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## Perspectives on IR8
The rice that changed the world

Life, death, and rice at a time of war

Making rice waterproof

Farming for conservation

Rice in harm's way

# Bold new vision
Lessons of the past help IRRI chart the way forward

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# Breeding history

*by Tom Hargrove and W. Ronnie Coffman*

***Forty years ago, a remarkable rice-breeding project culminated in the release of a rice variety under an unremarkable name—IR8. This is the story of the research that would ultimately change the face of agriculture across Asia.***

U.S. PRESIDENT Lyndon B. Johnson makes an impassioned speech during his October 1966 visit to IRRI. He said, "If we are to win our war against poverty, and against disease, and against ignorance, and against illiteracy, and against hungry stomachs, then we have got to succeed in projects like this, and you are pointing the way for all of Asia to follow." Examining IR8 in the Institute fields in August 1967 are IRRI breeder Hank Beachell (*crouching*), visiting philanthropist John D. Rockefeller III (*left*), and IRRI Director Robert Chandler. IRRI breeder Peter Jennings briefs visitors on IR8 in April 1966, only 7 months before its official release (*inset*).

URBITO ONGLEO (3)


IRRI

Asia was desperate for food after World War II. Only massive shipments of U.S. grain prevented famine.

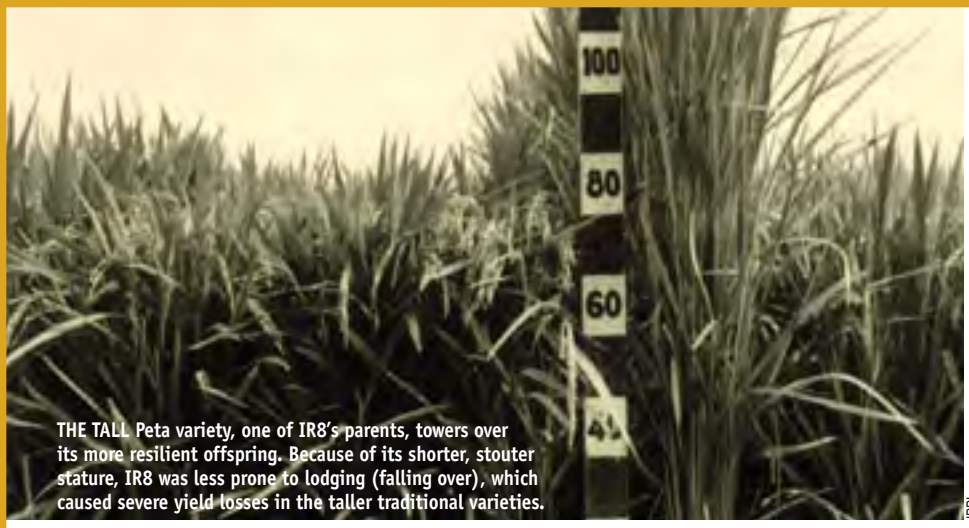
Rice was, and is, Asia's lifeblood. That's why the Ford and Rockefeller foundations pooled resources and, in 1960, established a modern research center to focus on the world's most important crop: the International Rice Research Institute (IRRI), based in Los Baños, Philippines.

Robert Chandler, IRRI's first director, assembled a team with a mission: to develop a high-yielding rice variety.

IRRI scientists knew that the architecture of the tropical rice plant was the main constraint to yield increases. Traditional rice varieties are tall, with long, weak stems. When a farmer fertilizes a tall plant, it "lodges," or falls over. Photosynthesis ceases, and grain rots in the water, or rats eat it.

A short, nonlodging rice plant that would convert nutrients to grain and hold the panicle (the terminal shoot of the rice plant that produces grain) upright—a dwarf or semidwarf—was needed to accelerate rice production.

IRRI didn't invent the dwarf concept. Scientists had already established it in other crops. Dwarf sorghum was already available. And semidwarf rice varieties



THE TALL Peta variety, one of IR8's parents, towers over its more resilient offspring. Because of its shorter, stouter stature, IR8 was less prone to lodging (falling over), which caused severe yield losses in the taller traditional varieties.

IRRI

had already been developed and released in mainland China, largely unknown to the rest of the world.

More significant, in 1946, S.C. Salmon, a geneticist with General Douglas MacArthur's Occupation Army in Japan, had sent seeds of Norin 10, a dwarf wheat variety that he found in a Japanese agricultural experiment station, to Orville Vogel at Washington State University. Within a few years, Dr. Vogel had developed Gaines, a semidwarf wheat variety that spread rapidly across the U.S. Pacific Northwest. Vogel sent seeds with the Norin 10 dwarfing gene to Norman Borlaug of the Rockefeller Foundation wheat program in Mexico. Dr. Borlaug used those seeds to breed semidwarf wheat varieties. The most successful was 8156—given that name for Dr. Borlaug's 8,156th cross. 8156 yielded bountifully and made Mexico self-sufficient in wheat production by the mid-1960s. Seeds of 8156 spread to Pakistan, where it was called "MexiPak," then to Turkey, Iran, and India.

In 1949, the Food and Agriculture Organization of the United Nations established the International Rice Commission, which commissioned an indica-japonica hybridization project based in Cuttack, India. Its mission was to cross the short japonica, or temperate, rice with taller indica, or tropical, varieties, to develop short-statured varieties with higher yield potential. Shorter rice varieties such as ADT 27 and Mahsuri, selected from the japonica × indica crosses, were widely planted across the Indian subcontinent in the 1960s.

Meanwhile, U.S. rice breeders were irradiating seeds of tall U.S. varieties, hoping to induce a short-statured mutant. Among those pioneers were Nelson Jodan of Louisiana State University's rice research center in Crowley, Louisiana, and Henry ("Hank") Beachell of the Texas A&M University rice research center near Beaumont, Texas. But their selections had high sterility and were not successful.

In 1957, the Rockefeller Foundation sent Peter Jennings, a young plant pathologist, to Arkansas, Texas, and Louisiana to learn about rice in order to develop new rice varieties for Latin America. The Rockefeller Foundation then sent Dr. Jennings to Mexico and Colombia.

Dr. Jennings and Sterling Wortman, later to become IRRI's associate director, traveled across Asia in 1960, looking at rice varieties, meeting rice scientists, and interviewing prospective trainees and staff. "Be on the lookout for a dwarf rice," Dr. Beachell recalls advising them. Dr. Beachell visited the fledgling IRRI as a consultant in 1962, then returned to Beaumont.

In India, Drs. Jennings and Wortman encountered Taichung Native 1 (TN1), a Taiwanese variety that was probably the first widely grown semidwarf variety in the tropics. TN1 yielded far better than tall varieties, but was highly susceptible to major disease and insect pests.

Dr. Jennings joined IRRI as head of the Varietal Improvement Department in 1961. Among the germplasm assembled at that time was Dee-geo-woo-gen (DGWG) from China, a parent of TN1, and clearly its source of dwarfism. But at that time the nature of inheritance of DGWG's short stature was unknown.

Dr. Chandler described DGWG as "a high-yielding, heavy-tillering, short-statured variety from Taiwan."

Dr. Jennings and Akiro Tanaka, hired from Japan as IRRI's first plant physiologist, conceptualized the semidwarf rice plant and systematically studied the causes, and effects, of lodging during IRRI's first 3 years. In his 1982 book, *An adventure in applied science: a history of the International Rice Research Institute*, Dr. Chandler wrote about lodging research:

> *By supporting tall varieties such as Peta and MTU-15 with bamboo sticks, Jennings found that tall varieties yielded essentially as well as did lodging-resistant varieties. Moreover, the lodging-susceptible varieties, when supported, responded well to nitrogen applications, whereas the unsupported plants showed a decided negative response. … This proved beyond doubt that lodging per se was the primary cause of low yields when traditional tropical varieties were subjected to modern management methods.*

Dr. Chandler made several references to IRRI's breeding objectives in the first IRRI Annual Report (1961-62). The section "Varietal Improvement" almost gives a blueprint for the


AFTER A BUMPER crop in his first season growing IR8, Indian farmer K.N. Ganesan was so moved by the new variety that he named his second son in its honor—IR-ettu in Tamil, and signed as Irettu. Here, father and son stand in a field of a different variety, IR50, in 1983.

GENE HETTEL

variety, yet to be developed, that several years later would turn rice production on its head:

> *It would seem that the following plant type might be useful in the near future throughout much of the tropics—a combination of short, stiff culms bearing erect, moderately sized, dark-green leaves; responsiveness in yield to fertilizer; mid-season maturity and in most cases, photoperiod sensitivity to permit double cropping practices. These objectives are being pursued [. . .] with both indica by indica and indica by japonica hybridization.*

Not much was known about the genetics of tropical rice varieties at the time, so IRRI hired a geneticist—Te Tzu Chang, from Taiwan—in its first group of scientists. Dr. Chang began studying the inheritance of plant height.

Jennings made 38 crosses in late 1962; 11 of them included the dwarf parent DGWG, TN1, or I-geo-tze (IGT)—another dwarf from Taiwan.

The eighth IRRI cross—from which IR8 was eventually selected—was of Peta, a tall, vigorous variety from Indonesia, and DGWG. From that cross, 130 seeds were formed. Those seeds were planted in pots in IRRI's screenhouse and produced the first, or $F_1$, generation of plants. All were tall.

Seeds from the $F_1$ plants were sown in the field, and produced about 10,000 second-generation ($F_2$) plants that segregated by height in a ratio of three talls to one dwarf. Dr. Jennings immediately recognized this as a Mendelian ratio—named after Gregor Mendel, who became known as the father of genetics for his 19th-century research into the inheritance of traits in pea plants. This was a key result—it meant that dwarfism in DGWG was controlled by a single gene and was therefore simply inherited, making the job of developing a commercially usable semidwarf variety immeasurably easier.

Dr. Jennings immediately brought Drs. Chandler and Wortman to the field to see the segregating plants. He then cabled the good news to Dr. Beachell in Texas. "That's when we knew we had it [meaning that DGWG could be used to breed an improved semidwarf variety]," Dr. Beachell recalled years later.

With this discovery, Dr. Jennings persuaded Drs. Chandler and Wortman to exchange a cytogenetics position in the Varietal Improvement program for a second breeder to help with the increase in field work that would obviously come. They agreed, and Dr. Jennings suggested Dr. Beachell, who arrived in 1963.

Tall, late-maturing plants from the Peta-DGWG cross were discarded, and only short, early-maturing plants were saved. Seeds were "bulked" and planted in a nursery where they could be screened for susceptibility to the rice blast fungus. In 1963, Dr. Jennings departed IRRI for study leave, leaving the material in the hands of newly arrived Dr. Beachell. From the third ($F_3$) generation, Dr. Beachell selected 298 of the best individual plants. Seeds from each plant were sown as individual "pedigree rows"—the fourth ($F_4$) generation.

From row 288, a single plant—the third one—was selected and designated IR8-288-3. Its seeds, the $F_5$ or fifth generation, were grown to produce the basic IR8-288-3 seed stock.

IR8-288-3—which was eventually named as variety IR8—was a semidwarf rice, about 120 cm tall with strong stems that held the plant upright, even when heavily fertilized. It was also nonsensitive to photoperiod, or daylength, scientists would later learn. That meant it could be grown in many latitudes, at any time of the year.

"The seed [of IR8] was uniform enough for trials in other countries, but a couple of years later Dr. Beachell devoted considerable effort to producing an extremely pure strain that would serve as a uniform seed source of IR8 for the future," Dr. Chandler wrote.

Meanwhile, seeds of IR8-288-3 and other promising lines were being sent for testing by national rice programs across Asia.

"IRRI's policy was free access to all of our genetic material," Dr. Beachell said. "It was made available to the world."

In the 1966 dry season, S.K. De Datta, a young Indian agronomist who had joined IRRI in early 1964, examined the fertilizer response of IR8, along with other rice varieties. "We wanted to determine maximum yields under the best management possible," he said.

Dr. De Datta was amazed when he harvested the trials in May. IR8 averaged 9.4 tons per hectare, yielding as high as 10.3 tons per hectare in one trial. Average yields in the Philippines then were about 1 ton per hectare.

Dr. De Datta took his yield data to Dr. Jennings, then to Dr. Beachell. "Let's go see Bob [Chandler]," Dr. Beachell said.

But, at that moment, Dr.


IRRI STAFF load IR8 seeds for distribution to farmers in 1966.

IRRI

Chandler was chairing a seminar—the news would have to wait another hour. After what seemed much longer, Drs. Beachell and De Datta finally saw their director. Sensing the pair's excitement, Dr. Chandler suggested they move to his office.

Dr. De Datta showed his data, and Dr. Chandler was excited.

"The whole world will hear about this," Dr. Chandler said. "We're going to make history!" He then shook hands, congratulating Dr. Beachell for helping develop IR8 and Dr. De Datta for discovering and demonstrating the semidwarf's yield potential.

"The IR8 yield data were the most exciting thing that ever happened to me," Dr. De Datta later recalled.

Soon, similar reports of dramatic yield increases were coming to IRRI from across Asia, including 11-ton harvests in Pakistan.

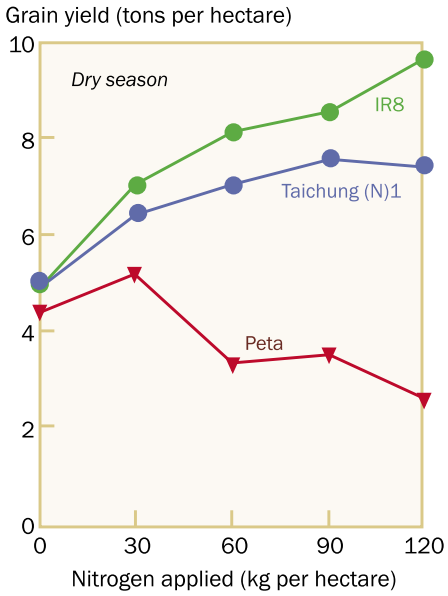
Dr. De Datta prepared his widely published "yield response" graph, showing how yields of IR8 rose with increased fertilization, while those of traditional varieties actually declined (see figure *above*).

Philippine President Ferdinand Marcos heard about the new rice, and flew to IRRI by helicopter on 3 June 1966. Dr. Jennings and others briefed the president by a plot of IR8 next to Peta, a tall, traditional variety.

Dr. De Datta recalls President Marcos's reaction: "Do you mean that little rice can out-produce our vigorous Philippine varieties?" the president asked. Dr. De Datta assured him that it could.

"*No kidding*?" Marcos responded.

President Marcos soon ordered that IR8 seeds be multiplied as rapidly as possible. Marcos's goal was to make the Philippines self-sufficient in rice production during his first term of office.




**THE RESPONSE TO nitrogen fertizer of two semidwarf rice varieties—IR8 and Taichung Native 1—and of Peta, a tall, traditional variety, in the 1966 dry season on IRRI's experiment farm.**

It was. During the last half of 1966 alone, 2,359 Philippine farmers came to IRRI by bus, on bicycle, and on foot, from 48 of the country's 56 provinces, to get seeds.

The new rice yielded bountifully, but had major disadvantages. Foremost was its bold, chalky grain, which distracted from its market appearance as polished rice. The grain also had high breakage during milling. And IR8 had high amylose content, which made it harden after cooling. (Dr. Beachell remembers a young Filipina saying, "I don't like IR8 because it scratches my throat.")

Dr. Beachell recalls the consensus view of the IRRI seed committee: "We needed to move as fast as possible. There was not enough rice to go around. We had to have something to alleviate the rice shortage. Enough rice was more important than grain quality.

"So, would we release the line as a variety, or wait to improve it? We knew IR8's limitations, but also knew we had the plant type. IR8 would be the prototype for future varieties. We decided to spread it."

The seed committee decided to formally name IR8-288-3 as IR8 on 14 November 1966. The news was released on 28 November.

Dr. Chandler later wrote:

> *He [Beachell], Jennings, and Chang made a fine team. When I was asked, some years later, who, among the three senior scientists in the Varietal Improvement Department, should receive the coveted John Scott Award for the creation of IR8, I replied that the prize should be split among the three: Jennings for selecting the parents and making the cross, Beachell for identifying IR8-288-3 from among the multitude of segregating lines, and Chang for having brought to the immediate attention of IRRI breeders at the start the value of the short-statured varieties from Taiwan such as Dee-geo-woo-gen, I-geo-tze, and Taichung Native 1.*

Pioneer rice scientists such as Drs. Jennings, Beachell, Chang, and De Datta, as well as others who played key roles in developing and testing IR8—such as Dr. Tanaka and another plant physiologist, Benito Vergara—proved Dr. Chandler right. IR8, and IRRI, did indeed "make history." IR8 changed the world food situation and initiated what is now called the Green Revolution in rice.


**IR8 PICTURED next to its parents: Peta, a tall, vigorous variety from Indonesia, and the Taiwanese dwarf variety DGWG.**

IRRI

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The author (*left*) with former Viet Cong political officer Tran Van Rang on the Xa No Canal in the lower Mekong Delta in 1988. Rang has just explained why he didn't have me killed 18 years previously, when he'd had the chance.

VO TONG XUAN

# I Remember Honda Rice

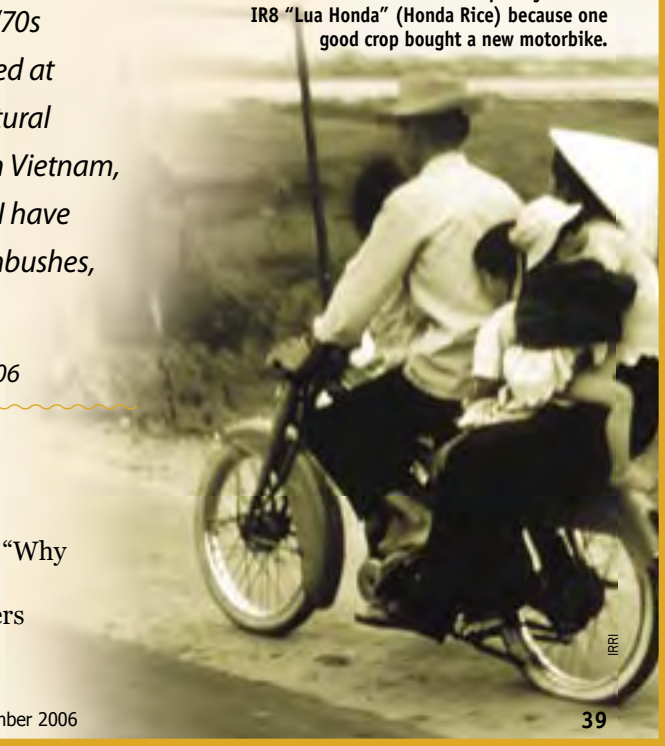
**by Tom Hargrove**

## *How the first Green Revolution rice variety—IR8—influenced life and death in the Mekong Delta during the Vietnam War*

*The Green Revolution in rice has been documented throughout much of Asia, but few think of Vietnam in the 1960s and '70s as a "Green Revolution country." That's because IR8 arrived at the height of a brutal war that overshadowed an agricultural transformation in the countryside. Rice means life itself in Vietnam, and was used both as a weapon and as a tool for peace. I have strong memories of the war: Huey choppers, mortars, ambushes, and needless deaths. But I also remember Honda Rice.*

*Tom Hargrove, August 2006*

A VIETNAMESE family of five on a motorbike in 1974. Vietnamese farmers quickly dubbed IR8 "Lua Honda" (Honda Rice) because one good crop bought a new motorbike.



IRRI

**4 June 1988, in Hau Giang Province, Vietnam (Chuong Thien Province during the war)**

I'm stunned. I struggle for the right words, then simply ask, "Why didn't you kill me, Tu Rang?"

"Because you brought the new rice seeds, and our farmers needed them."

"But did you know I was a U.S. Army officer?"

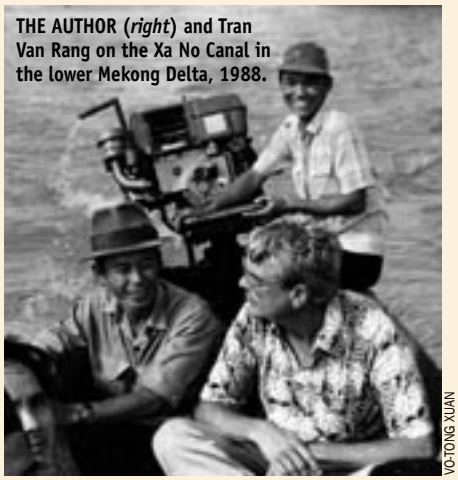
"Of course. Your civilian clothes didn't fool anyone."

The former Viet Cong—literally, Vietnam Communist, the common name for the National Liberation Front—and I look into each other's faces, something we never did in 1969-70. He's smiling, but he's hard—it shows. He's also telling the truth. I can sense it.

"I was less than a kilometer away whenever you traveled this canal in 1969," Tran Van Rang says. Today, Tu Rang is vice-chairman of the Vi Thanh People's Committee. But, two decades ago, he was the local Viet Cong political officer. I know that political officers held ultimate power in the Communist infrastructure—they gave orders to military commanders.

"You were entering *my* territory when you came here," Tu Rang continues. "The local farmers all supported the Revolutionary Forces, and reported on you.

"But I didn't have you killed because of the new rice seeds."



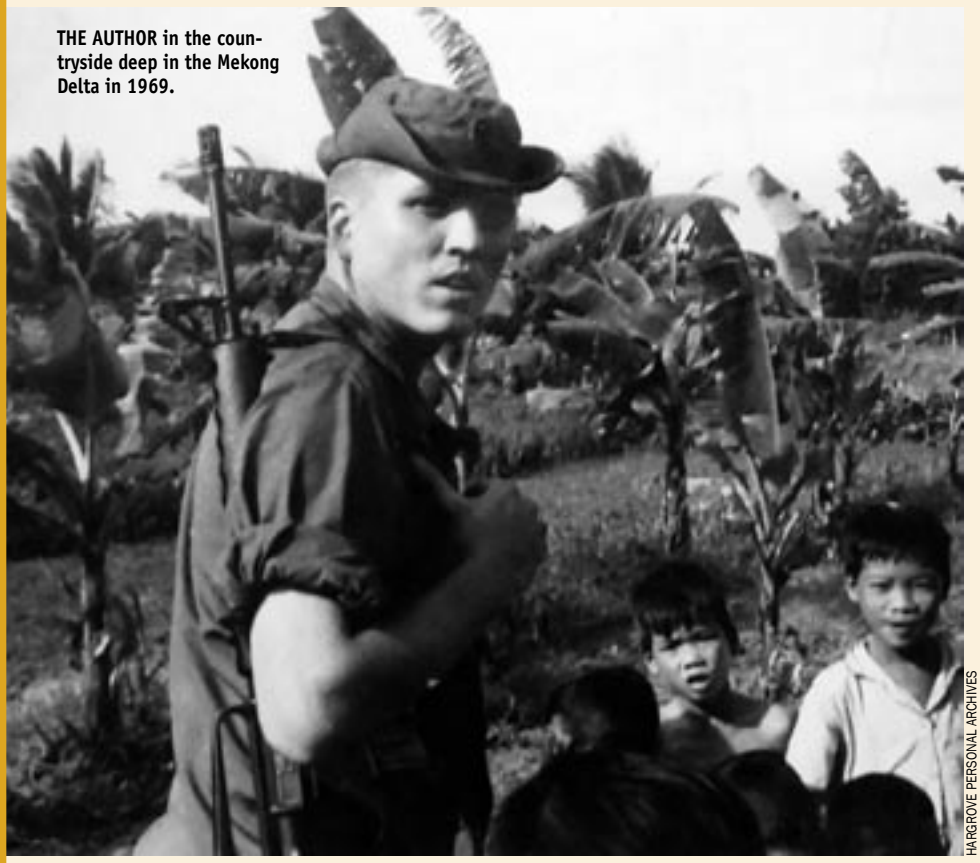
THE AUTHOR (*right*) and Tran Van Rang on the Xa No Canal in the lower Mekong Delta, 1988.

VO-TONG XUAN

This trip is getting heavy, I think, as our sampan cuts north through the muddy waters of the Xa No Canal.

New rice seeds. To me, they're one of the world's most powerful tools for peace. That's why I made the Green Revolution my profession.

But I learned about those seeds—especially IR8 or Honda Rice—here, in the midst of carnage. Had there been no war, rice wouldn't have become such a part of my life. Now I must face a new reality: those rice seeds probably *saved* my life.



THE AUTHOR in the countryside deep in the Mekong Delta in 1969.

HARGROVE PERSONAL ARCHIVES

The lower Mekong Delta is peaceful and beautiful now. But I remember it as ugly, dangerous, and one of the most tragic places on Earth. To me, this is still 1969-70. We've just passed Duc Long. I remember friends being killed in an ambush north of this village ... in a sampan that I was supposed to have taken. Tu Rang must have ordered that ambush. I know I'm safe now, but I've never traveled this canal without an M-16 and bandolier of ammunition.

"Has any other American been here since the war?" I ask Dr. Vo-Tong Xuan, my host and vice-president of the University of Can Tho. Xuan, who is now the rector of Angiang University, in the Mekong Delta, had worked as a research fellow at the International Rice Research Institute (IRRI), where I'd worked since 1973.

"No, you're the first foreigner—of *any* nationality—to be in the lower Ca Mau Peninsula since the war ended in 1975."

I can do it only because I work with rice.

## 2006: looking back

Vietnam veterans and historians have recently queried me about the origin and history of the term Honda Rice in the war. Interesting, considering that the war ended 31 years ago. Or did it? Wars never really go away, for those who lived them.

War and rice. Anyone who wants to understand the war should know the role that rice played. I learned about rice as a young U.S. Army officer deep in Vietnam's heavily contested Mekong Delta at the height of the war, in 1969-70.

IRRI released the semidwarf IR8 to farmers in late 1966. Within a couple of years, it was the most widely grown rice variety ever known. IR8 launched the Green Revolution in Asian rice.

The Western press called IR8 the miracle rice. Its official name in Vietnam was Lua Than Nong, or "Rice of the Farming God."

But Vietnamese farmers quickly dubbed IR8 Lua Honda—or Honda Rice—because one good

**HAVING TEA** in the Ba Lien home in 1988 are the author (*second from left*), Ba Lien's granddaughter Huyen Xuan Dep (*center, holding baby*), and Ba Lien (*far right*).

VO-TONG XUAN

crop bought a new motorbike.

How did I get into rice in Vietnam? I was raised on a West Texas cotton farm. I received my B.S., a double degree in agricultural science and journalism—along with an Army officer commission—from Texas A&M University in 1966. I then finished an M.S. at Iowa State University and, in 1968, reported to Infantry Officers School at Ft. Benning, Georgia.

I arrived in Vietnam in June 1969 as a first lieutenant. The legendary John Paul Vann (made famous by the book and movie *A Bright Shining Lie*) ran the war in the Mekong Delta. Vann reviewed my records, saw my farm and educational background, and assigned me, as an adviser to the Vietnamese military and government, to Military Assistance Command-Vietnam (MAC-V) Team 73 in Vi Thanh in Chuong Thien Province, in Vietnam's southern Ca Mau Peninsula. Seventy percent of Chuong Thien's population was rice farmers.

Chuong Thien was an awful place for a dryland cotton farmer. The average elevation was less than 1 meter, and 97% of its land was covered by water—rice fields or swamp—during the 6-month monsoon season.

Chuong Thien was also a Viet Cong (VC) stronghold. The U.S. military constantly classified it as one of the two least secure South Vietnamese provinces. Putting it another way, Chuong Thien was one of the VC's two *most secure* provinces.

A dozen U.S. advisers were killed in Chuong Thien during my 1-year tour. Five were killed in sampans. These boats were our only transport, unless we could hitch a ride on helicopters, along the rivers and canals during 6 or 7 months of monsoon rain. No one survived a sampan ambush.

Our casualties may not seem high, but only 160 Americans were stationed in Chuong Thien, and only 30 or 40 advisers worked outside the small provincial HQ in Vi Thanh.

Chuong Thien was also the only Delta province with no civilian agricultural adviser, assigned by the U.S. Agency for International Development (USAID). The word was, none would go there. But no one asked if I *wanted* to go to Chuong Thien—the Army sent me.

U.S. President Lyndon B. Johnson, or LBJ, had visited IRRI in October 1966, accompanied by Philippine President Ferdinand Marcos. LBJ appreciated farmers, and went into the IRRI experiment fields to see IR8 (see main photo, pages 34-35). LBJ made a historic flight later that day, to Cam Ranh Bay, Vietnam, "to visit our boys over there." Johnson later pressured USAID to promote the hardy IR8 in Vietnam.

IR8 had arrived in Chuong Thien Province in 1968—a year before me. The first IR8 seeds were smuggled into Vietnam in 1967 by my colleague Jose Ona, a Filipino agronomist who had done his M.S. research at IRRI, then was hired as USAID rice agronomist for the Mekong Delta. A friend at IRRI had harvested the IR8 seeds from IRRI experimental plots, and given them to Ona.

Ona then set up IR8 demonstration plots in each province of the Mekong Delta. I feel safe in saying that no farm technology—anywhere—ever spread faster than IR8 seeds in the Delta, even at the height of the fighting.

A farmer named Ong Ba Lien planted the first Honda Rice seeds in Chuong Thien Province in late 1967. He was the best farmer in the region, and Ona and I later tested and demonstrated IR8 and IR5, another IRRI variety, on his farm. I felt not only welcome but, rarer in those days, *safe* on Ba Lien's farm, even though the area ranged from dangerous to suicidal for Americans.

When I arrived in 1969, farmers were already growing IR8 on almost 1,000 hectares across the province.

I was soon bringing IR8 seeds to farmers, who suffered as much as any people I've ever known, across Chuong Thien, a province that the war had torn brutally. We traveled mostly by sampan on brown-water canals and rivers with Vietnamese agricultural cadres and soldiers.

But sometimes by Huey helicopters. I could spot IR8 easily from choppers, because it reminded me of a "crew cut." IR8's short, stiff stems held it erect, while the tall traditional varieties fell over and lay flat. Thus, IR8 could convert nutrients to heavy heads of grain, and hold them upright.

That genetic trait made IR8 outyield any rice that tropical Asia had ever known. Farmers started harvesting 5 or 6 tons per hectare from fields where yields had stagnated at 1 or 1.5 tons for centuries. Traditional rice varieties took 160 to 200 days to mature, so farmers could grow only one crop per year using the monsoon rain. IR8 matured in about 130 days, so farmers could grow two crops per year. The new rice was also nonsensitive to daylength, so farmers anywhere could grow it, at any time of the year.

By mid-1970, IR8 was planted on about half of Chuong Thien's rice land, land that was scarred by bomb and artillery craters.

That's what made it tough to come to a personal peace with Vietnam. In my other role, as an Army officer, I called a lot of the bombs and artillery that left those scars, and sometimes killed or maimed farmers who were grateful for the IRRI seeds. War and peace. Working with both was hard.

The new rice seeds were the only good thing—other than wonderful Mekong Delta farm families—that I saw in the war.

To me, new seeds offer hope. Maybe that's why I made rice improvement—then later, overall international agricultural development—my profession after Vietnam.

But I learned about those seeds in a setting of death.

What did the Viet Cong think about IR8? In the first couple of years, the VC opposed IR8, calling it a plot of the "imperialistic Americans." But, in 1970, the VC

**THE AUTHOR (*far right*) and Vietnamese staff at the Rice Research Station in My Tho, in the Mekong Delta in late 1974, a few months before Saigon fell.**

HARGROVE PERSONAL ARCHIVES

IRRI

DESPITE THE TURMOIL of the war, IRRI maintained a presence in Vietnam. Here, the Institute's inaugural director, Robert Chandler, talks to trainees from the National Rice Production Training Center just outside Saigon in August 1969.

changed its position and issued a new directive. VC cadres were now to learn IR8 culture, and take the new seeds to contested or "liberated" (meaning VC-controlled) zones.

### IR8 in North Vietnam

Information is scarce about how IR8 and other IRRI varieties spread in North Vietnam during the war. I've read that in 1968 or 1969, an Eastern European vessel—I believe it was Polish—purchased a shipload of IR8 seeds at Dhaka (then in East Pakistan) and quietly off-loaded the seeds at Haiphong, the main North Vietnamese port. From there, the seeds went to farmers in the Red River Delta.

A former high-ranking North Vietnamese agricultural official told me that IR8 reached North Vietnam in other ways. Some of the few North Vietnamese soldiers who went back north on the Ho Chi Minh Trail carried a kilo or two of IR8 seeds.

IR8 was called Nong Nghiep 8, or "Agriculture 8," in North Vietnam. But I'm sure the farmers weren't told that the high-yielding seeds were bred at an institute then funded entirely by the Ford and Rockefeller foundations, spawned by capitalism. Yet neither foundation intended for those seeds to be used for war.

### Back to the Mekong Delta, two decades later

The Army discharged me in 1970. In early 1973, I joined IRRI, the source of those seeds that had impressed me so greatly. My family and I moved to the Philippines, and I spent the next 19 years following the world's rice crop.

In 1988, IRRI sent me to Vietnam to write about IRRI's impact there. It was my first return since the war ended in 1975. I probably could have returned to Vietnam years earlier, but I was afraid of how I might react, emotionally.

"Can we go look at the rice in the old Chuong Thien Province?" I asked my friend and host, Dr. Vo-Tong Xuan.

That led to the most emotional journey of my life. Soon after arrival in Vi Thanh, Tu Rang, Xuan, and I were traveling by sampan 8 kilometers up the Xa No Canal to visit Ong Ba Lien, the farmer who had planted the first IR8 in Chuong Thien.

I was never sure about Ba Lien's politics. I doubted that he had any. Honda Rice, or IR8, was the bond of our friendship.

Tu Rang speaks: "Of course, Ba Lien supported the National Liberation Front during the war. His two sons-in-law were Viet Cong colonels. One was a revolutionary hero. And his wife is my aunt, and helped us gather information on you."

"Ba Lien never told me *that*," I reply.

"How *could* he?"

Tu Rang's words are numbing, but I knew that most farmers along the Xa No probably supported the VC, at least at night. I bear no animosity; I'm still alive.

We dock along the canal and follow the ex-VC to a familiar palm thatch home beneath coconut palms, surrounded by bougainvillea, in a grove of banana, papaya, and mangosteen. The house is so much smaller than I remember.

Ba Lien is in his seventies now, and his beard is scraggly and white, but I recognize him easily. We shake hands and embrace. We sit at a round table, where we had often shared simple meals of fish and rice. A crowd gathers, and someone pours green

THE AUTHOR (*tallest*) and Ong Ba Lien (*center, next to the author*) at the Ba Lien home. I had just given Ba Lien's granddaughter, Huyen Xuan Dep (*holding book*), a Vietnamese copy of *Field Problems of Tropical Rice*, an IRRI booklet that helps identify common pest and soil problems.

VO-TONG XUAN

tea. I talk about my family, IRRI ... anything to hold back the emotion as Ba Lien throws me back in time.

"Do you remember Jose Ona, who brought the Honda Rice?" I ask. Xuan translates. "And how in 1970, Jose smuggled 2 kilograms of IR20 seeds from the Philippines?"

Those IR20 seeds—the first in all of Vietnam—were precious, because IR20 was IRRI's first improvement over IR8. Yields were slightly lower, but IR20 had better grain quality and resisted several insects and diseases without pesticides. Ona and I gave the IR20 seeds to Ba Lien in trust, because we knew he'd give them the care they deserved. Within a few years, IR20 had replaced IR8 across the Mekong Delta.

Yes, Ba Lien remembers the same things I remember—Honda Rice, Ona, IR20.

A shrill voice breaks my thoughts: "Uncle Tom! The tall American!" A young woman rushes through the crowd and grasps my shoulder. Xuan asks her to slow down, then translates.

"I remember you so well. I'm Huyen Xuan Dep, Ba Lien's grandaughter—the little girl you carried around the farm on your shoulders." She now balances her own baby on a hip.

All I can say is, "Yes, but I can't do that now." I can't talk anymore, so Ms. Dep and I walk outside to the concrete patio where Ba Lien dries rice.

I pull a copy of *Field Problems of Tropical Rice*, in Vietnamese, from my bag. I coordinated publication of the IRRI booklet, with 158 color photos to help farmers identify rice pests. I'm proud that Xuan and I raised the money to print 160,000 copies of the Vietnamese edition—enough to give one copy to every agricultural brigade in Vietnam.

Ms. Dep clutches at, then flips through, the booklet. She thrusts an open page at me. "This is our problem now!" It's thrip damage.

MILES HARGROVE

THE AUTHOR in 2003, during his fourth return to Vietnam since the war. This time, my son Miles and I were filming a documentary.

I introduce her to entomologist Nguyen Van Huynh, like Xuan, an IRRI alumnus. We all go to the field.

The rice looks bad, and Huynh confirms that thrips are the problem. IRRI variety IR13240, resists most pests, but not thrips. Huynh tells her how to save the crop, if she can get the chemicals.

We go back to the house. "What happened to the bomb shelter?" I ask. "It was in that corner."

"We don't need a bomb shelter anymore." I'd made a bad joke, and everyone knew it. But it was okay.

It's finally time to leave. About 30 Vietnamese have gathered at the canal to see us off. "We know it was hard for you to come here," Ms. Dep says, as tears streak her cheeks. "We are deeply moved that you remember us after all the years."

I should have taken *her* child for a ride around the farm on my shoulders, I think. But it's too late now.

A dozen Vietnamese are crying as we climb into the sampan for the trip back to Vi Thanh. Me too, I guess.

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*Much of this article is adapted from Hargrove's book* A Dragon Lives Forever: War and Rice in Vietnam's Mekong Delta, *originally published by Random House/Ivy, now available from AuthorHouse.com.*