Asia Brief
Improving farmer livelihoods in Asia

SDC Swiss Agency for Development and Cooperation – East Asia Division

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THE IRRIGATED RICE RESEARCH CONSORTIUM

Established in 1997 with support from the Swiss Agency for Development and Cooperation (SDC), the Irrigated Rice Research Consortium (IRRC) strives to ensure that rice farmers benefit from technologies arising through research. The IRRC's main goal is to improve the livelihoods of the rural and urban poor who depend on rice. This includes people from rice-farming communities—such as farmers, farm laborers, and their families—as well as the urban poor for whom rice is the most important food.

The IRRC has developed partnerships between the Philippines-based International Rice Research Institute (IRRI) and 11 rice-growing countries in South and Southeast Asia. The Consortium has helped identify and address each country's irrigated rice problems by developing and testing rice-growing technologies and crop-management approaches in farmers' fields.

By building strong partnerships with various stakeholders, the IRRC is contributing to two of the United Nations' Millennium Development Goals: eradicating extreme poverty and hunger, and ensuring environmental sustainability.

The IRRC not only helps farmers use resources such as land, labor, water, and fertilizer more efficiently, but also promotes ecologically sound management of weed and rodent pests, leading to sustained, environmentally friendly increases in production.

Since 2005, partner countries Indonesia, Myanmar, and the Philippines have disseminated technologies nationally through IRRC Country Outreach Programs (ICOPs). The ICOP model has strengthened links between research and extension (educating farmers about, and training them to use, new technologies), developed crucial links to policy advocates, and enabled IRRI to respond to important new national policy initiatives in each country. IRRC technologies have been validated in farmers' fields in four regions in Myanmar, six regions in the Philippines, and four regions in Indonesia.

In other countries technologies have been promoted at a provincial level. For example, activities have been undertaken in the Mekong and Red River deltas of Vietnam, in four provinces in China, in three states of northern India, in northwest Bangladesh, and in Sri Lanka.

The IRRC has successfully promoted findings generated from high quality science in the fields of natural resource management and social anthropology. Water-saving, weed-management, crop-establishment, and postharvest (drying, storing and milling) technologies are being adopted by thousands of farmers across Asia , The same is true for ecologically based rodent management and location-specific nutrient management.

Alternate wetting and drying, a water-saving practice, has been adopted by tens of thousands of farmers in China and the Philippines, and is rapidly being adopted by farmer groups in Vietnam, India, Bangladesh, Myanmar, and Indonesia. This technology allows farmers to harvest the same yields using 15–30% less water.

Direct seeding of rice—an alternative to the usual method of transplanting seedlings—saves 20% in labor costs and 30% in water costs. Direct seeding is now seen as a way to alleviate hunger and poverty in northern Bangladesh, and is being validated by hundreds of farmers in India, Myanmar, and Indonesia.

Strong partnerships with the private sector have led to wide-scale adoption of IRRC's postharvest technologies. This year, about 5,000 farmers in Myanmar and Lao People's Democratic Republic (Lao PDR) have better quality rice and higher incomes through the use of mechanical dryers. More than 4,000 farmers in Cambodia and Vietnam are earning more by using special airtight bags to safely store their seeds.

The IRRC helped harmonize national recommendations for nutrient management of irrigated rice in Indonesia, followed by the development of a national working group on fertilization of food crops. China is now following suit.

The Consortium continues to strengthen interactions among, and build the capacity of, its national partners. From 2005 to 2008, IRRC scientists trained more than 1,900 research and extension staff through more than 100 training workshops and sponsored more than 75 partners from 10 countries to attend international workshops and conferences.

A REGIONAL APPROACH TO FOOD SECURITY

SDC is investing in research to increase rice production in Asia. This investment comes at a time when a rise in the price of rice can mean a drop in real income for poor consumers in urban areas and landless laborers in rural areas. For the poorest people, even a small increase in price can seriously affect household food security.

With support from SDC and IRRI, the IRRC was established to develop and promote technologies that increase environmentally sustainable rice production. The IRRC works with partners in Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Myanmar, Sri Lanka, Vietnam, Malaysia, and the Philippines. Partner countries are involved right from the start, in setting the research agenda, and participate during the research process, finding practical technological or management solutions to their rice production constraints.

Once an option or technology is identified, it is tested in different environments and adapted to local conditions. Specific training on the innovation is then held across partner countries to further test if it will work on a broader scale, and to get feedback to further improve the prototype. Once the prototype is validated, trainers are trained, and manuals are made and translated into local languages. Through the IRRC, countries with the same challenges learn from one another. Through participatory research and extension, the capacities of partners are strengthened to enable environmentally friendly solutions to increase rice production and therefore help achieve regional food security.

THE ROOTS OF RICE PRODUCTION

Throughout history, rice has been one of humanity's most important foods. Around half of the world's population depends on rice for their staple food, yet little is known about the origins of rice cultivation. Archeological evidence traces the roots of rice to China and India around 3,000 B.C. Rice culture gradually spread westward and was introduced to southern Europe in the medieval times.

IRRI and the Green Revolution

After World War II, Asia was desperate for food. At a time when the fear of famine was spreading across Asia, the Ford and Rockefeller Foundations founded the IRRI in Los Banos, Philippines, in 1960. Why a research institute for rice? There are two parts to the answer. First, rice was, and still is, the single largest source of food, employment, and income for billions of people, particularly in Asia. Second, at the time the institute was built, the world's population was rapidly increasing at the same time that land for growing rice was steadily decreasing.

With the introduction of IRRI's modern high-yielding varieties in the 1960s, rice yields and overall production rose rapidly. Annual production increased from only 200 million tons in 1961 to 600 million tons in 2007. The period of growth throughout the 1970s and 1980s has become known as the Green Revolution. By increasing farmers' income and, at the same time, lowering rice prices–and thereby benefiting poor consumers—the Green Revolution directly and indirectly reduced poverty across Asia.

CHALLENGES TODAY: THE RICE PRICE CRISIS

Today, there is a call for another Green Revolution. Rice has been major news in 2008 as international prices soared from US$400 per ton in January to more than $1,000 per ton in May. Major exporters Vietnam and India have cut back exports to ensure enough rice for their domestic needs. In some countries, food riots have led to soldiers guarding food trucks to prevent looting.

Why is this happening? Many factors, both long- and short-term have contributed to the present crisis. One reason is that the world is consuming more rice than it is producing. This has been seen in the rapid reduction in rice stockpiles over the past few years. One of the reasons for this is that annual growth in yield has slowed to the point where it is now behind population growth.

Reduced public investment in agricultural research and development has contributed to the problem. Many governments believed that the steady decline in rice prices in the 1990s meant that there was plenty of food available and that supply problems had been beaten.

In 10 years, the world will need to produce 50 million tons more than it does now. However, there is little room to expand rice-growing area. Indeed, tens of thousand of hectares of rice fields are lost annually to housing and industrial development.

Weak irrigation infrastructure, recurring pest outbreaks, and extreme weather have also taken a toll on rice production in recent years. Adding to the problem, rising oil and fertilizer prices have made production and transport of rice more expensive. The increase in the price of fertilizers has also led to reduced usage and, consequently, lower yields.

COUNTING ON IRRIGATED RICE

Now that the world is facing almost the same dilemma as it did 4 decades ago—before the Green Revolution—the question is: where do we turn to get more rice? The answer brings us back to Asia, specifically the continent's irrigated lowlands. There are 79 million hectares of irrigated lowlands in Asia, which represent only 45% of the global rice area. However, this is the planet's most productive rice-growing environment, providing 75% of the world's rice. In South Asia, for example, 1 hectare of irrigated rice can feed 48 people, while 1 hectare of rainfed rice can feed only 13.

More than 2.7 billion Asian farmers and consumers depend on irrigated rice for their food. To get through the current crisis and improve livelihoods of people in Asia, yields from the irrigated lowlands must be increased.

IMPACT OF THE IRRC: IMPROVING EFFICIENCY IN RICE PRODUCTION AND REDUCING MAJOR LOSSES

Not all technologies are at the same level of advancement in all countries. Some technologies are still being disseminated while others already have achieved impact.

Growing more rice using less water

Water is a precious commodity, with competing demands between water for households, industry, and agriculture. Irrigated rice is estimated to receive 24–30% of the world's freshwater. In Asia, more than 80% of the developed freshwater resources are used for irrigation purposes, mostly for rice production. By 2025, 15–20 million hectares of irrigated rice will experience some degree of water scarcity, and important biodiversity wetlands will suffer from water shortages.

Irrigated lowland rice is usually grown under flooded conditions, and kept continuously flooded to help control weeds and pests. However, rice only needs to be continuously flooded when it is in the flowering stage. Using alternate wetting and drying (AWD), a water-saving practice developed by the IRRC and its partners, fields are allowed to dry to a degree, then are re-flooded, then allowed to dry again. In AWD, rice can be flooded to a lesser extent than usual (to a depth of 3–5 centimeters instead of up to 10 centimeters). Using 15–30% less water, farmers can harvest the same yields. The water saved can be used to irrigate more fields, thus increasing overall production. For example, where there is sufficient water for 80 farmers to flood their fields continuously, 110 could use AWD.

After 4 years of research, training of trainers, and dissemination among farmers, AWD is now being practiced by tens of thousands of farmers in China and the Philippines, and is being adopted rapidly by farmers in Vietnam, India, Bangladesh, Myanmar, and Indonesia. In An Giang, Vietnam, for instance, 161 farmers used AWD in 2005. One year later, 1,500 farmers grew rice using AWD on 1,700 hectares.

In Tarlac, Philippines, several farmer groups have adopted AWD. When continuously flooding their fields, these farmers ran a pump for 10–12 hours just to irrigate a single hectare. With AWD, they now use the pump for only 4–5 hours—a considerable saving given the rising cost of fuel. AWD crops, which require less labor, are also 20–25% cheaper to manage.

In the Philippines, where rice shortages are causing major political pressures, some 40,000 farmers are estimated to have adopted AWD since it was introduced in 2006.

If AWD were to be adopted all across the irrigated lowlands of Asia, 200 cubic kilometers of water would be saved. To put this into perspective, 1 cubic kilometer—1 trillion liters—is about how much Paris uses in 1 year. Adopting AWD provides tremendous benefits for the environment and for the sustainability of rice production.

Direct seeding saves labor and water costs

The Indo-Gangetic Plain is a large, fertile plain covering most of northern and eastern India, the most crowded regions of Pakistan, and almost all of Bangladesh. The Plain is India's "grain bowl," which produces half of the nation's rice and wheat. Although farmers here have access to mechanical equipment and relatively well developed irrigation infrastructure, they face rising costs, worsening soil health, labor shortages, and waning productivity. Bangladeshi farmers in an area known as the Barind Tract also experience farm labor shortages, as many people leave migrate to cities to find work. A more urgent problem is the availability of water. Farmers here depend on monsoon rains, and they cannot establish the crop if the rains come too late.

The IRRC and its collaborators are now tackling these problems by promoting an alternative way to establish a rice crop. Instead of the common method of transplanting rice from a nursery into the field, and flooding the field, rice seeds are sown directly into an unflooded field. This approach, known as direct seeding, has been around since the 1960s but the IRRC has now developed better agronomic principles for its use.

Direct seeding in dry fields allows quicker land preparation and reduces the amount of water needed. However, without the protective layer of water, weeds are a potential major problem. Timely and appropriate weed management is essential to avoid drastically low yields. This is where the IRRC and its partners come in.

The IRRC is promoting and training national partners in India, Myanmar, Bangladesh, and the Philippines on direct seeding and integrated weed management. In Iloilo, Philippines, where more than 80% of farmers direct seed, weeds can cause 12% yield losses in the dry season. But in areas where farmers use integrated weed management, yields increased by 6% in the wet season and 16% in the dry season.

Direct-seeded rice matures 10–15 days earlier than a transplanted crop, allowing farmers to sow wheat and other crops earlier. This is extremely helpful for Indian farmers, who plant wheat after harvesting their rice crops. A delay in planting rice causes a delay in planting wheat, and this translates to loss in yield and income.

When direct-seeded rice was introduced in Uttarakhand, India, in 2002, only a few rice fields were directly seeded. But by 2007, more than 450 farmers were directly seeding rice in Uttarakhand, West Bengal, and Bihar.

Adoption of direct seeding has not been as rapid compared with some other technologies (new rice varieties, for example). The amount of knowledge needed—such as timing with respect to the monsoon and soil moisture, and weed control—is extensive compared to other planting options, and decision-making is relatively complex. Therefore, understanding the information needs of farmers has been a major part of the activities.

IRRI, along with three nongovernmental organizations (NGOs) and Indian universities, has just received funding for an outreach project (2008-11) aiming to work with 4,500 farmers in the Indian states of Uttaranchal, Uttar Pradesh, Bihar, and West Bengal. One of the goals is to provide access to information on direct seeding of rice and related options to 450,000 farmers.

Direct seeding became a savior to farmers in Bengal, India in 2007, when their crops were lost in severe floods. Farmers were able to plant new direct-seeded crops using 2,000 drum seeders (see *Beating the drum*, below) that were distributed by NGOs.

A direct-seeded rice field in Rangpur, Bangladesh.

Beating the drum
A drum seeder is a simple, cylindrical tool made of high-density plastic that makes direct seeding easier. As the drum is pulled by one person across a puddled field, pre-germinated seeds placed inside the drum fall neatly in rows. Originally designed by IRRI, improvements by researchers and manufacturers in Vietnam have made it lighter, cheaper, and easier to use. The drum seeder has gained success as a way to save seeds, but its capacity to save labor is overwhelming. While it may take 50 person-days to transplant 1 hectare of rice, it only takes about 2 person-days to directly seed in puddled soil using a drum seeder. Partners in the Philippines,

Myanmar, Bangladesh, and India are promoting drum seeders. In Myanmar, 55 drum seeders have been distributed since 2007, and farmers are being provided with training, field visits, and demonstrations. Compared with spreading seeds by hand, a drum seeder needs 50–60% less rice seed, the labor cost is saved, and sowing the crop in rows makes manual weed control easier.

Helping feed the hungry in northern Bangladesh

With early-maturing varieties and proper weed management, direct seeding has helped ease the hardship of farmers in northern Bangladesh. Each year farmers face the *monga* or "hunger" months that last from late September to mid-November, when the landless ultra-poor and other rural families are waiting for the harvest of transplanted rice and do not have other means of income. With direct seeding, farmers can harvest their crop at least 35–40 days earlier, sell at a higher price, and grow other crops such as potato, maize, chickpea, or vegetables. This generates important labor opportunities in the region. Farmers in Nilphamari District, who planted direct-seeded rice and applied good weed management, were able to harvest 4.7 tons per hectare, compared to 2.1 tons previously.

An NGO partner introduced these technologies in 2006 to 10,000 farmers' field-school members in 29 sub-districts. They were tested on 1,271 hectares. In 2006, these technologies helped 9,247 farmers to plant earlier on 3,140 hectares. This created jobs for 27,377 laborers who had work during early harvesting for about 10 days, at a time when farm work was previously rare.

The Bangladesh Department of Agricultural Extension is now planning to use direct seeding to change the cropping pattern in the wet season, enabling farmers to harvest early, create jobs, and allow crop diversity (by growing mustard, potato, and maize for example). Some 40,000 hectares are targeted for the 2008 wet season.

In Myanmar, about 500 farmers are involved in farmer groups where direct seeding options are being validated in participatory field trials. Around 100 farmers are involved in similar trials in Indonesia.

Healthy crops with the right amount of fertilizer

Most nutrients needed by a rice plant for its growth come from the soil, but this supply is not enough to produce high yields to feed billions of people. Nutrients in the form of fertilizer must be applied to supply the additional need of the rice plant. Farmers typically lack knowledge on the most effective use of fertilizer for their fields, and their inefficient use of fertilizer leads to diseases of the rice plant, damage to the environment, and low profit from farming. Research on nutrient management for rice has led to the development and dissemination of simple technologies to enable poor rice farmers in Asia to increase their production and thereby, their profits, through more efficient use of fertilizer.

The approach, called site-specific nutrient management (SSNM), has been applied across favorable rice-growing areas in Asia, following research and extension in Bangladesh, China, India, Indonesia, Myanmar, the Philippines, Thailand, Malaysia, and Vietnam.

A simple tool for farmers
The leaf color chart is one of the tools developed for farmers to assess the nitrogen needs of their crop. It is a plastic strip with four or more panels that range in color from yellowish green to dark green. Farmers simply compare the color of the leaves with the panels. Dark green leaves mean that the crop has enough nitrogen, while yellowish green leaves is a sign that the crop needs nitrogen fertilizer quickly. As of May 2008, more than 339,000 of these useful tools have been distributed in Bangladesh, China, Indonesia, India, Vietnam, Thailand, Myanmar, Malaysia, and the Philippines. An additional 180,000 were sent to Bangladesh in the second week of May.

Since 2003, correct fertilizer timing and application rates have greatly raised farmers' yields compared with their traditional practices. In Bangladesh, yield increases from improved nitrogen management increased net returns by about $100 per hectare per year, and net returns increased by as much as $300 per hectare per year when management of other nutrients was also improved. Elsewhere, the annual income of farmers who followed the recommended nutrient management practices in southern India increased by $168 (47% increase in income); in the Philippines, by $140 (13% increase); and in southern Vietnam, by $34 (4% increase). For farmers who adopted SSNM in northern Vietnam, yield increased by as much as 15% during the high-yielding season and 8% in the low-yielding season, realizing a net benefit of $150 per hectare per year. In 2007, a random survey of smallholder farmers in two provinces in the Red River Delta in Vietnam enjoyed higher rice yields (by 0.21 tons per hectare) using less nitrogen fertilizer. Farmers who adopted the technology also reduced their pesticide use.

Clean and green

Applying the right amount of nitrogen fertilizer avoids excessive early vegetative growth. This produces healthy crops that are less prone to disease and insect pest attacks. Farmers can thus apply less pesticide, increase their profits, and lower the risks to their health and the environment.

Increasing the crop's use of the applied nutrients also reduces the risk of nitrogen leaking from rice paddies, polluting water bodies and the air, and contributing to global warming. Scientists used data from farmers' fields and a simulation model to show that improved use of nitrogen fertilizer on crops can reduce the release of nitrous oxide, a greenhouse gas that contributes to global warming and is more than 300 times as potent as carbon dioxide.

The research has led to important policy changes at national levels affecting millions of farmers. For example, in January 2006, the Minister of Agriculture in Indonesia signed a recommendation for site-specific nutrient management to be implemented for lowland rice. This decree covers 21 provinces and 93.5 million rice farmers feeding 230 million people. In Guangdong, China, a technology based on the nutrient management approach was endorsed for adoption in January 2007. Guangdong is one of China's major rice-growing provinces, and is the second most populous province in the country with 94 million people. The Center for Chinese Agricultural Policy then recommended the technology to the Chinese Ministry of Agriculture for dissemination.

In 2008, the principles of site-specific nutrient management have been compiled into a simple, computer-based nutrient decision system for Indonesia, the Philippines, China, and West Bengal in India. This interactive tool provides 10 multiple-choice questions, which can be answered easily by an extension worker or farmer for a specific rice field or area. Based on the reply to the questions, a printout with amounts of fertilizer by crop growth stage is provided for the rice field. In 2008, SSNM principles were disseminated in Indonesia through 60,000 farmer field schools, and became one of the major pillars of a new national program for increasing rice production in the Philippines.

Better quality rice, higher prices, and reduced postharvest losses

Rice farmers in Asia experience postharvest losses because of spoilage and wastage of rice at the farm level, delay in drying, poor storage, poorly maintained or outdated rice mills, and losses to pests throughout the postharvest chain. These losses lead to lower quality rice for consumption, smaller returns to farmers, higher prices for consumers, and greater pressure on the environment as farmers try to compensate by growing more rice or using chemicals to control pests. From harvest to market, farmers are losing 30–50% of their earnings.

Two of the biggest problems now being addressed by the SDC-IRRC initiative are delayed or improper drying and poor storage.

The main reason for the deterioration of seeds is delayed, incomplete, or ineffective drying. Drying is the most critical operation after harvesting a rice crop. Traditionally, millions of Asian farmers dry their grain by spreading them under the sun on roads, town squares, and other open spaces. To maintain the high quality of grains, mechanical dryers have been developed that are affordable for farmer groups.

Mechanical drying or heated air drying can be done at any time of the day or night, and moisture levels are easily monitored. Use of mechanical drying also reduces labor. In general, grains dried in mechanical dryers produce better quality rice compared to sun-drying because they are uniformly dried. Mechanical drying also leads to a higher milling yield of rice.

The most frequently used dryer for small quantities of rice is the simple flat-bed dryer (pictured above). By May 2008, 37 flat-bed dryers had been constructed (with nine linked directly to farmers' villages) over the previous 1.5 years by the Myanma Rice and Paddy Traders Association, a national traders organization in Myanmar. Farmer groups, millers, and seed producers were trained. Now, 105 farmers per village benefit each season (twice a year) by using the dryer. The project has led to more than 3,800 farmers having better quality rice, which in turn means they can sell at higher prices.

In Lao PDR, four flat-bed dryers have been installed, one as a demonstration unit in Vientiane and three at provincial research centers. Thirty mobile low-cost, farm-level dryers have been distributed to farmer groups in different provinces. Their use is coordinated by a specialist trained by the IRRC. A dryer installed in Savannakhet Province had dried over 50 batches (200 tons) of rice seeds by May 2008, which means it has produced good quality seed for 700–1000 farmers who grow rice on about 1,700 hectares.

In Indonesia, collaborative research led to the design of more efficient fans for grain dryers. In 2007, this led to milling quality 12–40% higher than that of sun-dried rice. The IRRC helped a local manufacturer set up production and the first dryer was installed in South Sumatra in 2004 at a farmer processing center. Thirty-nine more dryers were developed by several manufacturers and installed at millers and traders who dry their own crop and also provide contract drying services to farmers. These units were installed in West Java and West Nusa Tenggara.

Environmentally and ecologically friendly

Conventional mechanical dryers need around 10–15 liters of kerosene to dry 1 ton of paddy. However, kerosene is harmful to the environment and is becoming more expensive . These reasons prompted the IRRC and its Vietnamese and Philippine partners to develop dryers that use rice husks as fuel instead of kerosene.

Rice husks (a by-product of rice milling) are available in abundance and are low in cost. Using rice husks is also more environmentally friendly.

A 4-ton seed dryer with a prototype of the rice husk furnace was installed for evaluation at the Philippine Rice Research Institute. Farm laborers gave feedback that the automatic feeding and ash disposal reduced their need to stir the husk and remove ash in the hot and dirty work area.

In 2006 in Vietnam, three commercial furnaces were installed—two for 4-ton paddy dryers in Long An Province and one for a peanut dryer in Tay-Ninh Province. These furnaces produced virtually no smoke, less ash, and little carbon dioxide, all of which hurt the environment. Colleagues from Nong Lam University monitor the installed commercial furnaces to address potential durability issues and the upscaling of the furnace design for use with 8-ton dryers. Dryers are now being introduced to Cambodia, Myanmar, Laos, and Indonesia.

An efficient storage system is crucial to protect seeds for the next planting season. In humid, tropical conditions such as in Asia, seed and grain quality quickly deteriorate within 3–4 months of storage because rice grains absorb water from the surrounding air, and storage pests, mostly insects, accumulate. Simple airtight containers or storage systems have been developed that enclose and protect the grain from pests and prevent water absorption from the humid surrounding air. The IRRI Super Bag was developed specifically for farmers with small amounts of land. It can store up to 50 kilograms and costs less than $1.20. The bag, as well as other IRRC postharvest technologies, is designed to be as inexpensive as possible to maximize poor farmers' access.

When properly sealed, oxygen levels inside the bag decrease from 21% to 5% and carbon dioxide levels increase. This reduces the number of insects to a ratio of less than one insect for every kilogram of grain without using insecticides—often within 10 days of sealing.

The Super Bag and larger airtight storage systems (with 5- to 200-ton capacity) have been extensively tested and verified with farmers and seed processors in Vietnam, Cambodia, Lao PDR, Indonesia, and Myanmar. Results confirmed that these storage systems control insect grain pests without using insecticides, protect the grain from rodents, maintain a high seed germination rate, and result in less broken grains during milling.

More than 4,000 farmers in Cambodia (Battambang and Prey Veng Provinces) and Vietnam (Long An and Nam Dinh Provinces) are now using Super Bags to store their seeds safely for 6–9 months. The farmers have been able to maintain germination rates above 90%. And, they can now sell more grain in the market since higher germination rates mean they need less grain for seed.

Ecological management of rodent pests

Across Asia, rats and other rodents can cause preharvest losses ranging from 5% in Malaysia to 17% in Indonesia. To put this into perspective, an average loss of 6% in Asia amounts to enough rice to feed 225 million people—roughly the population of Indonesia—for 12 months. Rat damage is often patchy and family rice plots are small, so it is not unusual for farmers or villagers to lose half of their entire rice crop to rats. Rats and mice can also contribute to about 5% of post harvest losses.

By understanding the population ecology and behavior of rat species, farmers can apply a simple environmentally friendly community method to control rats in lowland irrigated rice crops. Trials in Indonesia and Vietnam, involving 400 farmers, led to a 50% reduction in the use of chemical rodenticides and increased yields by about 0.5 ton per hectare.

This ecologically based approach to rodent management was adopted as the national policy for rodent management in Indonesia in 2001, Myanmar in 2006, and Vietnam in 1999. Farmers in five provinces in Vietnam and four provinces in Indonesia are now routinely using this approach, which has replaced widespread use of rodenticides, cocktails of illegal chemicals, and the use of electrocution—all serious risks to human health. A 16-year old Vietnamese boy died in 2004 after being electrocuted by wires illegally placed along the edge of a rice crop.

Rat meat is also an important source of protein for rural people in Vietnam, Lao PDR, and Myanmar. In 2003, the IRRC commissioned a market study of meat from field rats in the Mekong delta. In Vietnam. some 3,500 tons of rat meat are processed for human consumption each year. Therefore, reducing rodenticide use offers major health benefits.

Building the capacity of partners in developing countries

The IRRC in partnership with SDC has had tremendous success as a regional consortium in helping smallholder farmers increase their rice production in an environmentally sustainable manner. The IRRC-SDC partnership builds the capacity of partner countries by enhancing the skills of researchers, extension workers, and farmers. During the past 3.5 years, the IRRC has conducted more than 100 workshops (12 of them at a national level) covering all technologies. The IRRC also sponsored 75 partners from 10 developing countries to attend international workshops or training courses.

The regional initiative has resulted in countries sharing different ways to produce irrigated rice different ways to efficiently get the message to extension specialists and then to farmers. The Consortium has been a focal point for critically needed cross-country learning. Most importantly, the findings of the IRRC have also been communicated to policy makers. This has led to crucial changes in national agricultural policy—a prerequisite for sustainable changes in rice production in Asia.

WHAT THE FUTURE HOLDS

With the IRRC playing a strong role in many countries across Asia, it has proven to be an excellent platform for delivering new technologies to small-scale rice farmers, especially during the current rice price crisis. The IRRC provides multi-country learning for national scientists and extension specialists in 11 Asian countries, and these partnerships have made a significant contribution to the food security of Asians while maintaining a safe environment.

Just a small increase in price can seriously affect the food security of a rural household. For instance, a 25% increase in rice price translates to a 7–10% drop in the real income of poor consumers, as rice purchases often constitute 30–40% of total household expenses. Such a drop in income increases the number of poor people and pushes people deeper into poverty and hunger. With less money available, the poor are forced to spend less on such essential needs as health care and nutritious food—essential for good health, especially for children and pregnant women. Families may even pull children out of schools, thus threatening future generations with ongoing poverty. Further advances in sustainable increases in rice production and in developing more effective pathways for delivery of these technologies to farmers are crucial. The Swiss-funded Irrigated Rice Research Consortium is playing an important role in reducing hunger and poverty and improving the livelihoods of farmers and rice eaters in Asia.