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Rice Today
International Rice Research Institute
April-June 2004, Vol. 3 No. 2
Official publication of International Year of Rice 2004

The tao of Tom: A philosopher's life in science

Taking part: Farmers guide crop selection

Rice year forum: Farm and market issues in Rome

CRYING TIME
Women learn to cope when their menfolk leave the farm

ISSN 1655-5422

IRRI

Rice Science for a Better World

Rice lacks the vitamins and minerals children need to grow and develop, so making rice more nutritious helps future generations lead happier, healthier lives.

Rice is Life

INTERNATIONAL YEAR OF RICE 2004

contents

RiceToday
Vol. 3, No. 2

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Printer **Primex Printers, Inc.**

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 15 centers funded by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private donor agencies. For more information, visit the CGIAR Web site (www.cgiar.org).

Rice Today welcomes comments and suggestions from readers. Potential contributors are encouraged to query first, rather than submit unsolicited materials. *Rice Today* assumes no responsibility for loss or damage to unsolicited submissions, which should be accompanied by sufficient return postage.

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Proud to lead the way

The world was a terrifying place in 1952-53. The period saw the first use of "population explosion" in *Time* magazine and — a cruel irony — the first detonation, over the Pacific Ocean, of a hydrogen bomb. It also brought across the Pacific two senior Rockefeller Foundation agriculturalists to study how to end 2 decades of stagnating rice yields in Asia. By 1960, the population explosion was a cover story in *Time*, and the International Rice Research Institute (IRRI) was established in the Philippines to shore up global food security in the face of exponential population growth.

Along with the other midwife of the Green Revolution, the Mexico-based International Maize and Wheat Improvement Center, IRRI was a prototype for a global network of research centers that, since 1971, have found common purpose within the Consultative Group on International Agricultural Research. With more than US$400 million in annual funding from its 63 cosponsors and member states and organizations — in particular the World Bank and developed countries in North America, Europe and the Asia Pacific — the 15-center group represents the world's largest investment in mobilizing science to generate public goods for poor farm communities.

Since IRRI's release in 1966 of the first modern rice variety, the institute has led the way in developing improved rice cultivars and other agricultural technologies to benefit Asia's 200 million rice farmers and the billions of rice consumers who depend on them for reliable, affordable supplies of their staple food. IRRI's work, on its research campus at Los Baños and across Asia in collaboration with the national partners it has nurtured, has greatly contributed to the near doubling of the Asian rice harvest since 1970.

Today, the institute combines rice-biodiversity conservation, gene discovery and plant breeding with natural resource management, integrated pest management, agricultural engineering and postharvest technologies, and social and policy studies to develop ecologically and economically sustainable strategies to reverse a troubling new stagnation in rice-yield improvement. This trend occurs in the contexts of slowing population growth and Asian farmers enjoying an average yield more than double that of their parents and grandparents at IRRI's founding. It nevertheless threatens to undermine the indispensable agricultural foundation of development, thus sabotaging the prospects of today's 500 million poor in rice-producing Asia and a large portion of the billions to be born in the several decades before the global population finally stabilizes.

People at IRRI take pride in how they, their colleagues and their predecessors going back to the shell-shocked middle of the 20th century have helped to make the world a more prosperous, safe and hopeful place. But much remains to be done to achieve the United Nations Millennium Development Goals and so alleviate hunger, want, preventable disease, ignorance, inequality and environmental degradation. With continued support, IRRI's 1,000 scientists, administrators, support staff and contract workers will contribute much more than their share.

Agriculture and poverty reduction: unlocking the potential

by Jonathan Wadsworth

The United Kingdom's Department for International Development (DFID) is the government department responsible for promoting sustainable development and reducing poverty. The central focus of policy, explained in two white papers of 1997 and 2000, is to achieve by 2015 the internationally agreed Millennium Development Goals. These seek to:

- Eradicate extreme poverty and hunger,
- Achieve universal primary education,
- Promote gender equality and empower women,
- Reduce child mortality,
- Improve maternal health,
- Combat HIV/AIDS, malaria and other diseases,
- Ensure environmental sustainability,
- Develop a global partnership for development.

DFID Department for International Development

DR. WADSWORTH, rural livelihoods adviser in the Central Research Department of DFID's Policy Division, adapted for this column a DFID policy paper with the same title published in December 2003 and available under Publications at www.dfid.gov.uk.

Agriculture, in its broadest sense, is responsible for making the connections among these areas, especially in the poorest countries whose economies have not yet diversified and where the great majority of people still live in rural areas. Furthermore a study on agricultural productivity and poverty alleviation that appeared a few years ago in *Development Policy Review* showed that growth in agriculture benefits the poor more than growth in any other sector, and that yield increases of just 1% reduce the proportion of people living on less than $1 per day by 0.6-1.2%.

Regional disparities

Since 1970, largely due to technical advances made by agricultural research organizations throughout the world, global food production outstripped population growth, but the average figures disguise big regional disparities. In Southeast Asia, Green Revolution technology saved millions of lives and lifted millions out of poverty by providing a platform for diversified economic growth. In contrast, agricultural production declined by 5% in sub-Saharan Africa between 1980 and 2001, and the number of people suffering hunger increased by half. Even in Asia rates of productivity growth are slowing, and many people have never benefited from Green Revolution technology. In India alone some 300 million people still live in extreme poverty.

Basically, agriculture has performed badly in areas where it needs to work well. Consequently in recent years donor funding for agricultural research investments in rural development has declined dramatically in real terms, and the relevance of agriculture has been called into question. DFID has been working on policy options to harness renewed interest in agriculture by developing-country governments and international agencies.

The U.K. recognizes that more aid spent on agriculture will on its own achieve little and has prioritized the need to identify and adopt practical measures that will unlock the potential of agriculture for poverty reduction. The international development community needs to work together to find approaches that can work in situations far less favorable to smallholder farming than those experienced in the first Green Revolution in Asia.

Partnerships

Even in the past decade, when funding for research became much tighter, DFID maintained its support for international agricultural research. Total contributions in 2002 to the Consultative Group on International Agricultural Research (CGIAR), IRRI's parent organization, were around £15 million, making DFID one of the largest donors after the World Bank. In addition, many CGIAR centers already participate in research conducted through bilateral research programs. It is anticipated that such productive partnerships will continue under the new research strategy that DFID is currently developing.

Recent work by the International Food Policy Research Institute, partly supported by DFID, has shown the widespread and diverse impact of international agricultural research by the CGIAR, much of which has directly benefited the poor. An important finding is that increased returns for farmers often make up only a small proportion of the benefits, the main gains arising from lower food prices due to supply increases, which benefit both urban and rural poor. Such impacts were an influential factor in the decision to increase DFID support to the CGIAR by £30 million over the next 3 years.

Korea gives direct seeder to IRRI

The Korea National Agricultural College of the Rural Development Administration has donated two direct seeders, a set of steel tractor wheels and a ton of silicate fertilizer to the IRRI research farm under the sponsorship of Kwangsan MTC Co. Ltd. and POS Ceramic Co. Ltd.

On 10-11 February, a six-person delegation headed by Kwang-Ho Park, head of the Crop Science Department of the college, visited IRRI and tested the two direct seeders with IRRI engineer Joe Rickman and crop physiologist Shaobing Peng. The new technology developed by Dr. Park saves labor and improves crop establishment.

The direct seeder sows pregerminated seeds in rows and covers them with silicate fertilizer or sand. Basal fertilizer is placed

5 cm below the soil surface along with the seeds to improve nutrient-use efficiency. Seeds are placed 3 cm below the soil surface, which reduces lodging. The technique also reduces bird damage because silicate fertilizer or sand covers the seeds. Following the field-testing of direct seeders, Dr. Park presented a seminar on the development of the new direct-seeding method.

BUSINESS CULTURE IN RESEARCH: IRRI's International Programs Management Office facilitated the Cambodian Agricultural Research and Development Institute retreat-cum-workshop in Seam Reap on 25-29 January. The event, themed "Business culture in a research and development institute," attracted more than 80 managers and staff members, seen here in front of Angkor Wat.

Some donors increase support for agriculture group

The British government's Department for International Development (DFID) announced in January an additional US$50 million in support for the Consultative Group on International Agricultural Research (CGIAR) over the next 3 years (see page 5). According to Paul Spray, head of DFID's Central Research Team, this commitment "reflects DFID's conviction that the CGIAR reform process is moving in the right direction, governance issues and systemwide reforms are being addressed, and new evidence is emerging of real impacts on poverty."

The CGIAR reform efforts, led by the World Bank, are designed to streamline governance, strengthen science and expand the partners with whom the CGIAR works. The reforms were instrumental in convincing Canada to increase its financial support to the CGIAR by $20 million, doubling its 2002 support level. The government of Italy recently announced that it, too, will double its contribution.

Recent changes include the International Food Policy Research Institute absorbing the International Service for National Agricultural Research and discussions among the 15 CGIAR centers toward increasing collaboration.

Ian Johnson, CGIAR chairman, said that he was "delighted that several donors have increased their commitment to the CGIAR based on the conviction that the CGIAR reform program is progressing well, and is impacting on poverty."

Briefly Briefly Briefly

Workshops for irrigated systems

The Philippine Rice Research Institute (PhilRice) teamed up with IRRI's Irrigated Rice Research Consortium in January to host a workshop on integrated nutrient management. PhilRice is promoting two nutrient-management approaches to help Filipino farmers improve their productivity: site-specific nutrient management and the minus-one-element technique. In February, IRRI hosted a planning workshop to establish guidelines for the development of Phase III of the consortium (2005-08) following a favorable external panel review in October 2003 of Phase II (2001-04).

Technologies for flood-prone rice

The final review meeting for the project "Validation and delivery of new technologies for increasing the productivity of flood-prone rice lands of South and Southeast Asia" took place in Vietnam in February. The project, supported by the International Fund for Agricultural Development, was conceived by IRRI to improve poor farmers' livelihood in flood-prone ecosystems in India, Bangladesh, Sri Lanka, Thailand and Vietnam. Participants identified successful technologies for sustainable management of farm and natural resources. These included an IRRI-designed drum seeder, which reduced production costs and increased yield in Bangladesh by as much as 30%, and leaf color charts for managing nitrogen fertilization. Participants also discussed improving farmers' livelihood by strengthening the capacity of the national agricultural research and extension systems.

More hybrid rice

Hybrid rice developed by Syngenta Philippines Inc. is set to be commercialized in the Philippines by next September, thus solving the hybrid seed shortage that has slowed the Department of Agriculture's target to raise hybrid rice area from 7,000 hectares in 2001 to 200,000 hectares by the end of 2003.

Global issues raised in Philippines

IRRI Deputy Director General for Partnerships William Padolina addressed poverty alleviation, biosecurity and food security at two meetings in the Philippines in January. Speaking in Manila on 31 January on "Poverty and the knowledge age: The role of agricultural extension" at the Presidential Celebration on Poverty Alleviation sponsored by Rotary International, Dr. Padolina warned that "there is no simple law of nature" that links technology and economic growth. Three days earlier, while addressing "Biosecurity and food security" at the Southeast Asian Regional Center for Gradu-

Three Reductions project wins Vietnamese award

A communications project designed to motivate farmers to reduce their seed, fertilizer and pesticide use has won the Vietnamese Ministry of Agriculture and Rural Development 2003 Golden Rice Award for best agricultural innovation. The team that developed the Three Reductions Initiative received the winners' plaques in December from Vice Minister Bui Ba Bong during the Cantho International Agricultural Fair. The IRRI-led "No early insecticide spray" project, which used a similar approach to reduce insecticide use, won the 2002 award.

The project — led by Nguyen Huu Huan, vice director general of the Plant Protection Department, since its start in 2000 — developed a poster, a leaflet, and radio and TV dramas. Supplemented by farmer interviews and game shows, these reached thousands of farmers and prompted three provincial governments and the Danish International Development Agency to allocate additional resources to extend the project.

THREE REDUCTIONS: Scientists from IRRI, Swiss Agency for Development and Cooperation, Cuu Long Delta Rice Research Institute, and Vietnam Ministry of Agriculture and Rural Development celebrated International Year of Rice on 7 February in My Thanh Nam, an isolated village in the Mekong Delta province of Tien Giang in which 135 farmers who practiced Three Reductions techniques enjoyed a bumper crop and improved profits.

The picture below shows (*from left*) Tran Van Hai (Cantho University), Nguyen Huu Huan (Vietnam Plant Protection Department), Pham Van Quynh (Cantho Plant Protection Sub-Department), Pham Sy Tan (Cuu Long Delta Rice Research Institute), Monina Escalada (IRRI), K.L. Heong (IRRI, see Grain of Truth, page 38), Nguyen Van Ngau (Cantho Department of Agriculture and Rural Development), Pham Van Du (Cuu Long Delta Rice Research Institute). Not pictured are IRRI scientists Vethaiya Balasubramanian and Roland Buresh, Ha Anh Dung (Cantho provincial extension center), and Nguyen Hong Linh (Cantho television).

After being launched on 8 March 2003, the Three Reductions practices spread to more than 90% of the farmers at the target sites, Omon and Vi Thuy, in Cantho Province. Most farmers found that they could reduce input costs by as much as US$50-100 per hectare per season.

Capitalizing on the success of the program, IRRI entomologist K.L. Heong led a drama script-writing workshop using the entertainment education approach in Vientiane, Laos, in December.

Briefly Briefly Briefly

ate Study and Research in Agriculture in Los Baños, Dr. Padolina stressed the importance of managing biological and environmental risks associated with food and agriculture in a globalized world.

Basmati grown in Philippines

Farmers in the Bicol region of the Philippines have begun planting basmati rice and plan to promote the aromatic South Asian variety, which was introduced by Bicol farmer Rodolfo Tuanqui, in surrounding areas. Growers are currently purifying their lines and hope that the rice will be ready for market this year.

Improving livelihood in India

IRRI and the International Maize and Wheat Improvement Center (CIMMYT) held a workshop on "Accelerating technology adoption to improve rural livelihoods on the rainfed Eastern Gangetic Plains" in February in New Delhi, India. The workshop's 58 participants from Bangladesh, India, Nepal, CIMMYT, IRRI and the World Agroforestry Center identified technologies that have the potential to enhance productivity and conserve resources — and so improve rural livelihoods — for each of the project's 11 sites. A work plan for farmer participatory research was developed to validate and disseminate the identified technologies. Participants also formed a research team of technology innovators and promoters for each site.

Cheaper fuel from rice

Many Indian and Thai cement exporters are now heating their kilns with rice husks. This alternative fuel reduces fossil fuel emissions and, if transport distances are not too great, is relatively cheap. Burning rice husks can potentially save millions of dollars per year and has attracted interest in China (the world's largest producer of both rice and cement), Vietnam, Sri Lanka and the Philippines. One of the pioneers, Thailand's Siam City Cement, now saves as much as US$6.1 million a year after investing $380,000 in new equipment 3 years ago.

Bran new road surface

Japanese scientists have used rice waste to make roads that absorb noise better, drain more quickly and are less susceptible to extremes of temperature than conventional road surfaces. The new surface contains rice bran, the brown by-product left after polishing rice grains, which is usually used as cattle feed or simply thrown away. Mixing bran with resins results in a material that is hard and resilient but also light and porous when added to asphalt or aggregate.

GURDEV KHUSH, former principal plant breeder at IRRI, received from Iranian President Mohammad Khatami on 8 February the Khwarizmi International Award for Agriculture, which he shared with Sanjaya Rajaram, former wheat breeder at the International Maize and Wheat Improvement Center. This annual award, organized by the Iranian Research Organization for Science and Technology and now in its 17th year, honors the renowned 9th century Iranian mathematician and astronomer and acknowledges achievements in five areas of science and technology.

Promoting library automation

The advantages of library automation to meet the growing needs of agricultural scientists were highlighted late last year at a training course on WebAGRIS, the freely available software associated with AGRIS, an international information system for the agricultural sciences created by the Food and Agriculture Organization (FAO) of the United Nations.

The conference, which was sponsored by FAO and IRRI, aimed to enable members and prospective members of the Philippine Agricultural Libraries and Information Services Network (PhilAgriNet) to actively participate and contribute to PhilAgriNet and AGRIS databases. PhilAgriNet resulted from a collaborative effort by agricultural information-management professionals to create and maintain a central electronic database of Philippine agricultural literature.

IRRI Head Librarian Mila Ramos reports that important information is not reaching its potential users due to outmoded library systems in the Philippines and their failure to capitalize on the availability of free software. "Many librarians are still unable to automate their libraries," she said. "There is an urgent need to increase librarians' capacity to manipulate available digital tools and use them to the fullest."

EXTENDED CURE: During a 27-29 January workshop at the National Agricultural Science Complex in New Delhi, India, the Consortium for Unfavorable Rice Environments (CURE) inaugurated its new project, "Integrating and mobilizing rice knowledge to improve and stabilize crop productivity to achieve household food security in diverse and less favorable rainfed areas of Asia." CURE has received Asian Development Bank funding to support its activities for the next 3 years.

'Asia's rice industry in crisis' – *Jakarta Post*

The leading English-language daily in the Indonesian capital ran this headline at the top of its 14 February front page. "Not only is the rice industry in Asia facing a crisis in the supply of such essential resources as land, labor and water," *The Jakarta Post* quoted IRRI Director General Ronald Cantrell as saying, "but — most importantly of all — many nations are finding it difficult to develop sustainable ways to provide decent livelihoods for rice farmers and consumers."

The statement from IRRI, distributed via Agence France-Presse, cited the case of one of the Jamaah Islamiyah militants convicted of the October 2002 bombings in Bali, which killed more than 200. The convict had fled poverty in the Indonesian village of Tenggulun to seek work in Malaysia, where he was recruited. A fifth of the working-age population of that heavily agriculture-dependent village has left home in search of employment.

Dr. Cantrell cautioned that collapsing international support for public rice research was hindering efforts to make rice farming less of a poverty trap. "While IRRI still has some very committed donors, there is no doubt that the institute could do a lot more if it had more support," he said.

Philippine columnist rethinks rice imports

In the 15 December edition of *The Philippine Star*, columnist Boo Chanco questioned the "conventional wisdom" of pursuing self-sufficiency in rice no matter how much it forces up the retail price.

"While it is important for us to make sure we always have enough rice to feed our people, it is also equally important to make sure that it is affordable," Chanco wrote. "The high cost of rice is a burden to the budgets of poor families."

Chanco recalled a flap from 2 weeks earlier when several Philippine newspapers prominently ran a 1 December AFP report in which IRRI economist David Dawe said the Philippines "may never attain rice sufficiency." Some readers objected, apparently misinterpreting Dr. Dawe's comments as questioning the Philippines' *right* to rice sufficiency. IRRI responded by reaffirming its policy never to obstruct any nation's sovereign right to set food policy.

Chanco borrowed from the AFP report a quote from Dr. Dawe. "Self-sufficiency has a cost if you want to do it and in the case of the Philippines that cost is borne by the poor," he said. "As an economist, I would say that the Philippines would be slightly richer if it didn't focus on self-sufficiency."

The columnist then quoted his "agri-business guru," Rolly Dy of the University of Asia and the Pacific. "High food prices will drive wage demands," said Dr. Dy. "High wages will make labor-intensive industries uncompetitive. As a result, investors [will] prefer to locate in low-wage countries …."

"In today's world," Chanco concluded, "we have to question conventional wisdom and think in terms of what we can do most competitively in a borderless world market for all goods and services."

Also…

The journal *Science* reported in its 16 January issue (Vol. 303, No. 5656) that Indian scientists have genetically engineered new **salt-resistant rice varieties**. A team led by Ajay Parida at the M. S. Swaminathan Research Foundation in Chennai has inserted a salinity-resistance gene, isolated 3 years ago from a coastal-growing mangrove, into several Indian rice varieties. In greenhouse experiments, the plants have grown in water 3 times as salty as seawater. Climate change is expected to worsen seawater intrusion in coastal rice-growing areas, and the foundation estimates that a third of all irrigated land is now affected by salinization.

- *The Hindu* newspaper ran on 7 December a detailed report about the Sardar Vallabhbhai Patel University of Agriculture and Technology in Uttar Pradesh con-

Rural poverty in Asia undermines stability

In a series of meetings and media interviews in Australia in February, Keijiro Otsuka, chair of the IRRI Board of Trustees, warned that lagging development in the Asian rice sector threatens stability in Asia, especially in Indonesia and the Philippines. Dr. Otsuka also outlined how new technologies from IRRI promise to lift Asian rice farmers out of poverty and still their restlessness caused by a lack of opportunity.

National, metropolitan and regional print and radio media picked up his message, including *Radio National Bush Telegraph*, *National Commercial Radio Rural News*, and major rural press publications. The April/May issue of *Asia Today International* magazine (www.asiatoday.com.au) was expected to carry an article on the issues raised during the visit, and a related opinion piece by Dr. Otsuka (www.onlineopinion.com.au/view.asp?article=2027) was slated to appear in *The Canberra Times* in March.

Keijiro Otsuka.

Meetings with Bob Clements, executive director of the ATSE Crawford Fund, and with senior personnel from the Australian Center for International Agricultural Research provided further opportunities to discuss events associated with the International Year of Rice, current and proposed IRRI projects, and additional prospects for partnerships and collaboration.

Bangladesh government urged to 'pay for the penny'

Abdul Bayes, professor of economics at Jahangirnagar University and contributor to *The Daily Star*, urged in a column published on 2 December that Bangladesh cease to be a nonpaying member of the Consultative Group on International Agricultural Research (CGIAR).

"The Bangladesh government should now pay the membership fees every year and should 'earn' its voice in the deliberations of the CGIAR," he wrote, adding that an annual subscription of half a million dollars would be appropriate. "This is miniscule in terms of the costs but would, possibly, raise the image of the country substantially in the international forum."

Dr. Bayes cited research by Mahabub Hossain, a fellow Bangladeshi economist and head of IRRI's Social Sciences Division, measuring the benefit that has accrued to their homeland from rice research. Dr. Hossain estimates a benefit averaging $652 million per year in the 3 decades to 1993, with cost savings in rice production accounting for almost half. In the same period, the average total investment in rice research and technology transfer in Bangladesh was $18 million per year.

"The benefit-cost ratio ... is estimated to be 16.6 if only the cost saving in rice production is considered," wrote Dr. Bayes, counting among the additional gains foreign exchange savings from reduced rice imports and the expertise earned by Bangladeshi agricultural researchers.

"The cost savings in rice production and faster growth in rice supply compared with population growth have contributed to a fall in rice prices by about 1.6% a year," Dr. Bayes observed, adding that the main beneficiaries of lower rice prices were urban and landless rural poor. "Let's pay, partly at least, for the penny that we earn or save through the stewardship of CGIAR institutions and make ourselves proud of being a paid member."

Year of Rice makes news in Thailand and Japan

After headlining on 16 January the arrival of International Year of Rice with *UN grants to rice its due recognition*, the *Bangkok Post*, the leading English-language daily in the capital of Thailand, the world's biggest rice exporter, ran on the front page of its 25 January issue *In appreciation of the 'Year of Rice.'* This guest perspective by IRRI Director General Ronald Cantrell spelled out the significance of "the food that feeds almost half the world on a daily basis" and how the International Year of Rice promises to focus attention on the concerns of poor rice farmers and consumers, especially in Asia.

"Perhaps 2004 will be the year when the people of Asia realize that we share one common value or belief — a deep appreciation of rice," Dr. Cantrell wrote. "More than politics, religion or culture, rice is the one thing that truly defines Asia."

Dr. Cantrell pointed out that sustainable economic development depends on lifting rice farmers and the rural, landless poor out of poverty. He then outlined several issues, challenges and opportunities now affecting rice research, from the sequencing of the rice genome and the complex question of national claims on rice varieties, to scientists' efforts to augment the micronutrient content of rice and to help farmers use water more efficiently. Finally, he underscored how a funding crisis is undermining the work of rice scientists and other public-sector agricultural researchers.

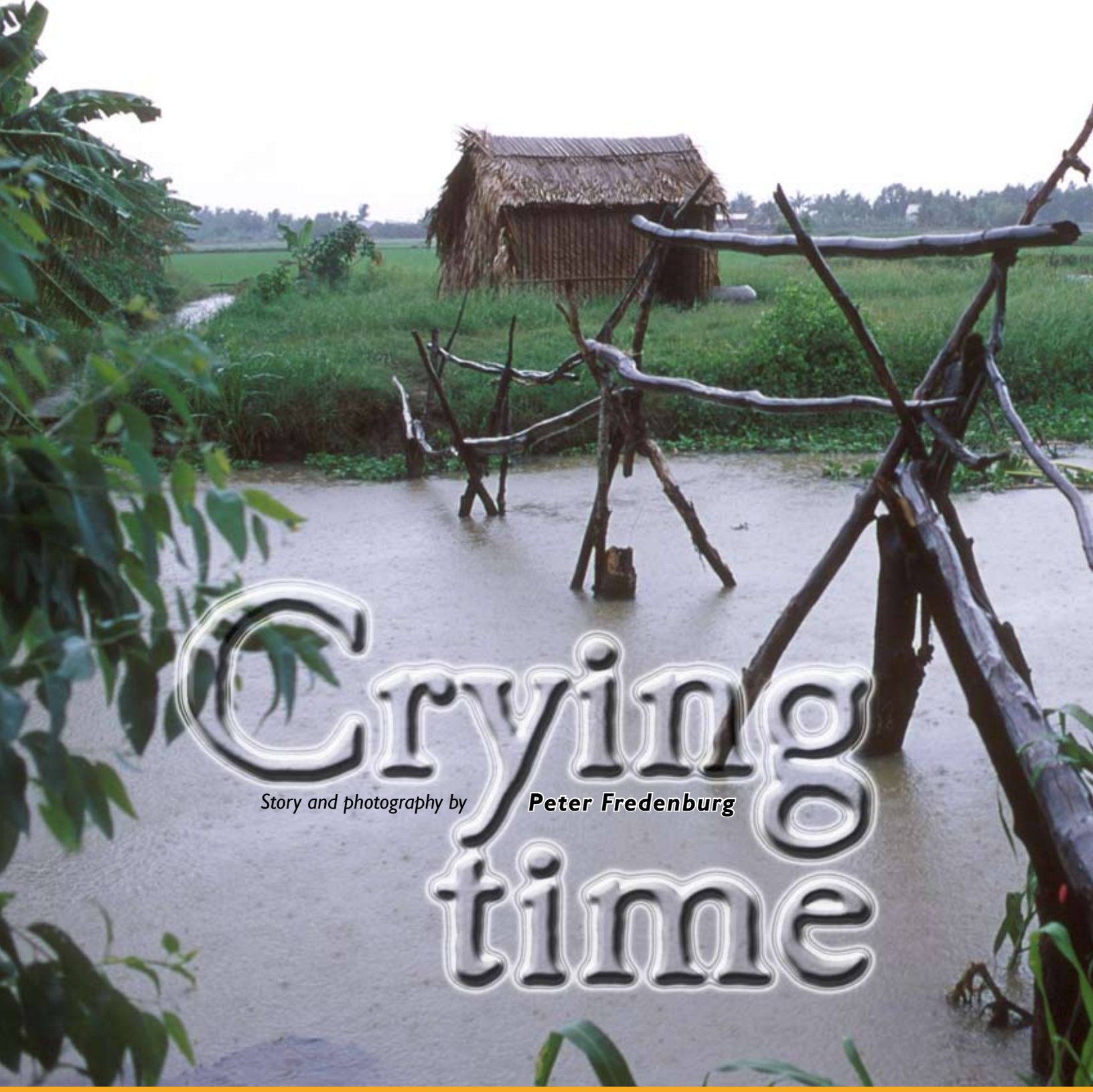
In Japan, Kyodo News, the Associated Press and *The Japan Times* were among the news organizations that reported comments made on 20 January by Dat Van Tran, senior rice agronomist for the Food and Agriculture Organization (FAO) of the United Nations and executive secretary of its International Rice Commission.

Dr. Tran, who was in Tokyo for a workshop marking International Year of Rice, expressed hope that the Japanese government would redouble its efforts to raise global awareness of the issues affecting rice farming and the need to support research in developing countries. He added that 500 million of the world's 840 million chronically hungry live in areas dependent on rice.

"We eat rice almost every day," the Vietnamese FAO official added, referring to his Japanese hosts and other Asians. "But in Europe and America, we raise the issue, but they are not aware. I think Japan should try to be more involved in global awareness."

ferring **honorary degrees** on IRRI Director General Ronald Cantrell; former IRRI Director General (1982-88) M.S. Swaminathan; R.S. Paroda, former director general of the Indian Council of Agricultural Research (ICAR); Mangala Rai, current director general of ICAR; M.C. Saxena, assistant director general of the International Center for Agricultural Research in the Dry Areas; social and religious activist Swami Kalian Doe Jig; and social worker Jagdish Prasad Mathur.

- **Golden Rice**, the provitamin A-rich rice whose tropical versions are now under development at IRRI, continues to be a lightning rod in the ongoing debate over this and other products of biotechnology, or genetic modification (GM), as in Nao Nakanishi's story posted by Reuters on 19 February, *Is Golden Rice the crop to prove GM's worth?*, and Cecil Morella's story posted by AFP on 30 November, *Scientists harness rice gene in global battle against poverty*. Morella followed up on 7 December with another story for AFP, which was picked up by the Sun.Star network of community newspapers in the Philippines, on how funding cuts are undermining the competitiveness of IRRI and other producers of international public goods as "biotech firms muscle in on rice research."



Crying time

Story and photography by **Peter Fredenburg**

When they come calling in a village, Truong Thi Ngoc Chi and Tran Thi Ngoc Mai bring the refreshments. They do this because the poor rice-farming women who receive them would be hard pressed to offer nuts and rice cakes to nibble on while sharing information, tea and sympathy. Chi, an associate scientist at the Cuu Long Delta Rice Research Institute, and Mai, a researcher at the same Mekong Delta-based institute, are researching how Vietnamese women cope with the demands of rice farming when their husbands migrate away to earn extra income.

"We're looking at how farm families are bearing up as modern forces restructure rural economies across Asia and redefine the place of rural people in national societies," explains Thelma Paris, a gender specialist in the Social Sciences Division of the International Rice

As migrant workers across Asia leave farmwives home alone, three women in a poor Vietnamese village shed light on the socioeconomic and food-security implications — along with a few tears

THACH THI SEU's husband and eldest son left her to run the family farm in 1996 when they took up farm wage labor in the next province, visiting home 3 or 4 times per year.

Research Institute (IRRI), who coordinates the research in southern Vietnam with parallel work in Thailand, Philippines, Indonesia and India. "The results have implications for formulating policies to manage change in a way that broadly maintains and improves social welfare. And the research should provide early warning if rapid change in the countryside is undermining the national and regional food security that we've

worked so hard over the past several decades to achieve."

Results to date show that the women left behind generally cope well with their expanded roles. They certainly welcome the opportunity to tell social scientists about their successes and failures, their abiding hopes and loneliest fears. But gaps still open up in conversation, potentially awkward moments that the refreshments help to fill.

"The women," Chi observes, "often cry."

The southern Vietnamese hamlet of Gia Tieu consists largely of thatch huts with floors of packed earth. A sun-scorched, rutted track along an irrigation canal provides two-wheeled access from the road a couple of kilometers away. The tiny rice farms of Gia Tieu, typically measuring 1 ha or less, are poverty traps despite irrigation. Small wonder that many residents here, especially men, seek off-farm employment.

It is an old story that workers throughout the developing world migrate to find jobs in cities and remit earnings to relatives back home. This study found, however, that more than two-thirds of the migrants from families in the study area in Bac Lieu Province, one of the poorest in the Mekong Delta, work not in cities but in other rural districts, mostly in agriculture but also in construction. More than a third of the women receive no remittances because their husbands can barely support themselves on the US$1-2 they earn for a day's work. Others fare somewhat better, and remittances typically account for a quarter of the income of farm families with migrants, bringing their average per capita annual income to $190. This is higher than the $145 figure for farm families without migrants, but still below the Bac Lieu per capita gross domestic product of $296.

AILEEN DEL ROSARIO-RONDILLA

In short, migrant families start out poor and usually stay that way. Nearly half of the women left behind cite their children's education as the only real benefit of migration. Almost as many say they gain nothing. Some report that their neighbors' belief that they are better off actually makes getting loans more difficult.

Despite everything, women generally manage to maintain the productivity of their rice fields, albeit at the cost of considerable effort and anxiety. Pest control is especially challenging, as women's traditional inexperience in identifying pests and the appropriate pesticide to use is compounded by the difficulty of carrying a bulky backpack sprayer. They hire help for this and other heavy work such as preparing land, applying

fertilizer and hauling sacks of grain — often going into debt to do so.

"Still, they feel vulnerable to theft and violence," says Chi. "Many can't manage water as efficiently as they should because they're afraid to go out to their fields alone at night."

'Just sad'

Thach Thi Seu describes her farm management as only so-so since 1996, when her husband and eldest son started doing farm labor — mostly threshing and hauling rice — half a day's drive away across the Mekong Delta in Cantho Province. Her husband visits 3 or 4 times per year, staying for as many days each time. He remits $20 per month, which Seu goes to Cantho to collect when there is no convenient traveler to deliver the money. She depends on neighbors and shopkeepers for advice on fertilizers and pesticides, which she hires labor to apply.

"Mostly I'm just sad because my husband is absent," says the 46-year-old mother of five. "But I have to bear it because we're poor. I used to worry that he might be unfaithful but not any more."

En route to the next interview, Chi quietly laments that the head of the hamlet women's association is sitting

TRAN THI NGOC MAI takes notes as Thach Thi Seu tells of life as a home-alone farmwife; (*inset, from left*) Mai, a neighbor child, Seu and Truong Thi Ngoc Chi pose in front of Seu's house. (*Continuing clockwise*) Chi enrolled in a recent course on leadership for Asian women in agriculture research and development in the Training Center at IRRI; a woman rows produce to market in Bac Lieu Province; Chi interviews Phan Thi Be.

in, precluding discussion of such highly personal concerns as sexually transmitted disease. "I'll come back for that another time," she says.

Phan Thi Be is thin and visibly weak, her spindly neck bandaged where a tumor was recently removed. Despite her frail appearance and wistful manner, this 52-year-old mother of three makes most of the decisions regarding her family's 0.65 ha of rice land and does much of the work. After her two grown sons and hired hands do land preparation and planting, she fills the gaps in planting and pulls the weeds. And, after they harvest and thresh the rice, she dries it.

"My husband didn't have any skills when he migrated," she recalls. "We grew rice and raised ducks, but disease killed most of the ducks 3 years ago. That left us in debt, so my husband decided to migrate. He and my daughter went to Ho Chi Minh City. A neighbor knew about construction work there. The boss assigns my husband easy jobs like cleaning bricks because he's 49 and too old for heavy work. The mail service is slow, so we write only if someone can hand-carry the letter. He comes home once a year during the Tet holiday for a week or 10 days.

"Our daughter was also doing construction, but now she works in a bakery," she adds. "She doesn't make enough to send home money, but she comes to stay with me when I'm sick."

Be — who lives with her younger son, his wife and their 2-year-old daughter — regrets that her husband's work comes irregularly and that he can remit only $20-25 every 4 or 5 months. All of the money goes to repaying the family debt, which peaked at $500 and is now down to $300, despite 6% monthly interest and a new loan last year for a corrugated fiberglass roof to replace leaking thatch. "We can't spend this money," she says. "I worry because of debt." She pins her hopes on her younger son's plan to raise shrimp, a venture perhaps inspired by his seasonal work in the neighboring province of Soc Trang, where he operates pond-digging machinery.

"I feel overworked," admits another interviewee, Nguyen Thi Le, an apparently healthy and energetic 36-year-old mother of four, aged 5 to 16, whose husband has spent most of the past 5 years building houses 25 km away from Gia Tieu. "Besides housework and taking care of the children — including helping them with their lessons in the evening — I have to manage most of the rice farming. After my clothes get dirty from working in the field, I just wear them in the canal while netting fish. Fishing isn't difficult, and each time I get a bowl of small fish, which is enough for a meal with vegetables that I gather from around the homestead. I also do farm labor for others, mainly hand-weeding and gap-filling. We own a boat, so when the weather is fair I ferry passengers — usually students and other villagers — to the road."

Le's husband returns once or twice a month for 1 or 2 days — coming home more frequently and staying longer when it is time to sow or harvest their 0.78 ha of rice. Her aspirations? "I'd like to earn enough

NGUYEN THI LE tends her fields (*shown here after the harvest with Chi*), ferries travelers between the road and the village (*below*), and casts a net for dinner (*opposite*) — then musters the energy to help her children with their lessons.

so that my husband could stay here all of the time, so we could be together as a family," she replies. "And I hope my children can find steady jobs."

Children leave

Le's desire to see her children leave rice farming echoes the results of a parallel preliminary study, funded by the Danish International Development Agency, in northeast Thailand. Dr. Paris and Nongluck Suphanchaimat, her Thai collaborator, note that "labor migration to the nonfarm sector is common among young laborers aged 15 to 20, and this will continue to take educated persons away from agriculture." How the status of farming has evolved in northeast Thailand may offer a foretaste of what to expect in less-developed Vietnam and later in Cambodia and Laos.

"We've completed extensive studies to monitor the social consequences of male labor out-migration in selected villages in India, Philippines and Indonesia," Dr. Paris reports. "With funding from the Australian Center for International Agricultural Research for 2004 to 2006, we're conducting similarly extensive studies in Vietnam and northeastern Thailand. We need to understand more fully the impact of migration on the efficiency of Asian rice production. Finally, we need to expand our efforts to provide these women with proper training in improved farming methods."

Meanwhile, every day sees more women in Vietnam and other Asian countries left behind on the farm to learn how to cope alone.

The tao of TOM

by Adam Barclay

A life's journey of nearly 3 decades in rice research brings this beloved scientist-cum-philosopher full circle

Because his discoveries have improved the lives of millions of poor rice farmers and consumers, it's perhaps surprising that Tom Mew never wanted to be a scientist. He had a different dream.

"When I finished high school, I wanted to go into liberal arts," says the 64-year-old plant pathologist. "My first choice was philosophy. But my family wasn't financially secure, so my father insisted I should study something that would guarantee a steady income."

Dr. Mew will retire in August after 29 years at the International Rice Research Institute (IRRI), including 22 years as the head of its Entomology and Plant Pathology Division. His distinguished career has earned him the admiration of

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colleagues, the gratitude of national partners and farmers, and the affection of all who know him. It has also demonstrated his spiritual resilience. Modest circumstances may have spoiled his early dream of a career in philosophy, but the creativity he brings to bear on rice pest and disease problems proves that he never lost his ability to dream.

"One thing I'm good at — I'm a positive thinker," he says. "I never think negatively. I never say, oh, now, we can't do this. There must be a way we can do it. If not one way, then another."

The young Tom Mew examines tomato plants at the Asian Vegetable Research and Development Center in 1973 with research assistants surnamed Chu and Ho.

Newly minted Ph.D.

Born in 1939 in Weihai, a fishing village in the northern Chinese province of Shandong, Twng Wah Mew migrated with his family to Malaysia when he was 6 years old. In 1960, he went to Taiwan to earn a bachelor of science degree, which he followed up in 1965 with a masters in plant pathology from the University of Rhode Island and, in 1972, a doctorate from the University of Minnesota.

His first job as a newly minted Ph.D. would shape his career and the rest of his life.

Robert Chandler, IRRI's founding director general, was at this time setting up the Asian Vegetable Research and Development Center in Taiwan. He offered jobs to the young Dr. Mew and his wife, another plant pathologist named Annabelle I-Pin. Dr. Chandler had a passion for agricultural science that inspired young scientists — such that Dr. Mew still displays in his office an old black-and-white photograph of his mentor.

"He told all the scientists, 'If something happens in the field, tell me right away,'" recalls Dr. Mew. "'No matter where I am, bring me to the field.'"

Two years into Dr. Mew's brief career in Taiwan, a long and frustrating search for disease-resistant lines of mung bean suddenly yielded a visible result. Relating the story, Dr. Mew's voice becomes excited, almost as if it were 1974 again and he's seeing the result for the first time. He burst into Dr. Chandler's office to find the director general working on the budget with his deputy, who brusquely pointed out that Dr. Chandler was busy. Mung beans could wait until tomorrow.

"Chandler told him, 'When a scientist comes to your office and says he has something in the field he wants to show you, you should drop what

AVDRC

you're doing and go to the field with him,'" Dr. Mew recounts. "So that's what they did. When you're a young scientist, that really gives you a warm feeling."

At Dr. Chandler's urging, Dr. Mew applied in 1975 for an opening at IRRI. While in Malaysia on home leave, he received a telex from Dr. Chandler asking him to go to IRRI for the International Rice Research Conference and — as Dr. Mew learned only upon his arrival — a job interview. Entering IRRI's gates for the first time was memorable.

"Walking around the IRRI campus — wow! These were people I admired from afar and hoped one day to be one of," Dr. Mew recalls. "In those days, if you worked in international agriculture — even for only a few years — you knew all the names, who was who."

'Go to the field'

Later that year, Dr. Mew took up his duties in the plant pathology division, then led by S.H. Ou, a renowned plant pathologist and another big influence on Dr. Mew's scientific outlook.

"Right off, he told me to go to the field more often," recalls Dr. Mew. "See the problem in the field. You can't make good observations just staying in the lab. You won't know what the crop is all about. You won't know how rice grows. Learn how the disease develops, then start designing your project."

Another IRRI plant pathologist, Hei Leung — who was recruited and mentored by Dr. Mew — confirms that Dr. Ou's message still comes through loud and clear.

"What impresses me most is that, when you take Tom to the field, he's at home," says Dr. Leung. "He's probably the most knowledgeable rice-field pathologist living. And he's willing to look at things outside his area. That ability to appreciate science in general is a huge advantage. I don't think we could find anyone else like him in our discipline anymore, because we're so specialized now."

Dr. Mew's eagerness to get out of the lab and work closely with farmers has been instrumental in bringing long-overdue focus on managing seed health (see sidebar above). "His work in seed health is a down-to-earth thing that has had tremendous impact," comments Dr. Leung.

More broadly, Dr. Mew's success in making the Entomology and Plant Pathology Division a world leader has depended on his ability to both maintain a big-picture perspective and stay ahead of the curve regarding modern trends toward specialization. "Tom had the vision to know that, if you want to be a player in rice pathology, you've got to have strength in individual disciplines," explains Dr. Leung. "So, after he became head, he assembled a team with me on host-pathogen relationships using molecular biology, Hiroyuki Hibino

Begin with a seed

Ensuring good seed health requires farmers to select high-quality seeds with care and to store them correctly.

"We recognized seed-related problems in rice production as early as the 1970s," says Tom Mew, noting that rice seed, like any other, harbors microbes, some that are beneficial and many that are pathogens. "We worried about it, but no one actually tried to apply seed-health management to control pests and diseases. If farmers start with good seed that produces a healthy crop, it solves many production problems. So, in the early 1980s, I started looking at farmers' options to manage seed health in the Philippines."

JOHNNY GOLOYUGO

DR. MEW and former IRRI trainer Roger Rosales (*left*) discuss seed health with local farmers at a 2001 workshop in Infanta, Philippines.

Research revealed that many traditional — but waning — farm practices incorporated basic elements of seed-health management. After saving seeds from the best plants in the crop, farmers often stored the panicles near the kitchen stove, the heat from which kept them relatively dry. As a bonus, smoke from the stove fumigated the seeds, reducing pest problems. In recent decades, however, with younger men leaving the farm and the resulting labor shortage, farmers have become less careful about selecting and storing seed. Seed quality deteriorates from one season to the next, lowering yields.

Dr. Mew recently studied the benefits of seed health improvement in a subproject of Poverty Elimination Through Rice Research Assistance, a bilateral project in Bangladesh managed by IRRI and funded by the United Kingdom's Department for International Development (see page 5). He found that educating Bangladeshi farmers on how to choose and store seeds can increase yield by 10%.

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DR. MEW EXAMINES a rice leaf affected by bacterial leaf streak.

on viruses, Mike Bonman on fungi, and Paul Teng, an epidemiologist with a systems approach. The plant pathology unit has since evolved into an integrated team of researchers including Nollie Vera Cruz on host-plant resistance and Il-Ryong Choi on virology."

Ren Wang, IRRI deputy director general for research, comments that ever-tighter budgets in public research, shortened project timeframes and donor pressure for immediate, development-oriented results demand today a response from IRRI that emphasizes the high quality of its science. Dr. Mew's work has been particularly valuable in this light.

"He's conscious of nurturing the research quality — the science part — of the division," says Dr. Wang. "Under his supervision, the Entomology and Plant Pathology Division and the Seed Health Unit have grown particularly strong in this regard.

"He has contributed a lot in terms of using a systems approach to address rice pest and disease problems in the context of the whole production environment," the deputy director general adds. "And Dr. Mew describes this approach and the underpinning philosophy in his papers. That's very important."

IRRI PLANT PATHOLOGIST Hei Leung discusses rice pathology with Dr. Mew, who recruited him in 1986. Dr. Mew leads a Consortium for Unfavorable Rice Environments study tour (*below left*) in Yunnan Province, China, including C.R. Rajendran (*right*), director of the Agriculture, Environment and Natural Resources Division of the Asian Development Bank's Mekong Department. The black-and-white photo of Robert F. Chandler (*opposite*), IRRI founding director general and Dr. Mew's boss in Taiwan, is a reminder of his influence over Dr. Mew's career. The photo below Dr. Chandler's shows then-President Jacqueline Fletcher welcoming Dr. Mew in 2002 as a fellow of the American Phytopathological Society.

Dr. Wang explains that viewing a system as a whole, and not merely as a sum of its parts, pervades Dr. Mew's work, illustrating the point with his research on using biodiversity to manage rice disease (see sidebar opposite).

"There is a deep philosophy behind it," says the deputy director general. "Dr. Mew explores the mechanisms built into traditional agronomic practices such as intercropping and rotation and so on. And he explores the use of natural forces — using biodiversity to maintain biodiversity, to achieve harmony with nature. This is an innovation of great potential."

PETER FREDENBURG

Quest for harmony

Along with Dr. Mew's self-proclaimed optimism, a quest for harmony, arising at least partly from his interest in Buddhism, permeates his life in and out of science. Sometimes the quest has required a special effort. Following his first wife's death in 1987, Dr. Mew set up the Annabelle I-Pin Mew Foundation to assist poor but academically gifted Filipinos with their high-school studies. More than 50 students have benefited to date, most of them going on to university.

ARIEL JAVELLANA

A different stripe

IRRI

INTERPLANTING in Yunnan Province, China.

Some farmers in the southwestern Chinese province of Yunnan have traditionally planted different varieties of rice alongside each other to control pests and diseases. Techniques varied from place to place, and the mechanism at work was a mystery. The practice became less common with the arrival of modern, pest-resistant hybrid rice varieties.

In 1998, Tom Mew and his collaborators set out to learn how well biodiversity in rice controls disease, which techniques are most effective and how the process works. Cooperating farmers interplanted 812 ha with a modern hybrid resistant to the fungal disease rice blast and a traditional glutinous (sticky) rice variety that fetched a good price but was highly susceptible to the disease. In the traditional variety, blast incidence dropped to 5% from an average of 55% seen in monoculture. The following year, the interplanted area expanded to more than 3,000 ha, and farmers reported an average of US$281 more income per hectare compared to growing hybrids alone.

Not only do rows of hybrids block the transmission of the blast fungus between rows of glutinous rice, but the presence in the field of susceptible rice plants appears to lengthen the useful life of improved, resistant varieties. Susceptible plants provide refuge to pathogens, reducing selective pressure on them to overcome plant resistance. Farmers both achieve better plant protection with minimal fungicide use and preserve popular traditional varieties, once endangered outside of genebanks, as profitable field crops.

By 2002, more than 200,000 ha in 101 counties of Yunnan were sporting the distinctive pinstripes made by individual rows of tall traditional varieties between 5 or 6 rows of shorter hybrids. The *New York Times* described the project as "a stunning new result from what has become one of the largest agricultural experiments ever." The technique is now being applied in other countries and has helped quell outbreaks of tungro virus in the Philippine province of Iloilo.

After he hangs up his IRRI lab coat in August, Dr. Mew aims to stay active in research. With his second wife, Teresita, and their two daughters, he will stay in the Philippines. Perhaps he will indulge, at least for a while, his taste for reading Shakespeare and collecting fine Chinese tea services. His first project will be a comprehensive revision of *Rice Diseases*, the pathologists' bible originally written by the same Dr. Ou who advised him to get out of the lab and into the field.

Dr. Mew's 29 years of working on rice, the staple food of half of humanity, has allowed him to achieve more than he would likely have dreamed of as a young Ph.D. working on mung beans in Taiwan. And philosophy's apparent loss has turned out to be science's gain, becoming the *yin* that guided his personal and professional development in tandem with the *yang* of scientific training.

"To be a good scientist," he reminds us, "you need to be something of a dreamer."

AILEEN DEL ROSARIO-RONDILLA

Taking part

by Gary Atlin

Rice breeders for difficult environments are improving cultivar adoption rates by securing farmers' early participation in the selection process

Rice breeders who target rainfed areas struggle to emulate the success of breeders for irrigated conditions, who see their products rapidly adopted by farmers. This success stems from breeders' clear understanding of the needs and preferences of farmers who grow irrigated rice and their ability to reproduce the irrigated production environment on the research station.

A TRIBAL WOMAN in northern Laos votes her preference by piling Job's tears next to the name of a rice variety. This mode of preference analysis voting allows participants to express the strength of their opinions by piling up many seeds, few or none. A farmer (*opposite*) takes notes at the same field day near Luang Prabang, but most activities of participatory varietal selection do not require farmer literacy.

PETER FREDENBURG (2)

By comparison, developing improved rice varieties for nonirrigated areas has been slow and frustrating. Farmers who depend entirely on rainfall farm a bewildering array of environments, from the craggy mountains of northern Laos to the tidal flats of Bangladesh. They are often much poorer than those in irrigated areas because they produce only one rice crop per year and eke out yields that are lower on average than those of irrigated-rice farmers. They sell less of their output, depending heavily on their rice crop for basic household food security. Because their cash income is low, and they risk losing crops to drought and flood, farmers in rainfed areas minimize risk by applying much less fertilizer than do irrigated-rice growers.

The highly productive, fertilizer-responsive varieties bred for irrigated conditions cannot tolerate the flooding and drought that commonly afflict rainfed areas, which require varieties specifically adapted to them. Asian breeding programs have produced many such candidates, but only a few have been widely adopted by farmers — notably *Mahsuri* and *Swarna* in India and Bangladesh, and *TDK 1* in Laos — and then only in relatively favorable rainfed areas. In the driest uplands and the most

BRUCE LINQUIST (2)

FARMERS IN NORTHERN LAOS evaluate an upland, or dry field, rice variety in a participatory varietal selection trial and (*bottom*) taste candidate varieties before voting their preferences for eating quality.

flood-prone lowlands, farmers continue to grow traditional varieties.

Two reasons explain why rainfed rice farmers are slow to adopt improved varieties. One — a problem more of extension than breeding — is that many farmers simply cannot get seed of new varieties. Another reason is that the varieties may not perform well in the challenging rainfed environment or else lack a characteristic of unanticipated importance to farmers, such as palatability the day after cooking or ease of threshing. The complexities of developing acceptable cultivars for variable and stressful rainfed environments require that breeders become deeply familiar with farmers' needs and preferences.

To keep improved varieties from languishing on the shelf, breeders are adopting new methods that involve farmers in varietal development at an earlier stage than traditional methods have done, testing the performance of new lines under farmer management and soliciting farmer opinion about the full range of production and end-use characteristics. These methods comprise a suite of techniques called participatory varietal selection (PVS).

Conventional rice breeding programs usually seek farmer input only at the very end of the process, when newly released varieties, usually only one or two per year, are evaluated in on-farm demonstration trials.

The innovation of PVS is to involve farmers early in the selection process, to ensure that they like released varieties well enough to adopt them. What distinguishes PVS from simple on-farm testing is the emphasis on systematically collecting farmer opinions and preferences. This "innovation" is not really new. In the early 1990s, the International Rice Research Institute (IRRI) and its Cambodian partners annually conducted hundreds of on-farm variety trials in which farmers were asked to rate the varieties. But the incorporation over the past decade of PVS as a standard step in the breeding process has revitalized many Asian rice breeding programs.

IRRI and its collaborators have enjoyed substantial success with a set of simple techniques for institutionalizing farmer participation. At the beginning of a PVS program, focus group discussions reveal the varietal preferences and requirements of farmers, both men and women. Then farmer groups identify preferred varieties in a researcher-managed trial of a relatively large number of advanced breeding lines.

Preference analysis

In a balloting procedure known at IRRI as preference analysis, farmers vote for their preferred varieties by depositing a ballot in a box or envelope placed in front of each variety (men and women use ballots of different colors to reveal gender differences, if any, in varietal preference). The method is fast, simple and effective, even with illiterate farmers, because it does not require them to write. Nor does it require researchers to take notes or survey individual farmers. And participants enjoy it — Philippine farmers often call the process a "beauty contest."

After the vote, farmers and researchers discuss the most preferred and disliked varieties to determine what made them so. In the following season, researchers distribute the preferred varieties to farmers to evaluate on their own farms, under their own management. Usually, each participating farmer receives two or three test varieties. These "baby" trials (the "mother" being the earlier researcher-managed trial) are repeated many times. By minimizing their own involvement, researchers ensure that the trials are managed in the same way as the rest of the farmer's crop and — always an

H.N. SINGH

INSPECTING A RICE plant in Uttar Pradesh, India, are (*from left*) Abha Singh, a social scientist at Narendra Deva University of Agriculture and Technology (NDUAT); Thelma Paris, an IRRI social scientist; Sanjay Singh, a former plant breeder at NDUAT; and a farmer. Abha Singh and her husband, H.N. Singh (*bottom, right*), another NDUAT social scientist, have greatly facilitated participatory varietal selection in Siddharthnagar district, near the Nepali border.

important consideration in rainfed rice research — minimize the cost per trial.

Rather than harvesting and weighing crop samples, researchers often identify preferred lines by relying on farmer ratings of the varieties. In addition to questions about yield and quality, farmers are asked whether they plan to grow the variety next year or have given seed to friends or relatives. Eagerness to grow a variety again and neighbors' demand for it are strong indications that it is widely preferred.

In India, IRRI's collaborative breeding networks facilitate the adaptation of PVS for rainfed rice breeding. Since 1992, breeders in eastern India, for example, have worked with IRRI through the Eastern Indian Rainfed Lowland Shuttle Breeding Network to develop improved varieties for flood- and drought-prone areas. The network links small and isolated rainfed rice breeding programs and allows them to exchange promising breeding lines and evaluate them in a broad range of environments. It serves a vast area, encompassing eight states with 24 million ha of rainfed rice lands, and has been an excellent laboratory for integrating participatory methods into rainfed breeding programs.

V.N. Singh, a rice breeder at Narendra Deva University of Agriculture and Technology (NDUAT), located near Faizabad in eastern Uttar Pradesh, works with Abha and H.N. Singh, a husband and wife team of social scientists, as well as with Thelma Paris, an IRRI social scientist, to develop varieties for flood- and drought-prone rainfed areas. They have established a strong relationship with farmers in several villages in Siddharthnagar, a district near the border with Nepal. New lines from NDUAT and other centers in the breeding network are evaluated by farmers at central locations in each village. The following year, each interested farmer grows larger plots of one or two promising varieties.

Farmers have identified several varieties with better yield and submergence tolerance than the widely grown *Swarna*, and these are now undergoing advanced testing in state and national cultivar trials. Similar programs underway at most sites in the eastern Indian breeding network aim to ensure that varieties released by the formal breeding sector are both agronomically productive and valued by farmers.

The NDUAT program features strong collaboration between breeders and social scientists. Abha and H.N. Singh see to the inclusion of women and farmers from disadvantaged socioeconomic groups in the selection process, and they have taken the lead in monitoring farmer-to-farmer spread of introduced breeding lines to gauge farmer preference.

Training in methods

Unfortunately, not all rainfed breeding programs enjoy the services of social scientists, but experience at Faizabad and elsewhere has shown that, with training and experience, breeders and agronomists can themselves boost farmer participation in the selection process. Training in PVS methods — including survey methodology and the art of eliciting from farmers, not least women and marginalized groups, information uncontaminated by leading questions — is now part of the IRRI Training Center's advanced plant-breeding curriculum.

THELMA PARIS

TRAINING CENTER

AT A PARTICIPATORY varietal selection site in Tarlac, Philippines, for aerobic rice (an intensive, dryfield crop being developed for water-short areas), Gary Atlin (*left*), the author of this article, trains breeders from several countries in participatory techniques with the help of Army Lactaoen (*center*), the National Irrigation Administration researcher who coordinates the site.

Similarly, PVS is helping to heighten the impact of improved varieties of upland rice, which grows as a rainfed dryland crop like wheat. In an upland rice-growing area of Batangas, a few dozen kilometers from IRRI headquarters, and in the Arakan Valley of Mindanao, IRRI has been working directly with Philippine farmers to identify acceptable varieties and, not incidentally, to refine PVS methods.

A PVS program initiated in 2001 tested both improved, input-responsive modern upland varieties and purified seed of traditional Mindanao tropical japonica types valued for their quality. Farmers in Mindanao, who still grew or at least remembered the traditional varieties, rated the purified traditional varieties very highly. Farmers in Batangas, who no longer grow such varieties, strongly preferred fertilizer-responsive improved varieties with high yield potential. Thus, farmers in similar agroecological and socioeconomic environments can have markedly different varietal preferences. PVS can help breeders tailor varieties to local needs and preferences.

PVS is having an impact in even the most extreme rainfed environments. In the highlands of northern Laos, farmers grow upland rice on steep hillsides using shifting cultivation. However, population expansion has forced farmers to shorten the soil-regenerating fallow periods between rice crops, reducing soil fertility and intensifying weed pressure.

The long-term solution is to develop diversified cropping systems that include rice grown on permanent fields in scattered pockets of flatter, more fertile land. In the meantime, though, Lao farmers need varieties that can tolerate the infertile, drought-prone conditions they currently face. Because most Lao strongly prefer local types, notably high-quality glutinous (sticky) varieties rarely found outside of Laos and Thailand, the search for such varieties has focused on screening the large national germplasm collection for traditional varieties with particularly good agronomic performance under unfavorable conditions.

In the mid-1990s, Lao and IRRI researchers started screening upland rice in agronomic trials at the upland research station at Luang Prabang. They soon recognized that the material had to be quickly moved off the research station and into the hands of farmers for identifying useful varieties.

PVS trials began in 2001 under the leadership of Lao-IRRI agronomist Bruce Linquist and in collaboration with Lao extension workers from district agriculture and forestry offices. Each year saw 10 to 16 varieties, previously identified as high yielding in researcher-managed trials, tested on dozens of farms throughout northern Laos. Through balloting, farmers of different ethnic groups expressed strong preference for large-seeded varieties with big panicles (grain clusters). Researchers and extension workers also collected yield data from these multilocation trials, which identified the traditional upland variety *Nok* as a farmer favorite for its grain quality and performance in infertile fields.

Ongoing impact

PVS is having an ongoing impact on the working style of breeders and agronomists serving farmers in difficult rainfed environments all over Asia. Most breeders used to consider their work finished once high-yielding varieties were identified in multilocation trials and recommended to national release committees. Now there is widespread recognition that breeders and farmers need to work together through much of the selection process to ensure that the varieties released by national programs meet the needs of farmers in difficult environments.

To do this, breeders are increasingly moving off the research station and adopting methods that were previously viewed as the proprietary tools of social scientists. This sea change in the breeding process is generating impact in difficult rainfed environments. Progress will accelerate as researchers refine PVS methods and expose more breeders to them.

PETER FREDENBURG

BRUCE LINQUIST is the leader of Lao-IRRI's participatory varietal selection activities in northern Laos.

Dr. Atlin, a rainfed lowland rice breeder at IRRI, is chair of the working group for drought-prone lowlands of the Consortium for Unfavorable Rice Environments.

CHRIS STOWERS (5)

Photo contest highlights rice

The Food and Agriculture Organization (FAO) of the United Nations has announced a global photography contest on the International Year of Rice theme "rice is life." A panel of distinguished photojournalists and other photo professionals, as well as senior FAO International Year of Rice officials, will select a short list of contestants, whose work will be displayed along with the winning photos at www.rice2004.org by 20 September.

continued on page 34

Rice experts converge on 'a rare opportunity'

In the world of international agricultural research last February, all roads led to Rome

The Food and Agriculture Organization (FAO) of the United Nations held on 12-13 February its flagship event for International Year of Rice, the conference Rice in Global Markets and Sustainable Production Systems. The event brought to Rome leading rice experts from around the world.

The conference coincided with the opening of an exhibit occupying, until the end of February 2004, the entire atrium of the FAO headquarters

DUNCAN MACINTOSH

IRRI DIRECTOR GENERAL Ronald Cantrell (*left*) and Robert Havener, his interim predecessor in 1998, take in American rice at the FAO atrium exhibition in Rome.

in the Italian capital. Each of five regional zones in the exhibit — Europe and North America, Latin America, Asia and the Pacific, sub-Saharan Africa, and the Near East and North Africa — explored the rice-related issues of food security, nutrition, agro-biodiversity, environment, livelihood, science and culture.

Calling the International Year of Rice "a rare opportunity for the global community to work together towards fulfilling the Millennium Development Goals and the objectives of the World Food Summit," Louise Fresco, assistant director general of the FAO Agriculture Department, said that success depends upon global collaboration and international ownership. "This is an action campaign," she added, "a chance for us to make good on our promise to the billions of people for whom rice is life."

The first day of the conference focused on rice in global markets. Among the issues addressed were the state of the international rice market, the likely impact of multilateral trade negotiations, and expanding markets for value-added rice products.

Mahabub Hossain, head of the Social Sciences Division of the International Rice Research Institute (IRRI), got the ball rolling with an overview of long-term prospects for the global rice economy. He predicted that growth in demand for rice will slow substantially, particularly in middle- and high-income countries in Asia and Latin America, as population control takes hold and prosperity brings more varied diets. Demand for rice will increase by 1.1% per year in the next 3 decades, he said, or less than half of the 2.4% annual increase in rice consumption in the last 3 decades.


FABIO ACONI

DUNCAN MACINTOSH

"Even if the demand grows at a slower rate," Dr. Hossain cautioned, "global rice production must reach 800 million tons of unhusked rice by 2030 to match demand — an increase of 200 million tons over the peak production level reached in recent years."

Constraining production growth is the worsening scarcity of land, labor and water for rice. Dr. Hossain saw little scope for expanding irrigated area but vast long-term potential for increasing yield in rainfed areas. "One bright spot," he said, was the new rice for Africa (NERICA) developed by the West Africa Rice Development Association – The Africa Rice Center. He noted, however, that NERICA varieties target only 4 million out of 150 million ha of global rice land.

"The impact of [NERICA] on global rice production will not be significant," he predicted. "It will have a substantial effect on rice production for individual countries in West Africa [...] but is unlikely to offset the increase in demand" in sub-Saharan Africa.

David Dawe, IRRI economist and former food-policy adviser to the Indonesian government, examined the changing structure, conduct and performance of the world rice market, starting with today's historically low prices.

"Because the poorest Asians are landless rural dwellers who must purchase their daily rice, low food prices are important for poverty alleviation in Asia," Dr. Dawe explained, adding that other rice-deficit farm households and the urban poor also benefit.

Increased competition

"Not only are world rice prices much lower than in years past, they are also much more stable," he reported, crediting improved stability of per capita production, a pronounced deepening of the world market, and the renewed commercial orientation of several major exporters. "In terms of tonnage traded, world trade in milled rice increased from an average of 13.5 million tons in 1984-93 to an average of 23.9 million tons in 1994-2003, a near doubling of the market."

Citing his coauthor, Tom Slayton of Slayton & Associates in the United States, Dr. Dawe noted the diminishing roles of governments and large trading companies in the international rice trade. "Today, there are more small trading companies," he observed, "which has increased competition and eroded trading margins."

Despite progress toward liberalizing the international rice trade, serious distortions remain. "Japan, Korea and Taiwan (China) have all increased their level of

imports as part of the World Trade Organization negotiations, but protection in these countries is still extraordinarily high as the government effectively controls the quantity of imports through very high tariffs or quotas," Dr. Dawe reported.

Dr. Dawe was speaking to an audience of more than 300 delegates representing all of the major rice-producing and -consuming countries in the world — mostly from Asia, but also from Africa, North and South America, Australia, and Europe. The conference was one of the first times that most principal members of the international rice industry have gathered to consider issues of crucial importance such as trade and protectionist policies, the looming water crisis, and the poverty that afflicts most rice farmers.

Delegates focused on the need for the International Year of Rice to achieve tangible results in terms of improving farmers' livelihood and ensuring that growing rice becomes more environmentally and economically sustainable. They highlighted the impact of unfair tariffs and taxes, and several delegates called on governments to recognize the difficulties facing poor rice farmers.

More than 100 invited guests joined delegates on the first evening of the conference for a gala reception in the FAO atrium, where the exhibition on rice was on display. The reception buffet, provided by representatives of the Thai and Italian rice industries, presented an array of exotic rice dishes for delegates and guests, who treated the informal event as an opportunity to debate many of the issues raised in the day's presentations.

The focus of the conference on the second day moved to the challenges and opportunities posed by sustainable rice-based production systems. Gurdev Khush, former principal rice breeder and head of IRRI's Plant Breeding, Genetics and Biochemistry Division, presented a keynote address on harnessing science and technology for sustainable rice-based production systems.

"In spite of all the achievements of the Green Revolution, serious food problems exist in the world," said the world's most celebrated rice breeder. "Chronic hunger takes the lives of 2,400 people every day. Currently there are more than 800 million undernourished people in the developing world."

New plant type

Dr. Khush outlined the breeding strategies available for boosting the yield potential of rice. After addressing conventional hybridization and selection procedures, he described the ideotype breeding strategy with which he designed the new plant type (NPT) for low tillering, no unproductive tillers, 200-250 grains per panicle, dark green leaves that are thick and erect, and a vigorous and deep root system. "Three NPT lines have been released in China and one in Indonesia," he reported, adding that other national partners are evaluating and further improving NPT lines.

Turning to heterosis breeding, Dr. Khush reported: "Rice hybrids with a yield advantage of about 10-15% over the best inbred varieties were introduced in China in the mid-1970s and are now planted on about 45% of the rice land in that country. [...] Increased adoption of hybrids in the tropics should contribute to increased productivity."

Dr. Khush lauded the emerging area of wide hybridization, or wedding crop cultivars with wild rice species (see *Rice Today* 3:1, pp 14-19). "Wild species of rice are a rich source of genes for resistance breeding," he said, adding that diseases and insects damage annual yields by as much as 25%. In the realm of genetic engineering, he predicted that altering the photosynthesis pathway of rice from C_3 to the more efficient C_4 type, by introducing cloned genes from the C_4 crop maize, could boost the yield potential of rice by 30-35%.

Looking beyond rice, Prabhu Pingali, director of FAO's Agricultural and Development Economics Division, considered the opportunities and constraints affecting agricultural diversification.

DUNCAN MACINTOSH

CONFERENCE VOLUNTEERS Fabio Aconi and Debbie Townes smile over a poster. At a working group meeting (*opposite top, from left*) are Robert Gouantoueu Guei, head of genetic resources at the West Africa Rice Development Association; Eric Kueneman, head of FAO's Crop and Grassland Service; Mahmoud Solh, head of FAO's Plant Production and Protection Division; and Dat Van Tran, executive secretary of the International Rice Commission at FAO. Mahabub Hossain (*opposite bottom, second from right*), head of IRRI's Social Sciences Division, converses with Malaysian delegates.

> "The United Nations creates international years to encourage governmental and nongovernmental attention to important issues, rather than just urgent ones."
>
> — Posted on www.onlineopinion.com.au by Keith Suter, a consultant to the Wesley Mission, Sydney, Australia

"The rice sector in Asia is facing the dual challenge of sustaining high rates of rice productivity growth while at the same time transforming itself from a subsistence-oriented monoculture system to a diversified, market-oriented system," observed the former IRRI economist and later director of the Economics Program at the International Maize and Wheat Improvement Center.

Dr. Pingali cited risk aversion as a significant impediment to diversification, adding that "the diversification 'start-up' phenomenon, of high prices for several seasons leading to oversupply and a consequent collapse of prices, is all too common." Other disincentives to farmers' investment in diversification include insecure land rights, rigid design and inflexible water delivery in existing irrigation systems, and high labor requirements for cash crops.

DUNCAN MACINTOSH

RUNGTHIP THONGMALAI from Thailand talks rice with her son Apichart at the exhibit in Rome.

A recent FAO/World Bank study on farming systems and poverty nevertheless suggested that "diversification is the single most important source of poverty reduction for small farmers in South and Southeast Asia," he said.

"The paradigm of staple food self-sufficiency that has been the cornerstone of agricultural policy in most developing countries is becoming more and more obsolete with economic growth," Dr. Pingali averred. "The relevant development paradigm for the 21st century is one of food self-reliance, where countries import a part of their food requirements in exchange for diverting resources out of subsistence production. Future emphasis of agricultural policy ought to be on maximizing farm household incomes rather than generating food surpluses."

Other issues considered in the course of the second day included biodiversity in rice-based production systems, water use, biotechnology, upland rice environments, rice-fish systems and hybrid rice. IRRI Director General Ronald Cantrell made the first of five presentations on regional perspectives on rice production and poverty alleviation. He naturally focused on Asia, where 56% of humanity — including 70% of the world's 1.3 billion poor people — grows and consumes 92% of the world's rice.

Dr. Cantrell outlined IRRI's two-pronged strategy of "increasing productivity in favorable environments while developing rice technologies that have minimal adverse effects on the resource base of fragile environments" to meet the goals of ensuring food security and alleviating poverty while protecting the environment. He touched on the range of research areas by which IRRI pursues these goals, including natural resource management, integrated pest management, agricultural engineering and postharvest technologies, and social and policy studies. His main focus, however, was on the institute's traditional core areas of plant breeding and germplasm conservation and use.

Rice genomics

"The sequencing of the rice genome, and then discovering the functions of individual genes and combining them to accelerate crop improvement, is revolutionizing rice science," he said. "IRRI's roles as a producer of knowledge and a catalyst in technology development and transfer among various public institutions — and increasingly between the public and private sectors — are important as never before to assure strength in both sectors and that a balance is maintained."

IRRI catalyzed the formation of the International Rice Functional Genomics Consortium, he explained, to engage developed and developing nations alike in the functional characterization of all agronomically important genes in rice. "Active participation by developing countries will ensure access to the new science in the future," he said. "IRRI can serve as the unbiased broker between rice-improvement institutions in the developing world and advanced research institutes."

IRRI, Dr. Cantrell concluded, is uniquely placed to fill this role as the institute strives to bring to the poor the benefits of new technologies.

International Year of Rice contacts outside Asia

Ricegrowers Association of **Australia** (www.rga.org.au). **Brazil**ian Agricultural Research Corporation (Embrapa), Dr. Beatriz da Silveira Pinheiro (beatriz@cnpaf.embrapa.br). Ivan Angulo Chacon, FAO **Costa Rica** (iangulo@faocr.org). **Côte d'Ivoire**, Maurice Ossieny, administrateur de M12 (Minitère Ministère) (ministerem12@yahoo.fr) and Dr. L. Akintayo of WARDA (l.akintayo@cgiar.org). Eduardo Martinez Oliva, Asociacion **Cuba**na de Tecnicos Agricolas y Forestales (rdelgado@actaf.co.cu) and Ana Maria Navarro, FAO Cuba (anamaria.navarro@fao.cu). Dr. Badawi A. Tantawi, **Egypt** National IYR Committee (Badawi_a_tantawi@mail.claes.sci.eg). **Italy**, Giacomo de Ghislanzoni Cardoli, president, Agriculture Commission of the Chamber of Deputies (deghislanzoni_g@camera.it). Martin Smith, FAO **Madagascar** (fao-mdg@iris.mg). **Uruguay**, Robert Frugoni, general manager, Asociacion de Cultivadores de Arroz (aca@chasque.apc.org).

Ringing in International Year of Rice

The Secretariat of the Association of Southeast Asian Nations (ASEAN) officially launched its celebration of International Year of Rice on 13 January in Jakarta, **Indonesia**. Joko Budianto, then-director general of the Indonesian Agency for Agricultural Research and Development, delivered a keynote address on behalf of Minister of Agriculture Bungaran Saragih.

"Rice cannot be separated from the livelihoods of most Indonesians," he said, adding that more than half earn their livelihood in rice fields. "And the rich cultural heritage of different ethnic groups in this country is based on rice."

About 100 participants at the event represented ASEAN members Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam; the "plus three" states Japan, China and South Korea; the Food and Agriculture Organization (FAO) of the United Nations; IRRI; and local schools. Sjarifudin Baharsjah, chairman of the Indonesia Rice Foundation; William Padolina, IRRI deputy director general for partnerships; and Tsukasa Kimoto, FAO representative in Indonesia, were among those who spoke on the significance of rice in ASEAN. A rice exhibit included displays from IRRI and the Asia Rice Foundation, Indonesia Rice Foundation, FAO, Web-based trading hub Agritani, World Food Program and Indonesian Ministry of Agriculture.

"We take rice for granted all the time," said ASEAN Secretary General Ong Keng Yong, who pointed out that the ASEAN logo contains 10 rice stalks representing member states. "But, when we are hungry, we realize how important this simple thing is."

More than 2 billion Asians obtain 60% of their calories from rice and its derived products, according to FAO. In most Asian countries, the average person consumes 150-200 kg of rice per year. While the number of chronically undernourished people in ASEAN fell rapidly between 1971 and 2002, some 66 million people, or 13% of the region's population, still go to bed hungry every night.

Although the share of agriculture in the GDP of ASEAN nations has been steadily declining to around 11.5%, the proportion of the economically active population in ASEAN dependent on agriculture is still over 50%," said He Changchui, FAO's assistant deputy director-general and regional representative for Asia and the Pacific. "They must meet the spiraling needs of over 3 billion Asian people within less than a third of the world's arable land."

ASEAN SECRETARIAT

HUSKING RICE at the ASEAN celebration of International Year of Rice in Jakarta are (*from left*) Ong Keng Yong, a farmer, He Changchui and Joko Budianto.

Brainstorming session

In **India**, the Directorate of Rice Research (DRR) launched the International Year of Rice on 1 January with a traditional Hindu worship service led by Project Director B. Mishra, the chanting of hymns from holy scriptures, and the planting of a sapling. The afternoon was devoted to a brainstorming session on the theme of Rice Research for the Future.

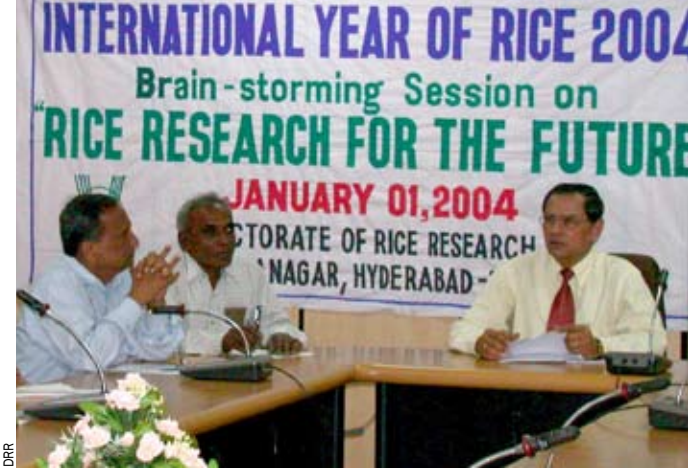
The Hyderabad-based DRR, the Indian Council of Agricultural Research (ICAR), and the Central Rice Research Institute (CRRI) in Cuttack have proposed several activities to mark the year, pending approval by Mangala Rai, secretary of the Department of Agricultural Research and Education and ICAR director general, who also serves as chief patron of the International Year of Rice organizing committee.

Scheduled for March was a group meeting on boro rice in Tripura focused on developing high-yielding, high-quality rice suited for the boro season.

April promises to be a busy month, beginning with an open day at DRR on 2 April, which is DRR Foundation Day, for displaying rice-production and crop-protection technologies to the public. Annual rice group meetings in New Delhi on 11-14 April will focus on the progress made and challenges to be met through the All India Coordinated Research Program on Rice. Finally, the 8th National Rice Biotechnology Network meeting in New Delhi on 15-17 April is expected to attract 100 participants engaged in basic and applied rice biotechnology research.

A 1-day national symposium on Strategies for Enhancing Sustainable Rice Exports, in Hyderabad in June, will attract 30 stakeholders in rice exports.

On 2-4 October, an international



DRR

AT THE DIRECTORATE of Rice Research brainstorming session are (*from left*) S.V. Subbaiah, head of agronomy; C. Kesava Reddy, principal scientist in plant physiology; and B. Mishra, project director.

symposium on Rice: From Green Revolution to Gene Revolution will take place in Hyderabad with 200 participants expected, including 20 foreign delegates. Two special awards will be announced at the symposium. There are plans to release a commemorative postage stamp on World Food Day on 16 October.

Thirty participants will take part in a 1-day national seminar in November on Drudgery Reduction for Women in Rice Farming organized by the National Research Center on Women in Agriculture in Bhubaneswar.

Meanwhile, state departments of agriculture and agricultural universities are being encouraged to organize farmers days and other celebrations at the state and regional level to generate awareness and transfer available technologies to rice farmers. On 4 February, the Rice Research Station at Chinsurah marked both the International Year of Rice and its 50th anniversary with West Bengal Chief Minister Buddhadeb Bhattacharjee and state Agriculture Minister Kamal Guha in attendance. Ten days later, the All India Young Farmers Association held a function in Haryana for 5,000 farmers marking International Year of Rice. R.K. Singh, IRRI liaison scientist, was the keynote speaker, and the guest of honor was the Japanese agricultural attaché.

ICAR plans to produce several special publications, including a comprehensive, multi-authored treatise on *Rice Research and Development in India — Past and Future* and another on rice biotechnology. In addition, DRR and CRRI will publish about 15 special bulletins and technical and research-paper series.

China, the world's largest rice producer and consumer, is planning an exhibition on Chinese Rice Culture and Achievements in Rice Science and Technology during the Asia and Pacific Regional Conference of the FAO in Beijing on 17-21 May. Fact sheets on rice science in China will spread the message, as will International Year of Rice newspaper articles, television programs, and links on the homepages of the Chinese Academy of Agricultural Sciences (CAAS) in Beijing and China National Rice Research Institute (CNRRI) in Hangzhou. Middle-school student visits to CNRRI are also planned.

Origin of rice

A national Rice Production and Food Security workshop is slated for April in Hainan Province. An international symposium on Science and Technology in Agriculture: Current and Future will be organized by CAAS and the World Food Prize Foundation, to take place on 10-12 July in Beijing. The Chinese capital will also be the venue in September of an international workshop on The Origin of Rice and Its Variety Development. CNRRI will organize an international symposium on Sustainable Rice Production and World Food Day on 15-18 October in Hangzhou. Finally, rice scientists will return to Beijing in November for an international symposium on Heterosis Application and Rice Quality.

On 10 January, CAAS set up a working group for International Year of Rice chaired by President Zhai Huqu, with Vice President Qu Dongyu (dyqu@mail.caas.net.cn) serving as vice chairman, and Department of International Cooperation Director General Liang Qu as secretary general (Chinese Academy of Agricultural Sciences, No. 12 Zhongguancun Nandajie, Beijing 100081, China. Tel [86-10] 68919476 [International Cooperation Department]; fax [86-10] 62174060; 68975184). Membership includes CNRRI Director General Cheng Shihua, Institute of Crop Sciences Director General Wan Jianmin, and Kaijun Zhao, IRRI liaison scientist for China (zhaokj@mail.caas.net.cn or k.zhao@cgiar.org).

In the **Philippines**, IRRI commenced its celebration of International Year of Rice with a concert on 19 January that featured two of the country's most distinguished international concert pianists, Ingrid Sala Santamaria and Reynaldo G. Reyes. The program included concerto excerpts from Tchaikovsky, Grieg and Liszt.

This was the first of at least five major musical events planned to mark the year in the Philippines, including a Rock for Rice concert in July led by IRRI, MTV Asia and FAO, and a Department of Tourism concert for the World Heritage-listed rice terraces of Banaue in October. Also connected with rice culture are rice-paper-making activities organized for April and May by the National Commission for Culture and the Arts and a year-long rice exhibit occupying an entire floor of the National Museum in Manila.

There will be several week-long

AL BENAVENTE

AFTER PERFORMING AT IRRI, pianists (*from left*) Ingrid Sala Santamaria and Reynaldo G. Reyes pose with William Padolina, IRRI deputy director general for partnerships, and his wife, Cristina.

Rice conference in Japan set for November

The World Rice Research Conference, organized by the Japanese Ministry of Agriculture, Forestry and Fisheries, will be the world's leading scientific celebration of the International Year of Rice. Including the 25th International Rice Research Conference, the event will bring together the world's leading rice scientists to exchange information on the latest research of potential benefit to the world's 200 million rice farmers and the billions of consumers who depend on them for their daily rice.

The opening symposium and keynote speeches on 4 November in Tokyo will raise the main themes of the conference. They are 1) innovative technologies for boosting rice production, 2) perspectives on the place of rice in healthy lifestyles, 3) adaptable rice-based systems that improve farmers' livelihood, and 4) the role of rice in environmentally sustainable food security. English/Japanese simultaneous dual translation will be available on the opening day. Scientific symposia in nearby Tsukuba on 5-7 November will take place in English.

DUNCAN MACINTOSH

LAUNCHING INTERNATIONAL YEAR of Rice in Japan, Ren Wang (*center*), IRRI deputy director general for research, was one of three special speakers on the first day of a 21-23 January workshop in Tokyo titled "Sustainable use of agricultural resources and environment management with focus on the role of rice farming." The others were Keiji Kainuma (*left*), member of the Science Council of the Consultative Group on International Agricultural Research, and Dat Van Tran (*right*), executive secretary of the International Rice Commission at FAO.

Japanese parties co-organizing the conference along with IRRI, and under ministry leadership, are the Japan International Research Center for Agricultural Sciences (JIRCAS), National Agriculture and Bio-oriented Research Organization, National Institute of Agrobiological Sciences, National Institute for Agro-Environmental Sciences, National Institute for Rural Engineering, National Food Research Institute, and the ministry's Policy Research Institute.

Registration and further information are available at www.irri.org/wrrc2004. The deadline for submitting abstracts for oral or poster presentations is 1 March. Contacts are:

- Dr. K. Toriyama, JIRCAS (toriyama@affrc.go.jp), 1-1 Ohwashi, Tsukuba, Ibaraki, 305-8686, Japan. Tel (+81-29) 838-6345, fax (+81-29) 838-6342.
- Dr. K.L. Heong, IRRI (k.heong@cgiar.org), International Rice Research Institute, DAPO Box 7777, Manila, Philippines. Tel (+63-2) 580-5600 (ext. 2726), fax (+63-2) 580-5699.

events, including Rice Research and Development Week led by the Philippine Rice Research Institute and the Bureau of Agricultural Research on 5-9 April; Rice and Environment Week in June organized by the Department of Environment and Natural Resources; National Science and Technology Week in July under the Department of Science and Technology and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development; Agriculture and Fisheries Research and Development Week in October led by the Department of Agriculture and the Bureau of Agricultural Research; and UN Week on 18-24 October organized by the United Nations Information Center with the Department of Education and the Commission on Higher Education.

The commission will also organize a conference on rice farming and biodiversity on 25-26 June.

In addition to the Department of Agriculture's World Food Day events, October will see a rice fair organized by Agrilink and the Foundation for Resource Linkage and Development, and an organic rice festival led by the Asian NGO Coalition for Agrarian Reform and Rural Development.

In **Myanmar**, the Ministry of Agriculture and Irrigation and the Myanma Agriculture Service are heading up the national committee for the year and planning exhibitions at the Myanma Rice Research Center in Hmawbi and the Agricultural Museum in Yangon. Plans were to start one exhibition on 2 March, which is Myanmar Peasants' Day. For more information, contact IRRI Administrative Coordinator Daw Ohnmar Tun (irri.mya@mptmail.net.mm) or the national coordinator, Dr. Tin Hla, at IRRI Representative Office, P.O. Box 1369, Yangon, Myanmar. Tel (95-1) 663590; fax (95-1) 642341.

Laos is planning several rice field days for national VIPs including members of Parliament, ministers and provincial governors, as well as for donors who missed a similar series last October. The 10th ASEAN Summit, with "plus three" countries Japan, China and South Korea, will take place in Vientiane in November. The Ministry of Agriculture and Forestry is planning to organize field days and other events for ASEAN delegates and other specially invited guests including international donors and IRRI representatives.

continued from page 27

Entry is free and open to the nationals of all FAO member countries. Professional and amateur photographers will compete in separate categories. Plans not yet confirmed call for FAO Director General Jacques Diouf to present awards to the best three in each category at a World Food Day special event in Rome on 16 October.

Participants may submit only one photograph, which should be recent and clearly tied to the "rice is life" theme. Entries should demonstrate creativity and technical skill in conveying the role of rice in food security, cultural heritage, indigenous knowledge, sustainable rice production, biodiversity, environment, scientific advancement, labor and/or livelihood.

Entries may be color or black-and-white but not multiple exposures or composites. Images should not be manipulated or altered except by such darkroom (or equivalent digital) techniques as brightness, contrast and color adjustments, dodging and burning. Submitted prints should measure between 20x25 cm (8x10 inches) and 30x40 cm (12x16 inches).

For more details on required submission specifications, see www.fao.org/rice2004/en/ph-001.htm.

Each photograph must be accompanied by a completed and signed entry form available at the Web site above. Participants in the professional category must include a bibliographical description and/or curriculum vitae. FAO assumes all intellectual property rights, including copyright, on submissions and will ensure due recognition to the photographer. Submitted materials will not be returned.

Entries should be forwarded by registered mail or prepaid courier (write "no commercial value" on the package) — *not by email*. Address entries to International Year of Rice Secretariat, IYR Global Photography Contest "Rice Is Life," Room C-789, FAO, Viale delle Terme Caracalla, 0100 Rome, Italy. The deadline for arrival at the secretariat is 15 June.

CONFERENCES, MEETINGS AND WORKSHOPS

Event	Contact	Date/Location
Nutrient Management in Agricultural Watersheds — A Wetland Solution	http://conference.ifas.ufl.edu/nutrient/index.html#meeting%20site	24-26 May / Teagasc Research Center, Ireland
Int'l Water Demand Management Conference	hdahlan@go.com.jo, www.wdm2004.org	30 May-3 Jun / Amman, Jordan
IFDC 2004: Indigenous Resource Development for the Fertilizer Sector	hrd@ifdc.org, hrdu@ifdc.org, www.ifdc.org	31 May-4 Jun / Dakar, Senegal
The 7th International Conference on Philippine studies: The Philippines: Changing Landscapes and Mindscapes in a Globalizing World	iias@let.leidenuniv.nl, www.iias.nl/iias/agenda/icophil	16-19 Jun / Leiden-Amsterdam, Netherlands
BIO 2004 International Biotechnology Convention and Exhibition	www.bio.org	6-9 Jun / San Francisco, USA
5th International Postharvest Symposium	postharvest2004@unimi.it, www.soihs.it/postharvest2004	6-11 Jun / Verona, Italy
Agricultural Biotechnology: Finding Common International Goals	NABC@cornell.edu	13-15 Jun / Guelph, Canada
5th European Pesticide Residue Workshop	eprw2004@slv.se, www.slv.se/eprw2004	13-16 Jun / Stockholm, Sweden
International Symposium: Food and Feed Safety in the Context of Prion Diseases"	dardenne@cra.wallonie.be, http://stratfeed.cra.wallonie.be16-18	Jun / Namur, Belgium
121st ASTA Annual Convention	www.amseed.com/eventDetailLarge.asp?id=24	27-30 Jun / Philadelphia, USA
7th International Symposium on Inorganic Nitrogen Assimilation in Plants	www.enaag.org	23-27 Jun / Wageningen, Netherlands
World Water & Environmental Resources Congress 2004	conferences@asce.org, www.asce.org/conferences/ewri200427	Jun-1 Jul / Salt Lake City, Utah
COL's 3rd (Biennial) Pan-Commonwealth Forum on Open Learning	pam.wyse@aut.ac.nz, www.col.org/pcf3 4-8	Jul / Dunedin, New Zealand
13th International Soil Conservation Organization Conference	isco2004@icms.com.au, www.icms.com.au/isco2004	4-9 Jul / Brisbane, Australia
Agricultural Biotechnology: International Trade and Domestic Production	icabr@economia.uniroma2.it, www.economia.uniroma2.it/conferenze/icabr2004/Achieva%20Brochre%203(blue)-03.pdf	8-11 Jul / Ravello, Italy
Groundwater Quality 2004: 4th International Conference	GQ2004@sciborg.uwaterloo.ca, www.science.uwaterloo.ca/earth/conference2004/gwrc/index.htm	19-22 Jul / Waterloo, Canada
American Phytopathological Society Annual Meeting; 4th International Weed Science Congress	aps@scisoc.org, www.scisoc.org	24-28 Jul / Spokane, USA
Soil and Water Conservation Society Annual Conference	www.swcs.org	24-28 Jul / St. Paul, USA
7th International Conference on Precision Agriculture	www.precision.agri.umn.edu/Conference	25-28 Jul / Minneapolis, USA
31st Annual Meeting of the Plant Growth Regulation Society of America	www.griffin.peachnet.edu/pgrsa/events.html	31 Jul-4 Aug / Charleston, USA
American Society of Agricultural Engineers Annual International Meeting	www.asae.org/meetings/index.html	1-4 Aug / Ottawa, Canada

2004 IRRI GROUP TRAINING COURSES (TENTATIVE LISTING)

Course	Duration (wk)	Target date	Coordinator(s)/ course facilitator
Basic Experimental Designs and Data Analysis using IRRISTAT for Windows	1	3-7 May	G McLaren/V Bartolome/ S Magadia
Scientific Writing and Presentation, IRRI HQ	2	17-28 May	D Shires/A Arboleda
Introduction to the SAS System, IRRI HQ	1	21-25 Jun	G McLaren/V Bartolome/ S Magadia
*Intensive English 1, IRRI HQ	12	5 Jul-10 Sep	A Arboleda/D Gavino
Genetic Engineering, Food Safety & Awareness	1	Sep	S Datta/D Gavino
Rice Production II	2	6-17 Sep	V Bala/E Castro
Water Management	1	Oct	B Bouman
Leadership Course for Asian Women in Ag R & D	2	8-19 Nov	T Paris/G Zarsadias
Analysis of Unbalanced Data	1	15-19 Nov	G McLaren/V Bartolome/ S Magadia
*Intensive English 2, IRRI HQ	3	15 Nov-3 Dec	A Arboleda/D Gavino
Grain Quality Management	1	TBA	J Rickman/D Gavino
IN-COUNTRY COURSES			
Grain Quality Management, Cambodia	1	TBA	J Rickman
Grain Quality Management, Bangladesh	1	TBA	J Rickman
Water Management, Myanmar	1	TBA	J Rickman
Tractor Training, India	1	TBA	J Rickman
Integrated Pest Management, Malaysia	2	TBA	KL Heong
Integrated Pest Management, Vietnam	2	TBA	KL Heong
Integrated Pest Management, Thailand	2	TBA	KL Heong
Integrated Pest Management, Iran	2	TBA	KL Heong
Rice Technology Transfer Systems in Asia (RDA)	2	TBA	J Lapitan/G Zarsadias

*TBA = to be arranged. * = after 5 pm classes only. For details, email IRRI-Training@cgiar.org.*


ARIEL JAVELLANA

Last farewell for first institute Board of Trustees

Paul Ma, the last surviving member of IRRI's founding Board of Trustees, passed away in Kunming, China, on 29 January. He was 97. Pao-chi Ma, to use his Chinese name, served on the IRRI board in 1960-62 and last visited the institute during its 40th anniversary celebration in 2000.

From 1999 until his death, Dr. Ma taught as a volunteer a course on the functions and achievements of the Consultative Group on International Agricultural Research and its member centers, including IRRI, to graduate students in the College of Agriculture of Guangxi University in Nanning, China.

"I wish to broaden the knowledge of our agricultural students," he said in an email to IRRI on 15 January requesting teaching materials. "I very much enjoy the challenge."

Dr. Ma was dean of the College of Agriculture at National Taiwan University in 1954-61. He left to become manager of a 5-year project under the Food and Agriculture Organization of the United Nations that led to the founding of the College of Agriculture at the University of Liberia.

IRRI's first director general (1960-71), Robert F. Chandler, Jr., described Dr. Ma as "one of the ablest men in higher education in agriculture in Asia."

Dr. Ma is remembered at IRRI for his proposal to conduct cooperative research projects in Taiwan (China) and other countries in the Far East. This underlined the need for localized basic research on rice diseases and how interbreeding cultivars with wild rice species might improve resistance and instill other desirable agronomic traits. He also urged research on how cultivars, insects and weather interact under different cropping systems. The proposals appeared in *A bird's-eye view of rice improvement in Taiwan and suggestions for further rice research*, which Dr. Ma co-authored with Te-Tzu Chang and submitted to the IRRI board in April 1960.

A memorial service was scheduled for 6 March at Oak Hill Memorial Park in San Jose, California. Dr. Ma is survived by Pauline Ma-Senturia, James Ma, Rose-Marie Twu, Yo-ling Ma and Paul Ma.

- **Robert E. Huke**, former visiting scientist at IRRI over a span of 25 years and author of a number of IRRI publications, died on 17 January in New Hampshire. He was 78. Dr. Huke obtained his Ph.D. from Syracuse University in 1953 and taught in the geography department at Dartmouth for 43 years, where he focused on food and population problems, particularly in Asia, beginning with doctoral research in Myanmar. He was married to Eleanor H. Huke and had three daughters and six grandchildren.
- **Klaas Tamminga**, senior expert with the Cultural Cooperation, Education and Research Department of The Netherlands Ministry of Foreign Affairs, and a key link between the ministry and the CGIAR, died in early February of cancer. He is survived by his wife, Titia, and two children.

Keeping up with IRRI staff

Sant Virmani, deputy head of IRRI's Plant Breeding, Genetics and Biochemistry Division, has donated ₱110,000 (US$2,000) to the Crop Science Society of the Philippines (CSSP) to sustain an annual award to Filipino scientists or experts who have contributed significantly to developing and disseminating hybrid crop technology.

The Dr. S. S. Virmani Award for Development and Dissemination of Hybrid Crop Varieties in the Philippines will be presented every 2 years to a Filipino researcher, seed production expert or extensionist who has excelled in this field. The winner will receive a plaque of recognition and ₱10,000 cash.

The inaugural prize was to be awarded this year at the CSSP's 35th annual scientific conference on 8-12 March in Davao City.

"I have worked at IRRI from 1970 to 1972 and again from 1979 to the present to develop and disseminate hybrid-rice technology, primarily for the tropics," said Dr. Virmani. "Many Filipino colleagues at IRRI and outside of the institute have helped me in successfully accomplishing this goal.

"I will retire from IRRI in 2005," he added. "Before I do so, I have decided to make a token contribution to the community of crop scientists in the Philippines by instituting the award. I am thankful to the CSSP, in which I have a life membership, for accepting the responsibility to administer the award."

The CSSP, founded in 1970, promotes human welfare through the organization and dissemination of knowledge concerning the nature, use, improvement and interrelationships of plants and their environment.

Yolanda Chen joined IRRI's Entomology and Plant Pathology Division on 12 January as an entomologist and host-plant-resistance specialist. Dr. Chen will develop rice varieties with enhanced insect resistance and design and evaluate strategies for their sustainable deployment.

Karl Goeppert, IRRI representative in Laos for the past 3 years, will relocate to Baltimore, Maryland, at the end of May to assume responsibility for Christian Relief Services' agricultural programs worldwide.

R.K. Singh, rice geneticist, planned to retire in March after 9 years as IRRI liaison scientist in India.

Foad Moradi, Iranian Ph.D. scholar at IRRI in 1999-2002, received the University of the Philippines Los Baños Gamma Sigma Delta Award in December for his outstanding achievements and service to agricultural science. Dr. Moradi, a crop physiologist, is a member of the scientific board and head of plant physiology at the Biochemistry and Proteomics Laboratory of the Agricultural Biotechnology Research Institute of Iran.

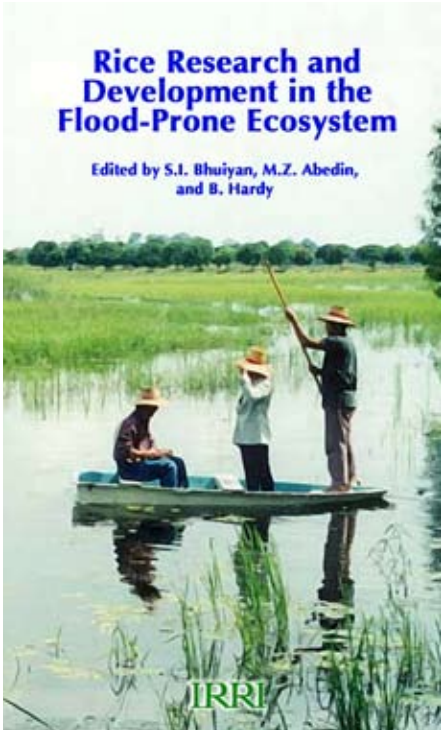
Partners in progress

Mahiul Haque has been appointed director general of the Bangladesh Rice Research Institute (BRRI). Dr. Haque joined BRRI as a scientific officer in 1973 and has since helped develop 39 rice varieties. He succeeds **Nurul Islam Bhuiyan**, who will evaluate subprojects for the IRRI-led project Poverty Elimination Through Rice Research Assistance before moving on to work on the National Action Plan for Hybrid Rice in Bangladesh.

Achmad Suryana, an agricultural economist, has been named director general of the Indonesian Agency for Agricultural Research and Development. Dr. Suryana was previously director general of the National Food Crop Security Agency. He replaces **Joko Budianto**, who plans to teach at a Jakarta university.

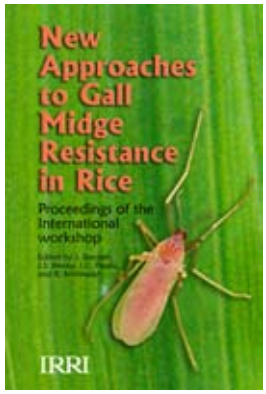
NEW BOOKS

IRRI has added three new titles to its inventory of more than 100 books currently available on rice research. Check IRRI's online publications catalog found at www.irri.org/pubcat/pubcontents.htm for pricing and ordering information on these and other titles and for announcements about additional new books.



Rice Research and Development in the Flood-Prone Ecosystem (edited by S. Bhuiyan et al) presents papers and major recommendations from a recent international workshop on Rice Research and Development in the Flood-Prone Rice Lands of South and Southeast Asia in Gazipur, Bangladesh. Participants discussed the hydrological, biological, agronomic and socioeconomic perspectives of flood-prone rice environments; the challenges, possibilities and strategies for improving the productivity of rice lands in flood-prone environments; and issues and strategies for action.

The flood-prone ecosystem consists of basins and lowland areas adjacent to rivers in the humid and subhumid tropics and in coastal areas subject to tide-induced flooding. This ecosystem is important for many rice-producing countries in South and Southeast Asia, where more than 11 million ha are prone to uncontrolled flooding. Globally, the flood-prone ecosystem accounts for 9% of total rice lands, but in India, Bangladesh, Myanmar, Vietnam and Thailand it can represent more than a quarter of total rice lands.

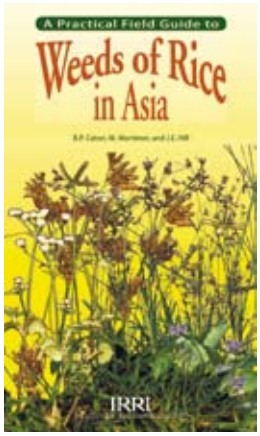


New Approaches to Gall Midge Resistance in Rice (edited by J. Bennett et al; 200 pages) consolidates researchers' understanding on rice gall midge biology and ecology, insect-plant interactions, and pest status and yield losses. The rice gall midge *Orseolia oryzae* is an important pest in Asia, as is *O. oryzivora* in Africa. Breeding resistant varieties has been a viable, ecologically acceptable approach for managing the pest, but diversity in pest populations and rapid selection of virulent biotypes of the insect require new approaches to studying gall midge resistance in rice

Put together during a workshop that attracted many experts in the field, this volume addresses 1) significant accomplishments in identifying sources of resistance and breeding resistant rice varieties in Asia and Africa, 2) pest diversity affecting the performance and durability of host-plant resistance as studied through both conventional and molecular approaches, and 3) the use of molecular techniques in mapping genes and in developing marker-aided selection protocols for breeding durable resistance.

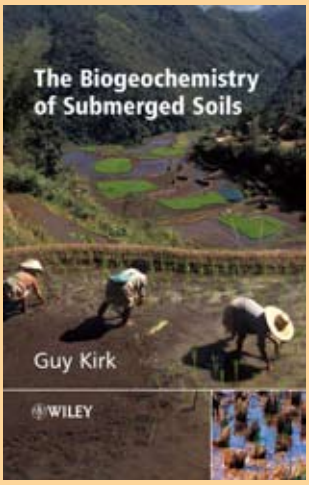
A Practical Field Guide to Weeds of Rice in Asia (by B.P. Caton et al; 116 pages) is a pocket-sized guide containing useful information about the botany, ecology and cultural control of weeds in a short text that is easy to use in the field. It includes 95 color photographs to aid early and accurate species identification.

Weed infestations are a never-ending concern for farmers. Rice farmers of similar ecosystems across Asia, from Korea to Indonesia and Nepal, contend with a small group of identical or similar weed species that includes many of the world's most troublesome.



This guide gives farmers, extension agents and researchers a practical in-field means of assessing weed-control problems and, where possible, provides strategies for improving integrated weed management in rice systems. It will help farmers better understand how land preparation, rice establishment methods and early-season water-management practices influence which particular weed species infest their rice fields.

The Biogeochemistry of Submerged Soils (by G. Kirk; 304 pages), published by John Wiley & Sons Ltd., describes the physical, chemical and biological processes operating in submerged soils and governing their properties. Wetlands are of huge practical importance in global food production and element cycles, and as centers of biodiversity. They are also scientifically interesting because of their peculiar biogeochemistry and the adaptations of plants and microbes.



This book explains the transport processes controlling the fluxes of gases and solutes through the soil; the interchange of solutes between solid, liquid and gas phases; reduction and oxidation processes; biological processes in the soil and overlying water; and processes in the roots and rhizospheres of wetland plants. The dynamics of nutrients, toxins, pollutants and trace gases are discussed in terms of these processes and in relation to wetland productivity and global element cycles.

Written by a former IRRI soil chemist renowned in the field, this work will be invaluable to earth, environmental and agricultural scientists concerned with natural or man-made wetlands, and to advanced undergraduate and graduate students of these topics. To order, go to www.wileyeurope.com/WileyCDA/Section/id-5271.html.

Rice imports come with the territory

by David Dawe
Economist

Exporters plant more than half of their crop area to rice — importers less than half

Asians eat rice daily, prompting politicians and policymakers in many countries to view imports of the staple grain as a sign of national failure. Leaving aside China and India, where wheat is almost as important as rice, analysis of historical rice trade patterns supports a contrary view.

Countries are long-term members of one club for rice importers or, barring upheaval, another club for exporters. This strongly suggests some deep force at work. The reasons typically advanced for failure to achieve rice self-sufficiency — faulty government policy, deteriorating irrigation systems, lack of farm credit, inadequate fertilizer use — are too short-term to explain such steadfast club loyalty.

This deep force is land endowment. Exporters occupy broad riverine deltas and plains with lots of land suitable for rice; importers are island or peninsular nations with more varied landscapes favoring such alternatives as maize, oil palm or coconut. The percentage of crop area devoted to rice tells the story. Figure 1 shows that consistent rice importers plant less than half of their crop area to rice, while countries that plant more than half to rice are consistent exporters (excepting Japan and Bangladesh because of their tiny area of arable land per person).

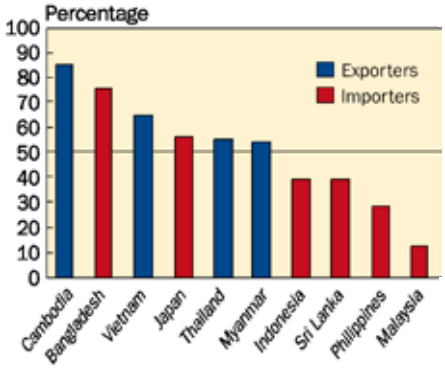


Fig. 1. Share crop area planted to rice, selected Asian countries, 1990-2001. Data: FAO.

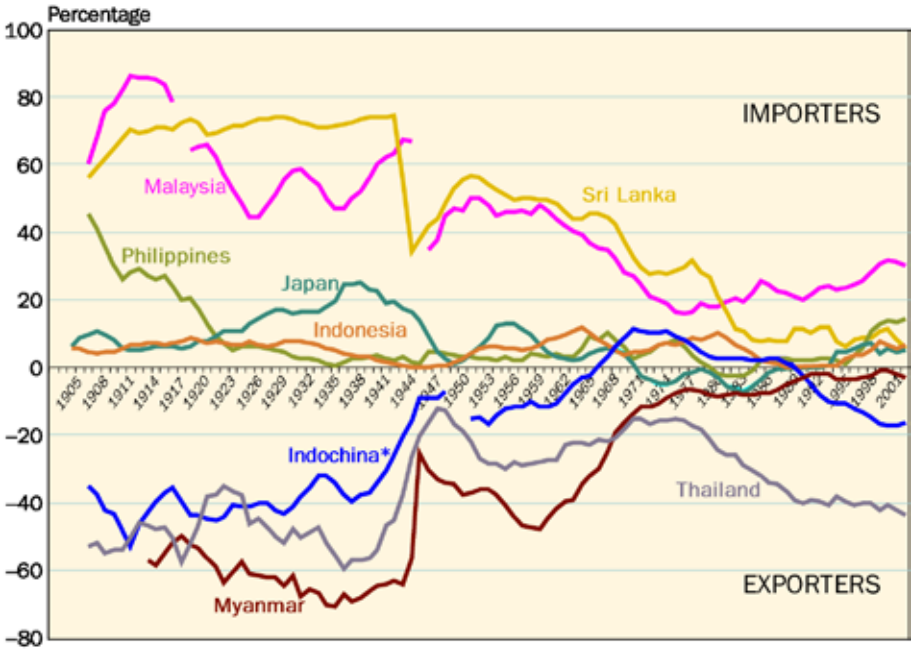


Fig. 2. Net trade status, selected Asian countries, 1905-2001.
Note: The values shown are 5-year moving averages to smooth year-to-year fluctuations. When imports exceed exports (+), net trade status is expressed as a % of consumption. When exports exceed imports (–), net trade status is expressed as a % of production. This convention avoids reporting values exceeding 100%. Gaps reflect unavailable data.
*Indochina includes Vietnam, Cambodia and Laos until 1949 and Vietnam and Cambodia from 1951, with trends in Vietnam dominating in both periods.

Malaysia is the Asian country most reliant on rice imports, which account for 30% of its consumption. Other countries that import rice to meet a significant portion of demand, with percentages averaged for 1996-2002, are the Philippines (13%), Sri Lanka (9%), Indonesia (6%) and Japan (5%). Strikingly, all five have consistently imported rice for at least the past century (Figure 2). The Philippines, for example, has imported rice almost every year since 1869. Java, the destination for most of Indonesia's rice imports today, has been a rice importer since the 16th century. Exports from these traditional importers have been sporadic and short-lived.

The history of Asian rice exporters is similarly consistent, though war and ideological zeal complicated trends in three of them following the 1960s. Early in the 20th century, the countries that exported the largest percentage of their rice production were Myanmar, Cambodia, Thailand and Vietnam — all mainland Southeast Asian countries with large river deltas or plains. Today, Thailand dispatches 40% of its crop to world markets. Vietnam, having bounced back from a quarter century of scraping along, now exports a fifth of its rice production. Myanmar and Cambodia have struggled more than Vietnam but now appear set to redeem their traditional roles as rice exporters.

Traditional importers have invested in irrigation systems to improve their land for rice. They now irrigate a much higher percentage of their rice land than do exporters, but these increasingly costly efforts have failed to eliminate the need to import. Land endowment remains the overriding factor that determines whether a country imports or exports rice.

Fear and loathing drive needless insecticide use

K.L. Heong
Entomologist

Rice farmers, like most people, instinctively abhor bugs, especially in their fields. This makes them easy targets for those unscrupulous insecticide marketers who exploit their fears. We have found that farmers wildly overestimate their real or potential losses to insect pests, usually by at least a multiple of 10, and that most of their insecticide applications are ineffective or even counterproductive, needlessly threatening their health, reducing their income and polluting the environment.

The good news is that sound advice to help farmers avoid unnecessary spraying — simple rules of thumb widely disseminated through popular media — can counteract the irresponsible advertising that some insecticide purveyors employ, sharply reducing farmers' spraying without hurting their harvest.

On-farm surveys in 10 Asian countries showed that farmers routinely spray insecticides, including those banned in the West as unacceptable hazards to human health, early in the crop cycle to control leaf-feeding insects collectively dubbed "worms." Yet research has shown that young rice plants can lose 40% of their leaves — or more than 4 times the damage typically caused by leaf-feeders — without suffering any yield loss. Detailed analyses of farmers' insecticide use in the Philippines and Vietnam showed that 80% of their applications targeted the wrong insect at the wrong time and so offered no economic return.

Young rice plants can lose 40% of their leaves — or more than 4 times the damage typically caused by leaf-feeders — without suffering any yield loss

Farmers able to make correct decisions about when and what to spray still face the problem of effective delivery. Even with optimal weather, spraying equipment and skills, a third of the spray lands uselessly on the ground. And the reality is that the spraying equipment used by Asian rice farmers is notoriously inefficient, emitting large droplets that immediately roll off the leaves. The result is that less than 2% of the insecticide sprayed on rice in Asia is likely to reach targeted insect pests. The rest contaminates the paddy water and soil, contributing to environmental pollution and killing beneficial insects and aquatic fauna. Under prevailing conditions in most of tropical Asia, rice farmers would be better off using no insecticides at all.

Ironically, predators of rice pests, such as spiders, are at greater risk of pesticide poisoning than the pests themselves because they are more mobile. Similarly, parasites that target pests are susceptible because they are small. Moreover, some pests pass their larval stage inside the rice plant, safely beyond the reach of sprays. Farmers' insecticide applications can thus disrupt natural biological control mechanisms in rice ecosystems, perversely creating environments that favor pests. A clear link exists, for example, between excessive insecticide use and outbreaks of brown planthopper. A study in the Philippines found that three sprayings before maximum tillering (or branching) resulted in 56 million more rice pests per hectare — and 14 million fewer natural enemies.

In the Mekong Delta of southern Vietnam, we conducted a media campaign using fliers, posters, billboards and radio spots to encourage farmers to withhold insecticides on part of their crop during the first 40 days after sowing and to compare the result with the sprayed portion. Farmers in the test area more than halved their spraying from an average of 3.4 sprays per crop to only 1.6 sprays. The subsequent Three Reductions campaign additionally encouraged farmers to reduce their seed and fertilizer use to optimal rates, thereby saving input costs while discouraging insect pests. This campaign saw the average number of insecticide applications per crop fall below one. Infestations of brown planthopper, which decimated local rice fields in the early 1990s, are now a thing of the past.

Pesticide-reduction campaigns in central Thailand and northern Vietnam have yielded similarly encouraging results, but our message has so far reached only a tiny minority of the more than 200 million rice farmers worldwide. Meanwhile, the pesticide industry continues its fear-based advertising, threatening to undo the progress we have made and to spread insecticide misuse to the few areas still unaffected.

Laos is particularly vulnerable, wedged between pesticide-producing Vietnam, Thailand and China. So far, few Lao farmers use insecticides, but only for lack of supply. Like their counterparts elsewhere, they welcome easy "solutions" to their pest problems. Protecting them urgently requires a comprehensive policy to regulate the importation, manufacture and marketing of pesticides. Also needed are programs to educate extension technicians and farmers on the health hazards and ecological principles that govern responsible pesticide use.