



rice TODAY

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December 2015

**Special issue: Tribute to Robert S. Zeigler,
IRRI director general (2005-2015)**

A "mad" scientist speaks candidly

A 10-year whirlwind

Zeigler editorial potpourri

TRIBUTE TO A COLLEAGUE AND FRIEND

As a tribute to Dr. Robert "Bob" Zeigler, I am delighted to present this special issue of *Rice Today* magazine, which chronicles his career, particularly at the International Rice Research Institute (IRRI). Bob, an internationally respected plant pathologist with more than 30 years of experience in agricultural research in the developing world, has been the IRRI director general for the last 10+ years—the second longest tenure after only the Institute's founding DG, Robert F. Chandler, Jr. (1960-72). As DG, Bob set the Institute's strategic direction and has also been a passionate spokesperson on a wide range of issues that affect rice growers and consumers worldwide. He retires in mid-December 2015.

Bob has had a productive research career on diseases of rice that focused on host-plant resistance, pathogen and vector population genetics, and their interactions to develop durable resistance and sustainable disease management practices. As Bob's career moved increasingly toward research management, his interests expanded to include broader crop management issues, the social forces shaping the agricultural environment, and finally the economic and political arena that frames food security and poverty issues. He has published more than 100 scientific works in these areas and often serves as an expert resource on rice security in the regional and global media.

Proclaiming himself an introvert, he still granted me this IRRI pioneer interview on 28 August 2015 with his customary wit and candor. In addition to his early years, he covered his professional life, which spanned time spent in Africa, Latin America, Asia, and the United States. Although a long 4-hour discussion—presented here in its entirety in more than 18,200 words—it is a quick and enjoyable read because he has an uncanny knack for telling entertaining stories that have important messages embedded in them.

He talked about a childhood dream of becoming a "mad" scientist, emulating the science fiction movies and comic book super heroes that were popular in the 1950s and '60s. In high school and college, he found science to be "mind-blowing". During the early 1970s, a stint in the Peace Corps cultivated his interest in plant disease. He had no ambition to be a center director general, but when tapped to do so, he gave it his all and met a number of big challenges head on. He concluded that there is no other job like being at the helm of IRRI.

He peppered the interview with anecdotes about polar bears and all-meat dinners above the Arctic Circle, studying forest fires in Crater Lake National Park, what gives him



goose bumps, and the wheels of the brilliant machine that is IRRI. He also gave frank opinions and views on a wide-ranging set of topics—Golden Rice, IRRI's proud Filipino roots, the research funding roller coaster, the plight of smallholder farmers, the role of women, the humbling experience of working with national programs, the Svalbard Doomsday Vault, climate change, growing up Catholic,

and unsolicited advice for the incoming DG Matthew Morell, among others. A "lightning round" at the end fills in a few more gaps. See the online version with links at <http://ricetoday.irri.org/zeigler-full-interview>.

This special *Rice Today* issue also features a timeline covering Bob's tenure as IRRI DG. It is a significant and event-filled subset of IRRI's overall timeline that can be found at www.irri.org/about-us/our-history. His activities start off at a reasonable pace early on, but around 2013 they become a breathtaking whirlwind.

A final section reprints two think pieces by Bob on *A Bitter harvest from a noble cause* and how *High science and smart policies will alleviate hunger and poverty*. We also reprint some selected editorials of Bob written for *Rice Today: a decade of storytelling* in *Rice Today*; the 50th anniversaries of IRRI and rice research in India, respectively, in 2010 and 2015; the inconvenient divergence of increasing population and decreasing arable land; and ensuring enough rice for future generations.

I, like Bob, turn 65 in January 2016. He is just 27 days older than me (that is why I look so much younger in the photo). So, with retirement looming after more than 22 years at IRRI, this special *Rice Today* is my next-to-last issue of the magazine as editor-in-chief, with only the January-March 2016 issue remaining.

I am the last original staff member on the magazine since its debut in April 2002, serving as contributing writer, Asia editor, and finally, editor-in-chief. It's been the pinnacle of my time at IRRI to witness the magazine's growth to become the Institute's flagship publication. This may have never happened without Bob Zeigler's determination to keep the magazine, knowing its potential, off the budget-cut chopping block. Thanks, Bob, for this and everything else!


Gene Hettel

Rice Today editor-in-chief and IRRI historian

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Uncredited photos are from the IRRI archives.



About the cover

Dr. Zeigler interacts with farmers in their fields around the world; here in the polder region of southwestern Bangladesh. (Photo by Gene Hettel)

Back cover ►
(clockwise from upper left):
Dr. Zeigler

- Consulting with farmers in northeastern Thailand (Photo by Gene Hettel)
- Giving a media interview at 3rd International Rice Congress in Hanoi (Photo by Gene Hettel)
- Mingling with research staff at Bangladesh Rice Research Institute (Photo by Gene Hettel)
- Attending the opening of the Svalbard Doomsday Vault north of Arctic Circle (Photo by Crissan Zeigler)
- Receiving the Order of Sikatuna, the highest award that the Philippine Government can give to a foreign national (Photo by Isagani Serrano)
- Updating staff on the state of the Institute (IRRI archives)



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IRRI is the world's leading international rice research and training center. Based in the Philippines and with offices located in major rice-growing countries, IRRI is an autonomous, nonprofit institution focused on improving the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes, while preserving natural resources. It is one of the 15 nonprofit international research centers that are members of the CGIAR consortium (www.cgiar.org).

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An introverted “mad” scientist speaks candidly, making no apologies

Agricultural beginnings on Pennsylvania dairy farms

When I was a kid growing up, both my parents came from farming families—they were dairy farmers. My father’s farm was in southeastern Pennsylvania; my mother’s in southwestern Pennsylvania. I was probably mostly influenced by my mother’s side of the family. They were pretty much very small dairy farmers, scraping to get by. I didn’t realize it at that time that they were very poor; I thought that’s what everybody was. The men worked in the bituminous coal mines of Cambria County. They got up at 4 o’clock in the morning, milked the cows, did a full shift in the coal mines, came back to milk the cows, raised their families. That was the way things were and I thought that was normal.

I just had the greatest admiration for those people. On weekends and during the summertime, I worked with them on the farms. I remember my jacket—I would have a lightweight jacket in the spring and in the fall and it took on the smell of the dairy barn. Then, I would wear that to school the following week with great pride that I smelled like a barn. I never understood why the girls would say, “Ewww, you smell like a barn!” I would say, “Yeah, that’s great; I smell like a barn, ain’t that the greatest perfume.” That probably explains a lot about my great history of dating as time went by.

And so, those were my formative years, which instilled in me a very deep admiration for farming and the pride people take in their farms. That somehow rubbed off on me and that’s something I’ve never lost.

A fourth grader’s wish: to be a mad scientist

Science always grabbed my attention as a kid. I was probably just wired that way. I loved plants. My earliest memories are of me working with my mother. She always had a vegetable garden and I just loved it when the plants came up, especially the first flowers in the spring. It just

gave me a sense of indescribable joy and a love of nature, life, plants, and gardens that I have to this day.

That led to a curiosity that transferred into science. I liked the 1950s’ science fiction movies, *The Killer Shrews* and *The Bride of Frankenstein*. Then, there were all the comic book superheroes such as the Flash, Atom, Green Lantern, Superman, and Batman. They had in them the good and the evil



of science all wrapped throughout. I took the good and thought it was exciting. This was pretty instrumental in shaping how I view the world, I think, in retrospect. The mad scientist role was a career model! I could be a mad scientist.

I had chemistry sets back in the 1950s and ‘60s. You could buy unbelievable sets that were toxic and explosive. My favorite pastime was to see if I could blow things up—a natural child’s pastime. I had very early on had an orientation towards science, plants, and discovery. The mad scientist role, I think, was that one could do things with science that were not normal.

Biology was mind-blowing

We had moved from State College, Pennsylvania, the home of Penn State University where my father was employed, to Urbana, where my father took a new job at the University of Illinois. My mother was a very devout Roman Catholic. She agreed to move from Pennsylvania to Illinois only if I could go to a Catholic school. So, I did; it was great. Before that, I was a terrible student—and I mean terrible! I was probably in the lowest quarter of students in terms of performance—barely passing. When we moved to Illinois, I had a fresh start. And in this Catholic school [St. Mary’s in Champaign, Illinois], I went into the 8th grade where there

was only one classroom for 25 of us. It was a pretty ordinary level of education and I did extremely well. I got my feet on the ground. I did extremely well at the Catholic school. I made friends that I have to this day. I was the worst student in terms of religion. We antagonized the mother superior in that class to the extent that, a few years later, she quit being a nun. I'd like to think that, to some extent, we had some responsibility for that.

When I rejoined the regular public school system in 9th grade [Urbana High School], I was put in the dumb track—a track for the kids who were not very well prepared. That meant, in 9th grade, instead of taking biology, I had to take general science. All the smart kids took biology in 9th grade and in 10th grade they went on to other things. But, the dumb kids took general science in 9th grade and biology in 10th grade, which turned out to be one of the best things that ever happened to me. The general science curriculum in 9th grade, even though it was for dumb kids, was actually very broad and quite rigorous—and I loved it.

I got the broad general science, physics, and chemistry; I did not touch biology. And I excelled. I was by far away the brightest kid in the class since most of the others were juvenile delinquents. Then, in 10th grade, I took biology and again the biology that was offered in the 10th grade, even though it was for the dumb kids—to use that politically incorrect term—the curriculum was actually much more rigorous. I was exposed to biology in a way that was just mind-blowing and I loved it. By being tracked with the dummies, I ended up actually being exposed to a much more rigorous curriculum, and I thought this is fantastic.

I really got turned on by science in a way that was academic as opposed to the mad-scientist comic book/science fiction movies. I thought, “Hey this stuff is really deeply neat.” It just helped change the way I saw things in the world.

I could have gone with the hoodlums or with the kids who were really smart. It was going to be one extreme or the other. Eventually, I fell in with the really smart kids because they were sort of social outcasts and so was I.



GENE HETTEL, IRRRI (L&S)

When I was in high school with these really smart kids, we were part of a boy scout explorer course. One of our great activities was to go backpacking. We would take summer trips out to the Rocky Mountains and to glacier parks and spend two weeks hiking through these mountains, and that, to me, was mind-blowing and eye opening. Oddly enough, once I got turned on by biology and general science, my whole attitude towards learning changed, and I thought all this stuff were pretty cool.

Somehow, I made the switch and got my brain so I could function within a normal school environment.

Molecular biology vs. plant ecology

I ended up going to the University of Illinois, based on what I did in high school. After admission there, I had an interview with an advisor who saw something in me. He recommended that I go into an Honors Biology Program. That really changed the course of my life. It was not the general biology pre-med class with 300 students; instead, around 10 of us were taught by four professors. It was a large land grant with thousands and thousands of students. It was akin to going to a school like Harvard with small classes and outstanding teachers.

Molecular biology was the thing at that time. The faculty there was really on the cutting edge and I was told, “Bob, you have got to go into molecular biology.” Being the iconoclastic, irreverent rebel that I was, I decided that I would go into plant ecology, the exact opposite of molecular biology. Ecology, which is a fascinating field, would bring together a lot of different things for me.

When I finished undergraduate school, I had experience working in a laboratory with Larry N. Vanderhoef, who eventually became the Director of Research at the University of Maryland and then the Chancellor of the University of California, Davis. I worked at his lab one-on-one with him, a brilliant, really nice guy. My conclusion, at that time, was that I did not want to go on to graduate school.



U.C. DAVIS

I took a plant ecology field trip to Mexico and was blown away again. I had never seen the ocean before. Mexico showed me a different culture with snow-capped mountains and tropical beaches. In the cities, I could drink beer even though I was only 20 years old. I didn't have to worry about an ID; fantastic food—my God, I thought I'd died and gone to heaven! I came back from that trip transformed. As a result, I joined the U.S. Peace Corps and was sent to Africa—Zaire, specifically, because of my French ability. How I learned French in the first place is interesting.

Learning French the Plato way

I took French in 7th grade, probably at a low point of my academic performance, and got a D minus. I took Spanish in 9th and 10th grades and just did horribly, absolutely horribly. I couldn't understand English grammar; I didn't understand French or Spanish grammar.

In 10th grade, my teacher said, “Bob, I'll make a deal with you. If you don't take another Spanish class in high school, I will pass you. I will give you a D.” I said,

“God, what a deal!” I won’t fail and I won’t have to take anymore Spanish. I had won the lottery on this one. What’s interesting is how this thing came together—and really funny. Because I was in the Honors Biology Program at Illinois, my program would not fit the normal schedule of courses.

Because I was in a Liberal Arts program, I had a language requirement. I had to take French; that was the deal for some reason, even though I almost failed it in high school. I ended up taking the only French program that would fit mine, which had an “X” beside it. I found out later that it meant “experimental.” I showed up in this French class and the class was told, “Guys, this is an experimental French class—the first in the history of the world that’s going to be taught by a computer. It’s called the Plato system. We’re going to teach you French in a way it’s never been taught before. You will never see a written word of French in the first year; you’re only going to hear French and you’ll be learning it orally. You will have a lectured class, but you won’t be seeing any written French. You will have interaction with the computer and a very sophisticated taping system.” I just loved it.

I ended up spending untold hours on weekends and evenings in the laboratories working on French because I was really curious. It was not being taught having to learn nouns, verbs, and adjectives. I still have a hard time picking up which is which, but this program was completely different and I just loved it, and did extremely well. The irony of all this was that having essentially failed French in 7th grade and Spanish in 9th and 10th grades, I ended up working in my career in environments where I had to speak fluent Spanish and French. And I learned them both, thanks to this entirely new way of teaching—which was opened up, to some extent, because of my weird attitude to be a mad scientist.

A transformation in the U.S. Peace Corps— interest in plant disease

I went to the Peace Corps and got sent to the Congo, Zaire at that time. I was placed in a little school, Collège Musim, out in Bandundu Province about 200 kilometers north of Kikwit [arrow on map]. If you “Google” Kikwit, you will learn about the Kikwit strain of Ebola that arose in May 1995, way after my time. At Collège Musim, I taught math, chemistry, physics, and biology to 9th through 12th grade students—60 kids to a class and in French. I was intrigued and I loved living in fascinating rural Africa. A transformative event was an outbreak of bacterial blight that wiped out the cassava crop [the third largest source of food carbohydrates in the tropics, after rice and maize]. I knew a little bit about blight because of the southern corn



leaf blight that caused losses in the 1970s in the Midwest [United States]. Here, the main food for the people in my area was wiped out. This was causing local starvation. We had to close our school; there was not enough to feed my students. It really struck me that a plant disease, hitting a staple crop, could have such impact and nobody could do anything about it. I heard rumors that some guys from an international center had gone to Kikwit to look at the outbreak of bacterial blight. It was James Cock from CIAT [International Center for Tropical Agriculture], whom I ended up working with years later. Anyway, that got me interested in agriculture and disease.

Later, when I was a graduate student at Oregon State University, I took a forest pathology course because I wanted to study the interaction of dwarf mistletoe parasitism, fire, and community dynamics. This continued my turn-on to plant disease. The complexity of plant disease in ecosystems, my exposure to its impact on cassava, and the real eye-opening experience of living and working in a developing country [through the Peace Corps] all directed my career from then on.

I joined the Peace Corps with a sense of adventure. I’d like to think that I wanted to improve the world and serve mankind. But to be blunt about it, I was 20 years old and I wanted to see the world and let somebody else pay for it. Of course, I took it very seriously. I prepared the courses that I taught very seriously and cared for the students as best as I could. But I was a 20-year-old kid. I traveled around Africa in the back of trucks, climbed Mt. Kilimanjaro, and visited game parks. I lived on just a couple of dollars a day and it was just fine.

Designing a fire plan for Crater Lake National Park

After I came back from the Peace Corps, I went to graduate school at Oregon State University and studied plant ecology. I examined the fire history of Crater Lake National Park, a beautiful place. My thesis project was based on the premise that the [U.S.] national park system should retain the forest in its pristine state. People have been putting out forest fires since 1900 even though fire is a



OREGON STATE UNIVERSITY

part of the natural environment. An interesting question: should we actually introduce forest fires? If the answer is yes, how do we go about it to capture the pristine state? We needed data. I petitioned my professor, Don Zobel (photo), to do a study on lodgepole pine forests, which is the primary forest species in

Crater Lake Park, to determine its pristine state. How might it have changed because of fire suppression and what did we need to do to reconstitute the pristine state of the forest there?

Don said, "Your thesis is to re-create the past and determine what we need to do to protect the forest and create the path to the future." That involved quite detailed studies on age, community, and structure to try to predict how things have changed over the last 70-80 years. It was fascinating.

Crissan, my wife, worked with me very closely. She collected the data in the field—quite thankless, hard work. Eventually, we got it done and we came up with a fire plan for Crater Lake National



BRYANT OLSEN

Park [Zeigler, R.S. 1978. The vegetation dynamics of *Pinus contorta* forest, Crater Lake National Park. M.S. Thesis, Oregon State University, Corvallis]. We wrote it up, my professor (Don Zobel) and I. Don, a great, wonderful adviser, said, "We need to determine when this should be re-evaluated to see if it has been effective or not." He asked, "Bob, how old are you, 25? Okay, let's say in 75 years. You'll be dead by then!" And sure enough, that's what they did [re-evaluation slated for 75 years later].

But here's the crux of this story. About 4-5 years ago, Crissan and I were driving back to Portland and we stopped at Crater Lake. We love stopping there. I open the door and smell a marvelous mixture of pumice dust, pines, and mountain air, and BOOM! I am sent right back to my youth. We came up to some parked cars and stopped. Some park rangers were there talking to visitors. We looked over the edge where, far below on the forest floor, was a raging forest fire. It was pretty big and crowning up. Some people shouted, "Why aren't you putting out that fire?" One of the rangers answered, "No, this is part of the forest management program's scientifically-based management program for Crater Lake National Park, based on a set of very, very important studies done in the 1970s that recommended ..." I thought, wow, she was talking about

me and my work! Oh my God, one does not get to experience that very often. What a coincidence that I was there in the crowd. I went up and talked to the ranger later and told her, "I'm the guy who did that study." She looked at me and rolled her eyes, saying, "That's interesting, thank you very much! Nice that you are back." From the expression on her face, she probably thought that I was really some old visiting crank.



No ambition to be a director general

It's funny. I never, ever had an ambition to be a director general. I, like most young, hungry scientists, loved nothing more than to make fun of the DG and to complain. My God, what we said: "Obviously, the director general does not know a damn thing; what is he thinking, etc." I was very much an iconoclast who felt that people in authority were pretty much incompetent and didn't know what they were doing. I made no secret about it and said it quite openly. Surprisingly, I still had a job [as a plant pathologist at both the International Center for Tropical Agriculture (CIAT) in Colombia and IRRI]. There were a number of people who said they wanted to be a DG. I won't say their names, but none of them became one; that's interesting.

The first time the notion of DG was ever mentioned to me was in this office. I was giving an exit interview to Ron Cantrell [then IRRI DG, 1998-2004]. I was going off to Kansas State University to be the head of the Plant Pathology Department. I didn't think I'd ever be back in an international center again. I thought I'd be moving into U.S. academia, focusing on agriculture there. Ron mentioned in passing that he saw a great future for me and, some day, I could even be sitting in this chair. I thought, "What, are you crazy?"

At that time [1998], CGIAR DGs were gods and I certainly didn't have any god-impression about myself. But lo and behold, 6 years later, I had left Kansas and was heading the CGIAR's Generation Challenge Program based at CIMMYT [in Mexico]. There, one of my colleagues, who was a good friend of Ron Cantrell, told me that Ronnie was resigning from IRRI and that he and Bob Havener [former IRRI interim DG in 1997] said they thought that one of the strong candidates for the position would be me. Anyway, to make a long story short, it ended up being me. But it's something I never sought.

Regarding the power and responsibility of a DG, the power is overstated and the responsibility is underappreciated. It's the best job I've ever had, I can tell you that. It's also the hardest job I ever had. I wouldn't wish it on anyone. It takes physical and emotional tolls on you. But, for a place like IRRI, assuming you do the job well, the opportunity that turns IRRI resources into making a

difference in the world is something you can't walk away from. If you're given the opportunity and you're a serious person, how can you say no.

Not “one of the boys” anymore



I was certainly one of the boys when I was here [as plant pathologist at IRRI, 1992-98, photo]. We had some wild, raucous times that will be best described by others.

Advantages. There were real advantages for coming back [as DG] after 6-7 years, and one was that I knew rice. I am the only director general of the Institute who actually has had a career in rice.

I understood the rice plant; I understood the challenges around rice biology, agronomy, and crop protection. I had an administrative career in rice at CIAT and at IRRI. I also have a pretty good appreciation of IRRI's culture, for better or worse. I knew where a lot of skeletons were buried. I knew ALL of the tricks that people pull on senior management because I had pulled them all myself in previous incarnations. I had a good relationship with most of our partners across the region. I had an appreciation for the real potential of rice in Africa.

Disadvantages. There were also some disadvantages, one being that I was friends with people [from the previous stint at IRRI in 1992-98] and that friendship could get in the way of doing my job—and that was really hard. I had to let people go who I used to play tennis with and socialize with; that's no picnic. Likewise, the direct expectations from me that people could draw on a past relationship to get favors done made me uncomfortable, to put it mildly. It was particularly hard for my wife. There were expectations that we could magically transform real problems or challenges at the Institute. As I looked more and more into what were the underlying problems that manifested themselves as dysfunctions in the Institute, I saw that there was some huge transformations that had to take place—and this took years. Some of them are still underway 10 years later. That was really hard because people didn't appreciate the insights you have as director general and the way you see the Institute.



People think they can hide things from you, provide you with distorted views—maybe they can. But I know more than people think I know and it could be very painful sometimes and very, very lonely. I found that I became less, far less, social than I was in the past at the Institute and that's because I can only make so many hard decisions

without it taking a toll, and I had to defend myself. On the other hand, I tried my very best to make sure that the Institute itself, not the DG, is as sensitive and responsive as possible.

One of the things I tried to do, and I hope I've been somewhat successful, was to take the personality cult, the “god” cult, out of the director: that we talk about the institution and not the DG.

Greatest challenges as IRRI DG

Convincing donors to contribute. One strength is the unassailable nature of IRRI's mission. Keeping in mind what IRRI was about, why we're here, our track record, and our ability to contribute made dealing with the challenges much easier. There are the usual challenges—one, making sure that the money comes in. I still love explaining to donors how important rice is and what IRRI's role is in the future of the world and what we have to contribute.

CGIAR nightmare. The CGIAR brings out the worst in people. Some people you deal with one on one are really nice, serious, and dedicated. But, when you get them into the context of the CGIAR, they're just horrible, myself included. I think I turned into the meanest SOB you'd never want to meet when I put on my CGIAR hat.



I never thought about it in those terms until right now. This morning, I had to write a message related to the CGIAR that I didn't want to write. I just find myself, in many cases, having to deal with people who somehow survived in positions way beyond their capacity. It's just one endless stream of frustrations. That's a real big challenge—to stay positive and keep IRRI working and moving forward in the CGIAR environment, which, in many cases, is toxic.

Being an introvert. There is the challenge of me being an introvert. I am generally happier by myself. People may be surprised to hear that, but I'm a very strong introvert. Meeting the challenge of being outwardly projecting was something I had to learn to do, including being gregarious and dealing with people in social situations. The idea of going to a cocktail party, to me, is hell on earth. If I go into a room of strangers to schmooze, I look desperately for one person I know. I may have a conversation with that person the whole night, maybe not talking to another person. That's just the way I am. I have to act like I'm not and it IS an act. Dealing with difficult personnel problems was always a big challenge for me.

Discovery—one of the greatest joys

Oh the discovery! Realizing that you found something new is a thrill that can't be described. I've worked on the hoja blanca virus, the bacterial pathogens of rice, the



pseudomonas complex, and rice blast disease [see below]. In each, I like to think I made some significant discoveries and advances. The realization, when it hits you—that you have an insight that explains

something that was unexplained before—there's nothing like it. It's a rush, I mean goose bumps; hair stands on end! It's just a thrill. I think any scientist will tell you that thrill of discovery—of enlightenment—when you had that flash of understanding—indescribable. I had a few of those and, my God, they're something else. Personally, it takes your whole being to a new level.

As a director general or research manager, one of the things that I found to be really exciting is taking pleasure from other people's discoveries. When they make breakthroughs and advances, I get that same thrill.

Just a few weeks after I had arrived at IRRI [in 2005], I was talking with [IRRI breeders] Dave Mackill and Abdel Ismail (right and left in photo) and they mentioned something about flood-tolerant rice. I had been a program leader of the rainfed-lowland system in the early 1990s. One of the things we were interested in was flood tolerance. Dave knew that, saying, "Bob let's go out to the field, I want

to show you something." In a tank right next to the Hemmi Building that had been drained a few weeks earlier were both live and dead plants. Plants that didn't



have the *SUB1* gene [for flood tolerance] were dead; those that had it were alive. Even though I had nothing to do with this discovery, I was blown away. I had the goose bumps and said, "This is fantastic; this is transformational! We have something that people have been looking for ever since they started to improve rice and this is it; we've got it, we've got to go with it." That really led to the complete rejuvenation of all our work on stress-tolerant rice.

I think IRRI's work on C_4 rice [transferring the photosynthetic efficiency of maize into rice] is another transformational piece of work, and I got equally excited about that. I think the long-term trials [Long-Term Continuous Cropping Experiment, photo in second column] are just beginning to show the impact that deep understanding [over 53 years] will have. I go down the list of work that we do in social sciences, remote sensing,



ISAGANI SERRANO, IRRI

and crop and water management. It's an endless list of really high-quality research that really gets me excited. The excitement of being a part of IRRI and being able to go and represent what our people do at the highest level is—I have no words—it's something special and it makes up for any of the minor inconveniences of being a DG. The thrill of being part of something so exciting, so important, never gets old.

More goose bumps!

Maize varieties in Burundi. My first set of goose bumps came with the performance of some of the improved maize varieties that I was working with in Burundi [when Bob was a technical adviser in the Burundi Maize Program, Institut des Sciences Agronomique du Burundi, employed by the International Development Research Centre, Ottawa, Canada, 1982-85]—looking at how they performed in farmers' fields. Oh God! And the excitement that the farmers had when they saw the harvest of what a decent variety of a high-quality seed could do; that was something.

Hoja blanca virus in Latin America. I discovered, through the data, the genetics of insect-susceptibility of the vector of the hoja blanca virus in rice. I realized that it was a disease of insects, as well as a disease of plants, and that the genetics determining whether an insect [planthopper] was able to transmit the virus to the rice plant was, in fact, a resistance-gene in the insect. We have a patho-system of the insect and the rice plant with the same virus. Both the insect and the rice plant have disease resistance mechanisms in them.

It gave me goose bumps when I realized that dynamic—the prevalence of resistance to the virus of the insect population and the prevalence of resistance in the host plant population to the same virus—and their interplay and how that explained the cyclical epidemics of the disease I've seen in rice fields. I wrote a paper on that with CIAT virologist Francisco Morales [*Genetic determination of replication of rice hoja blanca virus within its planthopper vector, Sogatodes oryzae*]

Phytopathology 80(6):559-666]. I think it was probably the most elegant piece of work I've ever done. Nobody ever reads the paper; nobody ever cites it [editor's note: actually it has been cited 23 times], but it was a deep insight and that gave me goose bumps.



Rice blast pathogen in Latin America. More goose bumps came when I was at CIAT working on the rice blast pathogen [*Magnaporthe grisea*] and getting an insight into the nature of the asexual propagation of the fungus. I worked with [CIAT colleagues] John Hamer, Morris Levy, and Joe Tohme. Understanding the lineages of the

pathogen and how populations were structured and how you could actually predict what kind of resistance genes could be combined to develop stable resistance to rice blast—that was a goose bump moment!

I was sitting in my CIAT office thinking about it. Then, it came to me in a flash; it explained everything! I ran over to Joe Tohme's office and wrote it all out on a whiteboard on his wall. I called it the "umbrella theory" because it encompassed everything about how one could manage resistance in the rice blast pathogen-plant complex. What it meant for the durability of resistance genes, what determined whether a gene was durable, etc. It was wonderful, beautiful, and elegant. Mostly true to this day, I think, as we gradually moved forward. Joe left it on his board for 18 months; never erased it. He said it took him six months to understand it, but I understood it right from the beginning. It was crystal clear—clear as can be.

And then, I found evidence for a sexual stage in the rice blast fungus in the Himalayan mountains of India [*Population structure and dynamics of Magnaporthe grisea in the Indian Himalayas*]. That was pretty cool, I tell you—beautiful, beautiful, beautiful; biologically beautiful structures, stunningly beautiful structures! In the context of these mixed systems in the Himalayas, Rebecca Nelson [plant pathologist] said I was involved in micro-tourism; that was exciting!

And the best of all [as mentioned above] was the goose bumps around seeing the stress-tolerant rice varieties and watching them perform in farmers' fields. My, that's the ultimate rush—seeing that kind of impact. It will change the lives of hundreds of millions of people for the better. There's no better rush than that. If you're a drug addict, I feel sorry for you because you are missing the real rush!

On hindsight

I would have done a lot of things differently. I would have managed my marriage differently, for sure. I would have had expectations. I would have been much more careful

about the kind of pressures that people put on me and my wife personally. Demands that were unrealistic and unachievable took their toll. I would do that differently. I would have probably managed some of our country relations differently, but again I'm an introvert and the idea of going around and glad-handing was just painful for me.

No apologies for the Green Revolution

I believe that those who developed the modern rice and wheat varieties in the 1960s and '70s and then recommended routine pesticide applications, etc., did not know that they were advocating bad practices. In that sense, an apology is not necessary. You make an apology for things that you do wrong when you knew they were wrong. And you judge the actions of people in the context of their time. We certainly openly recognize it was a mistake, and we have learned from it.



If you look at how IRRI's research program has evolved from that learning, early on, we started to question the impact of those early Green Revolution practices and took corrective action. This resulted in ground-breaking studies on the biosphere within the rice paddy, arthropod complexity, and the impact of insecticides.

Do we regret? I don't know. It was a different time and place. It's pretty hard to second-guess these kinds of things. Apologize? No! Recognize that those practices were destructive to the environment? Absolutely. Make sure that the same thing doesn't happen again? Absolutely. Be watchful and vigilant of those who misuse tools for short-term gain? Absolutely.

A story worth telling again—exact date for the beginning of the 2nd Green Revolution

I wasn't there, but I've told the story anyway several times. It was 31 July 2008, three years after being in the field with Dave Mackill and Abdel Ismail [Sub1 experiment mentioned above] and saying we really got to push this forward. We were moving hell and high water to get the Sub1 seed to eastern India where we knew the biggest impact of this flood-tolerant rice would be. We had collaborators in



eastern Uttar Pradesh near Faizabad where we had done lots of work in the Rainfed Lowland Rice Research Consortium back in the 1990s. They delivered the flood-tolerant materials to these farmers, just 5 kilos of seed. They planted out a few

plots in farmers' fields; Mr. [Asha Ram] Pal was one of them. The crop came up, then, BOOM! A flood came when the plants were just a few weeks old. The water receded, the field looked like hell, but the plants recovered. Then, a few weeks later, BOOM! A second flood came; the flood waters receded and the crop really looked bad.



Dave Mackill and Umesh Singh [India-based IRRI breeder] were there in the field with Mr. Pal. They saw little bits of green on the plants; but they looked pretty bad. The neighbors were laughing. When you go to the farmers' fields and you're a guy from IRRI, you draw a crowd—always! This crowd of farmers was saying, "Man, tear it out; you're not going to get anything." Well, Umesh and Dave asked the farmer to just let it go and see what happens. So, he left the crop there [top picture].

A few months later, they go back to visit the field and here's this unbelievable rice crop full of panicles [bottom picture]. I put forth that the beginning of the second Green Revolution (GR2.0) was on that date when Mr. Pal did not plow up that sickly-looking crop, which was ostensibly destroyed by [two] floods. Indeed, it recovered, demonstrating that the new technologies could prevent catastrophe. A farmer can get a decent rice crop [even with seasonal flooding]. That was the beginning of GR2.0. And it is also going to be GR2.0 that will allow us—and broader society—to withstand the onslaughts of climate change. It's going to be driven by the technology that was demonstrated there in Mr. Pal's rice field in 2008.

What was the first Green Revolution?



The first Green Revolution (GR1.0) took care of immediate problems of food and security, primarily in Asia, secondarily in Latin America. For better or for worse, it tended to focus on those areas that

were more favored with irrigation and drainage and access to fertilizer and the market. Farmers who benefitted from GR1.0 tended to become wealthier. People say that GR1.0 only benefitted the wealthy. Frankly, to use a technical term, that's a lot of "BS". Those who originally benefitted from GR1.0 were dirt poor to begin with. They became relatively wealthy because of GR1.0's technology. That was

the first transformation. Their kids went to school then they got good jobs and sent money back to the farms. Those farms then became relatively wealthy. That was the product of GR1.0. It did not favor the wealthy.

GR2.0 focuses on those farmers who, because of their circumstances, could not adopt the GR1.0 technologies. Those farmers primarily faced drought and floods. If the modern varieties [of that time] were subjected to



droughts or floods, they would not perform. GR2.0 is incorporating tolerance of abiotic stresses through the wonderful, wonderful tools of molecular biology, genetics,

and computational biology. It has enabled us to identify, manipulate, and incorporate traits such as tolerance of flash flooding and stagnant flooding, drought, and salinity. GR1.0 did not address these stresses that plague very, very difficult environments where the poorest of the poor live. These very, very poor people will be benefitting from the next wave of technologies, a new class of technology.

The semidwarf plant type drove GR1.0. Traits that will allow high yield potential to be expressed under difficult environments are driving GR2.0. Coincidentally, GR2.0 matches almost identically the challenges that eventually climate change is going to throw at us. Across the world, even in the more favorable rice-growing environments, we're going to see problems of drought, flooding, salinity, and heat. All of those traits, which we've been working on now to benefit those people in marginal environments, are going to be equally useful in what used to be favorable environments so that, as climate change impacts the agricultural sector in rice-growing environments, we will be prepared for it. I think that this convenient convergence is going to be a big salvation for the next couple of generations.

I don't know if anybody will really appreciate the vision and the work that our colleagues are doing NOW in rice research. When people are food secure in 2040 and 2050, they should look back and say, "It is because of the work of those guys in Los Baños, in eastern India, and in Southeast Asia in 2010, 2015, and 2020 that we have food today." And I look forward to (although I won't be around; I'll be dead and gone) to people recognizing that the work we've been doing today, much unheralded, in fact, is laying the foundation for establishing food security in the decades to come.

Would the "Consortium" concept work?

After I joined IRRI in 1992, I led the Rainfed-Lowland Program and Consortium. The consortium was a brand new

idea of bringing national programs together with IRRI and creating a common research platform or program. I had been trying to do that sort of thing in Latin America and the idea of coming to Asia to do it, I thought, was just an outstanding opportunity. This was a really, really good idea. If we did not engage with national programs, the ability to have an impact would be miniscule.



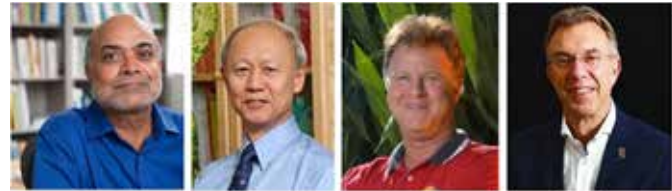
I remember the first meeting we had. I think we were up in Tarlac [Philippines] and I was sharing a room with J.K. Ladha [long-time IRRI scientist in photo with President Obama when he visited India]. J.K.

asked me, “Bob, tell me honestly, do you really believe this is going to work?” That is the kind of question that J.K. always asked. I answered that I think it will work and it is actually a good idea. He thought that was crazy and that it would not work. Whether it did or not, it is hard to say. But as we moved forward, attitudes around partnerships became more sophisticated. GRiSP [the Global Rice Science Partnership] is an offshoot of that same philosophy. I’ve always thought, from the very beginning, that the international centers had to work together with the national systems.

Right away when I started my career after finishing my PhD, Pete Jennings [IRRI’s first rice breeder in the early 1960s] told me, “Bob, if you want to make an impact and have a meaningful career, work in a national system. If you spend your whole life working at CGIAR centers, you will have a very twisted view of the world.” For various reasons, I ended up working in Burundi in a maize program, of all things. During that period as the head of the national program, staff from the CIMMYT [International Maize and Wheat Improvement Center] and IITA [International Institute of Tropical Agriculture] maize programs came through and visited with me and the national program scientists. They told me what crappy work the other center was doing. The CIMMYT people complained about the IITA people and vice versa. I didn’t care what you think of the other guy; all I want is the best maize material I could get. That cemented in my mind the attitude of what an international center has got to do for a national system, that is, get them good materials and not to tell them how great it is to be IRRI, or CIAT, or AfricaRice. That was a pretty important lesson for me. I was greatly embarrassed for the whole CGIAR when I saw that kind of attitude.

In the 1990s, pulling together a group of incredible minds

I remember hearing about the first inkling of biofortified rice when Robin Graham [Department of Crop and



Pingali Teng Cassman Kropff



Kirk Denning Dobermann

Atmospheric Sciences, School of Agriculture and Wine, University of Adelaide] came to IRRI in 1992 or 1993 to talk to us about high-iron rice. If we could increase the iron content of rice, we could have an incredible impact on the diets and well-being of many people. I thought that was the best idea I’d ever heard. Robin went on to say, “The problem is getting farmers to adopt it.” Well, I thought, with high-iron rice, we might get early vigor, better weed competition—we could work on that. In the discussion, all [of IRRI’s research] program leaders were there: myself, Prabhu Pingali, Paul Teng, and Ken Cassman—a real band of rogues, all of them great leaders in their own right as their careers went on.

Prabhu thought biofortified rice was a waste of time, adding, “All studies show that, as incomes rise, people spend more money on fruits and vegetables and the micronutrient problems will go away. As economies grow, we won’t have any more problems.” I sat there for a minute then said, “Prabhu, if you’re saying that the way to solve the problems of the poor is to make them rich, I’m sure that the poor will agree with you. But in the meantime, we’re going to have poor people for the foreseeable future; maybe we should do something in the interim before your economic magic takes hold. Twenty to thirty years later, we still have hundreds of millions of people who are poor and the micronutrient-enriched rice and other staple foods will begin to make a big difference in their lives. I still remind Prabhu of that.



It was a great time in the 1990s at IRRI. We had a tremendous intellectual energy in the likes of Prabhu, Ken, Paul [other IRRI researchers of the time] Martin Kropff, Guy Kirk, Achim Dobermann, and Glenn Denning—all had incredible minds. Klaus Lampe [IRRI DG, 1988-95] deserves credit [for bringing us together]. We were all

difficult people—we fought, we argued, and we carried on, but we were driven by the same passion to make great contributions. All of us have gone on to make our marks. That was a real crucible in the 1990s. Ask any of these people and they will say that was a special time. Klaus brought that bunch together, created the magic, and instilled in us a tremendous sense of what could be done by bringing science to bear.

Are we condemning smallholders to a life of poverty?



It was also special time for me when I was in Latin America. It was the glory days of the CGIAR—the 1980s. It was very interesting to begin the work on rice in Latin America with Peter Jennings. Jennings was really the father of the

Green Revolution in rice; never properly recognized, in my opinion, for political reasons. He upset people and, just for the pleasure of it, if somebody was an idiot by his standards, he made sure that they knew what he thought and that everybody else in hearing distance knew as well. He didn't make a lot of close friends. He and I had our difficulties as well at times. But I always respected his intellect, which was quite keen and I also respected his personality, which was quirky.

It was interesting working on rice in Latin America. The Green Revolution there had really run its course dramatically and Peter had a lot to do with it—driving it through. He brought the semidwarfs of Asia to Latin America and transformed rice production there. The modern varieties drove out upland production—that is, the marginal rice areas in Latin America were basically taken out. The small marginal subsistence rice farmers quit being rice farmers, left the countryside, and moved into the cities. For a certain sector within the CGIAR, rice was seen as a terrible crop. It was grown on relatively large mechanized farms of about 20 hectares—large by Asian standards, but small by Latin American standards. It was seen as a rich man's crop and, in the context of CIAT, an international center that should be working for the poorest of the poor, researchers should not be working on rice.

But there was the outsize personality of Peter Jennings and the Rockefeller Foundation who said rice is a staple and CIAT should be working on rice. I took that up and bought into it, hook, line, and sinker. My argument was that rice in Latin America fed the urban poor. Because if you look at the food economy of the major cities of Latin America, rice was becoming increasingly important and that the only beneficiary of the work we were doing was not the farmer, it was the consumer.

I got into an argument with Pete about that. Somehow

I was making an argument that he perceived as being against the farmer. I said, "We've got to consider other interests." He asked, "What interests are there other than those of the farmer?" I said, "Well, the consumer." The argument stopped there. A couple of weeks later, he came



back and said, "You know Zig, I've been thinking about this and you have got a point. We should be thinking about the consumer as well." I thought, really—I'd just won an argument with Peter Jennings!

At any rate, that argument didn't hold very well because there were people at CIAT who really felt that only the small-scale farmer should be benefited. Anything benefiting wealthy land owners was evil. And we still see that problem in the CGIAR system today—I see it even in the Gates Foundation. If we focus only on the smallholders, expecting them to stay small, are we going to be condemning these people to a life of poverty? Is that what it is? What about the many, many hundreds of millions of people who live in the cities who depend on affordable and good-quality rice?

We really have to rethink where we're going. I have fights and fights and fights and, honest to God, I cannot understand why people don't see that logic—that it's the price and affordability of high-quality food that is most important. Farmers have to make a decent living at it and the consumers have to be able to afford it. Our research has to recognize that we can't have in our mind some idealized version of the small farmer who's living in a blissful relationship with nature. That's fantasy! Farmers work really, really hard.

When I visit farmers in the field, I ask them what they want their children to be. It is very rare that a farmer says, "I want my child to be a rice farmer." [Photos show Bob asking farmers this question in Bangladesh]. A farmer usually says, "I want my child to be a lawyer, doctor, teacher, and businessman, or join the air force." Rarely, rarely, rarely, do they want their children to be rice farmers. When I suggest that they should consider it, they laugh at me. [On page 24, see exception to this trend when Bob visited Thailand recently.]

Near Khulna, Bangladesh, I asked rice farmers: How many of you have children?



Then I asked them: How many of you want them to be rice farmers?



GENE HETTEL, IARR (2)



National and International staff—wheels of a brilliant machine

I don't want to say anything that sounds like a platitude, but I don't think there is any question that the greatness of IRRI is due to its Philippine national staff (NRS).

The contributions of the NRS are incomparable, just incomparable. IRRI discovered a model that I didn't fully appreciate until last year (after 9 years of being DG and 7 years additional as scientist in the past). IRRI created and discovered this model completely by accident. I was reviewing with Christine Croombes [director of IRRI's Human Resource Services] our staff profiles. We noticed that the turnover time of international staff (IRS), on the average, is about 7 years and turnover time of the NRS is closer to 20 years.



It just clicked in my mind that we have a machine that is moving forward with different parts turning at different speeds in that, we have IRS turning at a much faster rate, bringing in

new thinking from outside via postdoctoral fellows and entry-level scientists. They come for 7 years or so and move on—maybe they come back later, maybe they don't. But they come in, constantly injecting new ideas.

We have another part of the machine that is turning over much more slowly. It's taking up that knowledge and innovation that is coming in from the young international scientists, but containing and retaining the past experience and accumulated knowledge. That system—of interaction and timing involving the NRS having the institutional memory, the experience, the knowledge of the historical nature of an experiment, and the context within which we are working and constantly interjecting



and interacting with new scientists coming onboard—is a brilliant model of renovation, rejuvenation, and conservation. You couldn't have designed a better system. But it wasn't designed; it was pure luck. But it is a brilliant, brilliant mechanism. I think, among so many other things, this explains much of IRRI's great success. It's that contribution, the commitment, the devotion, and the longevity of the NRS with the excitement and innovation of new IRS coming and going. It's quite a feat and I'll have to think about it some more and get some numbers behind it and maybe I'll write it up.

As I said, this is an insight that hit me just a year ago. It's like one of those blinding scientific discoveries—you go ohhh, of course, it is so obvious. But nobody has said that before. The nature of IRRI and its success are utterly dependent on that model. But that model would never work without the Filipino culture, its tremendous work ethic, tremendous loyalty, tremendous sense of family, and tremendous sense of community and commitment.

IRRI proudly proclaims its Filipino roots

The Philippines has valued IRRI as it has become part of its cultural heritage. We have been welcomed; we have been a source of pride; we have worked to maintain



the highest standards so that we are something that the Philippines can be proud of. We have proudly proclaimed our Filipino roots and heritage while maintaining our international status. The Government of the Philippines has been unbelievably supportive through the years, regardless of the political winds and has recognized IRRI as an important part of the Filipino reputation. We could never have accomplished anything close to what we have done without that level of support from the Philippine Government. Never have they compromised their responsibilities internationally in terms of phytosanitary

issues and they have always made it possible for IRRI to function as effectively as possible.



The Philippines wisely created PhilRice [Philippine Rice Research Institute], a national rice program, even though

IRRI was here. IRRI and PhilRice have been able to work together closely. UPLB [University of the Philippines at Los Baños] has been a generous and gracious landlord. There is nothing I can say that could overstate the contribution of the Philippine Government. Lately, it has started to make financial contributions in areas where IRRI and the Department of Agriculture overlap and that is certainly welcome.



Interacting with the NARES, a humbling experience

It's been a great pleasure to interact with folks all across the world. Very few people get that opportunity. A DG at IRRI is treated really well. One of the things that's really nice, if you go to a country where rice is grown, an IRRI DG is received with great respect and sometimes fanfare. One of the things I had to learn and act upon very early was that, when I went to a country and was met at the airport with fanfare, sometimes with a motorcade from the airport to the hotel, I had to say to myself, "You are being received as the director general of IRRI; it is not because you are Bob Zeigler. Don't let it go to your head. As soon as you are not DG anymore, it's going to be back to regular, old Bob."



In all countries, without exception, if the DG of IRRI expresses an opinion about something that is related to rice and agriculture, it is treated seriously; people pay attention. That is a pretty awesome responsibility. With the national agriculture and extension systems [NARES], IRRI has to be very careful. The "flavor of the week" sort of thing does apply because, if you say something, people take it seriously.

We've had the great pleasure of working with scientists from virtually every rice-growing country in the world, and these people take their job really seriously. I go to visit—it doesn't matter what country—these people are proud to be working on rice. They know that what they're doing is really, really important; they value the relationship with IRRI and it's just a pleasure beyond compare. IRRI, over the decades, has shaped, in many cases, the national systems and we have helped them in various ways—some small,

some large—to have the kind of impact that they've had. To me, it's a sense of pride, as well as it is humbling, to work with the national partners. These guys really want to do the work. They're the ones out there every day. We come and go, but they're the ones who "carry the water" and improve the crops.

The funding roller coaster

Funding—it's going to be a roller coaster ride; that's the nature of the beast. I knew when I took the job that we were on a downward slope. I knew that IRRI's mission and mandate was such that we could turn it around. And I



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knew that, later when the Institute and its budget were growing, it would not last forever. We would reach a peak and then have a downturn. Achim Dobermann, DDG-



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Research at the time, and Norm MacDonald, DDG-Management Services, knew that it would happen and that we would have to confront it. It would not be pleasant, but it was a necessary part of life. Plants

grow, the leaves become old and they drop. It is the nature of a dynamic organization. We change with some aspects of growth ending while others are beginning. That translates into funding that goes up and down. All of that is very easy to say, but when it comes to the execution, it is not fun.

Our [recent] sudden financial hit came in 2015. It was unexpected and I'm still trying to figure out what happened. I have no good answer. Just this morning, I sent a message out trying to figure out why in the hell did we actually have to take that huge cut? I'm suspicious; but regardless, it happened and frankly, I was confronted with a choice. I don't know how public this is. The



choice was to draw down our reserves and not make any adjustments to the program to keep everything stable and wait until next year, hoping things got better. If they didn't, then make the cuts after I'm gone. I thought we're taking a big negative hit; we're going to have to adjust to it at some point. It's reality. If we don't do it now, it'll be worse later. This is my last year. I've got two choices: I can just coast and have a fine old time, pretending everything is fine

and let my successor [Matthew Morell] deal with it when it would be much, much worse. Or deal with it now and help prepare the Institute for a future that will be very exciting and very positive.

Painted like that, it's pretty obvious that if you have any sense of responsibility, you'll deal with the problem now. It still means we had to let go of a hundred staff members and make other adjustments. My sense was to do it. Let's prepare the Institute, make the hard decisions now, clean the decks as much as we can, prepare the holes, and get things in the best shape we can. When my successor comes onboard, he should have a clean slate to build upon.

I think I had a pretty good reputation with staff. People know that I care about them; people know that I care about the Institute; people know that I tried to do the best for the Institute. In my last year, it would be easier to swallow this kind of adjustment than to have some poor sap come in after 10 years of Bob [to deal with it]. I think that would be a terrible thing to do to someone. Some of my counterparts in other centers, who will go unnamed, did just that and the poor guy who came in afterwards had to make some very hard decisions, making him look bad. I just think that's totally irresponsible.

I don't want to put lipstick on a pig, but when you have a problem that confronts you, you better turn it into an opportunity. You don't do across-the-board cuts, you don't do lazy thinking. You try to make the institution stronger. I guess most people understood that. My sense is that people believe that we have done what we could in the best interests of everybody in the Institute, and that the Institute is much stronger than it would have been had we not acted that way. That's my illusion, at least, and that was certainly my intention.

The Doomsday Vault, Svalbard, Norway—fantastic PR

The Svalbard vault has a repository for most of the genetic resources of domesticated plant species. We have them there in case something goes terribly wrong; we can go back to our genetic resources. Really, think about it. If things got so bad that the only recourse is a vault above the Arctic Circle, in the middle of the ocean, underground in a coal mine, who's going to go up there to get it? How will they know what to do with it?

However, it's very symbolic and very important that the significance of genetic resources was brought



to the general public's attention. With articles in *Time* magazine, *Newsweek* [in which Bob is interviewed], *CNN*, the *Economist*, and CBS 60 Minutes, the public relations value of it is tremendous—the practical value of it, history will tell. But bringing the issue to the attention of the general public, we might say, is priceless. That's my politically correct answer. [Editor's note: This interview was conducted before ICARDA scientists asked to retrieve crop seeds originating from the Middle East that are stored in the vault].

Polar bears and the Arctic dinner at Svalbard



I have this anecdote from my Svalbard visit in February 2008. This place is right in the middle of nowhere—it is the definition of the middle of nowhere.

People walk around the town with rifles because polar bears are everywhere. The place is a dauntingly dangerous place. In most hotels, there is a stuffed polar bear, over 15 feet tall, towering in the lobby. Every year people get killed by polar bears. Anyway, we were at the opening of the Svalbard Doomsday vault. The international press, CNN, BBC, and other media were there. I was there, my wife [Crissan] was there.

There was this big opening with the Prime Minister of Norway [Jens Stoltenberg], he gave a talk. Also there were people such as Pat Mooney and every environmental group, such as the Cartagena people—you know "let's preserve our natural resources" people, half of which are vegetarians. It was just a fantastic meeting of minds of those who were most concerned about the world's plant genetic resources.

The prime minister, after he finished his speech, said, "I want to invite you all to an Arctic dinner." I thought, "that's great, an Arctic dinner, that sounds good." Now, if you think about it, what do you eat in the Arctic? No edible plants grow there—it's all animals. We go to this big spread. This wonderful group of folks files through. And there's this spread of meat—nothing but red meat. You've got seal and Arctic hare. The big centerpiece is whale! I thought these people were going to faint on the spot. There were not any greens or vegetables. It was all meat, red meat—and whale. I thought that was just the most priceless thing in the world. These people—the idea that they were expected to eat this.

I thought, "What the heck, I'll try whale; I've never eaten whale." There was this big whale rib eye and I had a piece cut for me. I was expecting it to be oily and fishy. I took one bite of that whale meat and I understood why

the Norwegians and the Japanese still have their whale fishing fleets. It was better than the best piece of Kobe beef you could ever have in your life. Of course, it didn't taste fishy, it's a mammal!



I thought, "Oh dear, we've got a problem here." It was so funny to see these wonderful eco-friendly people there for the opening of the doomsday vault facing the reality of what a traditional Arctic dinner was. It was funny for me because so many of us—myself included—project our own fantasies on what we would like to think is the perfect world. We like to think of traditional people living in harmony; we like to think of small farmers having wonderful lives in the countryside with multiple cropping systems, etc. We project our fantasies on people and then we work, I think sometimes, to try to make their lives be like our fantasies. And that's a very self-centered and selfish thing. I think that we often do a disservice to them and to ourselves. As people who are involved in so-called development, we need to make sure that we don't project our desires onto someone else and to try change their lives to what we would like ours to be as success or as impact.

The vegetarians at Svalbard were really hungry. I got a complete belly laugh when the next morning, at the hotel, we had a buffet for breakfast. It was the leftovers from the dinner the night before—they probably just put it outside, because it is cold out there. I was going through the line and I turned to the woman next to me who was looking thinner and thinner. She had this little plate, I think she had some granola on it, and there was this big pile of whale meat in front of her. And I turned to her and I said, "You know this is just one of life's great quandaries", and she asked, "What's that?" I said, "What do you do with leftover whale?" The entire line of people burst out laughing; some had a sense of humor. But, there were people who were very hungry at the end of that trip—no salads, no veggies, no tofu.

Matthew Morell—ideally suited to be the next IRRI DG



I am extremely happy that Matthew Morell has been selected [as the next DG of IRRI]. He will have his work cut out for him and he'll do things differently than I have. But Matthew, like so many people who come to work for IRRI, get bitten by the bug and get consumed by the passion of this Institute. It's

an Institute unlike any other. You don't just work for IRRI; you become a part of IRRI and IRRI becomes a part of you. Matthew is becoming that kind of IRRI person and I think he is ideally suited to be the next director general. Like all of us, he'll have his ups and downs; he'll make mistakes. But I'm confident that Matthew will continue to maintain the Institute's focus.

The core of the Institute will continue to be genetic resources (that's just the nature of the beast). But Matthew and our colleagues understand the complementarity and critical nature of crop management, crop protection, social sciences, and socioeconomic dimensions—all of which enable the Institute's impact to continue.

Advice for Matthew. I was asked to give Matthew advice yesterday [during the joint Zeigler-Morell seminar, 27 August 2015]. I think the thing that worked the best for me is to have self-confidence. You've gone through a career, gained experience; you've been to many places; you've seen many things; you are the person who is ultimately responsible for what happens at IRRI. [Former U.S. President] Harry S. Truman said, "The buck stops here." It has become a platitude, but the fact is, you can't blame anybody else when something goes wrong. If things go right, other people get the credit.

Get as much advice as you can from people you respect. But when you make a decision, you have to be comfortable with it. Follow your judgment; never, ever make a decision that you fundamentally think is wrong, but other people pressure you to go that way. You're selected for the position for a reason. Your people have confidence in you. You just have to follow your gut.

IRRI's big challenge



The big challenge will be how we relate to the private sector. There's no question that the private sector is increasingly interested in rice and it's going to be our challenge to maintain our public

institution persona while taking advantage of the situation. I think it's our job to co-opt and help direct the way the private sector moves in a way that the maximum number of people benefits—the small farmer, medium-sized farmer, poor middle-class consumers—all of them will benefit from IRRI's work. We have the ability to manipulate how the private sector interacts. We have the ability to help countries come up with policies that maximize the impact of our work. That's the challenge of the Institute.



I'm quite optimistic that the Institute will continue to be relevant and when I take my last breath—whenever that is—IRRI will still be a strong and relevant institution. These are exciting times to be a part of IRRI, be a part of rice research; no doubts in my mind about that. I've been UNBELIEVABLY fortunate to have been a part of IRRI for almost 18 years. For seven of them, I had a real job as a scientist. And over 10 years as director general, I consider that a blessing. How I came to achieve it or deserve it, I'm not going to ask any questions, but I'm deeply grateful for the opportunity.

Challenges in plant pathology

In terms of the future in plant pathology, I expect that, over the next decade or so, we are going to have a profound understanding of how plant pathogens interact with the host plant. Based on that understanding, we will be able to very effectively manage plant diseases to the point where they are irrelevant in terms of production losses. I don't want to sound like we have the secrets of all technologies and that we can solve every problem, but we basically completely understand how the bacterial pathogens interact with plants and we can manage them accordingly.

Although the fungi and nematodes are far more complex, I think the basis of pathogenesis and susceptibility will be worked out to the extent that we will be able to basically have any disease epidemic of any consequence be merely historical records. I think that we should be able to manage them. It's going to take a decade or two, but these are very exciting times that involve the information that we accumulate, the genomes, the understanding of more subtle ways in which epigenetics control gene expression, and the very subtle interactions with the environment. I don't want to sound like I'm a complete naive technophile, but the handwriting is on the wall. We will be able to manage many of these situations in a way that was only a dream 5 or 10 years ago.

On the drawing board for rice improvement

The biggest change on the drawing board for rice improvement is probably gene editing. We have sequenced 3,000 rice genomes and will probably sequence another 10,000 in the next several years. For the available sequences, we have the phenotypes of those materials. We will have opened up the wild relatives of the entire genus *Oryza*, which will be available for analysis and manipulation. With the development of the CRISPR/Cas9 [clustered regularly interspaced short palindromic



repeats/protein-9 nuclease] complex for gene editing, there is nothing that will prevent us from moving genes from within the genebank containing different *Oryza sativa*, domesticated rice, and wild relatives of *Oryza* species, to improve and to tailor rice varieties for all kinds of beneficial traits. That will be much easier than classical breeding, but it will have the same impact as classical breeding. They will not be GMOs or transgenic.

We have before us the ability to stitch together any old kind of rice plant that we want. That's going to be the reality 10 years from now. That's going to completely transform the rice sector. Traits, which we [previously] spent decades identifying and working with, will bloom at our will. That, I think, is what will happen with rice.

Crissan—the better half



Crissan [with Bob and daughters Clare (center) and Ali and son Nick] has always been an unbelievable supporter. We got married and moved to Seattle and then went down to Oregon State University. As I already mentioned,

she worked with me in the field collecting data at Crater Lake National Park for my master's degree. We moved off to [Cornell at] Ithaca and she worked there as a waitress while I was doing my graduate work. We had a baby [Nick] and we lived in a trailer park. She was always incredibly supportive of the work that I did. She was willing to go to Burundi. Oh, and when I went down to Cali [Columbia] to work on my PhD, we lived in a working-class neighborhood in Palmyra; it was very difficult and challenging. We had no money, but survived. She went back to do a master's degree on her own with our new baby at the University of Illinois. We moved to Burundi, had baby no. 2 [Clare] in a little mission hospital there, no light; baby born as I was holding a flashlight in my mouth by the light of the full moon. We went to Columbia to work at CIAT.

There is no way I could possibly have done what I did without Crissan's support. She was a tremendous sounding board. I moved into administration, being an introvert, not very well suited to people management and leadership. When things went really dark, she was there and helped build me up, supported me, and provided the extroverted social aspect dimension of our family, which, in retrospect, was required to move along and to progress into what turned out to be a career path—although I never knew it was a career path.

She was always willing to play that role even though sometimes it meant subjugating her own personal interests and desires. It took a toll of course. She provided

me with a perspective on some of the human aspects of science, administration, and management that I was woefully unaware of. She certainly provided dimensions of perspectives that I desperately needed. She bore a lot of frustration when things didn't go as quickly as they should have here at IRRI for me as DG. She bore the brunt of a lot of that and, at some point, it also took a toll. She was genuinely interested in making sure that what we did worked.

We raised our children together. She's, of course, given my travels, had much more of the responsibility of that than I did. I could not even begin being the kind of person I am without her and without what she has done and what she has sacrificed and what she has contributed. It sounds trite and like platitudes, but fundamentally, I would be very different and would have accomplished far less without the difference Crissan has made in me and in my life.

The reason why we're settling in Oregon after IRRI is we went from Seattle to Corvallis in 1975 to do my master's work, and we've been going back with our kids to Oregon virtually every year since. It's the only home we have in the U.S. We did live 5 years in Manhattan, Kansas; those were the longest years in my wife's life.

Being at the helm of IRRI—no other job like it

The IRRI experience is number 1 in my career—without a doubt. The job as IRRI Director General is unlike any other job you can ever possibly want. Science, its value in human terms, the impact you can have positively on the environment—you can transform the way the whole planet will function decades from now, a century from now. What happens at IRRI is relevant.

My God, you can't ask for anything better or more humbling. If you work for IRRI, and you work hard, do your



best, you will never have to worry about whether you've wasted your life. Every morning, when you look in the mirror, you won't regret what is looking back at you. That's worth a hell of a lot.

Rocking chair in retirement?

I have a rocking chair and will put a little blanket over my knees and just rock in front of the fire. But seriously, I'll stay active. I like to think that some of my experience will be of use. I will spend some time supporting the objectives of the Asia Rice Foundation USA [a group of former U.S.-based IRRI staff members who have all worked and lived in countries



where rice is vital for food and earning a livelihood]. I think it will be nice to help support IRRI and that will be one way to do it. I will stay away from IRRI. Matthew and IRRI management don't need me nosing around and looking over people's shoulders.

I would like to have the opportunity to bring some of my experience to smaller companies in the private sector if they're interested in developing countries; perhaps bring some insights there. I would like to be professionally engaged about half the time. I've got a grandchild and will have several more, I'm sure, in the coming years. Then I'll spend some time with them and be the doting archetype grandparent who spoils the grandchildren and generally makes life more difficult.

Lightning round

Note: Bob was supposed to give "short" responses as I mentioned various issues and topics in rapid-fire fashion. He failed at this more often than not.

Future of food security in the world. Assuming we allow the broad use of technology, I think it's very comfortable.

CGIAR. Possibly in its death throes unless very hard decisions can be made around focus within the system.



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Golden Rice and related GMOs. I

hope Golden Rice will be adopted regardless of the development of the concept of using the GMO for betterment of mankind and the poorest of the poor as the beneficiaries. It exposes the

emptiness of the criticisms that GMOs and technology can only be bad. I think, in the end, Golden Rice will go down in history as being a transcendental application of genetic engineering.

Climate change. We will adapt to climate change whether we like it or not. The nature of our adaptation—who wins and who loses—is entirely up to us. We won't be short of food supplies because of climate change if we use our technology wisely.

Millenium Development Goals and Sustainable Development Goals.

I think it's very important that we articulate where we need to be going and should be going. There's always a risk that we spend far too many resources on elaborating these goals because once they are elaborated, we walk away from them; don't implement them.



System of Rice Intensification (SRI). A tremendous example of the power of communication and dedication of what one individual [Norman Uphoff] can do to get an

idea to move forward. It is a great example of the power of getting messages to the farmers and getting farmers to pay attention to their crops, particularly in remote areas. In that sense, it is a great positive contribution.

Private sector. Farmers are the ultimate private sector. They are entrepreneurs. They are business people. By not paying attention to the private sector, we're not paying attention to farmers. We need to understand that people are driven by some kind of profit motive and the sooner we recognize that and the better we incorporate that, the more effective our work will be.

Public sector. It is unbelievably important to overcome market failures. There are certain areas of work that are so difficult and the benefits of which are so diffused that the collective private sector will not engage. The public sector, for its own good, again may be avoiding the tragedy of the commons. People must come together and recognize that, for the benefit of all, some kinds of work need to be undertaken and that all should pay for it. That's the public sector.



Kansas State University. It is one of the great land grant institutions. Some great folks are there doing some great work, plagued by really, really bad senior leadership for a long time—unfortunate, sad, but true. It is the home, I think, of one of the

great agriculture deans whom I've ever interacted with, Mark A. Johnson [now president of the University of Nevada, Reno]. He is an unbelievably intelligent, visionary, thoughtful person who helped me to understand a lot about conservative mentality. Mark is a good Republican. I'm an old-school leftie, but I got along with him tremendously. I have the greatest respect for him. As a good Republican, he likes to hire liberals because he wants to have all the good ideas around him. He has a good sense of humor. He is a tremendous visionary.



Cornell University. I wouldn't be anywhere without Cornell. It was a great stepping stone for me. The name, Cornell, carries a tremendous weight with it. Unfortunately, it seems to have lost its way a little bit in terms of international agriculture, living a bit too much

off its reputation. I think it will probably come back. Dave Thurston [professor of international agriculture and plant pathology there] was a wonderful guy and adviser; he opened many doors for me. I have many colleagues there. I could not



CORNELL UNIVERSITY

have been anywhere close to where I am today without the experience at Cornell.



Oregon State University. Oregon

State opened my eyes to what graduate education could be. Don Zobel was my major professor. I was unbelievably fortunate to take a forest pathology class from Lew Roth. He was one of the great fathers of forest pathology. Among all the people I've ever worked with, he excited me about the beauty of what plant-pathogen interaction is. I was newly-married then—a wonderful, wonderful time to be alive and be exposed to what education can be.



University of Illinois. It was greatly

underappreciated, at the time, by me. I took it for granted. Turns out I got just an outstanding education. As I mentioned earlier, by just probably pure luck, I ended up with a set of courses and educational experiences that was probably equivalent to the best of the smaller Ivy League schools such as Harvard, or Yale. I didn't appreciate what I was getting at Illinois.

I mentioned earlier I took the world's first French course there taught by a computer. I was back there to give a talk a few years ago. They got so much money coming from alumni—for buildings and other things. I walked into the lobby of the Computer Science building where they had transformed a huge atrium into a museum. As part of the museum, on display, was one of the consoles that I had sat at to take my first French class taught using the Plato system. It's pretty disappointing when you go into a museum and one of the displays is something that you used.

Burundi. Working in Burundi with a national program for the first time gave me my first real responsibility—where they really couldn't look to anybody else. I had a young family there. My telex number was 3; of course, everyone remembers what telex is—right? It was during the hiatus between two unbelievably grizzly series of genocides or massacres in the early 1970s and then the late 1990s. We were there during a very peaceful time.

It was very magical for my wife and me. We really enjoyed it tremendously and made close friends there. It was, to me, a sense that you could conduct agricultural research that was scientifically meaningful and relevant to farmers. I did some work that convinced me that science and development were not at opposite ends. You could



JUAN LAZARO IV, IRRI

GLADYS EBONY, IIRRI



ask important questions that are relevant to the needs of the small farmers. I love the country. Our regional rice research and

development hub (new building in photo) was placed in Burundi for very good technical reasons. I won't deny that I was easily convinced to put IIRRI's hub there because I think I owe a personal debt to Burundi because I learned so much when I was there and I think that the people and the farmers deserve the benefits of what we can do in rice. I would like to see a similar thing for the DRC [Democratic Republic of the Congo], which is where I got my start in development.

Africa. You can't generalize Africa. I get crazy when people say Africans want this, Africans want that—come on; it is an extraordinarily diverse continent. It has suffered tremendous problems with postcolonial stress. It was absolutely shameless, shameless cynicism on the part of West. The communists and the noncommunists during the 1960s, '70s, and '80s had their proxy wars in Angola, Mozambique, and the Congo and the so-called nationalist groups slaughtered one another when they were basically fighting wars that were between the U.S. and Russia since these superpowers didn't want to fight head-on. Many parts of Africa are coming out of a pretty rough history. There's great opportunity there. I see great growth happening there.



State of the world. I'm pretty optimistic about the state of the world. It's not going to be the kind of world that we hold in our own romantic dreams, but I think that, all in all, in one or two generations, it's my dream and hope that any person born will have the opportunity to live a life that they see as fulfilling and satisfying. I do believe



that the arrow of history, to use an old term, is moving in the direction that the value of human life, human rights, sanctity of the ability of the people to live life peacefully and contentedly in an environment that's comfortable and I supposed sustainable—I think that dream will be realized. It won't be in my lifetime. It won't be in my children's lifetime, but maybe in the lifetimes of my grandchildren or great grandchildren. There'll be ups and downs. That's how I see things going.

Marginal environments. That's a subjective term. If the environment doesn't support agriculture and you call it a marginal environment, maybe you should not be doing agriculture there. Some of these marginal environments are extraordinarily rich ecosystems and I think that they should be left out of agriculture. I think "marginal" environment is a judgment term based on agricultural productivity.

Cambodia's "Killing Fields." A very stark reminder of what people can do to each other in the name of truth; same thing in Rwanda, Burundi, Congo, Germany in World War II, and in the expansion of the U.S. into native American territories. Every single one of them was done in the name of God, truth, and justice and right. I think if anybody tells you that they are right and they know the way to go, you should run as fast as you can in any other direction. Because if they think they are so right and you disagree with them, you're in trouble.

The Media. We have to be able to communicate. I think it's important to have a means of communication and the more media we have, the better we are. I believe that the more we cast light on things and the more mechanisms we use to get our ideas across, the better we will all be. Some will be misused; some will be manipulated; some will distort and communicate twisted ideas to further the interest of only a small group. But at the end of the day, the more communication we have, the better off we are.



Role of women. Unfortunately, I think it's true that women, as part of society, have been subjugated, have been marginalized, and have been taken almost as property, as reproductive animals. I think if we look at



some of the attitudes across many, many, many different cultures, it's only the recent decoupling of the control of reproduction that women have been able to assume more control over their lives. It's very clear that as women become more educated and are freed up from societal requirements—that they are first and foremost for reproduction—they are treated as people and then an unbelievable richness and wealth of opportunity will emerge.

When I was coming up in the 1960s and '70s, women's movement maintained that there was no difference between men and women. I raised two daughters and I can tell you that women and men are different. Thank God! And I think that difference is biological in basis and there are different ways that women perceive the world. I think that threats and opportunities are perceived differently by men and women. And I think that, by not recognizing that, we actually discard the tremendous source of wisdom and perspective. I'm not saying that women are smarter or better or not than men, but even seeing my little girls from early on before I tried to raise them as good liberal persons, it is just different. I'm convinced that it's hardwiring and there's nothing wrong with that. As a matter of fact, I think it's a damn good thing. As our societies move, I hope against hope that women are engaged absolutely as leaders and as full participants in our society, all of our societies.

Yes, they will have children. Yes, they will be mothers, thank goodness. But I think that the role of women has got to be much more as a leadership role than it has been in the past. If we look at the Philippines, Bangladesh, India, Germany, Israel, these are places where women have provided unbelievable leadership. I think that is just a tiny example of what women have to offer. As societies, we are foolish to discard that or to belittle that or somehow to push it aside.

Birds of IRRI; 93-species field guide. Well, since my ringtone is a quacking duck; I'm a lame duck. I think it's an outstanding contribution. It's an example of the environmental sensitivity of IRRI and how we view our agricultural practices being sustainable. I think



TIRSO PARIS



ISAGANI SERRANO, IRRI

it's a great, great addition and only a couple of decades overdue, but better late than never.

Bill Gates. Bill came to visit IRRI [8 April 2015; at right in photo] and it was really an exciting time. I found him to be a very, very engaging guy. I was concerned that he would be difficult to talk to. All my fears were completely unfounded. I found him completely well-informed and really interested in what we're doing and happy to engage with our scientists.

Among the smartest people in the world and certainly the most financially successful person in the world, he genuinely wanted to learn from our scientists. He recognized that the people he was talking to knew more about the science than he did. He wanted to learn from them and he was properly humble before them and I was really impressed.

I really admire the transformation he went through in his life. He started out as a pretty brass, hard-driving, hard-nosed business person, and once he was very, very, very successful, he and his wife decided that maybe they should turn their energies towards philanthropy, wanting to make a huge difference. And I think that's tremendous. I admire the guy greatly and I consider myself very fortunate to have had an opportunity to spend a day with him. I learned a lot.



IRRI's greatest achievement ever.

IRRI; IRRI is the greatest achievement ever. It is an institution, which is focused on developing knowledge, technology, and human resources towards improving the lives of hundreds of millions of people. That's IRRI's greatest achievement.

Bill Clinton. Duncan Macintosh, who was IRRI's public relations guy and spokesperson for quite a while, was forever trying to get me lined up with the big heavy hitters of the world of philanthropy, not realizing that it was a losing task when you have an introvert like me.



But anyway, Duncan somehow got us into a Clinton Global Initiative event in Hong Kong. Suddenly, I was on the stage with Bill himself. It was basically a photo op, so I thought it would be nice to have a chat with him. While shaking his hand, I began asking him a few questions. He looks at me with that “who the hell are you?” look, suggesting that I just



smile and get the picture taken. Oh, so that’s how it works.

Jet Li. During another philanthropy event that Duncan got me into, this time in Singapore, I was standing around at this cocktail party. After half

a glass of champagne, I saw this Chinese guy looking awkward and uncomfortable, just like me, standing in a corner. So, I thought I’d slide over to him and chat. He’s living in Singapore and we talked about our kids. His were going to the international school there. All of a sudden, somebody comes up and starts taking our pictures. So, I thought someone finally noticed that the director general of the International Rice Research Institute was in the room! Anyway, the event host comes up to us and says to my new friend, “Oh, I can’t believe you’re here all by yourself.” Hey, he is with me!

Anyway, it turns out that he is Jet Li [the famous martial arts actor] who was the guest of honor and who had just started the *One Foundation*. He’s sort of a model of the new Asian philanthropy. After the event, we ended up having dinner together in the city. He’s a really very nice guy. We had a lot of fun because



people kept coming up to us for HIS autograph. He saw the humor in this. But anyway, you get the chance in this job to meet some of the rich and the famous and the majority of them are pretty decent, regular people.

Vietnam. It is a fascinating country. I spent a significant part of my life trying to avoid going to Vietnam. It is irony or poetic justice, I suppose, that I found myself drawn to Vietnam and IRRI has made a huge difference there. IRRI’s relationship with Vietnam is very special. We were engaged with them all during the terrible years of the war, both the North and the South. IRRI’s nonpolitical status was cemented, I think, in that kind of relationship.



The minister of Vietnam, of whom I have the greatest admiration, Minister Phat [Minister of Agriculture and Rural Development (MARD) Cao Duc Phat; at right in photo], was telling

me over dinner once that, during the bombings of Hanoi, he was sent to the countryside to work in the rice fields. He said he loved working in the rice fields, adding that, if it wasn’t for the Americans bombing Hanoi, he would never have come to love rice and the rice fields and the importance of rice for the people. He would have never fully appreciated it. To me, that is a man of great wisdom who can take a horrible hardship and transform it into a positive lesson. He held no grudge against me because I’m an American, but shook my hand and thanked me for being the DG of IRRI. That’s what Vietnam means to me.



India. Several times a year, if I have no reason to go to India, I make up one. It’s such an important rice-growing country where

IRRI’s contribution has been so enormous and continues to be enormous. They are great, great people to work with, both the scientists and government officials. I find the richness of the culture absolutely fascinating and take the opportunity to interact with farmers of many different subcultures—really a very, very special place in my heart.

Professionally, it was a great place to work. I had the opportunity to do some work up in the Himalayas working on rice blast disease. That’s where Rebecca Nelson accused me of going up to the Himalayas to practice micro-tourism to study fungi, a quip on the ecotourism that people do. I resented that, since I felt that I was only going there only for the highest professional purposes. Thank you very much. IRRI’s impact in India has been enormous ever since the introduction of the semidwarf varieties and will be equally enormous and perhaps greater as our stress-tolerant varieties move through stress-prone environments in some of the poorest parts of the country.

Bangladesh.

One of my first trips when I became a research scientist at IRRI in the 1990s was up to northeastern Bangladesh—just fascinating. There were unbelievable



levels of poverty, but the people were the most pleasant you may ever want to meet, very welcoming and open. IRRI, just like with India, has a phenomenal reputation. Farmers (photo) know of IRRI. In fact in Bangladesh, the term for any improved crop cultivar is “IRRI.” So, if there’s a new potato variety released, farmers call it the IRRI potato. If there’s a new sweet potato or wheat variety, it’s called an IRRI sweet

potato or IRRI wheat. I love telling this to my colleagues in the other centers. Like in India, Bangladeshi farmers are very open to new technology. If it works they'll take it up.

Thailand. Early in the 1990s when, as an IRRI scientist I visited northeastern Thailand, I never thought that



GENE HETTEL, IRRI

rained lowland farmers in this region would ever get out of abject poverty. I said in other parts of this interview that, whenever I go to farmers' fields and ask them what they want for their children, few ever say they want their children to be a rice farmer. But in northeastern Thailand, when I was up there a few months ago visiting with farmers (photos), it was quite a different situation. First thing, I remarked, is how unbelievably the area had grown in terms of wealth and material good for the farmers. Every farmer had a two-wheel tractor; every farmer seemed to have a pick-up truck. There's electricity. The roads were paved. Villages and towns have schools.

When I asked the farmers how many of them wanted their kids to be rice farmers, every single one raised their hands. They want at least



GENE HETTEL, IRRI

one of their kids to keep the farm going. They expected that the children would work in Ubon or Bangkok, but they wanted to keep the farming going and the kids liked to come back on the weekend at harvest time to help on the farm.

It was a very different attitude from what I've found elsewhere in Asia [see page 13]. What's the difference? Well, in fact, those farmers can make good living growing rice. There has been a lot of bad press around Thai government policies providing high rice prices for farmers that was a ploy to buy votes or to get the farmers in the rural sector to support a certain politician. That's probably true. But on the other hand, that money did go to the Northeast; that money did go into farmers' pockets; that money did improve the livelihoods of farmers. People ask, "Why is a certain politician still popular in Thailand?" I reply, "Take a trip to the Northeast and see why somebody is popular." Now, economists will say these are bad policies and that there is good evidence that this has led to corruption. All of that is probably true, but the fact of the matter is that the farmers benefit and it's obvious to anybody who's been going to that area over the past 20-30 years. So, maybe some people can benefit from corrupt politicians. Stranger things have happened, I can tell you that.

Japan. I was first introduced to Japan through our then board chair, Kei Otsuka. He was the guy that can be held responsible for the Zeigler "mistake." He was the chair when they hired me. We spent a lot of time trying to successfully cultivate additional support to IRRI from Japan. Japan has been a long-time supporter of IRRI—one of our most important donors over the years. In recent years, they cut back their general assistance. Although IRRI suffered from that, we're still highly viewed within the Japanese government as a reputable institution. Kei and I worked together to find alternative sources of funding from Japan and we were quite successful. They've given us quite a bit of support outside the normal channels.

It's a pleasure working with Japanese scientists and institutions. We have always had a number of Japanese scientists working at IRRI. Those folks end up being great ambassadors for us back in Japan. They've been just outstanding scientists. Peter Jennings credits the creation of the ideal plant type of IR8, not to himself but to his Japanese colleague, Akira Tanaka. According to him, this physiologist was the real brains behind IR8's plant type. In addition to Tanaka in the early days, we also had Shouichi Yoshida, the physiologist who replaced Tanaka in 1966, and Kenzo Hemmi, the internationally acclaimed agriculturist who served as chair of the IRRI BOT in 1984-88.

China. This country has always been a bit of an enigma for us. As China was opening up in the early 1970s, IRRI was among the first institutions that had any kind of contact as the Cultural Revolution began tailing off as things started to stabilize and open up. IRRI was one of the first key institutions to come in to exchange germplasm. In the 1980s, the China National Rice Research Institute (CNRRI) was modeled after IRRI and we made significant intellectual contributions into its design early on. The restorer lines that make the hybrid rice program in China possible came from IRRI. Without those restorer lines, there would have been no hybrid rice in China. This was something that was not generally acknowledged until about 10 years ago. So, we've had very, very good relations with particularly CNRRI



ISAGANI SERRANO, IRRI

and the Chinese Academy of Agricultural Sciences (CAAS), and a number of the provincial Academies of Science. Our scientific relationship with China has been very productive.

As China has become increasingly wealthy, we have been trying to convince the Chinese that maybe they could give some financial contributions to IRRI, but so far, we have not been very successful. Having said that, IRRI has maintained its scientific relationship at very high levels. In 2014, the Institute's 3K RGP team (in photo bottom of page 24) with CAAS and the Beijing Genomics Institute have sequenced 3,000 rice genomes—just a phenomenal achievement. This is going to be a source of discovery in rice science, rice biology, rice genetics, and rice improvement that will be yielding results for decades to come. It's a pretty exciting time for rice scientists. I'm reasonably comfortable saying that if IRRI had not been involved, the project never would have happened and again I'm very justifiably proud of the leadership that IRRI has shown in many of these areas, not just sequencing of 3,000 genomes. It's just one example of our global leadership.

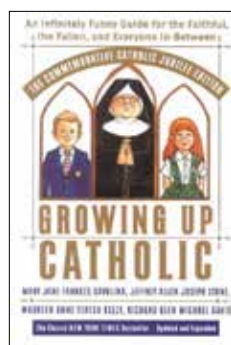
St. Louis Cardinals [Bob's favorite U.S. baseball team]. The Cards are something. The Cards are the real thing. It's the Cardinals and the Yankees and the Dodgers that are baseball. Maybe Boston, but they are a bunch of losers. And those Ohio teams [Indians and Reds], you can tell them to take a walk [a dig at the interviewer who is from Ohio]. It's the Cards; they are the real thing. Harry Caray [sportscaster] before he was with the [Chicago] Cubs, Stan 'the Man' Musial, Lou Brock, come on, these guys are the rocks of baseball. And those hot Midwest nights—humidity, crickets, listening to a ballgame on the radio, pennant race, St. Louis Cardinals; it doesn't get much better than that.



Fox News and Walter Cronkite. FNC is a serious, serious, serious flaw in the American psyche. It is a cynical approach by some to manipulate the fears of others. I just think it's a great tragedy. Look at journalists like Walter

Cronkite who had the trust of the American people, who was a patriot, and who communicated the news in a way that informed the public and that people could rely on. Now, look at the same media being distorted by the characters on Fox News. It breaks my heart, breaks my heart.

Growing up Catholic. You got to blame somebody. So, I blame the Church. I sometimes say I'm a



recovering Catholic. I always read the news stories about the Pope and what's going on at the Vatican [actually Bob attended meetings in the Vatican in his capacity as IRRI DG as photo shows him



flanked by Swiss Guards; see 5 November 2013 in timeline]. I'm not particularly religious anymore. I think if there's a God, He and I'll sort it out when I'm dead; if not, we won't. The Church, frankly, is primarily interested in promoting the interest of the Church, which is too bad because there are some good people. The current Pope [Francis], I think, is a great guy and he is trying to use the tools and the instruments of the Church in a very, very good way. I wish him the very best. If there's anything I can do, I'm happy to help. Growing up Catholic, you have a lot of guilt. However, my time attending a Catholic school was transformational for me; I'm grateful for that.



GENE HETTEL, IRRI

Water. It brings to mind a line from Johnny Cash in his album *At Folsom Prison*. He gets a glass of water from the warden and he takes

a sip—'Brahhh, yup, that's water alright,' implying that it's better to drink something else. That was the first thing that came to mind when you said "water," unfortunately, that's my answer. Yes, water, rice—all aspects of life!



JUAN LAZARO IV, IRRI

Convenient convergence/inconvenient divergence. Yes, "convenient convergence" is my line and it's a good one, I think. I used it with my first realization that the work we are doing for the poorest of the poor—developing rice varieties tolerant of drought,

flooding, heat, salinity—is exactly the same kind of work we need to adapt to climate change. The convergence of the agenda of meeting the needs of the poorest of the poor while addressing the future challenges of climate change, I thought, was a very convenient convergence of agendas. And it should enable us to generate support from a multitude of donors with different agendas.

Unfortunately, shortly after I came up with that term, Al Gore [U.S. vice president and presidential candidate]

came up with "An Inconvenient Truth." I had "Convenient Convergence" and he had "Inconvenient Truth." I withdrew my Convenient Convergence for a while, but now it's time to resuscitate it. I think it's a sound concept.

[Editor's note: I came up with "inconvenient divergence" where population continues to increase as productive agricultural land continues to decrease. Bob: Yes, and I say that we counter that by making the productivity of the area of land increase and that's a challenge for us.] See Bob's *Rice Today* editorial on page 49.



Rockefeller Foundation.

Brilliant, brilliant, brilliant visionaries—founding IRRI, working in health, providing a philanthropic example for the Gates Foundation, not to mention the guys coming out of the Foundation who were giants in our lifetime: Norman Borlaug, Peter

Jennings, David Thurston, to name a few. Then, there is the Foundation's Rice Biotechnology Program, which has transformed the way biotechnology research operates. Single-handedly, they did that, making rice a model system. Other colleagues coming out of the Foundation—Bob Herdt, Gary Toennissen, John O'Toole—I admire to this day. They have rendered an unbelievable service and should be

recognized; I hope they will be.

Being 65. I'm not 65. I'm 64 and my wife hasn't left me yet! At 64, I feel about the same as being 24 or 25. I just move a little slower.

Being Santa Claus. Being Santa Claus or meeting him? It was



GENE HETTEL, IRRI

fun. I enjoyed it. I could be irreverent. Nothing more I love than being irreverent.

Being a grandfather.

Unbelievable. Everybody says it's a great experience, but until you become a grandpa you don't know. It's transformation, and I look forward to years and years of being a doting grandfather and it gives me a thrill that I did not think was possible.



ZIEGLER FAMILY ARCHIVE



ARTHUR'S PLACE

Scuba diving at Arthur's Place [in Anilao, Batangas, Philippines]. It opened an entire new world. I really love seeing a whole other part of the planet and appreciating it, pretty humbling in terms of the diversity of life and how, for all of that life, we are completely irrelevant. There's nothing like swimming around in a tropical coral reef with the fish and the unbelievable biological diversity and realizing that all of that life predates human civilization by millions and millions of years. Aside from the pollutants and the temperature change that we might induce, we are completely irrelevant and it's humbling—and beautiful, sublimely beautiful.



GENE HETTEL, IRRI

Spending time on a jet plane. I spend far too much time on jet planes. I watched too many bad movies. I tried to do too much work and didn't sleep nearly enough. I never ever talk to my seatmates.

Ifugao clones.

[Editor's note: although this was not part of the interview, I could not resist including this photo here at the end. It shows Bob and Crissan with Ifugao bulols (rice gods), carved in their image, which Aurora and I presented to them on 28 November 2015. They are carved of narra wood, which represents wealth, happiness, and well-being. Bob responded, "We were moved beyond description. They will be treasured by us and our descendants for generations to come."]



GENE HETTEL

Bob Zeigler's 10-year whirlwind as IRRI Director General

Compiled by Gene Hettel

This timeline covering the tenure of Robert S. "Bob" Zeigler as director general of the International Rice Research Institute is a significant and event-filled subset of IRRI's overall timeline. It starts off at a reasonable pace, but really becomes a whirlwind beginning in 2013. The online version at www.irri.org/about-us/our-history has many links.



CHRIS QUINTANA, IRRI

21 March 2005

Bob arrives as the eighth director general of IRRI.



JOSE RAYMOND PANALIGAN, IRRI

5 February 2006

Bob welcomes His Excellency **A.P.J. Abdul Kalam**, president of the Republic of India, and party, to IRRI headquarters. Bob and other IRRI staff interact with the president, who is seeking solutions to problems being faced by Indian farmers.

25 May 2006

Bob unveils to staff IRRI's new, Board of Trustees-approved strategic plan, *Bringing Hope, Improving Lives*.



PETER FREDENBURG

12 January 2007

Bob signs a Memorandum of Understanding with **Sitaheng Rasphone**, Lao Minister for Agriculture and Forestry, for the establishment of IRRI's office for the 6-country Greater Mekong Subregion (GMS), in Vientiane. Later this day, Bob formally opens with a ribbon-cutting ceremony he led with **Gary Jahn**, IRRI representative to Laos and GMS coordinator.



3 February 2007

Bob receives an honorary degree of Doctor of Science (*Honoris Causa*) from Sardar Vallabh Bhai Patel University of Agriculture and Technology, Modipuram, Uttar Pradesh, India.

27 June 2007

With **Thira Sutabutr**, Thailand's Ministry of Agricultural and Cooperatives, Bob signs an agreement to expand their existing bilateral cooperation in the field of rice variety development to add increased value to Thailand's important staple.

1 September 2007

Bob announces the creation of the IRRI Golden Jubilee Committee to prepare for the activities that will take place during IRRI's 50th anniversary in 2010.

20 September 2007

As a part of the IRRI Board of Trustees meeting in Laos, with BOT Chair **Keijiro Otsuka**, Bob visits Lao Prime Minister **Bouasone Bouphavanh** in Vientiane.

26 October 2007

Bob is awarded the distinction of Fellow of the American Association for the Advancement of Science (AAAS).



5 November 2007

Bob discusses IRRI's research agenda with HRH Princess **Maha Chakri Sirindhorn** during the opening ceremonies for BioAsia 2007 in Bangkok.



19 February 2008

During a luncheon meeting at the Asia Society's Hong Kong Center, Bob discusses *the end of cheap, plentiful rice*. He points out that rice is as fundamental to Asia's success as the oil that drives its industries and the dollars that power its economies.

21 February 2008

Bob visits BBC Studios in London and gives an interview about the world's rising rice prices and the implications for the world's poor. He says, "Rice is the staple food for over half of the world's poor. So, if there is an increase in the price of rice, it translates to a cut in pay for the poor."



26 February 2008

Along with heads of state, fellow CGIAR directors general and other officials, and the media, Bob is on hand during the opening ceremonies to watch 2004 Nobel Peace Prize Laureate **Wangari Maathai** of Kenya and Norwegian Prime Minister **Jens Stoltenberg** ceremoniously deposit IRRI's rice packet container #1 into the Svalbard Global Seed Vault as the first crop of any species to be placed there.

2 April 2008

Bob appears on BBC's *Asia Business Report* to say that there is a need for another Green Revolution. Bob also discusses the rice shortage in Asia and the tightening of supplies.



10 April 2008

Bob is quoted in the *Time Magazine* cover story on Asia's rice crisis: "Rice isn't just another commodity. In Asia, rice has cultural, social, and, in many places, even a religious role, so it carries much more psychological weight." On the same day, Bob appears on NPR's Morning Edition to discuss the situation of rice-producing nations cutting exports amid shortages.

11 April 2008

Following the BOT meeting, Bob leads a press conference that includes other resource persons: BOT Chair **Elizabeth Woods**; Philippine Secretary of Agriculture (and IRRI BOT member) **Arthur Yap**; BOT members **Mutsuo Iwamoto** (Japan), **Ruth Oniang'o** (Kenya), **Seong-Hee Lee** (Korea), **Achmad Suryana** (Indonesia), and **M. Syeduzzama** (Bangladesh); and PhilRice Executive Director **Leo Sebastian**. They discuss rice price and availability with major Philippine media, which came down from Manila for the specially arranged event.



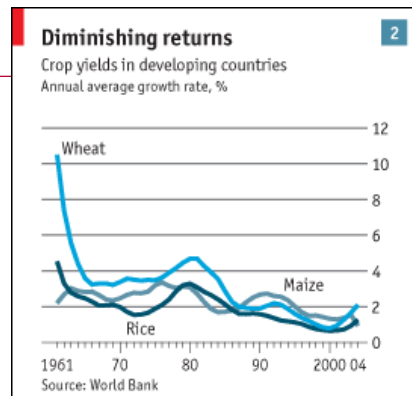


14 April 2008

Bob delivers keynote address at the 5th International Crop Science Congress (ICSC) in Jeju, South Korea. Entitled *Rice Science: Key to Food Security and Environmental Health in a Changing World*, Bob prefaces his remarks with the developing crisis on rising rice prices and shortages that are sparking concerns across Asia and the world.

19 April 2008

In the 19-25 April issue of *The Economist*, Bob is quoted in the feature, *Food and the poor: the new face of hunger*: "Yields cannot be switched on and off like a tap. Spreading extra fertilizer or buying new machinery helps. But higher yields also need better irrigation and fancier seeds. The time lag between dreaming up a new seed and growing it commercially in the field is ten to 15 years. Even if a farmer wanted to plant something more productive this year, and could afford to, he could not—unless research work had been going on for years. It has not."



10 May 2008

Bob discusses IRRI's work on rice that thrives despite climate change along with IRRI breeder **David Mackill** on a segment of CNN's *Spirit of Survival* series.

15 May 2008

During a special 45-minute program on Bloomberg Television, Bob talks with Bloomberg's **Michael McKee** about the rise in food prices and its impact on the global economy.



18 May 2008

In a major article above the fold in the *Sunday New York Times*, *World's poor paying the price as crop research is cut*, Bob states that, "Cutting back on agricultural research today is pure folly."

19 May 2008

The second Rice Research to Production training course, a joint idea of Bob with **Susan McCouch** of Cornell University and IRRI's **Hei Leung**, is held at IRRI HQ. Over 3 weeks, 28 participants from around the world attend. It is funded by the National Science Foundation USA, the United Kingdom's Gatsby Foundation, and IRRI.



5 June 2008

At a special awards ceremony in Beijing, Bob receives, on behalf of IRRI, one of China's most prestigious scientific awards from China State Councilor **Liu Yandong**, the *International Science and Technology Award of the People's Republic of China*. IRRI receives the award for making an "important contribution to improve grain output, agricultural efficiency, and the income of farmers."

18 July 2008

Bob assumes the presidency of the Los Baños Science Community Foundation, Inc. (LBSCFI) from **Luis Rey I. Velasco**, chancellor of the University of the Philippines-Los Baños, during a turnover ceremony in conjunction with the R&D Symposium celebrating SyenSaya, the Philippines' first science tourism event, at UPLB.

31 July 2008

Bob suggests that this date is the start of the Second Green Revolution because this is when Uttar Pradesh farmer **Asha Ram Pal** decided not to plow up his long-flooded rice field and would wait to see if IRRI's flood-tolerant rice with the *SUB1* gene would actually survive. In the 10 May 2014 issue of the Economist, he states, "Sub 1 is the first of a new generation of seeds. If all goes well, over the next few years plants that tolerate drought, salinity and extreme heat will revolutionise the cultivation of mankind's most important source of calories. But that will depend on the technology working as promised and, in particular, on public policies that support a second green revolution. Neither is guaranteed."



Mr. Asha Ram Pal's rice field, Palia Goa village, Faizabad district, Uttar Pradesh, India.



Newsweek

30 August 2008

In a *Newsweek* article, *The price of survival* (no longer available online), Bob reacts to the Manila-based Asian Development Bank (ADB) new Asian poverty line. The revised poverty lines don't reflect a sudden drop in conditions. Instead, they represent an attempt by development economists to, as he puts it, get their "arms around the definition of poverty and articulate it in a way that [policymakers] can use effectively." To accomplish that, ADB proposed scrapping the USD 1-per-day poverty measure popularized by the World Bank in 1990 as an estimate of the per-person cost of procuring the 2,100 calories a day deemed necessary for human health.

7 October 2008

Bob joins AfricaRice DG **Papa Seck**, and **Achim Dobermann** and **Marco Wopereis**, deputy directors general for research for IRRI and the Africa Rice Center (AfricaRice), respectively, to do a Q&A on how the two centers are working together to improve rice production in sub-Saharan Africa (SSA).



9 October 2008

Bob co-signs research cooperation agreement with National Taiwan University (NTU) President **Lee Si-chen** at a time when global rice stocks are at their lowest in a quarter of a century. IRRI and NTU establish a partnership in rice-related research to boost global rice production.



2 December 2008

Bob attends the first meeting of the Clinton Global Initiative (CGI) to be held outside the United States in Hong Kong. Bob is on hand to meet **Bill Clinton** and witness the announcement of an IRRI commitment, *Rice power: Using rice residues for bio-energy and climate change mitigation*.

20 February 2009

Bob joins a panel discussion in New York City, jointly sponsored by the Asia Society and Oxfam America, during which Bob answers—in the positive—the question: Is it time for another Green Revolution?



7 March 2009

Bob accompanies BOT member **Mohammed Syeduzzaman** and IRRI scientist **Abdelbagi Ismail** to meet with leaders from the government and private sectors in the Kingdom of Saudi Arabia. Bob gives a presentation on how IRRI's work could make a difference in the nation's efforts to secure a rice supply and take part in international efforts on food security and poverty elimination.

16 March 2009

During the Reuters Food and Agriculture Summit in Manila, Bob estimates that billions of dollars a year need to be invested in infrastructure such as new irrigation systems and new technology to boost yields in rice fields. "I'm worried that we won't make the necessary investments and we're going to see continued pressure on the ability to meet global demand," he says.

28 May 2009

Bob receives the 2009 *E.C. Stakman Award* for outstanding achievements in and contributions to plant pathology.



1 June 2009

In the June issue of the *National Geographic Magazine* in its feature, *The global food crisis: The end of plenty*, Bob is quoted: "Miracle rice' varieties developed here in the 1960s doubled yields in Asia. Further growth has stalled since the mid-1990s, as investment in agriculture has declined. Governments thought we'd won the war on food security, so they put money elsewhere."

26 August 2009

Bob has a royal audience with His Majesty King **Bhumibol Adulyadej** of Thailand at the King's Klai Kangwan Palace in the coastal city of Hua Hin. They discuss the International Rice Genebank and IRRI's work in Thailand.



8 October 2009

During a book launch at the headquarters of the Asian Development Bank in Manila, Bob reinforces the importance of the long-term IRRI-ADB partnership in conducting rice research.



25 October 2009

Bob welcomes to IRRI U.S. Secretary of Agriculture **Thomas Vilsack** (the only person to serve in this post for President Obama's two terms), U.S. Ambassador to the Philippines **Kristie Kenney** (the first woman to serve as U.S. ambassador to both the Philippines and Thailand), and Philippine Agriculture Secretary **Arthur Yap**. They discuss rice production in the Philippines and how rice research can help improve the health and welfare of farmers and consumers, result in a better environment, and cope with climate change.

20 November 2009

Bob delivers the 3rd Foundation Day Lecture of the KIIT School of Rural Management, a constituent of KIIT University, Bhubaneswar, Odisha, India. As part of the occasion, Bob and Dr. **A. Samanta**, Founder of KIIT, sign a Memorandum of Understanding on behalf of IRRI and KIIT University, respectively, to promote collaborative research work in improving the rice production and marketing system in India and neighboring countries.

10 December 2009

During a party at the Ramon Magsaysay Center in Manila to celebrate the 50th birthday of IRRI, Bob states, "The vision of IRRI's founders to invest in rice research to improve food security is the sort of long-term thinking we need now as we look to find solutions to address the challenges, including climate change, which threaten rice production." In attendance are Philippine President **Gloria Macapagal-Arroyo**; former Philippine President **Fidel V. Ramos**; ambassadors to the Philippines from Asia, Europe, and North America; Philippine government officials; donors; the private sector; and IRRI staff.



14 April 2010

Bob helps unveil two historical markers (one in English and one in Tagalog) at IRRI headquarters, which designate that IRRI is a national historical site in the Philippines, as recognized by the National Historical Institute (NHI).



GENE HETTEL, IRRI

14 October 2010

Bob joins discussion on *Partnering with smallholders: Strategies for food security* during the World Food Prize events in Des Moines, Iowa. Bob states, "The crop modeling, geographical information systems that are coming together, that can be used in a real-time way, allow us to begin to imagine a crop insurance program that would allow farmers to participate in the credit markets in a way that would give them a level of power and decision-making they haven't enjoyed before."

the credit markets in a way that would give them a level of power and decision-making they haven't enjoyed before."

9 November 2010

In Hanoi, Vietnam, Bob gives welcoming remarks during the opening ceremonies of the 3rd International Rice Congress. He says, "It's particularly appropriate that Vietnam has generously agreed to host IRC2010. Vietnam's adoption and adaptation of rice technologies have helped it become a major rice exporter and the country is an example of how rice science can benefit a nation and its people."



4 February 2011

In the journal *Science*, via the article, *With Reforms Under Way, International Centers Ask: Where Is the Money?*, Bob says of GRiSP (the Global Rice Science Partnership): "It is the first time there is a global research approach to address issues relevant to rice. It's a big step forward." Approved by the CGIAR Fund Council last November, it is expected to be a 5-year, USD 600 million endeavor to shave 13% off the expected rise in rice prices by 2035 and lift 150 million people out of poverty.

16 February 2011

Bob visits the Tamil Nadu Rice Research Institute (TRRI) in Aduthurai, India. He inspects various IRRI-TRRI collaborative research activities under the Cereal Systems Initiative for South Asia (CSISA) and discusses with scientists techniques for extending rice research in this partnership to benefit rice farmers.



28 March 2011

In the journal *Nature*, Bob states that, "Collaboration can boost citation impact, spread costs, and broaden research horizons. It has, for example, enabled IRRI researchers to tackle scientific questions on a scale once thought impossible."

9 April 2011

Bob addresses the 46th Annual Rice Research Group Meeting held by ICAR's Directorate of Rice Research (DRR). He states, "Investments in agriculture have been far too low and need to be doubled in the next couple of decades to maintain what the global community has achieved so far in terms of food security."

20 May 2011

Bob is given the honorary degree (*honoris causa*) of doctor of science by the Govind Ballabh Pant University of Agriculture and Technology in Pantnagar, Uttarakhand, India, during the 27th convocation of the university.

7 August 2011

Bob is presented the *International Plant Protection Award of Distinction* by the International Association for the Plant Protection Sciences (IAPPS) at its international meeting in Honolulu, Hawaii. Bob is recognized for his outstanding contributions to international plant protection—first for his research, then for his work in agricultural development and research leadership and management.



27 October 2011

Bob welcomes **Truong Tan Sang**, president of Vietnam, to IRRI headquarters. A partnership spanning almost half a century is the backdrop of the visit.



GENE HETTEL, IRRI

25 April 2012

Bob unveils the new home for IRRI's Center for the Social Sciences in Drilon Hall by participating in a ribbon-cutting ceremony and comments before an open house in the new facility.

10 September 2012

Bob addresses some 450 delegates during the kick-off of the 3-day *6th International Hybrid Rice Symposium* in Hyderabad, India. He expresses concern regarding prevailing drought conditions in Asia and other parts of the world, and the need to develop new varieties of hybrid rice that require less water.



GENE HETTEL, IRRI

7 November 2012

Bob joins **Gelia Castillo**, IRRI consultant, and **Bruce Tolentino**, IRRI DDG for communication and partnerships, in a brief ribbon-cutting ceremony that opens a month-long exhibit at IRRI headquarters with the theme, *Building the next generation of rice scientists: Beyond 50 years of IRRI scholarships*. The exhibit celebrates the 50th anniversary of the arrival of the first scholar at IRRI in April 1962 and is sponsored by the IRRI Training Center and the Association of Fellows, Scholars, Trainees, and Residents of IRRI (AFSTRI).

10 November 2012

Bob signs a Memorandum of Agreement with **Shri Ashish Bahuguna**, secretary of the Ministry of Agriculture and Cooperation, Government of India, to further strengthen the institute's collaboration with one of the largest rice-producing and -consuming countries in the world.



26 November 2012

Bob gives a plenary talk focused on the global rice research agenda during the *Third International Agronomy Congress* held at the Indian Agricultural Research Institute in New Delhi.

27 November 2012

In Ludhiana, India, Bob attends the opening of the 3-day international conference, *Sustainable agriculture for food and livelihood security*—part of the celebrations for the 50th anniversary of the establishment of Punjab Agricultural University (PAU). Addressing more than 1,100 participants, Bob commends PAU for having served agriculture well in the past 50 years and expressed hope that the university continue to produce the next generation of scientists that will help bring about global food security.



28 November 2012

In his Coromandel lecture, *Cutting-Edge Rice Science for Food Security, Economic Growth, and Environmental Protection in India and Around the World*, Bob notes that IRRI and India have been working together since 1967 to develop and deliver ways to help Indian rice farmers improve the productivity of their rice crops. "Climate change-ready rice varieties, water-saving technologies, more nutritious rice, better access to rice market information, and mobile apps to deliver advice to farmers are just some of the technologies that will help reduce poverty and improve food security."

29 November 2012

Bob signs ICAR-IRRI Work Plan for 2013-16. With the signing, both institutions agree to implement the 4-year work plan under the existing collaborative mechanism enumerated in the ICAR-IRRI MoA of 1974.

3 December 2012

Bob signs with Philippine Department of Agriculture secretary **Proceso Alcala** an agreement to help Filipino rice farmers produce more rice under the Philippines' Food Staples Sufficiency Program (FSSP).

30 April 2013

Bob signs a Memorandum of Understanding with Coromandel International Limited for cooperation in promoting and disseminating improved rice research technologies in India. Bob says, "Our new partnership with Coromandel fosters a new type of relationship with the private sector in India to advance our research in new and more dynamic ways through Coromandel's on-ground presence and direct interaction with farmers. With Coromandel, we are looking forward to reaching more farmers and spreading the benefits of the best in rice science even further to reduce poverty and improve environmental outcomes."



3 May 2013

Bob participates in the ribbon-cutting ceremony opening a 5-month long photo exhibit, *Feathers in the Fields: the Birds of IRRI*, at the Riceword Museum. The exhibit showcases photographs of the many bird species that frequent IRRI's experiment farm.

20 July 2013

Bob is conferred with the *2013 Leadership in Science Public Service Award* by the American Society of Plant Biologists (ASPB). Bob is honored for his focus on addressing the agricultural needs of the developing world through plant biology research.



30 September 2013

Bob begins a busy week hosting the 13th Meeting of the CGIAR Consortium Board. Back to back with the CB meeting is a retreat of the board chairpersons and the directors general of the various CG Centers. Bob states, "We need to make sure that CGIAR research is sharply targeted towards development outcomes. A good example of this was research on the *SUB1* gene, which enables rice crops to survive flooding for up to two weeks. I can tell you that when we started work on the

SUB1 gene, it was not exactly a popular area to work in. People thought we never would have an impact on flooding. It was a high-risk investment."

30 October 2013

Bob attends the opening and dedication of the new headquarters building for the East and Southern Africa (ESA) Rice Research and Development Hub on the campus of the National University of Burundi in Bujumbura. The new building is named in Bob's honor in recognition of his many years of work in development agriculture as a scientist and research leader in Africa and other parts of the world. Bob states, "This is truly an honor for me. I'm very optimistic that this new regional hub will substantially contribute to the development of the rice sector in East and Southern Africa, and build our collaboration with our partners in Burundi and the greater region."



GLADYS EBRON, IRRI

5 November 2013

Bob gives a presentation, *The continued need for more food—contributions from the CGIAR*, during a meeting of the Working Group on Bread and Brain, Education and Poverty, in Vatican City. He points out, “As the global population increases to a predicted nine billion by 2050, pressure mounts to produce more food without destroying the planet.” He adds that, “CGIAR is bringing donors together for better results and enabling scientists to focus more on the research through which they develop and deliver big ideas for big impact. CGIAR centers collaborate with research and development partners to solve development problems.”



7 November 2013

Bob addresses the IRRI-organized 7th International Rice Genetics Symposium (RG7), which attracts more than 700 top researchers in the field of genetics and related disciplines to Manila.

8 November 2013

In the wake of Typhoon Haiyan (local name Yolanda) that battered the central Philippine islands, and which was cited as the worst storm ever to hit the Philippines, if not the worst storm to make landfall in the recorded history of the planet, Bob sends a message to the Filipino people: “In my many years in the Philippines since 1992, I have never seen devastation of this scale. Like many of you, I am deeply saddened by the great loss of life and massive destruction caused by this typhoon. We thank everyone for sending their support to the Philippines during these dark times. We’ve had many staff asking how to help so we have set up a “Yolanda Drive” that IRRI will forward to those in need.”



15 November 2013

Bob welcomes to IRRI **David Rockefeller, Jr.** (and spouse, **Susan Cohn Rockefeller**), American sailor, philanthropist, and active participant in nonprofit and environmental areas, who is a leading fourth-generation member (known as “the Cousins”) of the prominent Rockefeller family. IRRI is considered by many as one of the Rockefeller Foundation’s great success stories.

3 April 2014

Bob signs with **Eufemio Rasco**, executive director of the Philippine Rice Research Institute (PhilRice), an agreement that maps out another five years of collaboration between the two institutes for the mutual protection of elite breeding lines in the Philippines. Bob states, “Ours is a model of how an international institution like IRRI should work with a national partner. For example, look at PhilRice’s current innovations as showcased in Lakbay Palay, an annual activity featuring initiatives that bring together its stakeholders from across the country.”



15 April 2014

Bob participates with BOT and IRRI staff members in the ceremonial harvest of the 150th crop of IRRI’s Long-Term Continuous Cropping Experiment. Of the LTCCE, Bob says, “I find this experiment to be one of the most exciting places in the Institute. No other research organization can address these kinds of questions. This is something that is incredibly important.”

10 May 2014

Bob is quoted in a feature article in *the Economist: The new green revolution—a bigger rice bowl*. Bob discusses his view on the starting date of the second Green Revolution, 31 July 2008, which is tied to when a farmer in Uttar Pradesh, India, decides not to tear up his flooded rice plants, which contained the *SUB1* gene for flood tolerance.



22 May 2014

Bob participates in a panel discussion on Agricultural Transformation in East Asia during the World Economic Forum, held in Manila. Bob states, "Climate change hastens the deterioration of rice-growing areas and of the condition of the poorest farmers, who already till unfavorable land to begin with. This also means, though, that with each successful targeted intervention, the poorest of the world's farmers stand to benefit the most."



ISAGANI SERRANO, IRRI

28 May 2014

Bob provides commentary on the publishing in *GigaScience* of an article on the genome sequencing of 3,000 rice varieties, along with the release to the world of the entire dataset in a citable format in the journal's open-access database. Bob says, "Access to the sequence data of these 3,000 rice genomes will tremendously accelerate the progress of breeding programs. The collaborative 3K RGP will add an immense amount of knowledge to rice genetics and enable detailed analysis by the global research community to ultimately benefit the poorest farmers who grow rice under the most difficult conditions."

7 June 2014

Bob publishes a chapter on the *Case for Golden Rice*, appearing in the Springer book, *Plant Biotechnology: Experience and Future Prospects*. In it, he writes, "The nearly 30-year history of the development of Golden Rice, a genetically modified (GM) variety of the cereal that contains beta carotene in the grain, a source of vitamin A, is an enlightening story of vision, imagination, technological creativity, and persistence. Many organizations and individuals in the public and private sector have been involved in this effort that has attracted more than its share of controversy. But, hopefully, Golden Rice's delivery to farmers and consumers will not be delayed much longer by those who oppose the use of this new, promising technology."



ISAGANI SERRANO, IRRI



TNAU

26 August 2014

During the 35th convocation ceremony of Tamil Nadu Agricultural University, Coimbatore, India, Bob is conferred with an Honorary Degree of Doctor of Science. In his acceptance speech, he speaks about the partnership that IRRI had with TNAU through a five-year MoU to promote research, training, and exchange of information and technology on rice and its farming systems and value chains.

30 August 2014

Bob appears on Radio Australia's *RN First Bite Program* to participate in the GMO-Golden Rice debate. While Bob admits that more work has to be done to improve yields, with the latest field trials showing 'mixed' results and lower yields than non-GM varieties, he said the science has shown without doubt that eating Golden Rice improves vitamin A levels for those who need it.



BROOKINGS

25 September 2014

Speaking during a Brookings Institution panel discussion on eliminating hunger by 2030, Bob says, "Immediate changes in rice production practices are necessary to offset volatile climates, limited water supply, and diminishing agricultural land."



1 October 2014

In his *National Geographic* feature on *The next Green Revolution*, author **Tim Folger** describes Bob as “white-bearded and avuncular, a self-described old lefty, who believes the public debate over genetically modified crops has become horribly muddled.” Bob is quoted in the article, “When I was starting out in the ‘60s, a lot of us got into genetic engineering because we thought we could do a lot of good for the world. We thought these tools are fantastic! We do feel a bit betrayed by the environmental movement, I can tell you that. If you want to have a conversation about what the role of large corporations

should be in our food supply, we can have that conversation—it’s really important. But it’s not the same conversation about whether we should use these tools of genetics to improve our crops. They’re both important, but let’s not confound them.”

18 October 2014

Bob signs a protocol on regional cooperation that applies to rice varieties developed by IRRI with the secretaries of agriculture of India, Bangladesh, and Nepal. The agreement fast-tracks the release across the three countries of any rice variety undergoing proper release protocol in any one of the countries. Bob says, “This is a historic moment and truly a highest honor to our partnership in the region. Scientific revolution has taken place in rice research. The seed sector should adapt these technologies and have a seed system in place. We need to establish a production system to make quality seed available, for marketing mechanisms to reach the farmers, and to develop better management of our technologies to realize the benefits of new technologies for farmers.”



STRASA-BANGLADESH



J.R. CABAÑERO

28 October 2014

Bob delivers the keynote to the 4th International Rice Congress (IRC2014) in front of more than 1,500 attendees from 69 countries. He tells them, “There is already profound impact for several million farmers worldwide who have adopted one of the first technologies of the second Green Revolution—flood-tolerant rice. Many of these farmers belong to the poorest of the poor who, for various reasons, did not benefit fully from the first Green Revolution in rice.”

6 November 2014

Bob appears on a segment of Channel NewsAsia’s public affairs program, *Insight*, entitled *The Hungry Planet*. He states, “Climate change and the effects of increasing greenhouse gas in the atmosphere will change and make more challenging rice production scenarios in the future. Rising sea levels and rising temperatures are a reality.”



GENE HETTEL, IRRI



CHINESE MINISTRY OF AGRICULTURE

10 November 2014

In Beijing, Bob exchanges views with Chinese Vice Minister **Li Jiayang** on strengthening science and technology cooperation between China and IRRI. He commends the efforts and contribution made by the Chinese Academy of Agricultural Sciences (CAAS) in promoting China-IRRI partnership, and expresses IRRI’s strong willingness to upgrade its cooperation with China and broaden cooperation areas. He adds, “I am looking forward to the working level consultation on details of the abovementioned cooperation between IRRI and CAAS.”

21 November 2014

Bob is featured in a *Wall Street Journal weekend interview*, in which he is depicted as both a plant scientist and environmentalist who is growing a second Green Revolution and championing Golden Rice, which could save millions of children from blindness and death. The author, **Hugo Restall**, describes Bob as an avuncular 63, but still maintains a grueling



KEN FALLIN, WSJ

schedule. On GM food, Bob says, “Ideally I would like to see the public and private sectors working on GM food in parallel, each focused on what it does best. A partnership of that sort underpinned the original Green Revolution, but it has been lost. That’s because the world has become complacent about food security. The assumption is that grain shortages are a thing of the past and we can concentrate on better nutrition and how to meet the demand for meat. While those are legitimate goals, if we take our eye off the basic staples, we could run into trouble.”

27 November 2014

Bob signs with **Cao Duc Phat**, Minister of Vietnam’s Ministry of Agriculture and Rural Development, a host country agreement that will facilitate more robust international exchange among Vietnamese and IRRI scientists and experts who will refine and implement Vietnam’s rice sector strategy. This also makes IRRI the first international agricultural research center to be officially recognized as an international organization by the Government of Vietnam.



JESSICA MARGISO, IRRI



ISAGANI SERRANO, IRRI

15 January 2015

Bob accepts from **Leigh Vial**, outgoing head of the IRRI Experiment Station, a Vial Family donation to IRRI’s Riceworld Museum of a 1962 Honda Super Cub. The Honda Super Cub was widely used by Vietnamese farmers when the IR8 rice variety—a milestone of the Green Revolution—was released in 1966. With their higher income from IR8, Vietnamese farmers were able to purchase Honda (which means “bountiful rice fields”) bikes.

26 January 2015

Bob signs with **James Sha**, deputy minister of Taiwan’s Council of Agriculture, an MOA to promote rice and other related agricultural research. Bob says, “The memorandum allows the COA and the institute to engage in advanced cooperation and take relations to the next level going forward.”



ISAGANI SERRANO, IRRI



ISAGANI SERRANO, IRRI

26–30 January 2015

During Asia Science Week of the Global Rice Science Partnership (GRiSP), some of the world’s leading experts on rice science convene at IRRI headquarters to review research efforts toward making rice systems work better for the poor. Bob says, “That while rice research is done mostly in Asia, there are important things to learn from challenges and research done in other parts of the world, such as sub-Saharan Africa and Latin America. GRiSP became a platform in which research in various regions around the world became familiar with one another.”

27 January 2015

Bob participates (with **Fernando C. Sanchez, Jr.**, chancellor of the University of the Philippines Los Baños) in the time capsule ceremony for the Lloyd T. Evans Plant Growth Facility at IRRI headquarters. Activities include the loading and burying of two time capsules to be opened in 2035 and 2060, respectively.



ISAGANI SERRANO, IRRI



GENE HETTEL, IRRI

9 February 2015

Bob interacts with rice farmers, researchers, equipment repairers, and millers in northeastern Thailand near Ubon Ratchathani. This is an area where Bob spent significant time more than 20 years ago as an IRRI researcher working in the harsh rainfed lowland environment to help improve farmers’ production and livelihood. His prognosis: a lot of progress has been made.

5 March 2015

Bob gives the keynote address at the 106th Foundation Day of the University of the Philippines Los Baños. Bob says, "The excellent education that many agricultural scientists received at UPLB is fertilizing and penetrating the soils of research across Asia."



8 April 2015

Bob welcomes **Bill Gates** to IRRI. Of Bill, Bob says, "He was unassuming, unpretentious, gracious, and with a good sense of humor. I have personally led similar tours of IRRI for many very high profile and influential people. This, of course, was the most scientifically rich among all of them. Never have I seen someone so personally engaged in the discussions, grasp subtle but fundamentally important arguments, and probe into areas until he understood. He obviously did his homework before coming (he is famous for that), but genuinely wanted to learn from our scientists."

12–15 April 2015

Bob joins IRRI staff and members of the Board of Trustees to participate in the Golden Jubilee Annual Rice Research Group Meeting at the Indian Institute of Rice Research (IIRR) in Hyderabad. At the inaugural session on Sunday morning, Bob expresses his appreciation of the contribution of Indian scientists to agriculture. "India's initiative in 1965 by setting up an agency for rice research, now IIRR, was a model emulated the world over. India leads the world in food security and its strides in rice research have always been first-of-its-kind."



13 April 2015

Bob signs a Memorandum of Agreement with the newly established Professor Jayashanker Telangana State Agricultural University (PJTSAU) to help build the next generation of rice scientists in India. Bob says, "Building this next generation of scientists has been a high priority since I started as IRRI's director general in 2005. So, I would like to see meaningful postgraduate exchange programs, in which some PhD students conduct part of their research at IRRI headquarters in Los Baños and MSc students can work in our research hub in Hyderabad, where the university and IRRI have overlapping programs."



21 April 2015

Bob participates in the first-year review of Phase 3 of the Stress-Tolerant Rice for Africa and South Asia (STRASA), funded by the Bill & Melinda Gates Foundation.

7 May 2015

During the 34th convocation ceremonies of the Orissa University of Agriculture and Technology in Bhubaneswar, Odisha, India, Bob receives an honorary doctorate degree (honoris causa) for his lifetime contributions to agricultural science.



14 May 2015

Bob participates in the Treasures in Art & Rice events at the Philippine National Museum, including (clockwise from upper left): ribbon cutting at the entrance of the IRRI Hall; signing with **Jeremy Barns**, National Museum director, the MOA between IRRI and the National Museum; unveiling of the special marker elevating the IRRI Manansala murals to National Cultural Treasures—(L-R) **Mr. Barns**; **Ronna Manansala**, artist and granddaughter of National Artist **Vicente Manansala**; **Ramon del Rosario**, chair of the Museum's Board of Trustees; **Emerlinda Roman**, chair of the IRRI Board of Trustees; and Bob—and viewing.





20 May 2015

The Myanmar Rice Sector Development Strategy at the Department of Agricultural Research is launched in Nay Pyi Taw. During the launch, Bob awards a special rice memento to Myanmar President **U Thein Sein** for his visionary leadership of the rice sector. Bob says, "The wonderful scientific achievements of IRRI need to be combined with development strategies and coherent programs that governments are willing to implement over a long period of time to ensure that farmers have access to and are able to use these. Having a government demonstrably willing to transform and develop its rice sector, an environment



conducive to rice production, and growing global demand for rice make Myanmar a good opportunity for investment."

Later the same day, Bob joins the ribbon-cutting ceremony with **U Myint Hiang**, Myanmar Agriculture and Irrigation Minister, to inaugurate IRRI's second office in the country at the Department of Agricultural Research compound in Yezin.

THE ECONOMIC TIMES

5 June 2015

Via an op-ed article appearing in India's *The Economic Times*, Bob writes that the poor are depending on scientists and policymakers to work together because we really don't have time to keep re-inventing the wheel. He adds, "The anti-science, anti-technology, and anti-genetically modified organism (GMO) movements hindering the use of transgenic crops

in India, such as *Bt* brinjal and pro-vitamin A-fortified Golden Rice, are having a chilling effect on students who are now wondering if they should devote any time at all to studying agriculture and biology."

30 July 2015

Bob talks about global food security as part of a World Affairs Council dialogue on *Feeding the next billion*. Bob says, "The population will plateau out before the physical capacity of the earth is met."



26 August 2015

In Manila, Bob joins experts in talking about smarter food production during a *Global Forum on Research and Innovation for Health*, sponsored by the Philippine government. He says, "If you want to address poverty and malnutrition, you have to pay attention to rice." He adds, "Food security is not just about improved production, but improved quality of food. Agriculture has a key role to play in improving nutrition, not just as a provider of calories, but as a provider of nutritionally-enhanced foods. Rice has an important role to play given its significance in the diet."

4 September 2015

In *Science*, Bob comments on yet another revamping of CGIAR: "We are burning up another year to 2 years in a reorganization," he says, "when the time and effort would be better spent shoring up CGIAR's finances and making tough decisions about which programs deserve the precious support."



4-8 September 2015

With *Rice Today* Editor-in-Chief **Gene Hettel**, Bob visits Bangladesh, one of IRRI's most valued partners, stopping in Dhaka to the north in Gazipur, home of the Bangladesh Rice Research Institute (BRRI), and to the south where they visit farmers and are updated on research being conducted in the polders of the country's coastal zone. Nothing stopped him—not cancelled airline flights, the Ganges River at a very high water level, or an elephant blocking his car's path (photo). In Gazipur, he discusses the latest rice research progress at the Bangladesh Rice Research Institute (BRRI). In

GENE HETTEL, IRRI

Dhaka, he calls on **Matia Chowdhury**, Minister of Agriculture, and other officials. He has lunch with Sir **Fazle Hasan Abed**, founder of Brac and winner of the 2015 World Food Prize, and visits the IRRI-Bangladesh country office, the institute's largest in its 13 country-office system in Asia and Africa.

7 September 2015

In Dhaka, during his last visit to the Bangladesh Rice Research Institute (BRRI) on 7 September, Bob receives a "Plaque of Honour and Partnership" that recognizes his more than 10 years of cooperation with BRRI as IRRI DG. From left are: **Paul Fox**, IRRI representative for Bangladesh, **Md. Ansar Ali**, BRRI Director (Research); Bob; **Jiban Krishna Biswas**, BRRI Director General; and **Md. Shahjahan Kabir**, BRRI Director, Admin and Common Service.



10 September 2015

Bob receives **Chen Xiaohua**, Chinese vice minister of agriculture, at IRRI HQ, who led a delegation of government officials to explore a renewed partnership between IRRI and China. Bob says, "For China to continue to be food-secure, it will have to correct the many problems it faces and adapt to the challenges of climate change. Many of the projects that IRRI had conducted and will conduct in the future can help address many of these problems."

12 September 2015

Bob welcomes to IRRI headquarters ASEAN ministers and senior agricultural officials to share a pledge to ensure food security and strengthen cooperation in agricultural development across the Southeast Asian region. Bob explains, "One of the objectives of the AIRDF (Agriculture Innovation and R&D Fund) is to help finance, in a sustainable way, the next generation of rice scientists. Rice farming for the next generation will be very different from that of today." He also talks about technology that is available or becoming available, but it will be impossible for us to use that technology without a trained scientific core.



7 October 2015

While attending the 6th session of the Governing Body of the FAO-based 136-member nation International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Bob announces that the genome sequences of more than 3,000 rice varieties have been placed with the ITPGRFA, stating, "We can't expect every program, every genebank in the world to redesign their databases to match some international standard; what we need is inter-operability to create portals where everyone's database can 'talk' to another."



GENE HETTEL, IRRI

21 October 2015

During the IRRI BOT reception and dinner, as the retiring director general, Bob is toasted a number of times during the proceedings. Bob comments that, "Being DG of IRRI has been an unbelievable opportunity and something that just a handful of people get to do." He calls his wife Crissan up to the stage to give her his thanks for her support during his time as DG."

Also on this date, excerpts of Bob's IRRI Pioneer Interview are published on the *Rice Today* website. In it he states, "The IRRI experience



GENE HETTEL, IRRI (4)

is number one in my career—without a doubt. The job as IRRI director general is unlike any other job you can ever possibly want. Science, its value in human terms, the impact you can have positively on the environment—you can transform the way the whole planet will function decades from now, a century from now. What happens at IRRI is relevant."



ISAGANI SERRANO, IRRI

29 October 2015

Bob is awarded the Order of Sikatuna, Grand Cross (Rank of Datu), Gold Distinction (Katangiang Ginto) by Acting Secretary of Foreign Affairs **Jesus I. Yabes**, on behalf of President **Benigno S. Aquino III**. It is the highest award that a foreign national can receive from the Philippine Government. In accepting the Order of Sikatuna, Bob says, "This is a tremendous honor and indeed humbling to receive this very, very important honor from the President of the Philippines. It is truly a moving experience personally and it is something that reminds me of the importance of IRRI. Although this honor is

bestowed on me, it is really a recognition of the extreme importance of the work that all of our colleagues at IRRI and our partner institutions in the Philippines do to advance the interest of not only Philippine farmers but also of all Filipinos.

6 November 2015

In Hanoi, Bob receives the Medal for the *Cause of Agriculture and Rural Development* presented from the Ministry of Agriculture and Rural Development (MARD). In accepting the award, Bob says, "I have always found your country to be fascinating. Over the years, I have been drawn to Vietnam. IRRI has made such a huge difference here. Our relationship with Vietnam is very special. We have been engaged with you all during the terrible years of the war, both the North and South. IRRI's nonpolitical status was cemented, I think, in that kind of relationship."



MARD



GENE HETTEL, IRRI

12 November 2015

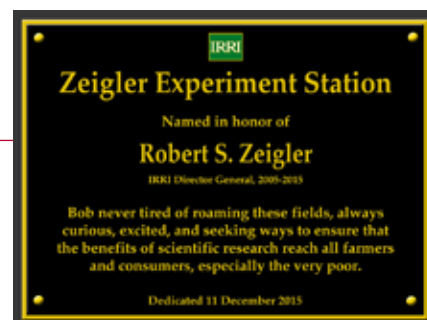
At the National Museum of the Philippines, Bob participates in a special event, Sharing the Harvest, which features the public unveiling of IRRI's three Manansala studies in the museum's IRRI Hall, as well as the launch of the *Guide to the Birds of Philippine Rice Fields* and the 2016 *Heirloom Rice Recipe Calendar*.

18 November 2015

Bob keynotes the International Rice Symposium 2015 during the inaugural session in Hyderabad, India.

11 December 2015

Bob officially turns over the office of IRRI director general to his successor **Matthew Morell**. Afterwards, IRRI's officially names its experiment station, the Zeigler Experiment Station in his honor.



JUAN LAZARO IV, IRRI

Mr. Hettel, is editor-in-chief of Rice Today and IRRI historian.



HIGH SCIENCE AND SMART POLICIES WILL ALLEVIATE HUNGER AND POVERTY

BY ROBERT S. ZEIGLER

Science-based improvements in agricultural technology have contributed significantly—across two Green Revolutions—to alleviating hunger and poverty in most of Asia. For example, the first Green Revolution that started in the 1960s—what I call GR1.0—converted India from a basket case to a breadbasket. The science of GR1.0 basically built a high-yielding semidwarf rice and wheat plant architecture adapted to low-stress environments, which benefited mostly farmers in favorable irrigated areas.

The science of the second Green Revolution (GR2.0) has gone one better on GR1.0 by “leaving no farmer behind,” especially those poor rice farmers growing their crop in marginal environments (see *Green Revolutions 2.0 & 3.0: No farmer left behind* on pages 32-35 of *Rice Today*, Vol. 14, No. 2). I maintain that GR2.0 in rice started in 2008, when farmers began adopting one of this revolution’s first new technologies, flood-tolerant rice, which can withstand total submergence for more than 2 weeks! Since then, these Sub1 varieties (such as Swarna-Sub1 in the photo)—the gene discovered and deployed by IRRI and partner scientists that enables the plant to survive complete submergence is named *SUB1*—have spread like wildfire in eastern India and in other regions where flooding is a perennial problem.

The Sub1 technology can be attributed primarily to high-level and top-quality science—science conducted in some of the finest laboratories in the world and published in top scientific journals (such as *Nature*)—to solve the



problems farmers face in their fields. One scientific study¹ reported that India’s scheduled castes—among the nation’s most underprivileged—are likely to be a major beneficiary of the spread of the flood-tolerant rice varieties. If this is not a scientific revolution helping to transform society, I don’t know what is.

I also envision that, sometime around 2030, a third Green Revolution (GR3.0) will commence when farmers start planting yield-plateau-busting *C₄* rice (see *Mapping the crop of the future* on pages 22-23 of *Rice Today*, Vol. 12, No. 4) and nitrogen-fixing rice. These varieties will be extraordinarily environmentally friendly as, to produce higher yield, they will need only half the amount of water and nitrogen that is currently used. By this time, as well, consumers should have been benefiting for years from more nutritious rice with higher quality, fortified with iron, zinc, and pro-vitamin A, in the marketplace. However, I fear that this vision could be delayed or thwarted altogether.



The anti-science, anti-technology, and anti-GMO movements, which are hindering the use of transgenic crops, such as *Bt* brinjal (eggplant) in India and pro-vitamin A-fortified Golden Rice in a number of Asian countries, are having a chilling effect on our students. Some brilliant students are wondering whether they should devote any time at all to studying agriculture and biology. Maybe it is not worth the effort if they are unable

¹ www.ncbi.nlm.nih.gov/pmc/articles/PMC3837307/

to fully apply their ingenuity to the tools that they learned in school. This is indeed troubling because the future of agricultural science, in general, and rice science, specifically, is at stake if we cannot nurture the next crop of vibrant, intelligent, and caring young scientists. We want these people to be attracted to agriculture and to work on something that contributes to food security, sustainability, and improving our environment.

In addition to giving students second thoughts about what to study, the anti-GMO movement is obstructing the delivery of much-needed products. For example, India is home to the world's largest population of vitamin A-deficient people, most of whom are children and pregnant women, many of whom are dying or going blind without the vitamin in their diet. So, it is an incredible act of negligence to keep Golden Rice from a needy and deserving population just because the anti-science clique doesn't like it. I was shaken to the core about 2 years ago when opponents in the Philippines—

where approval to distribute Golden Rice seeds to farmers has been led by the Philippine Rice Research Institute and monitored by Philippine regulatory bodies—ripped up experimental plots of the crop. What were they trying to accomplish? I suspect that they willfully destroyed the very experiments that would have proven that Golden Rice was a safe and effective food!

It is disappointing that the approval of *Bt* brinjal has been delayed in India. When one considers the large amount of pesticides applied to brinjal in the country, the release of the *Bt* version of the crop would bring tremendous environmental benefits

by greatly reducing excessive and broadly toxic pesticide applications that indiscriminately kill organisms and harm the environment. However, anti-GMO activists again continue to block release because they think GM is evil in and of itself. They try to balance hypothetical, even fantastical, risks of a technology against known, demonstrated, and massive positive benefits. And, they confound arguments around science and technologies with selected multinationals they choose to demonize.

Although still on hold in India, *Bt* brinjal has been released in Bangladesh. Interestingly, Bangladesh approved *Bt* brinjal based on the data

even better proof of concept is when, in October 2014, the secretaries of agriculture of India, Bangladesh, and Nepal and I, representing IRRI, signed an agreement to fast-track the release of any rice variety undergoing proper evaluation protocols in any one of their countries (see *Regional cooperation speeds up the release of rice varieties* on pages 14-15 of *Rice Today*, Vol. 14, No. 2). Acting rapidly on this revolutionary and courageous agreement, India has already directly released four rice varieties from Bangladesh and two from Nepal for Indian farmers growing rice in similar agroecosystems. This historic agreement will not only fast-track varietal releases but will also bring

huge savings of time and resources to the three countries.

Just think of what could be achieved if other countries decided to go the same way and put into place, as a matter of routine, accepting a neighbor's already thorough approval processes and protocols as one of the pillars of their own policies and regulatory frameworks—and

then truly act on it! We really don't have time to keep re-inventing the wheel. The world's poor are depending on us, scientists and policymakers alike, to work together to get the results of high science to those who can use them—rapidly and efficiently. If we don't, shame on us!

And, at the same time, GMO opponents and anti-technology lobbyists need to change their ways and learn to embrace science, not fear it! 🍌

Dr. Zeigler is director general of the International Rice Research Institute. Excerpted from an op-ed article that appeared in The Economic Times, India.



India, Bangladesh, Nepal, and IRRI sign a revolutionary agreement to fast-track germplasm exchange across the three countries.

generated in India, which illustrates a concept that I would like to promote further. Many countries already have rigorous approval processes for genetically engineered products, crops, and food, among other things. Countries in South Asia, for example, could mutually recognize those approval processes as much as they recognize the food standards in the *Codex Alimentarius*² rather than insisting that each test be repeated locally. This would be a responsible way to accelerate the adoption of high science and biotechnology—including crop varieties.

Bangladesh's release of *Bt* brinjal is one excellent example. Perhaps an

² A collection of internationally recognized standards, codes of practice, guidelines, and other recommendations relating to foods, food production, and food safety.

Bitter harvest from a noble cause

by Robert S. Zeigler

Dr. Zeigler, director general of the International Rice Research Institute (IRRI), reflects on the Green Revolution and fears that anti-technology zealots may steal the food from the mouths of future generations

Norm Borlaug had no illusions that the Green Revolution was anything other than a means to buy the world time. Time—to get our house in order to stabilize our populations, generate the knowledge that would allow us to support ourselves without destroying the environment, and enable most people to live in dignity. The expectation, he told me in several conversations in the early 2000s, was that we as societies would take up the new knowledge and use it wisely.

As an intellectual direct descendent of the architects of the Green Revolution, it is heartbreaking to see their noble endeavors attacked by people claiming to defend the environment and the interests of the poor. I know that, if we continue to listen to the shrill cries of anti-technology zealots, we will be distracted from taking on and solving the most serious problems that face us and our grandchildren.

Like many of my colleagues, I came to agriculture via the environmental movement. My university readings included Rachel Carson, Aldo Leopold, Muir, Thoreau, the *Whole Earth Catalog*, and, perhaps most importantly, Paul Ehrlich and the Paddock brothers, whose bestselling books predicted mass starvation in Asia. Being part of the organization of the first Earth Day (22 April 1970) at the university was key, as was a sense of social justice. My mother's side of the family dug themselves to

their deaths mining the coal seams of western Pennsylvania. That, together with the war in Vietnam and the global social upheaval of the 1960s, instilled a healthy distrust for authority and big business, and a knee-jerk response whenever possible to "stick it to the man."

As a Peace Corps volunteer in Zaïre (now known as Democratic Republic of the Congo), I saw close-up the havoc unleashed by an epidemic in the cassava crop. I witnessed the ecological destruction as villagers desperately slashed and burned swaths of tropical forest to meet immediate food needs. I was preparing myself for a career in plant ecology, but the misery caused by crop diseases was clear. They could be triggered by human mistakes and ecological disruptions, but they could also be tackled through human ingenuity and science.

I made contact with the only person in the U.S. I could locate with an interest in cassava diseases, Professor H. David Thurston at Cornell University. It turned out he was a contemporary and close colleague of both Borlaug and Peter Jennings—who developed the first semidwarf rice varieties that launched the other half of the Green Revolution. Dave opened the door

All these greats had something in common. A fire in the belly to try to make a mockery of the doomsday predictions.

for me to international agricultural research. He also regaled me with

endless tales of the personalities who, trudging their way through small farmers' fields in the 1950s and 1960s with funding from the Rockefeller

Foundation, strove to transform the lives of desperately poor farmers.

All these greats had something in common—a fire in the belly to try to make a mockery of the doomsday predictions of Ehrlich (*The Population Bomb*) and the Paddock brothers (*Famine 1975*). The flaw in these predictions was obvious to me, even as a student. They assumed that the future would be like the past. The role of science was *precisely* to make the future different from the past.

Soon, I was to meet one of these greats, Peter Jennings, at the International Center for Tropical Agriculture (CIAT) in Cali, Colombia, where I would conduct part of my



GENE HETTEL, IRRI



MANZOR DAR, IRRI

1. ON 25 MARCH 2014, the agricultural world celebrated what would have been the 100th birthday of Norman Borlaug (at center with trainees in Mexico in the early 1990s), the legendary scientist who developed high-yielding semidwarf wheat that started the Green Revolution for that crop.
2. DR. ZEIGLER (fourth from right) and IRRI staff interact with farmers on their turf whenever they can.
3. PETER JENNINGS, IRRI's first breeder, had a hand in history too by making the cross that led to IR8, the semidwarf variety that started the Green Revolution for rice.
4. SUBMERGENCE-TOLERANT variety Swarna Sub1 is drastically changing the lives of farmers in the flood-prone areas of eastern India.



manifest, environmental concerns became part of the mainstream consciousness, culminating ultimately in the United Nations Rio conference of 1992. But that conference framed a false dichotomy that continues to this day, between a healthy environment and idyllic, contented farmers on one side and a high-yielding agriculture on the other.

I began to experience cognitive dissonance. My firsthand experience with impoverished small farmers in the developing world was placing me at odds with my ideological brethren.

Our understanding of genetics and the ability to proactively manipulate how plants behaved and responded to the environment was becoming a reality. Many of us saw this as a way to reverse the negatives of the Green Revolution and open the way for, in the words of Sir Gordon Conway, a “doubly green revolution.”

We could now help the people left behind because they lived on lands plagued by droughts or floods that wouldn't support modern crop varieties.

It was easy to see that we could engineer into crops resistance to insect pests and pathogens that would eliminate the need for spraying toxic chemicals that sickened every organism they touched. Even better, we could now help the people left behind because they lived on lands plagued by droughts or floods that wouldn't support modern crop

varieties. I have seen this dream validated. India's untouchable communities (the lowest class) often farm on marginal flood-prone land. IRRI's flood-tolerant rice is most useful to these farmers and promises to transform the lives of millions.

In short, we saw modern biology as a driver for transforming agriculture into a tool for protecting the environment, meeting food needs, and reversing millennia of injustices that condemned certain segments of the population to the worst land.

Sadly, while we were working to make our dreams reality, the strange brew of anticorporate sentiment,



extreme environmentalism, romanticized traditional organic but land-hungry agriculture, and fear of new technologies boiled over to create a powerful antitechnology backlash. The extreme regulations for genetically modified (GM) crops demanded by self-proclaimed protectors of the environment had the perverse result that only the largest multinationals could afford to develop such crops. Predictably, this resulted in the same camp denouncing the growing domination of agriculture by multinationals. As costs for developing crop varieties escalated, the few seed companies that could afford the work focused only on areas with large markets. Marginal farmers were once again excluded.

This time, though, who is to blame? 🍌

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PhD research on a cassava disease. We argued endlessly about the best approach to developing lasting resistance to plant diseases. He was proud of the advances he and his colleagues had made in raising rice yields in Asia and Latin America but saw that, for these to be sustained, and for the overall health of the environment, the way crops were grown had to change (see *Where Latin America's rice gets a baptism by fire*, pages 24-25).

By the late 1970s and early 1980s, the shortcomings of the early phase of the Green Revolution were becoming clear. The most serious were the overuse of pesticides and fertilizer, and the inevitable transformations of the rural sector, where many, many gained but some, especially those in marginal environments, lost out. A backlash began among leftist academics who viewed the Green Revolution as a way for capitalist governments and multinational corporations to subjugate small farmers. This view was helped by the fact that some oppressive West-leaning governments were avid champions of the Green Revolution.

As the worst examples of the Green Revolution's side effects became



Celebrating 50 years of impact through rice research in India

The Indian Council of Agricultural Research (ICAR) and the International Rice Research Institute (IRRI) are delighted to jointly observe 50 years of successful rice research in India. During 12-15 April 2015, around 400 Indian researchers will be holding the 50th Annual Rice Group Meeting of the All India Coordinated Rice Improvement Project in Hyderabad.

ICAR's Hyderabad-based Directorate of Rice Research (DRR), recently named the Indian Institute of Rice Research (IIRR), is also planning special events later this year to celebrate its half century of significant contributions toward ensuring food security for all Indians.

The India-IRRI partnership has been a fruitful synergistic relationship. IRRI has had a long tradition—since the 1960s—of tapping into the unique expertise of many prominent Indian scientists to guide its research, governance, and management. Over the years, more than 50 Indians have distinguishingly served—or are serving—IRRI as globally recruited staff and 17 have been decision makers as members of the Board of Trustees. Since 1964, many Indian scholars have studied at IRRI to earn advanced degrees or participate in other educational programs.

During IRRI's early days, Dilbagh S. Athwal, an Indian plant breeder, worked at various levels in IRRI's upper management for a decade during 1967-77, ultimately serving as the Institute's first deputy director general. Later, M.S. Swaminathan, the first World Food Prize Laureate in 1987, served as IRRI's fourth director general during 1982-88.

Indian scientists at IRRI have contributed significantly to IRRI's success in using cutting-edge science to help bring food security, economic growth, and environmental protection to the world through their dedicated research and administrative efforts. G.S. Khush, the celebrated rice breeder and 1996 World Food Prize Laureate, worked for 34 years at IRRI and made countless contributions to keep the Green Revolution in rice production on the right path, especially with his breeding team's development of landmark varieties IR36 and IR64. Other prominent Indian researchers, as international staff members at IRRI, have helped the Institute become what it is today. They are listed on the IRRI-India website.

For their part, ICAR and IIRR are particularly interested in South Asia-focused flagship projects related to climate change, resource management, rice varietal development, GM research, and capacity building.

ICAR and IIRR especially appreciate IRRI's initiative in setting up, in 2012, the South Asia Rice Breeding Research and Training Hub at the International Crops Research Institute for the Semi-Arid Tropics in Hyderabad. The hub is already providing targeted breeding and training in India with a spillover benefit to other countries in the region.

ICAR and IRRI are seeking new opportunities to increase India's focus on upstream and innovative research and to catalyze the transfer of the new technologies to the region's farmers and others in the value chain. In addition, the partnership is playing a major role in further developing the rice sector, particularly in eastern and southern India.

In this issue, on adjacent *Grains of truth*, pages 46-47, you can read more about the historic India-IRRI partnership from



the perspectives of Dr. Swaminathan and J.K. Ladha, principal scientist and IRRI representative for India and Nepal. Also, find out on pages 10-11 why progressive Indian farmer-researcher Nekkanti Subba Rao, standing in the same field on his Andhra Pradesh farm, is featured on a second *Rice Today* cover.

On pages 16-18, Indian rice breeder extraordinaire E.A. Siddiq talks about his life's work in an exclusive IRRI pioneer interview. Dr. Siddiq developed semidwarf basmati varieties for the country's agricultural export trade and stiff-strawed varieties for India's now-thriving rice-wheat rotation. While on the IRRI Board of Trustees during the early 2000s, he fought for the continuation of the International Network for the Genetic Evaluation of Rice as well as hybrid rice research, which were on the budget-cut chopping block at the time.

Late last year, a cadre of renowned Indian rice scientists and administrators was asked to give testimonials on behalf of the thriving India-IRRI relationship. There was an enthusiastic response. Topics ranged from achievements in hybrid rice and building India's scientific capacity to addressing climate change. Read selected highlights of these tributes on pages 26-29 and see the full set on the *Rice Today* website.

The centerfold features the panoramic mural of Indian rice farming mounted on the wall of the DRR's Rice Museum in Hyderabad. Commentary on what it signifies comes from B. Mishra, former DRR project director, who commissioned the work in 2005. This issue's map section on pages 38-39 provides an interesting assessment of the rice preferences of urban consumers in India and Bangladesh.

On pages 20-21, learn about the achievements of two Indian scientists far away from home working with the Africa Rice Center—systems agronomist Senthilkumar Kalimuthu and lowland rice breeder Venuprasad Ramaiah.

In his regular *Rice facts* column on pages 43-45, IRRI head economist Sam Mohanty discusses India reaching the pinnacle in rice exports.

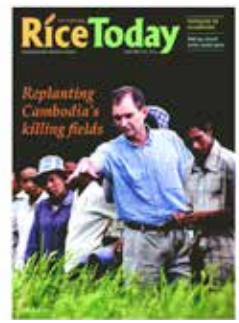
So, while reflecting on the last 50 years, read and enjoy these features and others in this special India-focused issue of *Rice Today*!

In the meantime, as the directors general of our respective organizations, we pledge that ICAR-IRRI will continue the partnering spirit of the last five decades to involve our scientists in enhancing food security in not only India but in all of South Asia.

Subbanna Ayyappan
Director general
Indian Council of Agricultural Research (ICAR)
Secretary of the Department of Agricultural
Research and Education (DARE), Ministry of
Agriculture of India, and
Member, IRRI Board of Trustees (2013-15)

Robert S. Zeigler
Director general
International Rice
Research Institute

A decade of rice storytelling



A popular magazine about rice? Hmmm ... What will you write about after the first issue? That's what I'm told one skeptic asked back in 2001 when IRRI was contemplating the development of a popular magazine devoted solely to rice. Indeed, when IRRI management decided to proceed with the experiment with the first issue of *Rice Today* in April 2002, some apprehension was evident about having enough editorial content to put between the covers on a regular basis.

However, as our award-winning *Rice Today* magazine celebrates its 10th anniversary in 2012, one only has to view this issue's cover of covers to see that rice is a multifaceted and vital topic about which interesting and spellbinding news and feature stories can be written. This is true even for a quarterly format in which any single issue now has no less than 48 pages—and sometimes more!

Leafing through the 34 issues published over the last decade, I'm amazed by the diversity of subjects that our legion of writers have covered from all corners of the rice world. Indulge me for a moment as I list just a smattering of some of my favorites:

- Replanting Cambodia's killing fields (2002)
- Sowing peace in South Asia with rice-wheat (2002)
- Interplanting dresses Chinese fields in pinstripes (2003)
- Precious cargo: Seeds of life for East Timor (2003)
- The art of rice: Food for the spirit (2004)
- Crying time: Women learn to cope when their menfolk leave the farm (2004)
- Drought—fighting the dry curse (2005)
- The genome sequence: Making waves in research (2006)
- The direct approach: Moving away from transplanting in South Asia (2006)
- Rice trade liberalization: Examining a tricky issue (2006)
- IR8: The rice that changed the world (2006)
- Rice and climate change: What's to be done? (2007)
- Vietnam and Laos: Making the uplands productive (2007)
- Bird's-eye view of the enduring Ifugao rice culture (2008)
- Coping with the rice crisis (2008)
- IRRI Pioneer Interviews (2008-10)
- How much water does rice need? (2009)
- Scuba rice: New varieties save farms from floods (2009)
- Uganda's rice revolution (2009)
- Praying for rain: Perils of the delayed monsoon (2009)
- Why cold-tolerant rice is needed (2010)
- Pockets of gold in Africa (2010)
- Water harvesting in Latin America (2010)
- Rice in the city (2011)
- The Americas have two faces (2011)
- How to feed 9 billion people in 2050 (2011)

The current issue continues in this fine tradition of storytelling with features about rice in Japan beyond 3.11 (page

20), Ethiopia's millennium crop (page 26), the plight of the rice birds (page 38), and many more.

Of course, rice and the activities that surround it are quite photogenic. We have exploited this aspect since our April 2006 issue with our breathtaking centerfolds. I look forward to this two-page spread in each issue. See the current one on pages 24-25 featuring traditional threshing of rice in Ethiopia using the hooves of trampling oxen.

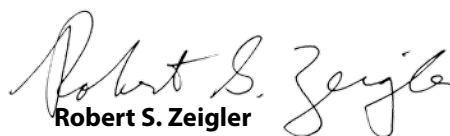
I also look forward to what have become regular features in each issue in recent years: a two-page map spread (this issue shows rice cropping patterns in Bangladesh on pages 28 and 29) and mouth-watering rice recipes from members of the IRRI community (this issue features soft-centered chocolate pudding using rice flour on page 42).

Since our April 2002 issue, the magazine has grown in distribution and reputation. It has carved out important niches in the publishing world—in traditional hardcopy, on the Web (now upgraded at www.irri.org/ricetoday), and through an email version (sign up by sending a message to info_ricetoday@irri.org). The magazine is now being distributed electronically to 13,000 subscribers including consumers, donors, and partners.

The Rice Trader (TRT), as publisher, and IRRI have now been successfully producing the magazine together for nearly 3 years. This unique partnership has opened up more advertising opportunities to help support the magazine and provide information about private-sector products and services.

In our next issue, we will be announcing the members of an Editorial Board for the magazine, which will reflect the makeup of the Global Rice Science Partnership (GRiSP), the first research program of the new CGIAR (Consultative Group on International Agricultural Research). The diverse mix of persons on the Editorial Board should bring in a plethora of new ideas and keep us abreast of the latest innovations and achievements of the men and women in rice science and trade in Asia, Africa, and the Americas.

Yes, as *Rice Today* enters its second decade, the future looks bright. The printed, Web, and e-*Rice Today* versions of the magazine continue to evolve into a global media presence and resource in an ever-changing world. The production team needs and wants your feedback and ideas. Let the team know what you think! I do regularly.


Robert S. Zeigler
IRRI Director General

Monitoring an inconvenient divergence

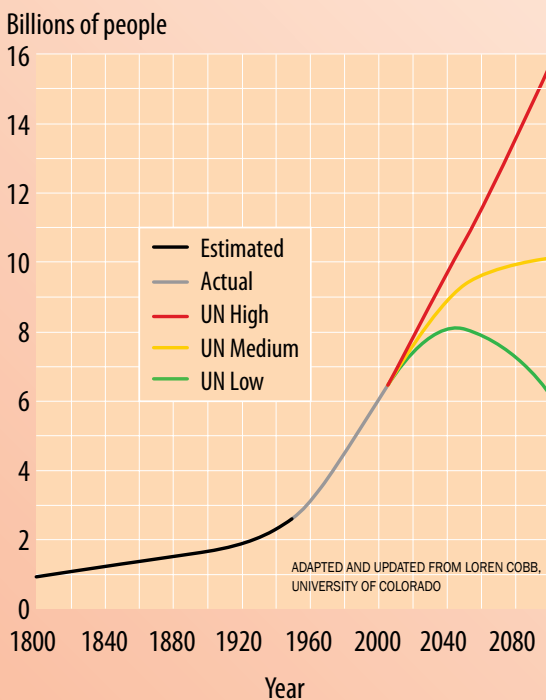
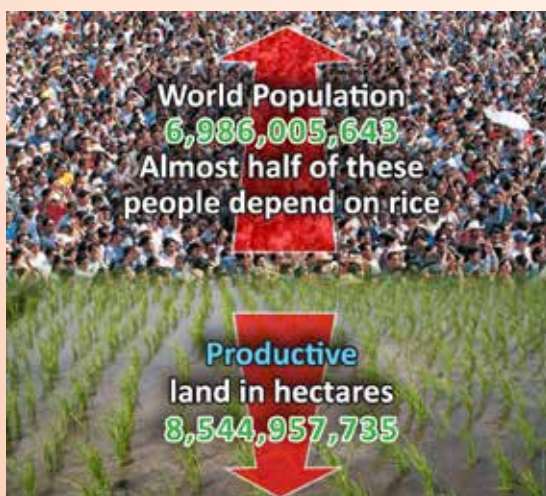
For several years now, I have been monitoring, with some alarm, the world population clock on the front page of IRRI's Web site. This clock is forever ticking upward, while, at the same time, the global productive land clock just beneath it is forever ticking downward. Truly, this is an inconvenient divergence of more and more people depending on less and less arable land, pasture land, and forest from which they must obtain food and other vital resources. The respective clocks are diverging at a current rate of around 2.4 persons per second and 1 hectare every 7.67 seconds!

In a few weeks (31 October to be exact), our population clock, which we have synchronized to match the medium variant in the United Nations' recent 2010 Revision of the World Population Prospects, will reach the 7 billion milestone. It does not escape me that almost half of this mass of humanity continues to depend on rice for its staple food.

What of the future? If we follow the UN's medium predictions, our clock will show around 9 billion by mid-century (yellow line on the graph)—now less than 40 years away—and level off at around 10.1 billion by 2100. However, if global fertility were just 0.5 child more per woman than expected, our clock in 2050 and 2100 could show as many as 10.6 billion and 15.8 billion (red line on graph), respectively—very scary and hardly imaginable! Going the other direction with global fertility being just 0.5 child less per woman than expected, the clock would show 8.1 billion in 2050 and then reverse course to only 6.2 billion at the end of the century (green line on graph). The medium prediction is probably more likely, at least for 2050, since people who will be 40 years old and older by then have already been born.

Although we should take all three scenarios in the graph "with a grain of salt," I think it is probably most prudent to take the middle road. If world population does stabilize at around 10 billion by the turn of the century, at which it hopefully will have reached a replacement-only level, we should be able to meet the still formidable challenge of feeding that many people with focused and cutting-edge agricultural research. We have the tools available—particularly in rice research now driven by the Global Rice Science Partnership (GRiSP)—to increase productivity significantly in the coming decades.

Shining examples of our impressive research progress to help us tackle problems associated with more people and less land are



showcased in IRRI's 2010 Annual Report. In addition, advances we are making in both favorable and unfavorable rice environments are featured in this issue of *Rice Today*, where we take close looks at the Impact of the Irrigated Rice Research Consortium (IRRC) and Consortium for Unfavorable Rice Environments (CURE), partners in the highlands.

To underscore the population dilemma for this issue, we feature two CGIAR (Consultative Group on International Agricultural Research) directors general as special columnists—Papa Seck, who leads the Africa Rice Center, one of our major GRiSP partners; and Shenggen Fan, at the helm of the International Food Policy Research Institute in Washington, D.C. Assuming the 9 billion or so scenario for 2050, Dr. Seck believes that sub-Saharan Africa will play a significant role in global food security in the coming decades. This is because, unlike Asia and Europe, where the availability of potential land and water for agriculture is declining, Africa still possesses a large reservoir of underused agricultural land and water resources. In the *Grain of Truth* section, Dr. Fan warns that population growth and land constraints are not the only forces of change that are challenging food security, especially where rice is concerned. We also have to add to the mix increased input and labor costs, water constraints, and climate change.

Adhering to the UN's medium prediction, the Global Harvest Initiative calculates that, if we are to feed the 9+ billion people sharing our planet by 2050, we will need to produce as much food in the next 40 years as we have in the last 8,000! As daunting as that concept is, I believe we can improve productivity enough to achieve it. Ironically, it will be due to what I call the "convenient convergence" of solving simultaneously today's problems of floods, drought, seawater incursion, etc., and tomorrow's problems tied to inevitable climate change and the continuing "inconvenient divergence" of more people and less land.

Robert S. Zeigler
Director General

Never an empty bowl:

ENSURING ENOUGH RICE FOR FUTURE GENERATIONS

The Green Revolution is generally believed to have saved one billion lives over 6 decades, making it arguably the single-most-effective philanthropic initiative in human history. (New York Times, 9 March 2008)

On 27 September 2010 in New York City, the International Rice Research Institute (IRRI), the Asia Society, and the Ford and Rockefeller Foundations held a special dinner and symposium to recognize and celebrate the 50th anniversary of IRRI and one of the most important philanthropic initiatives in Asia during the 20th century.

Founded in 1960 by the Rockefeller and Ford Foundations, IRRI played a critical role in advancing the Green Revolution in the Asian region. The increases in agricultural production that followed and the abundance of affordable rice that became available to millions of people helped lay the foundation for a period of unprecedented economic growth throughout Asia that has lifted more people out of poverty than at any other time in modern history.

At the same time, IRRI and the Asia Society released a new and significant report on Food Security and Sustainability in Asia, prepared by a joint task force co-chaired by Dan Glickman, former U.S. secretary of agriculture, and Dr. M.S. Swaminathan, India's leading food security expert (and former IRRI director general). The report examines the multiple factors contributing to Asia's growing food insecurity and lays out a strategy for the future that emphasizes the critical importance of rice as a source of nutrition, livelihood, and environmental sustainability. With Harvard economist and Asian food security expert Dr. C. Peter Timmer as the lead author, the report will be released across Asia over the next few months, including a special event at the International Rice Congress in Hanoi on 9 November.

In this report, the authors note that food security in Asia is currently facing serious problems—more than half a billion inhabitants of the region go hungry each day. The future seems even more daunting—population growth, dwindling land and water resources for agriculture, and huge uncertainties from climate change present scientists and policymakers with additional challenges. Moreover, the report states that, traditionally, improvements in rice technology and in farm productivity have been the main avenues to overcome problems related to food security. Indeed, rice availability and food security have long been synonymous in Asia, especially in the political arena. Despite rapid economic growth, sharply reduced poverty, and extensive diversification of the typical Asian diet, the dominance of rice remains a reality in the region's food security. As such, the task force's report focuses on the role of rice in sustaining Asia's food security and aims to provide a thorough assessment of the potential for continuing gains in rice productivity.

It's very clear that rice will remain fundamental to the region's growth, prosperity, and stability for the foreseeable future. At IRRI, we believe that it is imperative to encourage a new generation of philanthropy in Asia that supports rice science and innovation for the benefit of the entire region. Indeed, in keeping with the recommendations of this report, IRRI has organized a 50th anniversary fund-raising campaign to convince today's Asian philanthropists to invest in this vital work. For more on the IRRI campaign and its philanthropic initiatives in Asia, please visit www.irrifund.org. For those in the United States, you can visit the Web site of Give2Asia at www.give2asia.org/, where the IRRI campaign is displayed prominently.

I encourage you to spread the word about these important activities and I look forward to your continued interest in, and support for, international rice research.

Robert S. Zeigler
Director General



50 years and beyond

"Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world."

Louis Pasteur (1822-95), French chemist and microbiologist, discoverer of penicillin



The Founding Stone at the entrance to the International Rice Research Institute (IRRI) reads:

"An educational and research center devoted principally to the study and improvement of rice, the world's major food crop. Established by the Ford Foundation and the Rockefeller Foundation in cooperation with the Government of the Republic of the Philippines. Organized April 14, 1960. Dedicated February 7, 1962."

April 14 marks 50 years since the day the IRRI Board of Trustees held its first meeting in Manila, Philippines, and officially approved the architect's design of what was to become the Institute's headquarters in the university town of Los Baños in the province of Laguna, 60 kilometers south of Manila. The first Board chair was Dr. J. George Harrar of the Rockefeller Foundation in the United States. He was joined on that momentous day in 1960 by Dr. Paul C. Ma, the dean of the College of Agriculture of Taiwan National University; Paulino J. Garcia, the chairman of the National Science Development Board of the Philippines; Vicente G. Sinco, the president of the University of the Philippines; Dr. Hitoshi Kihara, a leading Japanese geneticist; M.C. (Prince) Chakrabandhu, the director general of the Department of Agriculture in Thailand; Juan de G. Rodriguez, the Philippine secretary of agriculture and natural resources; F.F. Hill from the Ford Foundation in the U.S.; K.R. Damle, the secretary of agriculture in the government of India; and Dr. Robert F. Chandler of the U.S. and IRRI's first director general.

It was an extraordinary gathering not only because the participants had traveled from around the world to set an agenda that would have a fundamental impact on the future of Asia but also because it was supported by the philanthropy of just two families: the Rockefellers and the Fords. Working with friends and collaborators across Asia over the next five decades, IRRI has been honored to be part of an extraordinarily productive partnership that has played a key role in one of the great success stories in human development. Scientists from many different nations working side by side made extraordinary contributions to food security in Asia through the Green Revolution in agriculture, providing increasingly inexpensive rice in ever more abundant quantities. In the process, they helped lay the foundations for economic growth in Asia that lifted more people out of poverty than ever before in human history.

Despite the impressive achievements of the past half century, the role and impact of rice research remain as crucial as ever. Poverty and food security are still major issues for many developing nations and threats such as climate change make the work of IRRI and its partners all the more challenging. It is for this reason that the Institute recently launched a 50th anniversary fund-raising campaign (www.irrifund.org) to find the resources and build the infrastructure IRRI will need to grow and accelerate its work now and into the future.

On IRRI's 50th anniversary, we not only celebrate those giants of rice research who came before us and honor their hard work, humanity, and dedication. We also look ahead to the great food security challenges of the future and hope that a new generation of visionary philanthropists and committed supporters will once again step forward.


Robert S. Zeigler
Director General

HISTORIC MEETING of the Board of Trustees of IRRI, 14 April 1960. From left end of table: Chairman J.G. Harrar, Paul C. Ma (*hidden*), Paulino J. Garcia, Vicente G. Sinco, Hitoshi Kihara, R.F. Chandler, M.C. Chakrabandhu, Juan de G. Rodriguez, and F.F. Hill. Not shown is K.R. Damle.



