories and protein in the diets of most Asian poor. Making rice more nutritious will help to alleviate hidden hunger in the world's most malnourished communities.
- Rice farming is the dominant land use in Asia, occupying more than 30% of agricultural cropped area in nearly all subregions and more than 60% in many of the poorest countries. Rice research to improve efficiency in the use of fertilizers and pesticides offers major benefits to the environment.

the facts established the preeminent position of rice as human food; and as thinking people reviewed the world food position and determined to exploit every possibility to encourage more food production, all resistance to the idea of declaring an International Rice Year disappeared.”

Navalpakkan Parthasarathy — FAO rice improvement specialist for the Far East, executive secretary of the IRC, and IRRI board member in 1966–69 — observed to the commission meeting “a significant coincidence” that International Rice Year was embracing several major scientific gatherings worldwide. These included the meetings of the IRC's three technical working parties, concurrent with the inaugural session of its Rice Committee for the Americas, on 23–28 July at Lake Charles, Louisiana; a conference on Mechanization and the World's Rice, organized by Massey-Ferguson Ltd. at its



**RICE IN THE NEWS.** The cover of the *Far Eastern Economic Review 1967 Year Book*, covering 1966, showed a hungry Asian child holding out his empty, broken rice bowl for more. On the cover of the bumper special rice number of *Indian Farming* in September 1966, a woman inspected a panicle of high-yielding, lodging-resistant but disease-susceptible Taichung Native 1, described by Robert Chandler as “a half sister of IR8.” M.S. Swaminathan, director of the Indian Agricultural Research Institute, convener of the National Committee for International Rice Year and, later, IRRI director general (1982–88), as he appeared in the March 1967 *Indian Farming* announcement of his Padma Shri Award for service to agriculture.





school in Warwickshire, U.K., on 26 September–1 October; and an ad hoc Conference on Agricultural Extension in Asia and the Far East on 7–12 November in Tokyo.

“International Rice Year provides an opportunity for a fresh look at centuries-old problems and the ways in which they should be tackled,” commented Sayed Mekki Abbas, FAO assistant director general, at the Warwickshire conference.

In September, the month before the IRC meeting in New Delhi, the Indian Council of Agricultural Research brought out a bumper “special rice number” of its periodical *Indian Farming*. The issue’s 156 pages made it 3 times normal size but left the editor promising that “a few articles” that hadn’t made the cut “owing to pressure on space” would be published in later issues.

“We in India are determined to bring about a technological revolution in our paddy fields,” wrote Prime Minister Gandhi in a message at the front of the issue. “We are glad that in this endeavor we have the cooperation of the international community.” B.R. Sen, director-general of FAO, noted ominously that the 8 million ton (20%) slump in India’s 1966 rice harvest was 1 million tons greater than the world’s total commercial rice surplus. (On 8 November, the cabinet of Thailand, a key commercial supplier, would ban rice exports until prices stabilized.)

M.S. Swaminathan, director of the Indian Agricultural Research Institute, convener of the National Committee for International Rice Year, and chair of the National Committee for the Coordination of Nationwide Agricultural Demonstrations, reported that the 1,000 national demonstrations of rice planned for 1966 represented a 7-fold increase over 1965 and had a yield target of 5–7 tons per ha. (Dr. Swaminathan would receive the first World Food Prize in 1987 while serving as IRRI director general, 1982–88.)

Representing IRRI in *Indian Farming* were a paper by Mano D. Pathak on new methods of pest control and another by founding Director General Robert F. Chandler, Jr., introducing high-yielding IR8-288-3. Dr. Chandler



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**RICE ON THE AGENDA.** The Symposium on Problems in Development and Ripening of Rice Grain in Tokyo in August and September 1966 was the “acid test” for IRRI’s acceptance by Japanese researchers, according to Bienvenido Juliano, an associate chemist at the young institute; at a symposium reception (*center, from left*), K. Yasumatsu of Takeda Chemical Industries, Dr. Juliano, Director Tatsuo Tani of the Food Research Institute in the Ministry of Agriculture and Forestry, and unidentified. Eighteen papers from the symposium comprised a special issue of the *IRC Newsletter*. A wooden, hand-operated rice transplanter developed by the Overseas Liaison Unit of the Institute of Agricultural Engineering in Silsoe, Bedfordshire, was part of the U.K. contribution to International Rice Year, presented at the conference *Mechanization and the World’s Rice*.





was among four recipients of India's International Rice Year Awards and the only scientist selected from overseas.

"His own personal qualities as a scientist and a dynamic leader have been primarily responsible for the emergence of the International Rice Research Institute as the finest rice research center in the world within 4 years," said the announcement, counting IRRI's tender years from its operational gearing up in 1962 rather than its founding 2 years earlier. "His contributions, therefore, lie not only in the practical application of science for human welfare but in the evolution of a pattern of research administration conducive to science becoming an instrument of social progress in the developing nations."

Dr. Chandler must have relished this particular accolade in the wake of a seminal event at the far end of Asia; the IRC's Symposium on Problems in Development and Ripening of Rice Grain, presented at the 11th Pacific Science Congress, was sponsored by Japan's Ministry of Agriculture and Forestry and took place at Tokyo University on 22 August–3 September.

### Acid test

"This was the acid test for IRRI," recalls Bienvenido O. Juliano, then an associate chemist at the institute, who both presented a paper and presided at the symposium. "There had been a lot of criticism, especially in Japan, about the choice of IRRI staff because many of us were young and not specialists in rice — me included. The symposium was the first formal introduction of IRRI senior staff presenting their work in Japan. Dr. Chandler was very happy at how warmly our papers were received.



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He felt that IRRI was accepted. For us, the symposium was the highlight of International Rice Year."

The IRC published 18 technical papers from the symposium in a special issue of its *Newsletter* at the beginning of 1967. At 173 pages, the publication was more than four times its usual size.

Size matters nowhere more than in the great American state of Texas, and the Texan who cast the longest shadow over the Sixties soon choppered into Los Baños. At high noon on 26 October 1966, the day after conducting a conference in Manila with America's allies in Vietnam, U.S. President Lyndon Baines Johnson alit at IRRI with his wife, Lady Bird, and the Philippine first couple.

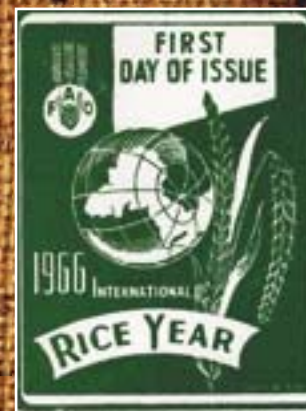
"Striding onto the experimental rice field beside Ferdinand and Imelda Marcos, Johnson crouched and sampled the soil with his fingers," writes Dr. Cullather. "Drawing on your experiments, your new rice strains, the technical training you are giving,' he told IRRI's staff and a global television audience, 'we can escalate the war on hunger. That is the only war in which we seek escalation.'"



KENICHI TAKAOKA



RICE ON THE TONGUE. Thailand, Japan and Ceylon (now Sri Lanka) issued commemorative stamps, and Dahomey (Benin), United Arab Republic (Egypt) and the U.S. planned to do the same.







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After giving Dr. and Mrs. Chandler an inscribed cigarette box and a “splendid likeness” of himself, the president skipped lunch, cancelled an afternoon excursion to Corregidor Island and flew to Vietnam, where, before the day was out, he would drop in on U.S. troops at Cam Ranh Bay.

“Naturally we were pleased and honored to have the presidential party here, even though his sudden decision to visit South Vietnam made it impossible to have lunch here,” Dr. Chandler wrote on 3 November to J. George Harrar, president of the Rockefeller Foundation and former IRRI Board of Trustees chair. “At the time of the visit, we were unaware of why he had to ‘move along’ to the next stop. Within a few hours we learned over the radio that the president had gone to Vietnam. On Thursday, the 27th, I talked with both President and Mrs. Johnson by telephone. I thought it was most gracious of them to call and extend their apologies for ‘walking out’ on the luncheon.”

President Marcos had visited IRRI before — on 3 June, 5 months into his term — to see for himself the institute’s experimental semidwarf “miracle rice,” as the press would soon dub IR8-288-3. He came on short notice, finding Associate Director A. Colin McClung the acting director general in Dr. Chandler’s absence.

“Colin phoned and told me to put my results on an easel and a live plant of IR8-288-3 in a pot,” recalls former IRRI agronomist Surajit K. De Datta, now at Virginia Tech. “For comparison, we planted the traditional variety *Peta* in a second pot and tied it up with a string so it wouldn’t lodge. I introduced IR8-288-3 to President Marcos, and Mano Pathak put together another display on improved pesticide placement. On 11 June, Dr. Chandler was summoned to Malacañang Palace, where he ceremonially presented a couple of kilos of IR8-288-3 seed to the president.”

### Project Spread

Word went out that any Filipino farmer who visited IRRI could pick up, free of charge, his own 2-kg bag of seed, attracting 2,359 farmers from 48 of the country’s 56 provinces before year’s end. A special seed-multiplication program provided much more seed for dissemination through the Philippine government’s USAID-funded Project Spread.

“As the August harvest came in, the Philippines was gripped by a modern tulipomania,” reports Dr. Cullather. “IR8 was sold in the lobbies of banks and fashionable department stores, and harvested grain was too costly to eat. [...] Marcos set up a coordinating council ... to direct the supply of seed, chemicals, loans and machinery, enabling the government to control prices and supply at

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every step of cultivation.” Running Project Spread in the rice bowl province of Tarlac, where he had been governor in the first half of the decade, was President Marcos’ political archrival, Benigno “Ninoy” Aquino.

IRRI’s contribution to International Rice Year included a 26-minute color film called *Harvest of Energy*. Depicting “the potential of the rice plant as an efficient converter of solar energy into calories for man,” the film (now lost) premiered before the IRC in New Delhi on 5 October 1966 and played at FAO headquarters in Rome the following 24 July. The U.S. rice industry and Department of Agriculture jointly made a 15-minute promotional short entitled *The Story of American Rice*, and films about rice were said to be in production in Ceylon, France, Italy, Korea, Portugal and Thailand.

“Details of some 30 national plans have been reported to FAO,” Dr. Fischnich told the IRC delegates. “They show an abundance of enthusiasm, energy and ideas and generally direct particular attention to the importance of strengthening the link between research scientists and practicing paddy farmers.”

As 1966 predates newsroom computerization by two decades, there is no way, short of combing newspaper morgues around the world, to unearth descriptions of the hundreds of planned national events: farmer field days, production competitions, postharvest demonstrations, cooking classes and cultural programs. A couple of examples must suffice. IRC delegates from the U.S., one of at least 16 countries committed to declaring a National Rice Week, reported that newspapers had marked it by publishing articles recounting the history of American rice, offering recipes for rice dishes and discussing the culinary differences between rice types.

Among the most colorful observances were likely those in Thailand. The kingdom scheduled National Rice Week for 9–14 May, and National Farmers’ Day for 12 May, to coincide with the annual Plowing Ceremony presided over by the king and queen on a field near the Grand Palace in Bangkok. At the ceremony, the four regional winners of rice quality and yield contests received certificates and prizes from the royal couple. There were also three winners of the essay contest on the topic “The economic importance of rice to Thailand.” A rice exhibit — jointly sponsored by the Ministries of Agriculture, National Development and Economic Affairs; the Office of the Prime Minister; the Rice Miller Association; farmer groups and various commercial firms — occupied the site from the day before the Plowing Ceremony until the end of the month.

### Research competition

The Thai government offered US\$1,000 in prize money for an International Rice Research Competition, jointly judged by FAO and IRRI (whose staff were excluded). The competition attracted 31 entries from 13 countries. Someone apparently ponied up another \$200 because three entries each earned their authors \$400. Y.L. Nene, associate professor of plant pathology in the Agricultural University of Pantnagar, Nainital, India, studied khaira disease; S. Patnaik, A.K. Bandyopadhyaya



URBITO ONGLEO

**RICE OF PRESIDENTS.** Newly elected Philippine President Ferdinand Marcos visited IRRI in June 1966 to see for himself the results of research conducted by the half-decade-old institute. S.K. De Datta (*center photo*) explained fertilizer responsiveness in IR8, and Mano Pathak (*right photo*) demonstrated improved pesticide placement. President Marcos returned in October with U.S.





and R. Sahoo of the Central Rice Research Institute at Cuttack, Orissa, India, analyzed upland soils; and Finis T. Wratten, professor, and Macon D. Faulkner, associate professor, of the Louisiana Agricultural Experiment Stations at Crowley, described a new system for drying rice. These papers and one of the two entries selected for commendation — D.N. Srivastava and Y.R. Rao, of the Indian Agricultural Research Institute in New Delhi, on bacterial blight disease — appeared in the March 1968 issue of *International Rice Commission Newsletter* (Vol. 17, No. 1).

Lavish funding supported a special aid program for Thai rice farmers. Individual farmers received, at cost and on credit, a total of \$750,000 worth of fertilizer. Farmer groups, associations and land cooperatives shared \$500,000 worth of pumps and tractors offered at half price on a 3-year payment plan. Farmer groups received \$250,000 for purchasing sprayers, insecticides and fungicides. A newly organized Agricultural Credit Bank opened its doors, and the government set price supports for paddy.

Today, Web searches for International Rice Year 1966 turn up little more than commemorative postage stamps from Ceylon (issued on 25 October), Japan (21 November) and Thailand (scheduled for 1 November) — a less-than-impressive marketing legacy. Yet 1966 truly was International Rice Year. Year-tagged conferences and events played a role, now largely forgotten, in making it so. The release of IR8 as the first modern rice variety, and other achievements in the salad days of publicly funded international rice research, left indelible marks. Serendipity such as President Johnson's visit, apparently passing without a mention of the year tag, usefully drew public attention to IRRI's work.

In the end, though, it was drought that wrote rice into the headlines of 1966. A year of living dangerously, teetering at the brink of mass famine, galvanized policymakers and "foundation grantslingers" (Dr. Cullather's phrase) to take the bold steps that launched the Green Revolution. Whatever branded 1966 as International Rice Year, its legacies today are lasting improvements in rice farmers' productivity and poor rice consumers' diets. It will be interesting to see how International Year of Rice 2004 measures up.

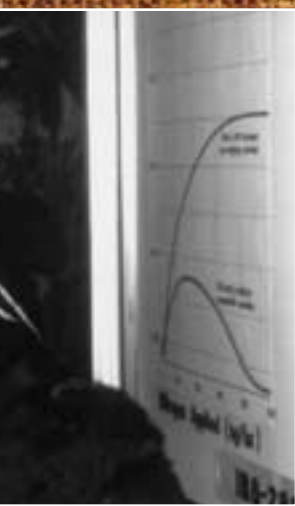


**Events:** director-general of the Food and Agriculture Organization of the United Nations (FAO) officially launches International Year of Rice at the 58th session of the **UN General Assembly** in New York on 31 October 2003, with **Global Contest on Rice** announcement; **permanent exhibit** opens in the FAO atrium in Rome in January; **launch gala** in Rome in February; events dedicated to gender and rice on **International Women's Day** on 8 March; MTV Asia **Rock for Rice** concerts in Philippines, Thailand and Indonesia in June; concluding celebration in Bangladesh for **Livelihood Improvement Through Ecology** project under Poverty Elimination Through Rice Research Assistance (PETRRA) in June; at IRRI in Los Baños, Philippines, **Farmers Open Day** in June, **Stakeholders Open Day** in July, **Philippine Government Open Day** in August; **REDBIO 2004** celebration in Dominican Republic in July; **International Cooperation Festival** in Tokyo to include IRRI exhibit on first weekend of October; events and information booth on **World Food Day** in Rome on 16 October and awarding of winners in Global Contest on Rice; launch of the radio drama series to encourage **reduced insecticide use** in Laos and Vietnam as part of Three Reductions workshop and St. Andrew's Prize workshop (see page 4).

**Meetings:** FAO organizing committee meets with **informal international working group** in Rome in November 2003 (and again in 2005 to discuss achievements and follow-up plan); **Turin Conference on Rice** in Italy in April; celebration during **Regional Rice Research Review** meeting in sub-Saharan Africa in Bamako, Mali, on 6–8 April; **Wild Rice Symposium** in Osaka on 8 August; international conference on **Integrated Crop Management Design and Delivery** in Indonesia in September; Annual General Meeting of **Consultative Group on International Agricultural Research** in last week of October; 25th **International Rice Research Conference** with **Japan International Research Center for Agricultural Sciences Symposium** in Tokyo in November, to include presentation of 2004 **Senadhira Award for Rice Scientists in Asia**; adoption of a special rice agenda at **ASEAN Plus 3** (China, Japan, South Korea) Summit in Laos in November; IRRI-hosted **rice breeding conference** in second half of 2004; workshop on **disease control through interplanting** in Chengdu, China, organized by Sichuan Provincial Department of Agriculture and Yunnan Agricultural University with IRRI as resource institute; policy-oriented workshop in Dhaka organized by **Seed Health Improvement** project under PETRRA; **Asian Science Congress** in Brisbane, Australia; side events at **FAO Council** in Rome on 27 November 2003, joint session of **Inter-Governmental Group on Grains and Inter-Governmental Group on Rice** in Rome on 12 February, **African Regional Conference** in Johannesburg on 1–5 March, **Near East Regional Conference** in Doha on 13–17 March, **Latin America and the Caribbean Regional Conference** in Guatemala City on 26–30 April, **European Regional Conference** in Montpellier on 5–7 May, **Asia and Pacific Regional Conference** in Beijing on 17–21 May; preparation of 21st session of the **International Rice Commission** in the context of International Year of Rice in Peru in April 2005.

**Publications:** IRRI to double frequency of *Rice Today* with special editions in January, April, July and October; FAO to publish *International Year of Rice Newsletter* in March, June, September and December; launch of **integrated crop management training manual** in June; National Institute of Genetics, Japan, to publish **Rice Genetics Newsletter**, Vol. 20; IRRI scientists Gurdev Khush and Parminder Virk to publish book on **IRRI varieties**; launch of IRRI book on rice science and extension in **Greater Mekong** subregion; *The Art of Rice: Spirit and Sustenance in Asia* published by Fowler Museum in California in early November; coffee-table book on rice by **Lonely Planet Publications** in Australia; special issue of *International Rice Research Notes*.

**Web:** Reciprocal links to tie **FAO International Year of Rice Web site** ([www.rice2004.org](http://www.rice2004.org)) to IRRI Home, Riceweb, Graindell, and other IRRI sites; **Riceworld** site to refocus on Riceworld Learning Center and new Riceworld shop; **Rice Library** site to highlight world's largest rice library and **Rice Literature Update** and **Rice Bibliography** databases as essential research tools.



President Lyndon Johnson. They viewed IR8 with (left photo, from left) Varietal Improvement Department Head Peter Jennings, Henry Beachell (Dr. Jennings' successor in 1967) and Director General Robert Chandler in a field of the Long-Term Continuous Cropping Experiment, then under its 12th crop, now under its 119th.





It was probably the most excess baggage I'd ever carried in my life. In November 2000, I represented IRRI at the first planning and site-selection meeting for the Seeds of Life project in Dili, the capital of newly independent East Timor. I and the representatives of four other centers in the Consultative Group on International Agricultural Research (CGIAR) were so eager to start our work that we hand-carried the planting materials with which we would begin helping East Timorese farmers reestablish their vital agricultural sector. My excess baggage from Manila to Dili included 135 kg of seed for field trials of 48 rice varieties.

Three years later, East Timor is still the youngest independent state in the world. Besides the eastern half of the island of Timor, the country includes an enclave called Ocussi-Ambeno on the north coast of the Indonesian province of West Timor and two small islands, Autaro and Jaco. The mostly Roman Catholic nation has a population of about 800,000, more than 90% of whom depend on subsistence agriculture.

After more than 450 years as a Portuguese colony, East Timor declared independence in November 1975, only to be invaded 9 days later by Indonesian forces. In August 1999, after nearly a quarter century of unrest, the East Timorese opted for independence in a United Nations-supervised popular referendum. The immediate result, however, was to inflame civil strife between those who favored independence and



# Precious

by Edwin Javier



The Seeds of Life project for reviving agriculture in war-torn East Timor took root quickly as collaborators flew in for their first meeting carrying much more in their luggage than clean shirts and socks

REPLANTING IN PEACE, farmers transplant into a large rice paddy (main photo) seedlings grown from seed carried in by hand (inset). Author Edwin Javier (bottom left photo) takes notes in a ripening field of rice and more notes (top right photo, right) as Claudino Nabais, a researcher in the Ministry of Agriculture, Fisheries and Forestry, consults with a farmer. Farmers in East Timor (small photos, left to right) preparing a rice paddy, displaying peanuts, harvesting maize and hefting sweet potatoes.



pro-integrationist militias. Many people died or became refugees, infrastructure was ruined, and agricultural and market activities suffered disruption. The UN Transitional Administration for East Timor succeeded in quelling civil strife, and East Timor received international recognition as an independent state in May 2002.

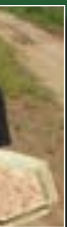
As the East Timorese set about rebuilding their nation, the most immediate need was to revive agriculture and restore food security. The first problem identified was the inadequacy of planting materials. Supplies of seed for planting staple

food crops were insufficient, and the seed stocks available were badly commingled and lacked vigor. Many of the planting materials that aid organizations had brought in during the crisis years of 1999 and 2000 were ill-adapted to East Timorese conditions and lacked purity.

Correcting these problems led to the development of the Seeds of Life project, to be modeled on a remarkable precedent in Cambodia. Decades of terrible hardship — first war, then brutal repression and economic mismanagement under the Khmer Rouge, and finally military occupation and diplomatic isolation



# cargo



— had by the 1980s left that Southeast Asian country in ruins. Like the East Timorese today, Cambodians needed to rebuild their agricultural sector from scratch. Fortunately, expert and committed help was on the way.

## Multifaceted partnership

The Cambodia–IRRI–Australia Project combined IRRI, the Australian Agency for International Development and many nongovernmental organizations (NGOs) in a multifaceted partnership to introduce, test, multiply and distribute to Cambodian farmers improved rice seed (see *Rice Today*, Vol. 1, No. 1). Or, in the case of

traditional varieties lost during the upheavals, the partners reintroduced and redistributed seed multiplied from samples held in trust in the Genetic Resources Center at IRRI. The project also trained Cambodian staff to assume greater responsibility as expatriate specialists were gradually withdrawn and to continue research and extension after the project drew to a close at the end of 2001.

In September 2000, Colin Piggin of the Australian Centre for International Agricultural Research (ACIAR) contacted IRRI management regarding the urgent need to introduce, test and distribute

improved rice varieties in East Timor. Of course, IRRI was more than happy to participate in the project. Four other CGIAR centers also agreed to work under Dr. Piggin's leadership and in collaboration with the Ministry of Agriculture, Fisheries and Forestry (MAFF) of the government of the Democratic Republic of Timor-Leste, to use the country's official name. Our project was thus unique in bringing together the expertise of five CGIAR centers from three continents.

Philippine-based IRRI would be responsible for rice, the Mexico-based International Maize and Wheat Improvement Center (Spanish acronym CIMMYT) for maize, the Peru-based International Potato Center (Spanish acronym CIP) for sweet potato and Irish potato, the Colombia-based International Center for Tropical Agriculture (Spanish acronym CIAT) for cassava and beans, and the India-based International Center for Research in the Semi-Arid Tropics (ICRISAT) for peanuts. With coordination and funding from ACIAR, the project would promote the return to East Timor of well-balanced nutrition, including carbohydrates from cereals and root crops and protein from legumes.

Upon our arrival in Dili for the first planning meeting in November 2000, we were welcomed by Dr. Piggin, MAFF staff and our NGO partners Catholic Relief Services, World Vision International and Australian Volunteers International. Our enthusiasm received a boost





SEEDS OF LIFE staff pose with the future president (*top photo, left to right*): (*seated*) Jose Abel, East Timor Division of Agricultural Affairs; Dineen Tupa, World Vision; Edwin Javier, IRRI; (*standing*) Clodagh McCumiskey, Catholic Relief Services; Fernando González, CIMMYT; Patrick Kapuka, World Vision; Brian Palmer, ACIAR; Xanana Gusmão, now president of East Timor; Colin Piggin, ACIAR, head of Seeds of Life project; Damarsetti Yadagiri, ICRISAT; Reinhardt Howeler, CIAT; Alfonso de Oliveira, Catholic Relief Services; Upali Jayasinghe, CIP.



when Xanana Gusmão, then president of the National Council for Resistance in Timor and now president of the country, highly praised the commencement of collaborative work between the national program and international organizations.

The Seeds of Life team took a field trip around East Timor, looking for sites to conduct variety trials. In its modest 19,000 sq km, East Timor packs considerable diversity of land and soil formations and climate. First, we traveled around the south coast, where the rainy season sees 1,000–1,500 mm of rainfall distributed over 6 months, starting in December. In contrast, the north coast receives considerably less rainfall, 800–1,000 mm in a wet season that lasts only 3–4 months. We also visited some sites in the hilly central part of the country, which receives a lot of rainfall, totaling 1,500–2,000 mm during the 6–8

month rainy season. We agreed that the CGIAR centers should assemble diverse germplasm sets and test them in a wide range of environments in East Timor.

The project's first annual technical meeting in Dili in October 2001 attracted all the key players, as did the second such meeting in October 2002. In both meetings, bolstered by words of encouragement from Estanislau da Silva, minister of MAFF, we discussed the results of researcher-managed variety trials and identified for each crop the best materials to include in our on-farm farmer participatory variety trials set to begin in the 2002–03 cropping season.

In farmer participatory variety trials, farmers grow one to three promising materials under their own management and using their own resources. Through these trials, we hope to discover how well promising

varieties perform in farmers' fields, allow farmers to select the varieties best suited to their management practices, and obtain feedback from farmers regarding these varieties. In addition, the project serves as a source of pure, vigorous seed for farmers, and the trials double as demonstration fields for other farmers to see. Results of the researcher-managed and on-farm farmer participatory variety trials guide the national program in identifying varieties for release.

### High-quality seed

During our upcoming third annual technical meeting in October 2003, we will discuss how best to deliver to farmers high-quality seed of the best-adapted cultivars. This will probably entail the government setting up a seed farm for initial seed multiplication, the output of





A VARIED DIET harvested from a research station in the highlands at Aileu includes (*drawings, left to right*) cassava, maize, sweet potatoes, peanuts and rice. (*Bottom photos, from left*) President Gusmão addresses the United Nations General Assembly in 2002; East Timorese women sift and clean rice; one of them tends beans.

which will be increased further in local villages under the management of farmer seed producers. Having a seed-production and -distribution system at the village level should ensure quick delivery of seed to farmers.

One key objective is to develop the technical capability of MAFF staff in germplasm evaluation, production and distribution. For starters, we conducted a 2-day training course on general management practices for each target crop and on how to conduct variety trials. Some 35 newly appointed district agricultural officers, district crop production officers and NGO technicians participated, and we were pleased with the enthusiasm they showed.

Early this year, the project sponsored the participation of two East Timorese in the Rice Production Training Course at

IRRI headquarters and another two trainees in the institute's Integrated Pest Management Course. Next year, we plan to conduct in-country training in seed production for MAFF staff members, who will train in turn village farmer seed producers.

On-farm farmer participatory varietal testing and seed production were critical components of the highly successful Cambodia-IRRI-Australia Project. I believe that the Seeds of Life project, combining the strengths of five CGIAR centers and applying strategies proven to be effective in Cambodia, will be instrumental in helping East Timor succeed in reinvigorating its farms and villages. 🌾

*Dr. Javier, an IRRI plant breeder and coordinator of the International Network for Genetic Evaluation of Rice, worked on the Cambodia-IRRI-Australia Project in 1993-98.*

## Announcement

The Institute of Agriculture and Food Research and Technology (IRTA) is a research institution with several locations in Catalonia, Spain. We conduct basic and applied research in the fields of agriculture, aquaculture, animal production and food technology.

We have a research position opening in rice agronomy at our field station in Amposta, Tarragona, Spain. We offer competitive salaries and a dynamic research environment. Knowledge of Catalan or Spanish is not a requirement. We ask candidates to visit our Web site ([www.irta.es](http://www.irta.es), available in three languages) and to send their CV to Dr. Tomàs Fosch ([tomas.fosch@irta.es](mailto:tomas.fosch@irta.es)).

Deadline for applications is the end of October 2003.





GOOD NUTRITION FOR ALL is a puzzle that needs every piece in place. Varied diets, vitamin and mineral supplements, and conventional fortification with additives have proven value. Now biofortification, or breeding for nutrition, may bring the puzzle closer to completion.

Scientific advances have helped farmers the world over grow more food. Can new advances help them grow food that is inherently more nutritious?



# + fortification

# Breeding for nutrition

by Bonnie McClafferty





ARIEL JAVELLANA

**N**early 70% of the world's poor and malnourished live in Asia, where rice is the staple food. In some of the poorest areas, particularly in South Asia, two-thirds of all calories consumed come from rice. In Bangladesh, where preschool children derive up to 76% of their calories from rice, 56% of them are underweight. What is worse, 73% of young children in Bangladesh suffer iron-deficiency anemia, challenging their cognitive development. Half of all pregnant women in that country face the same affliction, complicating childbirth.

Nearly 4 decades into the Green Revolution, feeding the poor is one thing, adequately nourishing them is another.

In 1994, a handful of innovative scientists began asking whether advances in agricultural and nutritional science could be brought to bear to help end all hunger — not just the obvious, grinding hunger manifest in gaunt children, but also the hidden hunger that undermines apparently healthy children by hindering their cognitive growth, crippling their immune systems and eventually stealing their eyesight.

As hidden hunger continues to afflict over 2 billion in the developing world, the next green revolution, the scientists reasoned, should make staple foods more nutritious. However, such an ambitious undertaking would require new science and new partnerships, observed Howarth Bouis, director of the Biofortification Challenge Program of the Consultative Group on International Agricultural Research (CGIAR).

“Biofortification” is a new term coined to describe an approach to breeding food crops that loads vitamins and minerals into the edible portions of seeds, roots or tubers. In essence, biofortified crops fortify themselves with micronutrients. These crops offer higher nutrient levels straight from the field, giving poor farmers and sharecroppers, and the urban populations they supply, access to more nutritious food without relying on processing with fortifying additives.

“Inducing plants to fortify themselves with vitamins and minerals, and then delivering them to the poor, requires an interdisciplinary alliance of research and implementing institutions all over the globe,” Dr. Bouis said. “Coordinating such an alliance became possible only with the advent

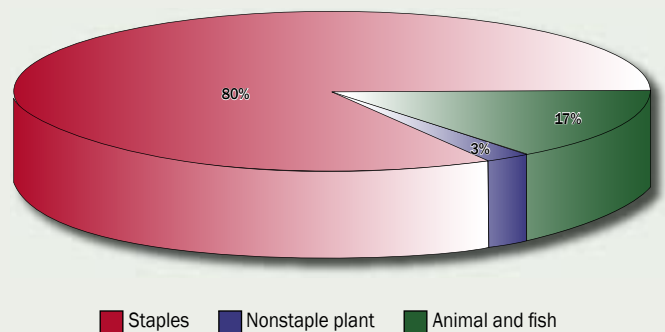
and easy access to the Internet in developing countries as well as developed ones, which has become a reality only recently.”

Conventional plant breeding has made some progress toward realizing biofortified crops, notably in IRRI's work to develop and test rice rich in iron and zinc. Biofortification also capitalizes on biotechnology, which speeds scientists' efforts to identify genes that intensify nutrient density and to insert them in target crops. In the case of transgenic crops, biotechnology makes possible combinations that could not be achieved through conventional breeding but are of potential benefit to billions of consumers.

### Channels for delivery

For decades, the community of scientists focused on human nutrition has worked tirelessly to identify channels for effective delivery of nutrients. Vitamin capsules and mineral supplements are critical interventions for arresting severe malnutrition. Conventional fortification with additives has been successful in reducing some forms of micronutrient deficiency in some places; iodized salt, for example, has reduced the incidence of goiter and cretinism.

But what about the millions of poor who lack access to the health clinics that dispense supplements and the markets that sell conventionally fortified foods? Other options are needed to reach the millions that remain beyond the reach of existing methods of nutritional intervention. Biofortification of crops may be another piece in the solution to this puzzle.



Share of energy intake in rural Bangladesh.



What exactly does it take to turn a clever idea like this into a successful technology and public good? We know that scientists can load such essential micronutrients as iron, zinc and provitamin A into staple crops, but can nutrient levels achieve sufficient density to have a significant impact on human health? Will farmers take up biofortified crops? Will malnourished consumers welcome them? How much beneficial impact will these innovations finally have on public health? What partnerships do we need to accomplish this monumental task?

We address the last question first. Success will demand the combined efforts of agronomists, plant breeders and geneticists from advanced research institutes, national research systems in developing countries, and universities in both the developed and developing world. Nutritionists working both in modern laboratories and in the field will formulate precise objectives and evaluate the safety of new crops and the bioavailability of nutrients in the bodies of consumers. Sociologists and economists will



**BREEDING FOR NUTRITION** has potential application across a broad range of staple crops. The Biofortification Challenge Program coordinates these efforts to bring health benefits to the world's poor.

focus delivery of the technology to the people who need it most and measure its impact.

### **Broad alliance**

Nongovernmental organizations and extension specialists based primarily in the developing world will facilitate adoption and evaluation. Partnerships with the private sector will provide access to patented technologies, regulate their use for the common good, and disseminate the technology

where it can be most effective. Communications and social marketing specialists will build support for this innovative approach among the donor community and the public. In short, success will require a broad alliance of disciplines and organizations with complementary areas of expertise — an inclusive collaboration that depends on all participants

committing valuable resources to achieve a common goal.

Answers to the other questions regarding the concept's prospects will become known as biofortified products become available to farmers and consumers.

The International Center for Tropical Agriculture and the International Food Policy Research Institute are the two CGIAR sister centers that share leadership of the Biofortification Challenge Program. They are joining forces with IRRI and other CGIAR centers and — by sharing materials, methods and information related to breeding for nutrition — ensuring that the program will have the broadest possible impact.

Immediately, the program is overseeing expansion of existing breeding programs. Because of progress already made, high-iron rice and high-beta carotene (provitamin A) orange-flesh sweet potato will likely be the first biofortified products out the door. IRRI's high-iron variety IR68144 (a nontransgenic rice) is already in large-scale human feeding trials to test how effectively it alleviates anemia. 🌾

*Bonnie McClafferty is the coordinator of communications for the Biofortification Challenge Program.*





# Multiple strategies assure impact

by Franklin Moore

The United States Agency for International Development (USAID) believes that meeting three fundamental needs of developing nations — ensuring food security, facilitating long-term economic growth, and improving the lot of the rural and urban poor — requires the best that science can offer. We must apply agricultural science to maintain current levels of agricultural productivity in the face of worsening biological and natural resource challenges and, additionally, increase productivity where possible to keep pace with expanding food demand and to stimulate agricultural and economic growth. Both goals rely heavily on advances in science and technology based on research.

Agricultural research takes many forms, ranging from cutting-edge science in advanced institutes to structured variety trials across a wide range of environments — and even simple trial and error by individual farmers. USAID increasingly emphasizes partnerships with a wide range of public organizations, facilitating public-private research collaboration and the participation of nongovernmental organizations, to produce knowledge-based public goods of benefit nationally and, more importantly as knowledge spills over borders, regionally or even globally. IRRI occupies the crossroads of this dynamic international process.

## New opportunities

Research frontiers such as biotechnology provide exciting new opportunities, making possible agricultural breakthroughs and speeding the development of other useful technologies. USAID's new Collaborative Agricultural Biotechnology Initiative (CABIO) facilitates increased support for technological innovation while ensuring safety for consumers and the environment. Two global CABIO projects — the Agricultural Biotechnology Support Project at Cornell University and the Program in Biosafety Systems — use partnerships with IRRI, its sister centers in the Consultative



Mr. Moore is director of the Office of Environment and Science Policy in USAID's Bureau for Economic Growth, Agriculture and Trade.

CHUCK PATAI/USAID

Group on International Agricultural Research (CGIAR), and national agricultural research systems. CABIO also has regional projects in Africa and national activities there and in other regions.

Although USAID is largely a bilateral organization, we also pursue partnerships with other bilateral donors and international organizations. The CGIAR is a prominent example. Our Bureau for Economic Growth, Agriculture and Trade (EGAT) supports international research programs involving U.S. universities and developing-country institutions through, for example, the Collaborative Research Support Program. USAID funds an array of regional collaborative research networks in Africa, some involving CGIAR centers. Our country missions in 79 countries around the world conduct a range of development programs that build on an array of existing foundations, including the CGIAR and CABIO.

USAID has long viewed IRRI as a cornerstone of the CGIAR because of its enormous contributions to global food security, especially in Asia. USAID started providing core (unrestricted) funding to IRRI in 1970, before the CGIAR was established. This support, handled centrally through EGAT, has continued, reaching a cumulative total of nearly \$124 million in

2002. Beginning even earlier in 1967, other sections of USAID in Washington and numerous country missions have provided additional restricted funding, focused on specific countries or research targets, totaling more than \$38 million by 2002. Overall USAID support for IRRI to date thus exceeds \$162 million. We see a strong continuing need for IRRI's leadership in advancing scientific research and applying discoveries to field-level problems.

## Global benefits

IRRI's current research goals are both demanding and highly promising. Some, like drought-tolerant rice varieties, could greatly help some of the world's poorest farmers. Intensive aerobicic

(dry field) rice systems may offer global environmental benefits by saving water and fuel. Nutrient-rich high-iron and Golden Rice promise improved health for hundreds of millions of people. IRRI's partnerships with advanced research institutions around the world further the new science of functional genomics, unlocking the enormous genetic diversity of cereal crops to find new solutions for poor farm families.

Central as it may be to improving productivity and nutritional quality, research is not the whole story. Maximizing its impact on agricultural communities and economic development requires complementary action. USAID's new agricultural strategy therefore focuses on three related areas: (1) expanding domestic and international trade opportunities and the ability of farmers and rural industries to respond to them, (2) promoting sustainable agriculture and improved management of natural resources, and (3) bridging the knowledge gap through training and education, outreach, and adaptive research.

In any effort to provide public goods, needs greatly exceed means, at the global level and especially in the poorest nations. CGIAR centers such as IRRI play a major role in ensuring that the global research system makes the most of available financial and human resources.





CRAWFORD FUND

### Lost Tribe

**Derek Tribe**, a tireless advocate of international agricultural research, passed away on 19 April in Melbourne, Australia. As the first executive director of the Crawford Fund (1987–96), he wrote and lobbied passionately on the theme of *Doing Well by Doing Good* (the title of his first book, published in 1991) and the role of international agricultural research in alleviating poverty and achieving food security.

In 1972, Prof. Tribe led the international task force assembled by the Consultative Group on International Agricultural Research (CGIAR) to look into establishing the International Livestock Centre for Africa (now reorganized as the International Livestock Research Institute of the CGIAR) and served on its Board of Trustees (1973–80).

He undertook consultancies for the Rockefeller Foundation, United Nations Educational, Scientific and Cultural Organization (UNESCO), World Bank, Food and Agriculture Organization of the UN, International Development Research Centre, International

Agricultural Exchange Association, CGIAR, and the governments of Australia and other countries. As executive director of the International Development Program (1980–86), he encouraged and supported Sir John Crawford in his successful effort to establish the Australian Centre for International Agricultural Research.

Among his many honors were the Silver Medal of the Australian Institute of Agricultural Science (1969) and appointment as a foundation fellow of the Australian Academy of Technological Sciences and Engineering (1975), an officer of the Order of the British Empire (1977) and an officer in the Order of Australia (1993). In 2000, the Crawford Fund established the Derek Tribe Award (given this year to Luis Salazar; see page 30).

- **B.P. Ghildyal**, former IRRI liaison scientist for India (1986–95) who initiated many collaborative activities between IRRI and the Indian Council of Agricultural Research and other national partners, died on 27 February.

- **David MacKenzie**, formerly of IRRI and the International Center for Maize and Wheat Improvement, and board chair of the International Potato Center since 1998, died on 23 October 2002.

- **Clarence William Bockhop**, former head of the then Agricultural Engineering Department at IRRI (1980–86), died in Corpus Christi, Texas, on 16 May at the age of 82.

- **Nuth Sakhan**, director of the Agronomy Department of the Cambodian Ministry of Agriculture, Forestry and Fisheries, died on 28 March.

### Keeping up with IRRI staff



IRRI

**John Bennett** was appointed in April leader of Theme 1 (Improving Water Productivity) of the CGIAR Challenge Program on Water and Food. Dr. Bennett brings to the position a wealth of scientific experience in drought tolerance, improvement of crop water productivity and project management. IRRI is one of five centers leading the program.

**Renee Lafitte** replaced Dr. Bennett in May as team leader of Project 7 (Genetic enhancement for improving productivity and human nutrition in fragile environments). Dr. Lafitte has extensive experience in the areas of plant physiology and crop improvement for tolerance of abiotic stresses and is active in facilitating and coordinating the Consortium for Unfavorable Rice Environments.

**T.P. Tuong** became in February the new head of Crop, Soil and Water Sciences. He had served as acting head of the division since early last year. Dr. Tuong, who joined IRRI in 1991, heads IRRI's Project 5 (Enhancing water productivity in rice-based production systems).

**Swapan Datta** was appointed in August rice crop leader of the CGIAR Biofortification Challenge Program (see page 24). As one of six crop leaders in the program, Dr. Datta will coordinate a multidiscipline research team and serve on the program's general planning committee. He leads IRRI's effort to develop a tropical version of provitamin A-rich Golden Rice (see page 9).

**David Dawe** was the only Westerner among 20 "Asian hero" nominees culled from 10,000 entries for a special report in the 28 April issue of *Time* magazine. Dr. Dawe, an economist, was nominated without his knowledge by a national colleague in IRRI's Social Sciences Division. Always a dark horse, he tied for 16th place with 0.3% of the vote.

### Award-a-BRAC



IRRI

**Fazle Hasan Abed**, founder and chair of the Bangladesh Rural Advancement Committee (BRAC) and member of the IRRI Board of Trustees, in

April received the Gleitsman Foundation International Activist Award for 2003 on Eradication of Poverty, which annually honors individuals who have inspired change and motivated others in the realm of social activism. Under Mr. Abed's leadership, BRAC operates a poverty-

alleviation program that engages 3.6 million poor households, a health program that benefits 31 million people, and 34,000 primary schools for 1.1 million poor children. The largest private development organization in the world, BRAC started programs in Afghanistan last year. Past winners of the award include Nelson Mandela (1993). The following month, Mr. Abed received an honorary doctorate of education from the University of Manchester in the U.K., whose citation read: "If you want to know the state of the art in providing sustainable microfinance and services to the poor and how to reach and assist the ultrapoor or how to help oppressed women achieve their human rights, you have to look at BRAC, its ideas and its systematic approach to learning from experience."

**K.L. Heong**, deputy head of IRRI's Entomology and Plant Pathology Division (EPPD), received the inaugural Award of Excellence in plant protection from the Malaysian Plant Protection Society. Dr. Heong, a life member of the society, which he helped to found in 1976, received its Outstanding Contributions Award in 1986 and was elected president in the following year. The Award of Excellence is the society's highest, given every 4 years to a person who has made significant scientific contributions to plant protection.

**Tom Mew** (pictured opposite, right), head of EPPD, received in May the Philippine Phytopathological Society Achievement Award for his contributions to rice pathology and crop protection. Dr. Mew, a world authority on rice bacterial blight, has worked

## IRRI agronomist made member, Order of Australia



IRRI

**Harold John Nesbitt** was appointed a member of the Order of Australia (AM) on the Queen's Birthday 2003 Honors List, released in June. The appointment was for "service to agriculture as project manager and agronomist for the Cambodia-International Rice Research Institute-Australia Project [CIAP] and, through this project, to the community of Cambodia."

Dr. Nesbitt, an agronomist, joined IRRI in November 1988 as team leader of CIAP and IRRI representative in Cambodia, positions he held until the project's completion in December 2001 (see *Rice Today*, Vol. 1, No. 1). He now lives in Perth, providing consultancy services and running a real estate development company.

Dr. Nesbitt was scheduled to receive the award and medal from the governor of Western Australia, Lieutenant General John Sanderson, in an investiture ceremony on 12 September at Government House in Perth.



CASIANA VERA GRUZ

to spread blight-resistant rice varieties over millions of hectares in the Philippines and other Asian countries. His work on managing rice seed health and seed-associated microorganisms for rice disease management has been adopted as a key component of integrated pest management.

## Economist elected IRRI board chair

**Keijiro Otsuka**, a respected agricultural economist in Japan, was selected in May to become chair of the IRRI Board of Trustees. In January 2004, Dr. Otsuka will replace Angeline Kamba, a public service commissioner from Zimbabwe, who will step down after almost 2 years in the post. IRRI's independent, 15-member Board of Trustees meets once a year to set the institute's policies and review its research agenda.

Dr. Otsuka is a professor at Japan's National Graduate Institute for Policy Studies and the director of the graduate program of the Foundation for Advanced Studies on International Development. The foundation conducts development research in Asia and Africa and offers educational and training programs for aspiring development professionals from Japan, other Asian countries and Africa.

An expert in agricultural economics, Dr. Otsuka was a visiting scientist at IRRI (1986-89) and a visiting research fellow at the International Food Policy Research Institute (1993-98), one of IRRI's sister centers in the Consultative Group on International Agricultural Research. His past research subjects include the effect of the Green Revolution on income distribution in Asia; how land tenancy, land tenure and natural resource management affect farmer efficiency and equity in Asia and Africa; and gender issues in inheritance and schooling investment.



ARIEL JAVELLANA

"There's no doubt that this is a very exciting time in rice research, and many new opportunities lie just ahead," Dr. Otsuka said, noting as well that recent funding shortfalls require IRRI to make the most of these opportunities with a curtailed staff roster and research program. "I am determined to work with IRRI's management team to keep the institute focused on its most important goals and challenges. These include how to help rice workers and farmers climb out of the terrible poverty in which so many of them remained trapped, and how to do this in a sustainable, environmentally friendly way."

**Hei Leung**, plant pathologist in EPPD, was selected as a fellow by the American Phytopathological Society Awards and Honors Committee for his outstanding contributions in plant pathology.

**Vethaiya Balasubramanian**, an agronomist in the IRRI Training Center, received in May the 2003 International Fertilizer Industry Association International Award, which recognizes research efforts leading to improved fertilizer use efficiency and environmental sustainability. Dr. Balasubramanian's development and promotion of the leaf color chart over the past 7 years has helped thousands of farmers apply fertilizers more efficiently.

**David J. Mackill**, head of IRRI's Plant Breeding, Genetics and Biochemistry Division, has been selected as a fellow of the

Crop Science Society of America for 2003. In addition to two stints at IRRI (1982-91, 2001-present) Dr. Mackill has been a research geneticist and adjunct professor at the University of California, Davis, and worked for the U.S. Department of Agriculture-Agricultural Research Service.

**Kenneth G. Cassman**, head of the Department of Agronomy and Horticulture at the University of Nebraska, was named in April the University of Hawaii's 2003 College of Tropical Agriculture and Human Resources Outstanding Alumnus. Dr. Cassman, who was head of IRRI's Agronomy, Plant Physiology and Agroecology Division (1991-96), has achieved international recognition for his contributions to sustainable food production in developing countries.

continued on page 30



## Partners in progress

**Luis Salazar**, head of the Crop Protection Department of the International Potato Center in Lima, Peru, is the recipient of the 2003 Crawford Fund Derek Tribe Award. Dr. Salazar, a Peruvian, is a world leader in research on potato and sweet potato pathogens. His contributions include studies of pathogen populations and new detection and clean-up methodologies. A virus clean-up technology for sweet potato he developed with Chinese partners on both sides of the Taiwan Strait is credited with bringing US\$550 million in economic benefit to Chinese farms and villages since 1997. Dr. Salazar will visit Australia in the last quarter of 2003 to receive the award and speak at various national institutions about his work.



**William D. Dar**, director general of the International Crops Research Institute for the Semi-Arid Tropics, was elected in May chairman of the Governing Board of the Future Harvest Foundation. Dr. Dar, who is also chair of the Public Awareness and Resource Mobilization Committee of the Consultative Group on International Agricultural Research (CGIAR), succeeds **Hubert Zandstra**, director general of the International Potato Center. The appointment is for 2 years. The 16 centers of the CGIAR created the Future Harvest Foundation in 1998 to catalyze action for a world with less poverty, a better environment and food security. Dr. Dar recently received an honorary Doctor of Science degree from Mariano Marcos State University in Batac, Ilocos Norte, Philippines.

**Jacques Ekebil** began in July a 1-year term as interim director general of the International Service for National Agricultural Research (ISNAR). Dr. Ekebil has held a number of director and head-of-program positions in his native Cameroon and served as deputy director general for international cooperation of the International Institute of Tropical Agriculture (1988–95). In 1995, he joined the Food and Agriculture Organization of the United

Nations (FAO) as deputy regional representative for Africa. In 1999, he became chief of FAO's Research and Technology Development Service and FAO constitutional observer to the ISNAR Board of Trustees, of which he was a former member (1984–88). From 2000 until his retirement last year, he was assistant director-general of the Sustainable Development Department of FAO. Meanwhile, **Mohammed Motlubor Rahman** retired in June after 27 months at IIRRI as ISNAR representative in Asia.

**Keiji Kainuma**, senior advisor to the Japanese Ministry of Agriculture, Forestry and Fisheries and former member of the CGIAR Technical Advisory Committee (1995–98), received from Emperor Akihito Japan's national decoration (*Shiju-hosho*) for his scientific achievements.

**B. Mishra**, project director of the Directorate of Rice Research in Hyderabad, India, and his associate **R.K. Singh** won in July the biennial Hari Om Ashram Trust Award of the Indian Council of Agricultural Research. Drs. Mishra and Singh were chosen in recognition of their genetic studies and breeding and development of rice varieties tolerant of saline and sodic soils, which they carried out at the Central Soil Salinity Research Institute at Karnal, Haryana.

**Howarth Bouis**, an agricultural economist in the International Food Policy Research Institute, has been appointed program director of the CGIAR Biofortification Challenge Program (see page 24). Dr. Bouis is a pioneer in developing the concept of breeding staple crops with augmented nutritional value.

**Jan Laarman** has been named World Agroforestry Centre deputy director general for programs. Dr. Laarman is a forest and natural resource policy economist most recently at the International Resource Group, where he led the program support unit of the Egyptian Environmental Policy Program. Previously, he led the Regional Environmental Program for Central America (1996–2001). The center also named **Mohamed Bakarr** director of strategic initiatives. Dr. Bakarr was vice president for research in the Center for Applied Biodiversity Science of Conservation International.

**Mutsuo Iwamoto** was appointed in April president of Japan International Research Center for Agricultural Sciences. Dr. Iwamoto, who had been director-general of the Agriculture, Forestry and Fisheries Research Council Secretariat, replaced **Takahiro Inoue**, who retired.

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continued from page 29

**Gurdev S. Khush**, IIRRI consultant and former principal plant breeder, received in March a Doctor of Science degree (*honoris causa*) from ND University of Agriculture and Technology, Faizabad, India. In May, Dr. Khush was one of 12 biotechnology pioneers recognized by the Council for Biotechnology Information for innovations spanning the last 20 years.

**Domingo Tabbal, Sr.**, IIRRI associate scientist, was named a fellow in April at the 53rd Annual National Convention of the Philippines Society of Agricultural Engineers. IIRRI water scientist **Bas Bouman** was elected honorary member for the year. The IIRRI paper *Technology transfer for water savings (TTWS) in Central Luzon, Philippines: preliminary results and implications* was acclaimed the best technical paper in the energy systems, water management and environmental management category. **Ruben Lampayan**, Dr. Bouman, Mr. Tab-

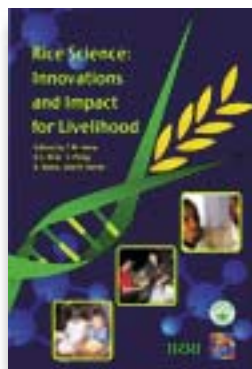
bal, **Lizzel Llorca** and collaborating partners from the National Irrigation Administration and Philippine Rice Research Institute are the coauthors. The society's Outstanding Regional Chapter Award went to Region IV, whose president is **Eugenio Castro, Jr.**, IIRRI assistant scientist and engineer.

**Peter Fredenburg**, writer/editor in IIRRI's Visitors and Information Services, won the Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences (ACE) 2003 Gold Award in the category writing for magazines for his *Rice Today* feature *Lost Horizons Restored* (Vol. 1, No. 1, April 2002, or visit [www.aceweb.org/homepage/ace\\_cd2003](http://www.aceweb.org/homepage/ace_cd2003)). **Juan Lazaro** IV, graphic artist in IIRRI's Communication and Publications Services, and **Gene Hettel**, the unit's camera-wielding head, shared the ACE 2003 Silver Award in the category of graphic design for covers, for the third edition of *Rice Almanac*.

The M.S. Swaminathan Outstanding Research Award went in July to the paper *Marker-aided pyramiding of bacterial blight resistance to genes in maintainer lines of hybrid rice*, by IIRRI scientists **Hei Leung** and **Casiana Vera Cruz**, **Lucia Briones** of Leyte State University, **Edilberto Redoña** of Philippine Rice Research Institute, **Marina Natural** of University of the Philippines Los Baños, and **Brad Porter** and **Frank White** of Kansas State University, all of whom collaborate under the Asian Rice Biotechnology Network.

The poster *Expression analysis of stress-related genes in resistant and susceptible rice phenotypes in response to blast challenge* won second prize in the Best Poster category of the Federation of Crop Science Societies of the Philippines conference in April. **Bin Liu**, **Ramil Mauleon**, **Marichu Bernardo**, **Violeta Bartolome**, **Alexander Cosico** and **Hei Leung** are the authors.

IRRI has added three new titles to its inventory of more than 100 books currently available on rice research, and a fourth title that's a "first" (see sidebar). Check the IRRI online publications catalog at [www.irri.org/pubcat/pubcontents.htm](http://www.irri.org/pubcat/pubcontents.htm) for pricing and ordering information on these and other titles and for announcements about other new books as they become available.



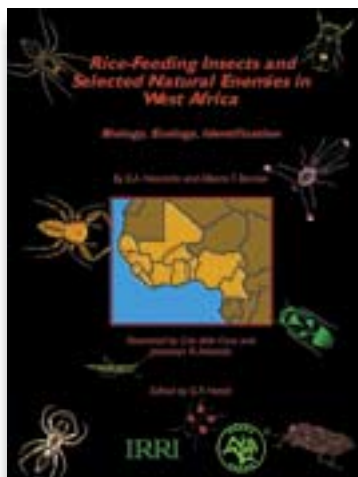
*Rice Science: Innovations and Impact for Livelihood* (edited by T.W. Mew et al; co-published with the Chinese Academy of Engineering and the Chinese Academy of Agricultural

Sciences; 1,022 pages) is the proceedings of the 24th International Rice Research Conference, held as part of the 1st International Rice Congress in Beijing, 16–20 September 2002. Dedicated to Gurdev Khush, whose work with many collaborators has provided more rice for millions, the volume contains selected papers presented at the conference, along with Chinese President Jiang Zemin's opening address and some keynote speeches. The papers report on the latest in cutting-edge rice research conducted by some of the world's most distinguished agricultural scientists.

*Improving the Productivity and Sustainability of Rice-Wheat Systems: Issues and Impacts* (edited by J.K. Ladha et al; co-published with the American Society of Agronomy and the International Maize and Wheat Improvement Center;



231 pages) identifies the problems that agronomists will need to solve to ensure that production under rice and wheat crop rotation continues to increase at the rate necessary to sustain the world food supply, while at the same time preserving natural resources for future generations. The rice-wheat system accounts for one-third of the area of both rice and wheat and feeds about 20% of the world's population. This book serves as an excellent reference for policymakers and those who conduct research involving both crops.



*Rice-Feeding Insects and Selected Natural Enemies in West Africa* (by E.A. Heinrichs and A.T. Barrion; illustrated by C. dela Cruz and J.R. Adorada; edited by G.P. Hettel; co-published with the West Africa Rice Development Association [WARDA] – The Africa Rice Center; 240 pages) provides the first comprehensive taxonomic keys to West African rice-feeding insects and their natural enemies. West African rice farmers face many constraints in their quest to increase rice production. As cropping intensity and cultural practices change to meet production needs in the region, it will be important to avoid the problem of increased pest pressure. With 600 hand-drawn illustrations, the book describes the presence and abundance of important insects and spiders in the various climatic zones and rice ecosystems of West Africa. This collaborative work combines the unique knowledge and expertise of two sister CGIAR centers, IRRI and WARDA.



## A brave new world called GRAINDELL

For more than 40 years, IRRI has published its rice research findings in scientific books for researchers worldwide. Now there is a compelling reason for the institute to venture into publishing for a new audience — children — to instill in them the value of rice to farmers and consumers (including themselves) and to teach them about its impact on Asian cultures, the environment and human health.

*Graindell* (by acclaimed Filipino children's author R.O. Villanueva and illustrated by R.A. Abos; 30 pages) is IRRI's first storybook for young people and the first of a planned series of books that will reach out to both urban and rural children — starting in the Philippines and then extending across Asia and to the world beyond.

The story is about two young boys, Abu and Thor, who live on a tiny, poor planetoid called *Graindell*, where it is difficult to grow food. The two friends share a dream to improve life on *Graindell*, which they ultimately achieve. The book captures IRRI's goal for all the children of the world — that is, to make their home a better place to live.

A parallel educational *Graindell* Web site ([www.Graindell.com](http://www.Graindell.com)) serves as a point of convergence for children and their stewards — parents, teachers, storywriters and illustrators, and other concerned citizens. The site is a developing knowledge bank on rice geared to young people, taking in science, food and nutrition, arts and culture, literacy, and community participation.



ARIEL JAVELLANA

As part of the National Children's Book Day celebration on 15 July, IRRI Director General Ronald Cantrell and author R.O. Villanueva sign copies of *Graindell* during the book's national launch at the Museo Pambata in Manila.

### Did you know...?

IRRI Library and Documentation Service provides instant delivery of requested rice literature by pdf attached to email messages, through the Internet-based document delivery system Ariel. Visit <http://ricelib.irri.cgiar.org> or email [irripub@cgiar.org](mailto:irripub@cgiar.org) to learn more.



## CGIAR ANNUAL MEETING IN NAIROBI

The Annual General Meeting (AGM) of the Consultative Group on International Agricultural Research (CGIAR) will take place at the United Nations Office in the Nairobi Conference Center in Kenya on 27–31 October. Hosted by the Kenyan Ministry of Agriculture, the AGM will feature on 27 October Members Day, an opportunity for meetings, discussions and dialogue between CGIAR members and centers and an official reception in the evening; on 28 October stakeholder field visits to farmers, community projects and research institutes; and on 29–30 October CGIAR stakeholder discussions. An exhibition including displays from each of the 16 international agricultural research centers supported by the CGIAR and many partner organizations will be open on 27–30 October. Highlights will include the International Food Policy Research Institute's biennial report *State of the World's Food*; the Crawford Lecture presented by Susan Whelan, minister for international cooperation, Canada; a ministerial roundtable and presentation by the Earth Institute's Jeffrey Sachs; and presentation of the CGIAR Science Awards. In the inaugural Innovation Marketplace on 29 October, African civil society organizations will be invited to submit program proposals that demonstrate innovative approaches to collaborative work leading to adoption or adaptation of CGIAR and national institute research. Also featured in the Innovation Marketplace will be the conferring of the US\$20,000 People's Choice Award.

## MODERN RICE FARMING

The International Conference on Modern Rice Farming will take place on 14–16 October at Alor Setar, Kedah Darul Aman, Malaysia. Co-organized by Malaysian Agricultural Research and Development Institute, IRRI, Muda Agricultural Development Authority and Malaysian Plant Protection Society, the conference will consider a broad range of topics, from land leveling to marketing. For details visit [www.mardi.my](http://www.mardi.my).

## ART OF RICE

On 5 October, the UCLA Fowler Museum of Cultural History will open an exhibition in Los Angeles, California, entitled *The Art of Rice: Spirit and Sustenance in Asia*. This traveling exhibition examines the interplay between rice and culture through a study of an array of visual art, including works from China, Japan, India, Indonesia, Korea, Thailand, Philippines and other Asian countries. The exhibition, which runs until April 2004, brings together the research and creativity of an international group of more than 20 curators, anthropologists and artists. For details, visit [www.fmch.ucla.edu/Exhibits/exhibit.htm](http://www.fmch.ucla.edu/Exhibits/exhibit.htm).

## OTHER CONFERENCES, MEETINGS AND WORKSHOPS

Event	Contact	Date/Location
2003 International Conference on Agricultural Science and Technology	OCMS@tamu.edu	12–15 Oct / Houston, USA
Workshop on donor relations and resource mobilization in agricultural research	z.franca@cgjar.org	13–18 Oct / Pretoria, South Africa
Entomological Society of America Annual Meeting	esa@entsoc.org; www.entsoc.org	26–30 Oct / Cincinnati, USA
World Agroforestry Centre 25th Anniversary Celebrations and Agroforestry Science Forum	www.worldagroforestrycentre.org	1–5 Nov / Nairobi, Kenya
Challenge Program on Water and Food – baseline conference led by IWMI	www.cgjar.org/iwmi	2–6 Nov / Nairobi, Kenya
Annual Meeting of the American Society of Agronomy, Crop Science Society of America, Soil Science Society of America	www.agronomy.org	2–6 Nov / Denver, USA
Invasive Plants in Natural and Managed Systems: Linking Science and Management and 7th International Conference on the Ecology and Management of Alien Plant Invasions	http://esa.org/ipinams-emapi7	3–7 Nov / Ft. Lauderdale, USA
British Crop Protection Council International Congress – Crop Science & Technology	www.bcppc.org	10–12 Nov / Glasgow, UK
1st European Conference on the Co-existence of Genetically Modified Crops with Conventional and Organic Crops	www.agrsci.dk/GMCC-03	13–14 Nov / Helsingor, Denmark
Research on Water in Agricultural Production in Asia for the 21st Century	IRRI-Training@cgjar.org	25–28 Nov / Phnom Penh, Cambodia
7th International Conference on Plant Diseases. Tomorrow: A New Perspective for Plant Protection	www.anpp.asso.fr/calendrier.htm	3–5 Dec / Tours, France
American Society for Cell Biology 43rd Annual Meeting	www.ascb.org/meetings	13–17 Dec / San Francisco, USA
British Society for Plant Pathology Presidential Meeting	www.bspp.org.uk	15–18 Dec / Nottingham, UK
<b>2004</b>		
International Advances in Pesticide Application 2004	http://aab.org.uk/meetings/mtgs2004/pest2004.htm	5–7 Jan / London, UK
Plant and Animal Genome XII Conference	www.intl-pag.org/pag	10–14 Jan / San Diego, USA
Hawaii International Conference on Sciences	www.hicsciences.org	15–18 Jan / Honolulu, USA
2004 Fertilizer Marketing Business Meeting	vbrown@tffi.org; www.tffi.org	1–3 Feb / New Orleans, USA
7th International Bielefeld Conference 2004	lossau@ub.uni-bielefeld.de; www.ub.uni-bielefeld.de	3–5 Feb / Bielefeld, Germany
Weed Science Soc. of Am. Annual Meeting	www.wssa.net	7–11 Feb / Kansas City, USA
American Association for the Advancement of Science Annual Meeting	www.aaas.org/meetings	12–17 Feb / Seattle, USA
Crop Protection in Northern Britain	www.cpnb.org	24–25 Feb / Dundee, UK
11th International Symposium on Analytical Chemistry	xrzhang@chem.tsinghua.edu.cn	5–8 May / Beijing, China
15th International Plant Protection Congress	ippc2003@ipmchina.net; www.ipmchina.cn.net/ippc/index.htm	11–16 May / Beijing, China
BIO 2004 International Biotechnology Convention and Exhibition	www.bio.org	6–9 Jun / San Francisco, USA

## 2004 IRRI GROUP TRAINING COURSES (TENTATIVE LISTING)

Course	Duration (wk)	Target date	Coordinator(s)/ course facilitator
Two-Week Rice Production, 1st offering	2	Jan	V. Balasubramanian
Integrated Nutrient Management	2	Feb	R. Buresh
Rice Breeding	3	Feb	G. Atlin
Integrated Pest Management	3	Mar	K. Heong
Oryza 2000 (Chia Agricultural University, China)		Apr	B. Bouman
Rodent Management	3	TBA	G. Singleton / K. Heong
Two-Week Rice Production, 2nd offering	2	Sep	V. Balasubramanian
Rice Breeding for Better Nutrition	1	TBA	G. Gregorio
Oryza2000	1	TBA	B. Bouman
English for Conversation*	2	TBA	A. Arboleda
Basic and Conversational English*	8	TBA	A. Arboleda
Intensive English 1*	12	TBA	A. Arboleda
Scientific Writing and Presentation	1	Oct	A. Arboleda
Intensive English 2	3	Nov	A. Arboleda
e-Learning for Development	2	online	A. Atkinson
Intro to IRRIStat	1	TBA	G. McLaren / V. Bartolome
Intro to SAS Version 8 for Windows	1	TBA	G. McLaren / V. Bartolome
Leadership Course for Asian Women in Agricultural R & D	2	Nov	T. Paris

TBA = to be arranged. \* = after 5 pm classes only. For details, email [IRRI-Training@cgjar.org](mailto:IRRI-Training@cgjar.org).

# The monoculture myth

by DAVID DAWE  
Economist

*The Green Revolution neither monopolized farmers' fields nor impoverished nutrition*

Almost everyone acknowledges that the Green Revolution has substantially increased the yield and supply of cereals in the developing world during the past 30 years. However, some critics maintain that these improvements in productivity perversely encouraged farmers to specialize in growing cereals at the expense of other, more nutritious crops. The Green Revolution, they say, worsened the nutritional status of people living in developing countries.

While the availability of modern rice varieties may have encouraged some farmers to specialize in growing rice, there is no evidence that such specialization has been widespread. Rice harvested area (hectares under rice multiplied by the number of croppings per year) has declined as a percentage of total crop harvested area in nearly all Asian rice-growing economies since 1970 (Table 1). Thus, if some farmers increasingly specialized in rice, others must have diversified into other crops — and done so over a larger harvested area. Despite a near doubling of the total rice harvest, rice is now less dominant in Asian agriculture than it was before the Green Revolution.

Overall cropping diversity — the variety of different crops planted — also seems to have increased since the

beginning of the Green Revolution. A widely used measure of concentration is the Hirschmann–Herfindahl index, in which 1 equals absolute uniformity and lower decimals indicate greater diversity. Applied to cropping systems, it shows that farmers in most Asian countries plant a wider variety of different crops today than was the case in 1970 (Figure 1).

The bottom line, however, is not what farmers grow but the nutritional value of the food people eat. Despite some critics' impression that malnutrition in developing countries has worsened, the incidence of child malnutrition, at any rate, actually declined in these countries between 1970 and 1995, according to a recent study by Lisa Catherine Smith and Lawrence Haddad of the International Food Policy Research Institute. While the incidence of child malnutrition still stood at a dismal 31% in 1995, this reflected a reduction of one-third from the 46.5% recorded in 1970.

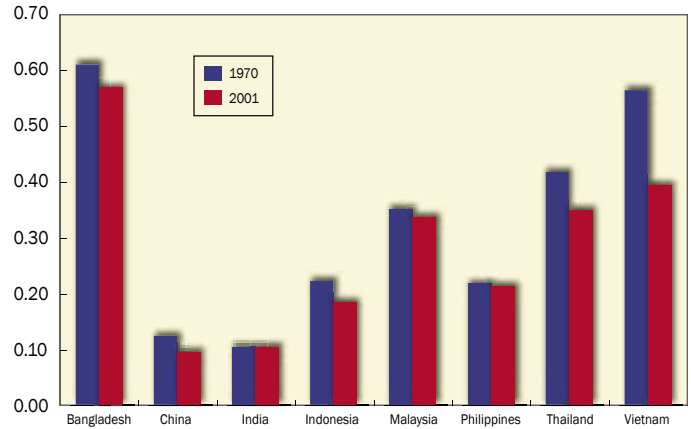


Fig. 1. Hirschmann–Herfindahl index of cropping uniformity.

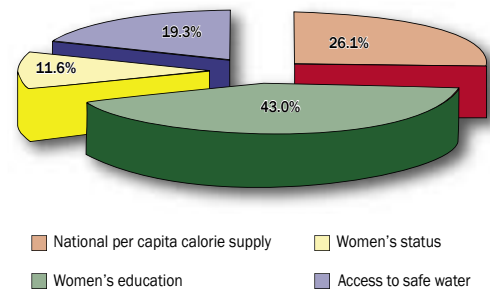


Fig. 2. Contributions of various factors to reduction in child malnutrition in developing countries, 1970–95.

*Agricultural Economics*,<sup>1</sup> also shows that the greater availability of calories at the national level — a direct consequence of the Green Revolution — contributed greatly to the easing of child malnutrition during this period. The authors credit more calories per capita with one-fourth of the total reduction (Figure 2). The only factor making a greater contribution was improved education for women. This provided more mothers with the nutritional knowledge to make better use of available food to safeguard their children's health.

	1970	1985	2001
Bangladesh	0.78	0.72	0.75
China	0.24	0.23	0.18
India	0.23	0.24	0.25
Indonesia	0.43	0.43	0.38
Malaysia	0.25	0.16	0.12
Philippines	0.33	0.26	0.32
Thailand	0.64	0.54	0.57
Vietnam	0.75	0.66	0.62

The study, which appeared in the journal

<sup>1</sup>Smith LS, Haddad L. 2001. How important is improving food availability for reducing child malnutrition in developing countries? *Agricultural Economics* 26:191-204.





# The truth about jasmine rice



N.R. SACKVILLE HAMILTON  
Head, Genetic Resources Center

**A** simmering controversy boiled over a couple years ago when newspaper articles accused American plant breeders of seeking to undercut Thailand's valuable export trade in aromatic jasmine rice. Fueling the debate were inaccurate reports, misconceptions regarding international agreements governing the exchange of rice seeds, and excessive fears over the implications for Thai rice farmers and traders. My purpose here is to set the record straight.

Scientists began collecting jasmine rice seeds in Thailand and transferring them to IRRI in 1960, the year of the institute's foundation. The process, repeated on many occasions, always complied with international agreements, guidelines and codes of conduct pertaining at the time. Transfers took place in cooperation with the relevant Thai authorities, who agreed to the material being distributed to researchers and scientists overseas.

Jasmine rice consequently became widely used in rice research and breeding. The Genetic Resources Center (GRC) at IRRI holds nine samples and derivatives of a form of jasmine rice known as *Khao Dawk Mali* collected between 1970 and 1982 (samples collected before 1970 did not survive). All nine are held under the auspices of the Food and Agriculture Organization of the United Nations in trust for the benefit of the international community. This FAO designation means that the GRC is obliged to provide seeds to any party that agrees to the legally binding terms set by the Commission on Genetic Resources for Food and Agriculture. The CGRFA, whose membership of 166 countries includes both Thailand and the USA, is the leader in forging intergovernmental agreements on the exchange of germplasm (seeds and other genetic material). It also ensures compliance with these agreements and handles disputes, including alleged infringements.

Since 1994, following the commission's revision of germplasm exchange requirements to comply with the Convention on Biological Diversity (CBD), the GRC has


protected all of its jasmine rice seed transfers with the standard CGRFA material transfer agreement (MTA). The MTA bars the recipient from taking out patents or any other form of intellectual property protection on jasmine rice obtained from the GRC, or on any related information. The GRC has distributed *Khao Dawk Mali* in this way on 53 occasions to 50 distinct third parties in 18 countries. Thai officials were fully aware that such exchanges were taking place.

Between 1985 (when seed distribution records were computerized) and the implementation of the CBD, the GRC sent *Khao Dawk Mali* seed 103 times to 70 distinct third parties in 22 countries, including eight transfers to scientists in the USA. In accordance with the approved practice at that time, the GRC distributed the seeds freely without an MTA.

In 1995, an IRRI scientist working outside the GRC, unaware that recent changes in germplasm-exchange protocols applied to seeds in his research collection, sent jasmine rice seeds to colleagues in the USA without the required MTA. This was regrettable but fully rectified when the recipients retroactively agreed to the terms of the CGRFA MTA. To prevent recurrence, IRRI implemented a training program to bring IRRI scientists up to speed on the CBD. It also instituted regulations that make a single

laboratory operated by germplasm-exchange specialists the single gateway for all seed transfers to or from IRRI.

How does this affect Thai rice farmers and traders? Not much. Climate, soil and other factors combine to create a unique environment in northeast Thailand for cultivating this exceptional rice. Most plant breeders agree that, even if scientists in America or elsewhere succeed in developing their own jasmine rice varieties, they still won't be able to replicate Thai growing conditions. Therefore, they have little chance of producing jasmine rice to match the aromatic harvest of northeast Thailand, the delight of millions of people around the world.



*The Genetic Resources Center holds jasmine rice samples in trust under the auspices of the Food and Agriculture Organization of the United Nations. This FAO designation means that the center is obliged to provide seeds to any party that agrees to the legally binding terms set by the Commission on Genetic Resources for Food and Agriculture*

The International Rice Research Institute  
**rice on the web**



Banaue, Philippines



[www.irri.org](http://www.irri.org)

DAPO Box 7777, Metro Manila, Philippines  
Email: [irri@cgiar.org](mailto:irri@cgiar.org)

## Internet sites

News

[www.irri.org/media/press](http://www.irri.org/media/press)

Rice Today

[www.irri.org/ricetoday](http://www.irri.org/ricetoday)

Rice facts

[www.riceweb.org](http://www.riceweb.org)

Rice statistics

[www.irri.org/ricestat](http://www.irri.org/ricestat)

Extension and training

[www.knowledgebank.irri.org](http://www.knowledgebank.irri.org)

[www.training.irri.org](http://www.training.irri.org)

Rice research in Asia

[www.irri.org/corra](http://www.irri.org/corra)

Library

<http://ricelib.irri.org>

Rice variety information

[www.iris.irri.org](http://www.iris.irri.org)

Photos

<http://rice-photos.irri.org>

Irrigated rice


[www.irri.org/irrc](http://www.irri.org/irrc)

Genetic resources

[www.irri.org/grc](http://www.irri.org/grc)

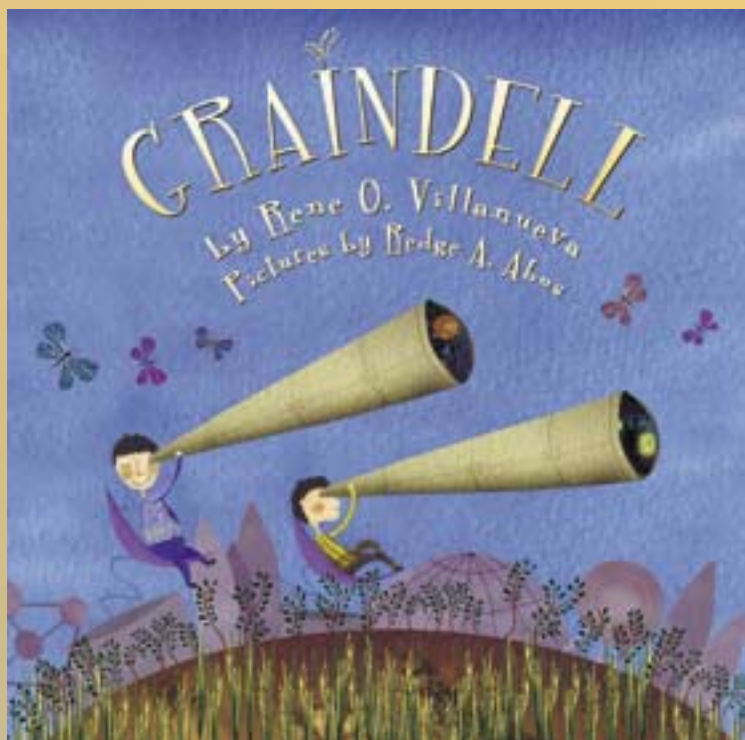
Publications

[www.irri.org/publications/catalog](http://www.irri.org/publications/catalog)

Rice Science for a Better World 



# IRRI launches its first children's storybook...



Copies of *Graindell* can be obtained by writing to Division WB, CPS-Marketing and Distribution Unit, International Rice Research Institute, DAPO Box 7777, Metro Manila, Philippines; Fax no.: (63-2) 761-2404, 761-2406; Email: irripub@cgiar.org or through accessing IRRI's online publications catalog at [www.irri.org/publications/catalog](http://www.irri.org/publications/catalog).

**G**raindell — IRRI's first venture into the world of publishing for children — was written by renowned Filipino children's author Rene O. Villanueva. The book captures the institute's goal for all children of the world, which is for them to be part of a progressive community where no one goes hungry. Through this story of friendship and goals achieved through hard work, IRRI introduces its future stakeholders to important issues and the concept that "Rice is life" at a very opportune time as the International Year of Rice approaches in 2004.

*Graindell*, "a planetoid in another part of the galaxy," tells the story of two friends, Abu and Thor, who share a common dream — to turn their home into a great place to live. This simple, yet moving, tale comes alive with the masterful and unforgettable illustrations of Redge Abos, a young and talented artist from *Ilustrador ng Kabataan*, a guild for illustrators of Philippine children's books.

## ... and associated community via [www.Graindell.com](http://www.Graindell.com)!

**T**he members of the Graindell Community — children and their stewards, including parents, teachers, scientists, children's storywriters and illustrators, and other concerned citizens — can converge at IRRI's new educational Web site, Graindell.com. It is here that the institute's scientists and others are lending their expertise to build a popular Knowledge bank on rice, against a backdrop of science, food and nutrition, environment, arts and culture, literacy, and community participation. The site strives to teach children to aspire, persevere and achieve through games, instructional materials and interactive learning exercises with other children, as well as their stewards. Visit [www.graindell.com](http://www.graindell.com) to sign up, get more information and contribute content to the site.

