Leading Crop Scientist Warns Of Potential Rice Crisis

Dr. Robert S. Zeigler, director-general of the International Rice Research Institute (IRRI), on Dec. 6, 2006, gave a "Newsmaker Presentation," at the National Press Club in Washington, D.C., titled "Super-Sizing Another Two Billion Consumers: A Contrarian View of Poverty, Agriculture, and Economic Development in India, China, and Asia." We report key points of this presentation, and provide excerpts from a follow-up interview with EIR *reporters Mike Billington and Marcia Merry Baker.*

The IRRI, the world's leading rice research center, is located in Los Baños, Philippines. Founded in 1960, it is a non-profit, autonomous agency, with activities in ten other nations; it functions as part of the Consultative Group on International Agricultural Research (CGIAR), the "Green Revolution" network for advances in food genetics. The CGIAR's Annual General Meeting took place in Washington, D.C., in December 2006.

Dr. Zeigler, an internationally respected plant pathologist with more than 20 years' experience in agricultural research in the developing world, became the director-general of IRRI in April 2005.

He called a press briefing in Washington, D.C., on Dec. 6 to sound the alarm on a potential rice crisis. Rice stocks have collapsed by half in the past five years, he reported, while funds for the urgent research needed to expand yields have been cut by more than 50%.

News reports carry numerous articles about the "exploding wealth" in Asia, Dr. Zeigler said, but the fact is that hundreds of millions of desperately poor people in Asia are already facing increasing rates of vitamin and mineral deficiencies due to a lack of basic nutrition, ruining millions of potentially productive lives. Most shockingly, Dr. Zeigler showed that, despite the horrendous food and nutrition crisis in Africa, the hunger crisis in Asia is far worse, not only in total numbers of victims, but also as a percentage of the population.

As Dr. Zeigler said in the interview below, he is a scientist, and he knows that poverty and hunger can be overcome, if the world shows the scientific and political will to do so.

IRRI

Robert S. Zeigler, Director-General, International Rice Research Institute, in a rice test plot, Los Baños, Philippines.

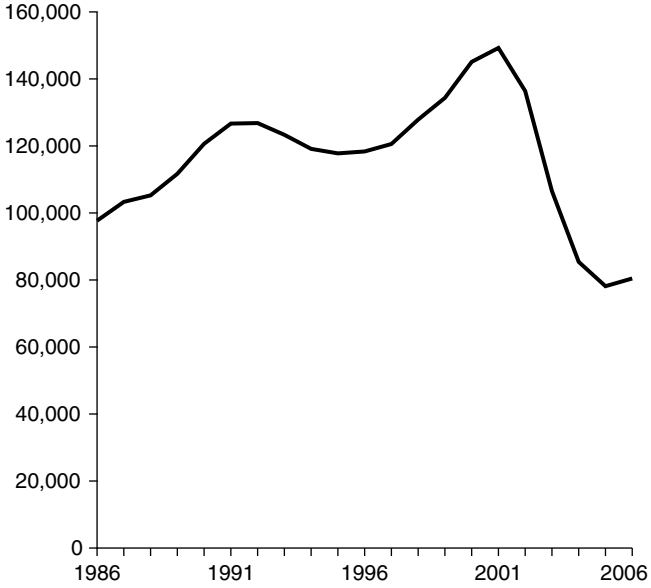
Baker: You have worked your whole life to develop ways to increase grain output, and worked with people committed to that, yet the axiom of GATT and then the World Trade Organization—and here I resort to "GATT-speak"—is that "you shouldn't have national grain reserves or world carryovers, because it is 'trade-distorting.' " However, as you and others point out, we face grain stocks so low, it means potential "food shocks."

Zeigler: Look at prices. My concern is that we're on the brink of that—in the next couple of years, some countries are going to find it difficult to obtain rice. And they need to import it.

A lot of countries are importing now, but they are not importing very much. The Philippines is an importer. Indonesia is an importer. All the African countries are importers. China has gone on the market for rice recently. In Latin America, probably all but Brazil and Colombia are importers. I am not sure about Peru. Europe is obviously an importer.

Baker: That's rice; then you can look at wheat and corn and

FIGURE 1
World's Ending Stocks of Rice, 1986-2006
(Millions of Metric Tons)



Source: UN Food and Agriculture Organization.

see other particularities, but it all adds up to low stocks, from production levels being below consumption levels—which also have been below the dietary intake levels really required.
Zeigler: Yes, what happens is that people just eat less at some point. And the people who are eating less are the poor.

Billington: So, even without taking into account the imminence of the collapse of the global financial bubble, and the chaos that can ensue, do you think that the current pace of this rice drawdown situation, and the lack of the kind of investments in R&D to solve it, mean that, in just a few years, we're going to be facing a rice crisis?
Zeigler: I think there's a real possibility of that. To highlight another problem, there hasn't been significant investment in irrigation infrastructure since the late 1980s.

Baker: In the 1960s, Mexico was going gangbusters on hydraulics projects, and then it stopped.
Zeigler: Well, look at what's happening in the wheat-growing area of Mexico. The numbers have dropped horribly. They've had some bad droughts. In 1985, the investment in irrigation infrastructure started to drop off. In the 1990s, there was almost none. Look at the Asian Development Bank, the World Bank, and the loan portfolios; you are going to see hardly any irrigation projects.

Baker: Then there is the stampede for biofuels.

Zeigler: We don't know what the impact of the big biofuel "lemming" reaction is. A friend of mine at the University of Nebraska sent me some figures a few weeks ago, for which they just did some back-of-the-envelope calculations on the likelihood of having to import corn into Illinois, Iowa, and Nebraska!

Baker: There's talk of even importing biomass—sugar from the Dominican Republic and elsewhere in the Caribbean, besides the talk about a breakthrough on cellulosic biomass for biofuels.
Zeigler: Are they going to bring in refined cane sugar? Or bagasse or molasses?

Baker: Maybe molasses as in the 18th Century. In the meantime, the mood among farmers in Iowa and elsewhere is kind of energized demoralization. They say, "I'm fed up with not making any money farming for 40 years, so I'll get what I can. I'm demoralized. I know it's not a good national policy. But I'm a farmer and I need some money. So I'll go along with the craze—the rapture of ethanol."
Billington: The politicians are going along with it. Think of the impact this is going to have when the farce is blown. As you have pointed out, you've created an infrastructure to go along with this. What kind of damage do you already have in this very short period of time?
Zeigler: If we can eventually develop some bacteria that will digest cellulose and lignin, then we can probably grow switchgrass and so on, but this is still wild speculation. I don't know what the energy equations would be for that.

Baker: Well, since we have known for 30 years what the energy equations are for uranium and thorium, we know we could properly feed everyone for a change by taking the right energy policy path.
Zeigler: Yes. I always wondered, when I was in college, why people were opposed to nuclear power. That was the politically correct thing in the early 1970s, in the late '60s. But I could never figure out what the issue was. You have issues of managing the waste, but that seemed to be a manageable problem.

Baker: In 1997, Gurdev S. Khush, from IRRI, gave a Washington, D.C., press briefing on what was called the next "Super Rice." Where does that stand?
Zeigler: Today's *Economist* [Dec. 9, 2006] had an article on one of our, what we call, frontier projects. It's an interesting process of technology development, where not everything works the way you hope it will. We had the idea behind the super rice, which was to redesign the architecture of the rice plant, to make it with larger panicles, and more and larger grains.

And when they did that—they succeeded—the assumption was that the rice plant was capable of filling all the grains

Ariel Javellana/IRRI

Dr. John Sheehy of the IRRI examines rice plants. A row of maize stands behind him.

Engineering Maize C4 Into Rice

One of the most promising approaches to give a large boost of productivity to rice, would be the successful incorporation of maize CO_2-concentrating C4 photosynthetic pathways into rice plants, using genetic engineering techniques.

Many scientists are looking at ways to do this, and some progress has occurred with the overexpression of C4 enzymes in C3 plants, but the ultimate goal—significantly boosting photosynthetic efficiency—has not yet been reached. The main problem lies in the anatomical arrangement of C4 plants. Most C4 plants, including maize, break up photosynthetic activity into two cell types, with C4 photosynthetic processes occurring in a different cell type than C3 photosynthetic processes: There is a separation in space between the CO_2-uptake processes and the CO_2 delivery site, with complex biochemical reactions occurring along the way. C3 plants as a rule do not have those qualities of structural complexity, and the challenge will be to mimic this complexity within one cell type, the mesophyll cell. —*Chris Craig*

that it could create. It turns out that it couldn't. The grain wasn't filled.

So we're now looking at the possibility of working with the photosynthetic mechanisms of rice. Let's see if I can explain this briefly: There are two kinds of photosynthesis in plants: something called C3 and, much more recently evolved, something called C4.

Baker: "More recently," meaning when?
Zeigler: Tens of millions of years ago. After the grasses evolved, some developed a C4 kind of photosynthesis and some developed the C3 kind. Actually, it's evolved independently about 50 times in the plant kingdom, just using different mechanisms.

The C4, which is what's in maize and sugar cane, is much more efficient. And we're looking at how we can put that into rice. It's a real man-on-the-moon kind of thing, but I think we can do it.

Baker: Does it have to do with leaf area? Or is it internal?
Zeigler: It's internal. It's the way the plant organizes itself within the leaf and the kinds of enzymes it uses. There's a nice write-up in the *Economist.*

Baker: This is still along the lines of what Dr. Khush was talking of, in terms of the traits involved. On this matter of the grains filling out, do you perhaps already have some type that, even if it all isn't filled out, is still a superior-yielding plant?
Zeigler: Yes. We just developed—it came out in a paper in

IRRI

IRRI's development of a rice plant that can withstand 14 days of submersibility will help food production in countries like Bangladesh, where flooding is a problem.

Nature in August—a rice that is tolerant of flooding. Rice grows in standing water—about 12 to 20 inches deep—and it's quite happy. But, if it gets completely flooded, it drowns, just like any other plant. So we have developed a rice that will tolerate 14 days of complete submergence, which is a big problem in areas of Bangladesh, eastern India, along the Indo-Gangetic Plain, and in the inland valleys of Africa. So that's a huge breakthrough. What's interesting is that we've done the very basic discovery science in parallel with targetting varieties that we know farmers will grow. Several varieties are being evaluated in farmers' fields now, in areas where flooding is a repetitive problem. This is a problem every year on about 10 million hectares.

Billington: You said in your presentation that, in India in particular, in the land in the Ganges where they are using groundwater, the water levels are being pushed down, And they need to intensify in the rainfed areas.
Zeigler: What is happening is that the water tables are dropping severely.

Billington: Do they have to subsidize fuel for the pumping of water?
Zeigler: The electricity for pumping is free, so, essentially, the water is free. But that's just not a sustainable system. And they've actually been growing rice there for only less than 40 years.

Billington: When there wasn't water?
Zeigler: Well, there wasn't water, but also the rice wasn't very high-yielding. But, with the new rice that was so high-yielding coming in, rice became very profitable, especially if the water is free. So that's a granary of India. Many rice types are being produced. If rice drops out of that area, that will cause some problems.

Baker: So, in the recent history of rice innovations, would you say that IR8 was the first one that came in? And that it resulted in such high-yield cropping and profitability in India and elsewhere so that now IR8 is extensive?
Zeigler: The IRRI was founded in 1960. The 40th anniversary of the release of IR8 was Nov. 26, 2006. IR8 and its progeny and varieties that developed from it are called semidwarf rice varieties. Dwarfs are very small, but the semidwarfs are about three feet high. Very robust. You push them over, and they just spring right back. They have tough straw.

IR8 was the first one to go out. It wasn't perfect. It had regular grain quality. It was susceptible to a number of diseases and insects, but it yielded like mad. It outyielded the traditional varieties by more than double.

Baker: What does that mean, in a place such as India; how many tons per hectare, after IR8 is in?
Zeigler: It depends where in India, but up in the Punjab, Haryana, they can get seven tons per hectare. Before that, you'd get a ton and a half or two tons. But, in some places, such as in Yunnan, China, where you have cool nights and it's in the higher latitudes, your days are longer, and you can get 10 or 12 tons.

Baker: So those are still advances from the semidwarf IR8, and we are looking forward to more breakthroughs, some-

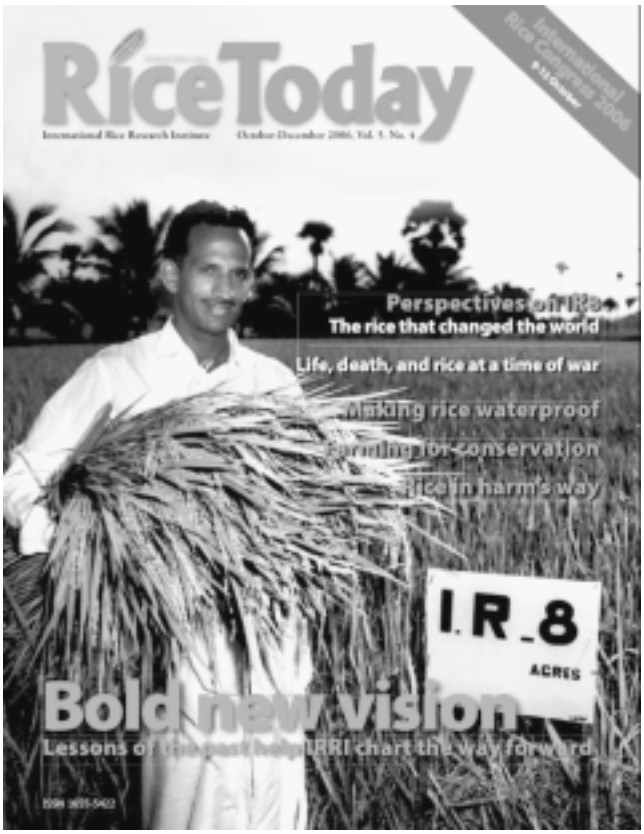
times called "miracle rice." What would you like to see, if you could succeed with the C4 process and everything you want?
Zeigler: What we're expecting in the C4 is to get anywhere from a 30 to 50% increase in yield. That would mean that we could get over ten tons per hectare—that's what we're looking for—in the tropics, in the wet season. The real yield challenges are in the tropics, where you have a lot of cloud cover in the rainy season. You don't get as much sunlight; you don't get as much photosynthesis. Your nights are warm, so the plant burns up a lot of its own energy at night because it's not capturing sunlight, so it's just keeping itself going. The way organisms work, the warmer it gets, the faster metabolism goes, and the faster they burn up energy.

Baker: Resources are being cut way back, to fund the CGIAR network, for developing new productive varieties of food crops?
Zeigler: In real terms over the last, let's say, ten years, there has been a slight increase in total funding to the Consultative Group on International Agricultural Research—the 15 centers. In inflation-adjusted dollars, there has been a slight increase in total funding, but the nature of that funding has changed completely.

In the beginning, IRRI's funding was 100% unrestricted, that is, we were given the money and expected to go out and do the job. We're a research organization, and the donors felt that we knew how to do research better than they did. Then, over the last 15 years or so, what's happened is that, for the CGIAR system overall, we're now down to about 40% of our funding being unrestricted. IRRI's is a little bit better; it's about 50%. It used to be 100% and now it's down to 50%. In addition, our total budget is down, in real dollars, about 50%.

Baker: Yet, at least half the world's people depend on rice.
Zeigler: Yes, and our budget is going down. And, of course, half of that money is what's called "restricted" funding. The problem with restricted funding is that it's generally for much more short-term kind of work. It's almost like development money. So, the funds that are going into the kinds of research that will yield your benefits seven, eight, nine, or ten years from now are being curtailed (drastically) across the system. And it's not just that the research is being cut back; we're losing human resources. People are leaving, maybe going to the private sector or elsewhere. They're retiring and not being replaced. This is eroding our capacity to ask the really important questions that need to be asked, and we are not having a chance to make a major difference.

Baker: What about the non-rice crops? The tubers and all the other specialties? What about cassava?
Zeigler: It's even worse. Two centers work on it. One is in Cali, Colombia, an institution called CIAT. Another is IITA, in Ibadan, Nigeria. Money for cassava is down to almost nothing. And it's a major staple.



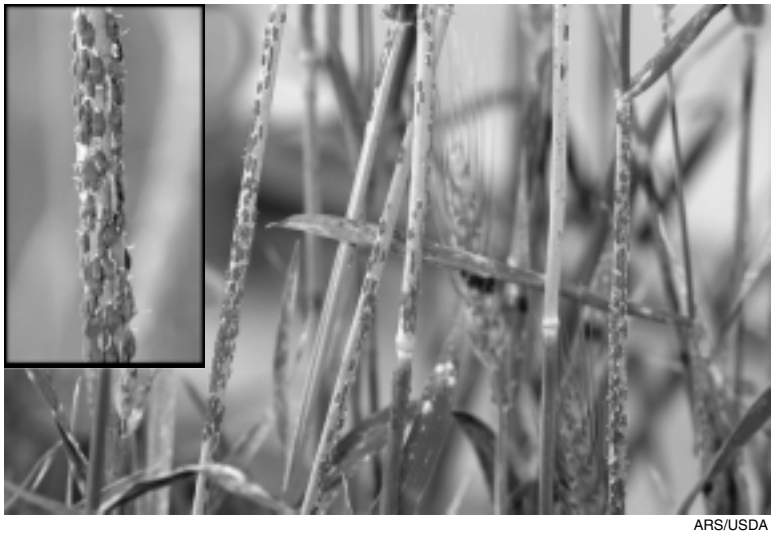
IRRI

The rice that changed the world: IR8. IRRI's first rice variety, released in 1966, "was to tropical rices what the Model T Ford was to automobiles—a rugged variety that could go almost anywhere," IRRI announced.

Billington: One of your slides at the Press Club contrasted the money going for R&D in private companies versus the money going to CGIAR centers.
Zeigler: Well, they [the privates] very legitimately need to make profit and need to give a return to their shareholders, so they identify research projects that will produce a product they can sell for a profit and that means they are going to sell to farmers who have the power to purchase and who see the value in the product. So, that's going to very strongly skew the kinds of projects that will pass through their internal evaluation process.

Baker: One fierce impediment to developing food genetics for the public good is that there have been sweeping changes in U.S. patent laws on this. In the 1930s, the traditional principle was, in effect, that no patent rights to food crops were permitted. You could have rights to some new ornamentals, but not food. Then, in recent decades, this all changed. In 1992, a key law was enacted allowing private rights. In 2001, a Supreme Court decision ratified extensive and unprecedented private patenting of food crop improvements. In effect, this amounts to control over "the means to life," and is against the American tradition of law.

Zeigler: Fortunately this can only be done in the U.S. under certain circumstances. After all, if it exists in nature, how can it be considered to be novel! But I know there have been wholesale filings on straight gene sequences. When you submit a filing, you have to give some use for it, but sequence-only claims are not now being allowed. This heavy filing has also led to a lot of confusion and worry, when in reality a patent is only an issue if you need to do your work in countries in which the patent is valid and where the issued claims might be relevant. For most developing countries, the patents are not in force at home. The only infringement threat might come in their exports. I've got nothing against patenting a product, if you create a product. But you can't patent the gene that yields that product. If you are clever enough to put several genes together, you can patent that particular combination, using those things. If somebody else wants to use them, and put them together they should be free to—you don't patent bricks!



ARS/USDA

Wheat stem rust, Puccinia *graminis, a highly virulent strain, present on the Arabian Peninsula, after it emerged in East Africa in 1999. For over 50 years, the varieties of wheat in use worldwide had been bred to be rust-free, but the new outbreak threatens to spread around the globe. In the mid-1950s, a related wheat rust destroyed 40% of the U.S. crop.*

Baker: The patenting matter must make research difficult.
Zeigler: It makes everybody nervous about exchanging plant material, because they are worried that somebody else will take a patent out on it and, for example, they would not be able to even use their own varieties. Recently, there was the "International Treaty for Plant Genetic Resources for Food and Agriculture." Basically, it determines how materials are handled. When people started patenting plants, everybody got scared. There were no rules. Now there are rules, so people are beginning to exchange more materials. So that also contributed to the problem of limiting germplasm exchange. People were afraid that companies were going to patent everything, and then sue people when they used their own stuff.

I think that we're a little better off now as the treaty is coming into force.

Baker: This patent control goes hand in hand with the spread of monoculture internationally. Look at soy, and the fast-changing, extreme situation in Brazil and Argentina, where a huge amount of area has been thrown into soy monoculture. Then, we saw soy rust show up from Asia.

In terms of vulnerability to the disease, from the plant pathology point of view, what principle would you bring out for the layman? What is the story on the new wheat rust?
Zeigler: Basically, wheat farmers around the world are depending on just one major gene to protect against rust, and that's recently been overcome, in East Africa. I'm not sure where it was first discovered—I think it was in Uganda, just a few years ago. It's wheat stem rust, and it's spread all over East Africa. The concern is that, if it gets into South Asia, moves across India, and into China, and up through Turkey, and then into the U.S., eventually, it could be devastating.

Baker: Was there only one variety?
Zeigler: It's not the varieties, it's the gene—the resistance gene.

Baker: How did it come about that the type of wheat grown was all of the kind that has this one resistance gene?
Zeigler: Because everyone wants stem rust resistance. CIMMYT (the International Maize and Wheat Improvement Center), our sister center, developed lines that had this gene, and then these lines were used for parents and crosses, and selected for resistance to stem rust.

Baker: If the CGIAR had enough funding tomorrow that could get your staffing and your labs and so forth to the levels you want, then would you be tracking such a contingency as this rust?
Zeigler: This is the thing: It's not what might happen; it did happen! It wasn't picked up earlier. In centers such as CIMMYT and IRRI, we have had one of the most wonderful sets of global networks, in which we would exchange germplasm, our breeding lines, etc., and among those, there are what we call nurseries, in which you might have, say, 20 lines of grow-outs. Some of these have specific purposes, and some of these actually monitor the presence of diseases around the world, so you can have an idea when something is changing.

But, in the mid-1990s, funding dried up for those kinds of networks. Funding was withdrawn. We're keeping what is called the International Network for the Genetic Evaluation of Rice alive on a shoestring, out of our unrestricted money, because we think it is so important to have that mechanism. Essentially, it is an early warning system

all over the world. That's something we can barely keep alive.

Baker: Yet the cost of these contingency measures is nothing compared with the cost of disease outbreak, even famine.
Zeigler: What happened is that the wheat network, because of the lack of funding, became—I don't even know if it is functioning anymore. So, something like this [wheat stem rust outbreak] happens, and it doesn't really come to the fore. If we had caught something early enough, we could have responded much earlier.

Basically, what you would do, at that site, where the new race of rust virus is, is set up field trials there, and you can do breeding there to find a line that is resistant to that strain. I'm not sure how likely it is that you will, but what you can do is carry out more sophisticated genetic analysis of that fungus, find out where it changed, how it changed, and, in the case of wheat, although it is difficult, start looking for resistance in other related cereals. Look in barley, small grains, and then say, OK, is there some way we can move the resistance strain over to wheat?

The funds that are going into the kinds of research that will yield benefits seven, eight, nine, ten years from now, are being curtailed drastically. . . . People are leaving, going to the private sector, or retiring, and not being replaced. It's eroding our capacity to ask the really important questions, and having a chance of making a major difference.

Baker: And CIMMYT was the kick-off, in the 1960s, to all the Green Revolution work in wheat and rice and the whole network that became the CGIAR.
Zeigler: CIMMYT is nearly broke. It almost went bankrupt a couple of years ago, and it's still in rough shape. And, this year [2006], the European Union is not contributing its $27 million to the system.

Billington: You said at the press conference that the EU is boycotting the whole year because it is fighting with the World Bank?
Zeigler: The situation is, the World Bank has a trust fund that manages donations to the CGIAR system. Then, the Secretariat of the Bank distributes funds to the centers according to the contributors' wishes. Now, they changed the rules to this trust fund such that the Bank accepts none of the liability, or responsibility, for any of the funds that are distributed. That goes against the EU rules, so it cannot give money to any entity that is not accountable for it.

I said in October: Look, IRRI is an international organization. The EU can give the money to us and we will distribute it to the centers. We will accept responsibility for reporting and so on. They said no.

Baker: What is going to happen with this wheat rust?
Zeigler: It is airborne. It is going to spread. CIMMYT is trying to start a global rust initiative, but it just can't get enough funding for it. It's the sort of thing that has the support of U.S. wheat growers and such.

Billington: Does this kind of thing come through the U.S. Agency for International Development?
Zeigler: USAID and the USDA can give some. It's an issue of interest to U.S. farmers, to U.S. agriculture, so they can support some work. There's a cereal rust lab at the University of Minnesota, a USDA lab.

Baker: In botany, you are talking about continuing to develop new traits, new resistances, new productivity, new yields—really, as a way of life?
Zeigler: I'm a scientist. I believe that, if we do things right, we can actually live in a wonderful world. I do believe that we can, with the proper management of resources, have a decent living for everybody. What I would see is that we could produce what we need for a world population of 9 or 10 billion, on less land, and using less water than we do now. Environmentally, it could be wonderful.

We should be able—this is another one of our harebrained schemes and I'm not sure we'll get anybody to fund it—to make rice and wheat and maize a little more like soybeans, which can produce their own nitrogen fertilizer, fix it out of the atmosphere.

Legumes have a neat trick. They associate with some specialized bacteria that take nitrogen from the air—which is 80% of the atmosphere—and transform it into a form that can be used so that you don't have to add nitrogen fertilizer. So, if you can get the cereals to do that—

You see that one of the big environmental problems in China is that they are just dumping nitrogen fertilizer on their crops, and it is polluting their groundwater. You get nitrates in the groundwater, so that it's toxic. You get nitrate runoff into the rivers, and you get algal blooms and all kinds of other problems. So, we're also looking at how we can turn rice into a plant that can create its own fertilizer.

Baker: Could nitrogen fixing in cereals be developed in the next 20 years?

Cornell University

Late blight, caused by the oomycete Phytophthora infestans, *wiped out Irish potato crops, and millions of the Irish as well, from 1845-49.*

Zeigler: It might take a little longer. The timing's probably a tough call.

Baker: So, you are really talking about engineering plant life. If you could go ahead and have all the means at hand to operate field tests constantly, and to know when rust or some disease shows up, and know when we have to act, what would you do?

How about answering this in terms of going back to the 1840s potato famine in Ireland? If we had had in place then all the means for testing, and then, one day, we saw a few rotten potatoes show up in the 1830s, before the disease spread in the 1840s, could something have been done? Of course, I am asking a reductionist question about the technical side. We understand that monoculture dependence on the potato to begin with was forced on Ireland. But could such plant protection work in principle?

Zeigler: Yes, I think that's exactly right. We would have seen that the varieties being grown were susceptible and that, under the right weather conditions, we could have a catastrophe. So, therefore, we would begin a program—we would have an ongoing program to constantly improve the resistance to these diseases.

Baker: Fungus and rot and bacteria?

Zeigler: Bacteria and viruses, whatever. At IRRI, our funding cuts have sharply diminished what has been our core strength: host-plant resistance. We've had to cut back on that. And, I am desperately trying to find a way to get funds to rebuild this, because we're below critical mass in my opinion.

Baker: If you at IRRI are below that, what about elsewhere? Does Peru have the world potato research? You are a flagship, so, if you're in bad shape, they're in really bad shape.

Zeigler: Yes. A number of centers are far worse off than we are.

Baker: In recent years, there have been warnings of a potato outbreak—in Russia or elsewhere.

Zeigler: Yes. I think it's only a matter of time for potatoes. The reason is that the late blight pathogen of potato—what used to be called a fungus—is very interesting in that it has sex. It has two different mating types. When potatoes were distributed around the world, only one mating type went with them. So, potato late-blight fungus has gone without sex for several hundred years or more.

Billington: That gives a new meaning to Mr. Potato Head.

Zeigler: That could lead to all kinds of comments! But then, in the last 20 years or so, or less, it's been demonstrated that the other mating type has spread. What that means is that, when you have only one mating type, you don't have any sexual recombination—no reshuffling of genes.

Baker: So you don't get mutations?

Zeigler: Well, you get mutations. But you can only have mutations. That's your only way of genetic change. If you have sex, you have mutation, plus you reshuffle the deck every generation.

Baker: Did the dispersion of just one sex go outward from Peru, from Mexico, or from where?

Zeigler: As in most areas, there is a bit of scientific debate about this. Most of the world believes that the other mating type came out of Mexico—the Toluca Valley, just west of Mexico City. Some Peruvians and Bolivians claim that they have evidence that it was present in the Andean valleys of southern Peru and Bolivia.

But that mating type is spreading around the world, and, as it spreads, the potential of pathogenic variation within the late-blight Irish famine potato fungus goes through the roof. And, you had big losses in the U.S. already. Upstate New York had some very bad occurrences in the 1990s and early 2000s.

Billington: So it's only a matter of time for it to blow up? And, again, people aren't working on it properly?

Zeigler: People are working on it, but there's not that much money for this stuff.

Baker: Is soy rust an example of that too? In other words, the kinds of things you'd be working on routinely, if you had

Henry Wallace: Science To End Hunger Forever

In early 1941, Henry A. Wallace, then Vice-President-elect for Franklin Delano Roosevelt, took steps to launch what became the Mexico-based International Center for Research in Wheat and Corn (CYMMIT), which produced the Green Revolution for those crops, and became the flagship institution for the Consultative Group on International Agriculture Research (CGIAR).

The CYMMIT project was one among the many economic initiatives of the FDR period, all associated with the principle that scientific breakthroughs can be deliberately fostered, to cause continual advances in agricultural production. This was a personal creed of Wallace, who served two terms as Secretary of Agriculture (1933-40) in the FDR Administration, as FDR's Vice President (1941-45), as Secretary of Commerce (1945-46), and fulfilled many special functions during World War II, including co-chairman of the Manhattan Project, and chairman of Economic Warfare for the War Mobilization Board.

Wallace repeatedly stated that science, coupled with related economic policies, especially food reserves and decent conditions for family farming, can eliminate hunger and want throughout the world.

Three programs of the Wallace/FDR period are most important for consideration today, given the policy morass in Washington, D.C. around bio-foolery, and the world food stock crisis.

1. Crop and livestock genetics can and must be vigilantly advanced, in the service of the public good, not under private cartel control.

2. National and international food reserves are essential to protect populations in times of disaster.

3. High-tech, family-run farms are essential for the national interest, so therefore, the Federal government must be sure that the farmer has infrastructure (water, transportation, communications, education), affordable inputs (machinery, fuel, electricity, chemicals), and an income that is based on prices covering his costs—a "parity" policy. This runs directly counter to globalization.

Henry Wallace

In 1936 and 1937, two successive volumes of the *Yearbook of Agriculture,* published annually by the U.S. Department of Agriculture, were titled, "Better Plants and Animals," and dedicated to genetics. Wallace, in the preface to the 1937 volume, wrote:

"Life is always changing because environment is always changing. There are always new types of diseases, new insect pests, changes in soil fertility, changes in consumer demands. The work of the plant and animal breeders is directed to meeting these changes. It has only just begun. . .

"If genetics enables us to outdo nature's own efforts, it is because it is in the truest sense a science of cooperation with nature. We want to do different things than nature does—for example, in the creation of hogs with plump hams, or wheat-X-grass hybrids with plump seeds—but we have to learn nature's methods of doing them. I think that more knowledge of how to cooperate with nature for our own good is the greatest need of the world today."

Wallace himself was a master plant and animal geneticist. In 1923 he developed the first commercially viable corn hybrid, and in 1926 founded what became the Pioneer Hi-Bred International seed company.

But he himself regarded as his most successful achievement, the 1938 law for a U.S. "ever normal granary," to store up grain in surplus years to cover lean years. He wanted this internationally, and said, moreover, that "after adequate storage supplies of wheat, corn and other grains have been established, it becomes the part of wisdom to conduct further storage operations in the soil rather than in the grain bin," foreseeing advances in soil fertility and crop science to end hunger forever. (Jan. 26, 1937, National Farm and Home radio)

For more on Wallace, see Lyndon H. LaRouche, Jr., "The Geometry of the Henry Wallace Nomination," and Robert L. Baker, "Henry Wallace Would Never Have Dropped the Bomb on Japan," *EIR,* Nov. 7, 2003.

—Robert L. Baker

the normal precautionary R&D under way, are not getting done? Soybean rust, for example, came to South America from Asia, arriving in 2001; it showed up in Argentina in 2003. Then, in 2004, it arrived in North America on the winds of the hurricanes. Now, the fungus has spread all across the United States.

Zeigler: Yes. It showed up in Brazil and so on. And, when you get just the right growing-season conditions, you can have your soybean crop just go *pphhhhtttt!*

Baker: Of course, someone can say: Don't worry, we can take care of it with this or that treatment. But, if you look at

land-use patterns, and see how people switched to soybeans under increasing monoculture, and marginalization of farming under free trade, this is not a snap. For example, the Delmarva Peninsula, which once produced mixed crops for the Washington/Baltimore metropolitan area, has gone over to soy. Then, the rust hit. So, you are piling onto family farmers—who have come to depend on off-farm jobs to continue farming—sudden extra costs for fungicide. In addition, off-farm jobs are disappearing as de-industrialization worsens in the United States. Look at Michigan, Ohio, and Indiana.

Billington: What about the avian flu?
Zeigler: It's a very serious concern. The implications of a jump to humans are enormous, just in terms of labor. What if 20 or 25% of your population is down during harvest time? Even if you have "only" a 2% death rate, if you have 25 or 50% of your population falling ill, your infrastructure and your processes could grind to a halt. And, is there a point at which they are not re-startable, some of them? I don't know.

Baker: A Malaysian expert is working on food supply plans for the contingency of not having poultry for animal protein in the national diet. He is thinking of legumes to substitute. He is worried that the know-how involved in cropping isn't even present among the population anymore. They don't know how to farm. But you are saying that, beyond that, the people may not be there at all, skilled or not, for beans, rice, and anything?
Zeigler: It could be a nightmare scenario. I remember when I insisted on having an influenza plan at IRRI. I also insisted on buying enough tamiflu for all of our employees and our dependents, so that we wouldn't shut down or have our critical services shut down. Some said it was a waste of money.

But you have to be forward thinking, and you have to plan for the worst, and hope it never happens. The scenario is terrible, especially in places like all over Southeast Asia, where the medical support is not what it needs to be to handle something like this.

Baker: Yes. Look at SARS. Here in Washington, D.C., near Dulles International Airport, the local county hospital handled SARS perfectly; they did a perfect response job when cases of infectious disease showed up. But, that can't be taken as par for the world. Sadly, it's the exception.

Baker: With your friendship with Dr. Norman Borlaug and the early leaders of the CGIAR network, do you have an interest in or recollections from them of the history of sound R&D and food policy? It was Franklin Delano Roosevelt's Vice-President, Henry Wallace, who was personally involved in corn and other genetics, who originated what became the CGIAR, the first research center in Mexico, now called CIMMYT.
Zeigler: Our history in rice is reasonably rich. We are coming up on our 50th anniversary. We were founded in 1960. IRRI has started developing an oral history. We are interviewing all the old-timers who are still alive. Hank Beachall is still alive. He won the World Food Prize.

The IRRI farm manager was right down the road from us. We never interviewed him, and he died. He had been there since the first day. We will interview his wife, and she will fill us in on a lot. So we're in the process of trying to collect this story.

Baker: What about your own background? Why do you call IRRI the "crown jewel" of the CGIAR network?
Zeigler: Well, it depends if you're a "rice guy!" My major professor at Cornell was a potato guy. And I did my thesis on cassava because I was in the Peace Corps in Zaire, from 1972 to 1974. I first went to the University of Illinois, then the Peace Corps, then back to graduate work in plant ecology at Oregon State.

I think, when I went to the Peace Corps, I didn't know that plants got diseases! But, when I was in Africa, there was an outbreak of disease of cassava, and that was a staple food. There was famine. I became interested in plant disease because there was this epidemic.

I had studied biology at the University of Illinois. I have always been interested in agriculture because of my family's farming in Pennsylvania. I would spend the summers on the farm. I got into agriculture, liked it; and I got into plant pathology. As an undergraduate, I got into plant ecology. I thought it was really interesting.

I was reading Paul Ehrlich's books, William Paddock's books—reading the stories of global agricultural collapse. And it didn't happen. And it didn't happen because of institutions like IRRI. People solved the problems.

Billington: Ehrlich and others didn't think it was possible to solve problems.
Zeigler: I am one of these guys who thinks it is possible. I think I have history on my side. Of course, history has been on other people's sides; there were a few hundred years of dark ages; there have been big-time collapses.

Billington: We have to get people to think at that level. We're at one of those moments when the world is going to go one way or the other.
Zeigler: I was intrigued, and I certainly bought their arguments at the beginning. I participated in organizing the first Earth Day in Illinois. But then quickly, I guess subconsciously, I decided to pursue science and try to make a difference in the world.

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