

THE WORLD FOOD PRIZE®

BIOFUELS  BIOFOOD



**GLOBAL
CHALLENGES**

THE BORLAUG DIALOGUE

Highlights from the 2007 Norman E. Borlaug International Symposium



AMB. KENNETH QUINN

*President,
The World Food Prize Foundation*

THE PRESIDENT'S WELCOME

"We felt the time was right to examine the international future of biorenewable energy and discuss how to balance the growing global demand for biofuels with a nutritious food supply for all."

In 2007, we again strove to have our week-long series of events be seen as "the most significant observance of World Food Day anywhere around the globe."

Expanding on a theme developed last year, we aimed to have our "Borlaug Dialogue" be seen as the place where "we come to have our conversations," as Peter McPherson of our Council of Advisors so eloquently put it.

With the increasing attention given to the burgeoning field of biorenewable energy, we felt the time was right to have a conversation on how to balance the growing global demand for biofuels with a nutritious food supply for all.

To that end, our "Borlaug Dialogue" attracted the leaders of several large agribusinesses, government officials from the United States and abroad, and respected scientists and researchers from around the world.

Over 700 participants from more than 60 countries joined us in Des Moines for our events. This year we expanded our programs by adding the inaugural Iowa Hunger Summit, hosted a Biofuels Expo, and once again welcomed several distinguished groups who held adjunct meetings and opening conversations, including USDA's Foreign

Agricultural Service's open session on Women in Science, the Board for International Food and Agricultural Development, the Sasakawa Africa Association and the Norman Borlaug International Fellows.

Once again, there was also a cross-generational conversation, as nearly 100 high school students from across Iowa, nine other U.S. states, Mexico, Nigeria, Tanzania, and France participated in the World Food Prize Global Youth Institute.

The centerpiece of the World Food Prize celebration was the presentation of the \$250,000 World Food Prize to Dr. Philip Nelson of Purdue University for his breakthrough achievement in revolutionizing aseptic food storage.

This book highlights different aspects of our week of events and presents selected passages from the presentations by the array of distinguished speakers we assembled for the 2007 "Borlaug Dialogue." The full texts of these presentations are available at www.worldfoodprize.org.

The success of this year's World Food Prize celebration has us looking forward to the 2008 "Borlaug Dialogue," in which we will tackle "Agriculture's Role in Development for the Next 50 Years." We hope you will plan to join us.



THE WORLD FOOD PRIZE FOUNDATION

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OPENING CONVERSATIONS



IOWA HUNGER SUMMIT

More than 400 Iowans came together to focus on Iowa's role in fighting hunger, both at home and abroad. Dr. Norman Borlaug was honored by Iowa's current and former Governors. From left: the Honorable Robert Ray, the Honorable Tom Vilsack, Dr. Borlaug, Governor Chet Culver and the Honorable Terry Branstad.

Over 50 Norman E. Borlaug International Fellows came to Iowa to attend the World Food Prize events. Sponsored by the U.S. Department of Agriculture, these young agricultural professionals from 17 countries were able to interact with Dr. Borlaug and the World Food Prize Laureates as part of their program to encourage and develop a new generation of global science and technology leaders in food and agriculture.



BORLAUG FELLOWS

The board of the Sasakawa Africa Association (SAA) met in conjunction with the 2007 World Food Prize events. In partnership with government officials, business leaders, researchers, and producers in 14 African countries, SAA works to bring proven agricultural technologies to farmers in support of a Green Revolution for Africa. Here, SAA President Norman Borlaug talks with Dr. Ronnie Coffman of Cornell University, a member of the World Food Prize Council of Advisors.



SASAKAWA AFRICA ASSOCIATION



BIFAD OPEN FORUM

As part of its national meeting, held each fall in Des Moines at the World Food Prize, USAID's Board for International Food and Agricultural Development (BIFAD) hosted an open forum on biofuels' implications for sustainable development in Africa. Speakers included Youba Sokona, executive secretary of the Sahara-Sahel Observatory in Tunisia.

Organized by Renewable Energy Group, a global leader in soy biodiesel production, the Iowa Biofuels Expo allowed World Food Prize attendees to interact with industry and policy leaders in biorenewable energy and see first-hand some of the cutting-edge technologies for biofuels production, distribution, and usage.



IOWA BIOFUELS EXPO



USDA WOMEN IN SCIENCE

Prior to the opening of the "Borlaug Dialogue," USDA's Foreign Agricultural Service hosted an open session on the visionary leadership of women in agricultural science and technology. High-level speakers came from USDA, the Department of State, the Millennium Challenge Corporation, the Bill and Melinda Gates Foundation, and the Forum for Agricultural Research in Africa.



DR. NORMAN E. BORLAUG
 Founder, The World Food Prize
 Nobel Peace Prize Laureate
 UNITED STATES

World Food Prize Founder Addresses His Namesake Symposium:

“I HAVE TO BE OPTIMISTIC”

“Let’s not get carried away by all of these doomsayers that do much to disrupt the rational application of science and technology. They’re all around us. They’re present in the affluent nations probably in bigger proportions, because those people, most of them, have never been close to hunger and poverty.”

A SPECIAL INTRODUCTION



Former Benin President Nicephore Soglo introduced Dr. Norman Borlaug.

Dr. Norman Borlaug was introduced to the 2007 Borlaug Dialogue stage by His Excellency Nicephore Soglo, the former president of Benin.

Soglo, a colleague of Borlaug with the Sasakawa Africa Association, praised Borlaug for his commitment to bringing the Green Revolution to Africa.

“As an African, I can’t leave here without expressing my respect, my admiration, and my gratitude to the 1970 Nobel Peace Prize Laureate - to pay tribute in my capacity to a man, a giant who has been writing one of the most valuable pages of modern history. Dr. Norman Ernest Borlaug has saved more lives than any person who has ever lived.

“Dr. Borlaug has been acting as president of the Sasakawa Africa Association since 1986. Since then, several million African farm families have been trained by Sasakawa Africa Association in the newest farming techniques in 15 countries, including Benin, my country.

“I hope that in the near future, the same effort will be extended to other countries in sub-Saharan Africa. Needless to say, despite some recent more or less successes, the African continent is still trailing behind all the others – even in farming and food production, which should be the root of her wealth.”

“Look at science and technology and what it has contributed, despite much of the criticism of the new people who look at only one narrow slit of the impact, for the positive, of science and technology. It’s science and technology that has made it possible to produce the food and fiber for this 6.6 billion people that inhabit the planet Earth today. Remember that much of this growth in population has taken place in my lifetime. When I was born in 1914, the world population was about 1.4 billion. Here we are, 6.6 billion. Where would we be had we not had improvements in science and technology?”

“Look at the broad picture and how it’s changed since the middle 1960s when the revolution in cereal production took place in Pakistan and India and a decade later in China and in many of the other developing nations. Were it not for the improvements in science and technology, we would be required to be cultivating three times more area of land of equal quality – if we even have that land. And here we are feeding the 6.6 billion and doing a better job of it than we were in the middle 1960s.

“Pessimism is a very poor ingredient on which to correct and to expand the needs of the human being to all different parts of the world. Remember that poverty and hunger and the instabilities that it brings to society are very fertile seed grounds for planting all kinds of isms, including terrorism.

“Many of the Third World countries, many countries of sub-Saharan Africa being a good example, have been left behind in the general education front. I’m not talking about number of advanced degrees of master of science and doctors of science. I’m talking about primary and secondary education, which are the components that change society greater than any other forces for good.

“We have to improve our science and technology in the years ahead to cope with the needs of the expanding population. And that population, as we all know, slows with better education. A good example is all of the Western European countries and many of the countries of the Americas. And we hope that slows in the areas where the pressures are the greatest. And that will be achieved by education – not PhD’s and masters of science, but primary and secondary education.”



HUGH GRANT
President, Chairman and CEO,
Monsanto
UNITED KINGDOM

“As an agricultural company, we have technologies that make a difference [in moving] from subsistence to a sustainable ag model. NGOs have local knowledge, contact, and connections that can connect best practices with needy farmers. And governments need to step up in infrastructure and look at policies that support agriculture. These relationships are the keys linked to the technology to drive this discussion forward.

“[In] the 1950s, there were but 2.5 billion people on the planet and 20 percent more land farmed. Today, there are 2.5 billion more people and agricultural area is decreasing. And if you fast forward another 20 years, there will be another two billion citizens, and food demand will double. So how do we make more with less? How do we squeeze more food out of every little patch of soil? How do we optimize production in every gallon of water? Water concern is growing as we look at food and fuel. There is a continued escalation between the pressure of cities and urban land competing with agricultural land, and that squeeze between the two is increasingly focused on water.

“In the last 40 years, yields have increased in this country about 2 times over until now we’re yielding about 150 bushels per acre in corn. And the prediction is it will move from 200 to 300 bushels per acre well within the next 40 years. But agriculture has been hard on the environment. It came with a price.

“As we look at today’s agriculture, we’re beginning to see the opportunity of increasing yield with a potential decrease on the impact on the environment... Two tools look promising: molecular breeding and improved breeding systems, and biotechnology. About half a billion pounds of pesticides have disappeared with the introduction of these new technologies. And with the increased use of no-till and minimum-tillage systems, and leaving the plow in the barn, we’re seeing more carbon being tied up in the ground. The elimination of fuel in spraying and plowing is yielding somewhere in the region of 20 billion pounds of carbon sequestration – about the same as 4 million automobiles taken off the road for a year.

“If you look at the variety of partnerships that we have started with this ‘gene revolution,’ in almost every region that we have seen this, we have seen yields increase. In India and China and Southeast Asia we’re seeing yields and quality improving every year. The conundrum is that in that same time frame Africa has gone backwards. It hasn’t even stood still; it has retreated. So why has that happened and what can be done about it?”

“There’s a whole bunch more that we need to do, particularly around reducing water use. At Monsanto we have the beginnings of a partial solution. We’ve been testing drought-tolerant corn – that now is using less water and yielding about 10 percent more. We anticipate that these will be commercialized early in the next decade right here in the U.S. Plants that sip instead of gulp become important tools in the next ten years. But in rain-fed agriculture in Africa, they have the possibility of stabilizing yield. And when you stabilize yield, you generate surplus.

“At Monsanto our business is driven more and more by the importance of relationships. There’s a piece of our mission to serve all our stakeholders worldwide beyond simply quarterly profits. Monsanto and companies like ours in this industry have a responsibility as we make these advancements in science to work more aggressively on how we share them worldwide and how we all want access to a broader global agricultural community beyond our traditional commercial customers.”



Hugh Grant and Dr. Norman Borlaug shared a private meeting prior to the opening session of the Borlaug Dialogue.

BEYOND FOOD AND FUEL:

Building Relationships for Agriculture in the 21st Century

“Demands in agriculture continue to surge, driven to a large extent by China looking for more calories, China looking for more protein. And increasingly, the Americas – from Canada all the way through the southern cone – are becoming the garden states that are trying to fulfill the increasing demand from China.”



SUSTAINABILITY KEY FOR BIOFUELS TRADE

GLORIA VISCONTI

Senior Expert,
Ministry for the Environment, Land and Sea
ITALY

“We don’t want to push forward biofuels at any cost. We have to look at sustainability – not only the environment, but also social equity, sustainable development, giving the possibility to developing countries and not having this fight of fuel-versus-food.”

“Is climate change an environment problem? Maybe not. It is a problem that engages in agriculture, economics, defense, national security, industry, and transport.

“The EU implemented a directive for 2 percent of biofuel in the transport sector to be reached by 2005. Unfortunately, the voluntary target wasn’t satisfied. The average was 1.4 percent, so some countries were very good in reaching a target of 2 percent – Germany, Sweden – but others, including Italy, were not so good.

“In March 2007, EU ministers agreed to a 10 percent binding minimum target for the share of biofuels in the overall EU transport consumption by 2020. If we want to reach the

targets that have been decided by the spring council, we have to look outside, so there are some opportunities for trade. And trade, we know, is a sensitive and key issue.

“Technology is key, but it is not the silver bullet. We have to go forward with research, development, and innovation, especially in order to disseminate this new technology in the emerging and developing countries.

“There is no clear clarification in the WTO about biofuels. It is something that may be addressed during the negotiation, as biofuel could be considered an environmental good. There is a need of clarification on classification and also a need of a kind of certification scheme that will work at the global level.”



BRAZIL’S PAST AND FUTURE IN BIOENERGY

HIS EXCELLENCY ROBERTO RODRIGUES

Coordinator, Getulio Vargas Foundation Agrobusiness Center
Former Brazilian Minister of Agriculture and Supply
BRAZIL

“I guarantee you this: agroenergy and biofuels represent not only a new paradigm for agriculture, they will change the geoeconomy in agriculture. And they will also change geopolitics.”

“We are in front of an enormous challenge, a responsibility to change civilization. How could we build a complete civilization over something like oil that is going to finish someday, a fossil fuel that’s not well-distributed to the world? We have to change civilization to renewable energy.

“We need strategies. We need public policies. In the 1970s, Brazil strongly supported doubling ethanol production. Everybody began to buy cars with ethanol engines; demand became more important, and the prices of sugar also went up. And the ethanol producers preferred to produce more sugar and less ethanol. And what happened? Consumers were very frustrated because of the lack of ethanol for their cars, and abandoned ethanol. If there is not a strategy, a program, a governmental policy, then production can disappear.

“Brazil has a cultivated area of 62 million hectares. 3.2 million hectares is cultivated with sugar cane to produce ethanol. We produce close to 20 billion liters per year; consumption is close to 15 billion liters per year. There is an annual stock of 5 billion liters; we can export at least half of that. So just 5 percent of our total cultivated area is in sugar cane to produce ethanol.

“More than that; Brazil has 220 million hectares of pasture. Of this, 90 million hectares are available for different crops; just 22 million hectares are good for sugar cane. We will still have, just in Brazil, 68 million hectares currently used as pastures that are able to produce food - more than one and a half times than we currently cultivate for food. So why should we have a lack of food if we produce ethanol?”



ZHANGLIANG CHEN
President,
China Agricultural University
CHINA

CHINA'S GROWING ENERGY NEEDS

“China’s energy needs rose 47 percent in 2000 and will continue to increase annually 3 to 5 percent, as our goal is for our GDP in 2020 to be four times as high as in 2000. Eighty percent of the population was rural before, but now it’s a little bit over 60 percent, because of urbanization. One hundred and fifty million farmers moved to cities in the past 10 years, and we expect another 100 million farmers will move to cities. And that needs energy.”

“Currently, 59 percent of renewable energy in China is biogas for household stove fuel. In 2006, 20 million households used biogas, and by 2010 we expect to have 8,600 biogas plants in China. In those rural areas, biogas has saved lots of carbon dioxide in terms of pollution.

“Liquid biofuels are a very new approach. Since 2003-2004, we have four factories that produce corn ethanol. However, in 2006, we see competition of food and ethanol for corn, so those plants were ordered to stop using corn to generate ethanol. Only 8 percent of China’s land is arable, to feed 1.3 billion people; we actually are importing major crops, and we know there can be no competition with food for people and no competition with land for crops. So we need new producers with new products. Recently other companies, international companies, are investing and building new factories in China to produce biofuels from other resources.

“In our university, a major university for biofuel research,

we believe sweet sorghum could generate a larger amount of ethanol. And it can grow in areas which do not compete with normal sorghum or corn in the fields. But we have lots of uncertainty. We need irrigation in agriculture, even in rural areas. If you plant more plants, they need water. People worry about plant diversity. We are thinking about growing energy crops in mountain areas or hills in southern or western China, but on a large scale that might have some effects on plant diversity.

“There’s a lot of international cooperation, and we encourage more. At this moment we have about 55 African scientists on our campus for a training course for bioenergy. And this is a big business. We are number four in terms of the largest economical bodies in the world; we’ll be number three soon. So we need lots of energy, and we know that we cannot just continue to use 50 percent imported petroleum. Bioenergy obviously has a very important future in China, and I encourage more people to get involved in China to produce biofuels.”



IBRAHIM REHMAN
Director of Action Programs,
The Energy and Resources Institute (TERI)
INDIA

BIOFUELS FOR PRO-POOR GROWTH

“Projected biofuels production for different countries and regions offers great opportunities in the energy crisis that the world is likely to face if we do not find alternatives. Currently, however, the scenario is not so rosy. Even though there is an enormous amount of trust in and emphasis on biofuels, overall global production is still quite low.”

“India is enjoying enormous GDP growth, over 8 percent. By 2030 India will be dependent on imported oil to the tune of 95 percent, and will also import nearly 40 percent of the coal required for energy generation. Lack of access to energy is a major barrier to rapid growth, and the Indian government has therefore put an enormous amount of emphasis on biofuels.

“There is an enormous amount of hype for biofuels without really going into the technical details, the agricultural and agronomy-related details, details related to economics, details related to the environment.

“We who are pushing biofuels sometimes get into oversimplification. We get into largely macro-level numbers, and the strategies and policies evolve out of those. The National Biofuels Mission says that India is to bring 40 million hectares of land under biodiesel activity – the supposed wasteland. The reality is, the ‘wasteland’ is not really available, it is under

various uses. So it is important to look at the functional, practical reality at the grassroots level.

“We were told that jatropha is a hardy species that can be grown on any soil under any conditions. True. But here one is not talking about only growing jatropha. One is talking about seeds, about oil production. If jatropha is grown on not very fertile soil, in semi-arid or arid regions, yes, it will grow. But the yields are not going to be there. And the economics are not going to work out. And then farmers are going to suffer.

“There are issues of land allocation and food security; these concerns may be voices of skepticism. But there is evidence to show that voices of skepticism, if not addressed properly, can be a stumbling block. It is important that we are cognizant of the experience of GMOs, where something extremely useful, was, because of lack of information and misinformation, completely diverted into another area and into the wrong kind of politics.”



HER EXCELLENCY LULAMA XINGWANA
 Minister of
 Agriculture and Land Affairs
 SOUTH AFRICA

The Minister's Address

BIOFUELS IN AFRICA: THE ROAD AHEAD

“Our biofuels strategy aims to use climate change realities to increase food security and provide renewable fuel opportunities. Although South Africa is food secure at the national level, food security is not guaranteed to an estimated two million people, 50 percent of whom live in rural areas. As a result, our biofuels strategy promotes the use of dual-purpose crops, crops that can be used for both food and biofuel feedstock.”

“Our big commercial farmers are critical for food security; hence, South Africa has to ensure that we don't take them from the food market into biofuels. To empower emerging marginal farmers and prepare them for this new biofuels industry, comprehensive development support is required. Our government has to come up with support programs to unlock the production potential within the rural communities. We need to ensure that there are incentives.

“South Africa is not different from most European countries since it has 14 million hectares of arable land, of which up to 4 million hectares are not utilized. Our strategy looks into the development of high potential land neglected by the apartheid regime, that has not had infrastructure development, and as a result does not participate in economic opportunities. We also look at increasing household food production in the rural areas. If we're able to increase food production and have a surplus, there will be no question of food insecurity because of biofuels.

“The biofuels plants must be where the people are. Not in Johannesburg or Cape Town; we don't produce sugarcane or soybeans there. They must be in the rural areas, so that we can ensure that farmers don't have logistical challenges and transportation costs, and are able through cooperatives to participate and have share holding in the plants producing biofuel from their stock.

“Whether we like it or not, the price of corn and wheat has gone up. Europe is into biofuels, the U.S. is into biofuels. Whether Africa comes into the biofuels industry or not, food prices are still going to go up, because the entire world is going into biofuels. So wisdom for all of us would be to go into biofuels and by so doing increase production and create jobs for our rural communities. But South Africa cannot go into biofuels alone; our neighboring countries – Malawi, Mozambique, Zimbabwe – should also participate.

“We cannot take the backseat and do nothing out of the fear of the unknown. However, we must make the benefits outweigh any risk that might occur. It is unthinkable that the world can expect Africa to venture into nonfood crops as feedstock while Africa is caught up in a food insecurity trap.”

AFRICAN SCIENTISTS, DIPLOMATS DISCUSS IMPACT OF BIOFUELS



2004 World Food Prize Laureate Monty Jones and Ambassador Hawa Ndilowe of Malawi participated in the Partnership to Cut Hunger and Poverty in Africa panel on agriculture and technology in Africa.

Inspired by Dr. Norman Borlaug's dedication to bringing the Green Revolution to Africa, the World Food Prize is privileged to host each year several high-level policymakers, business executives, leading scientists, and other experts from Africa, who hold board meetings and open sessions on topics related to food security, agriculture, and development on the continent.

In 2007, the Partnership to Cut Hunger and Poverty in Africa again brought a delegation of ambassadors from African countries to the United States to attend the World Food Prize events and take part in their own program visiting researchers, businesses and policy leaders in Iowa. As part of this program, the Partnership hosted an open session on current trends in African agriculture, science and technology, exploring issues of trade, agribusiness, future dimensions in Africa's rural sector, and the impact on reducing poverty and improving food security.

Earlier in the week, the World Food Prize also hosted the board of the Sasakawa Africa Association, which works to bring cutting-edge and high-potential agricultural technologies to Africa's farms. Headquartered in Tokyo and with leaders from around Africa and around the globe, the Sasakawa group's focus on improving access to technology to confront challenges to agriculture in Africa further enhanced the “Borlaug Dialogue” discussions on the global implications of biorenewable energy and biotechnology.

A CONVERSATION ON... GLOBAL PERSPECTIVES ON BIOFUELS



Lulama Xingwana, Gloria Visconti, Ibrahim Rehman, and Zhangliang Chen listen to Roberto Rodrigues.

“At the moment, sugar cane is the best raw material for ethanol. We have corn, we have sorghum, we have cellulose – and there will be alternatives in the future. But currently sugar cane is the best. And where is sugar cane good to be produced? In the tropical countries, the poor countries; in Latin America, Africa, Asia. This is the revolution. Agroenergy will give poor countries and poor people a chance to get more jobs, more wealth, with a revolution of energy in the world.”

- ROBERTO RODRIGUES
Coordinator, Getulio Vargas Foundation Agrobusiness Center



“We must all commit, especially the developed countries. They have to commit to Kyoto, especially because they have the means to do so. If we, as poor developing countries, are beginning and have committed ourselves, I think all of us are in a position to do so.”

- LULAMA XINGWANA
South African Minister of Agriculture and Land Affairs

“Looking at United States and the EU and China, there’s big consumption for energy in terms of gasoline and petroleum and coal. I would say that at this minute, if we say, ‘\$80 per barrel, so we use corn or other crops to generate ethanol,’ it looks kind of practical, but it’s very risky because the price of oil, it changes all the time.”

- ZHANGLIANG CHEN
President, China Agricultural University



“The devil is, in the end, in the numbers and the details.... The demands are, in fact, growing faster than the supply and it will take a great deal of inventiveness, a great deal of resources to actually achieve these goals worldwide.”

- NINA FEDEROFF (Panel Moderator)
Science and Technology Advisor to U.S. Secretary of State Condoleezza Rice

“So far, EU instrument schemes give very low or no tariffs to developing countries for the import of biofuel and have worked quite well. There is also a targeted link to the environment part of trade - that countries need to have adopted a convention on labor or biodiversity, so there is a link on sustainability – a weak link, but still something.”

- GLORIA VISCONTI
Senior Expert, Italian Ministry for the Environment, Land and Sea



“In India, if we are talking biofuels, we are talking of poor farmers who have small holdings on marginal lands. It’s important that the entire economics of biofuels is explained to them, that they are aware of all aspects of the value chain, and that they consciously get into it.”

- IBRAHIM REHMAN
Director of Action Programs, The Energy and Resources Institute (TERI)



HON. CHUCK CONNER
Acting U.S. Secretary of Agriculture
 UNITED STATES

The Second Annual Secretary's Address:
THE VIEW ON FOOD, FUEL & AID

“As the demand for ethanol has expanded, many concerns have been voiced about the impact of these higher corn prices and what they might have on livestock feed and, of course, consumer food products. Without question, we believe the anxieties of this issue have been running way, way ahead of any market reality.”

“The best estimate we have from USDA data is that ethanol will consume about 3.2 billion bushels of corn this year. And of course that’s up from about 2.1 billion bushels from the last year’s corn crop. But the key point to remember is that the amount of corn going into livestock feed will also go up this year from 5.6 billion bushels to roughly a little over 5.7 billion bushels. We have put more corn into the livestock sector, in addition to adding to our own ethanol for fuel supplies.

“We have seen remarkable progress in agriculture and food science over the last fifty years. Perhaps the best measure of how far we have come is the tremendous growth we have seen in our own per-acre productivity. Consider for a moment that, between 1948 and 2004, the average per-acre corn yield in the U.S. quadrupled from just 48 bushels an acre to now a record 160 bushels an acre.

“The Bush Administration and the Department of Agriculture have proposed \$1.6 billion in new spending on research and development in the area of renewable fuels as part of this year’s 2007 farm bill debate. The focus on most of our proposals is on speeding the development and the full commercialization of not corn-to-ethanol but cellulosic ethanol.

“Our ARS biologists and chemists are already working together to find the microorganisms and the enzymes that will efficiently break down cell walls and unlock the energy inside, so that it can be converted into ethanol, perhaps butanol, methanol and other specialty oils for biodiesel products.

“The renewable fuels industry will have to find the right mix of energy crops, from every part of the country, and the most efficient way to produce and distribute those crops in a way to protect the soil and to maintain a positive carbon balance.

“While scientific breakthroughs are critical to the future of cellulosic ethanol, the industry must build on a sound business model as well. It must find efficient ways to collect feedstock and distribute that fuel to its customers.

“Biofuels can meet the world’s demand for mobility in an environmentally acceptable way. They can bring new jobs, economic growth, and energy self-sufficiency, both to industrial nations as well as to the developing world. With more than a billion people expected to join the emerging middle classes of China and India by 2020, we have to recognize the demand for personal mobility and the energy to fuel that mobility is only going to grow internationally.”

A FOCUS ON FOOD AID

“Our federal food aid programs over the years have helped many nations lift themselves out of poverty and out of hardship. Perhaps the greatest measure of their success is that today, all the nations that are among the top ten buyers of our agricultural exports – all the nations except one – were once recipients of U.S. food aid.

“Generosity to the world’s neediest people does remain the cornerstone of American food aid policy. The United States does continue to be the largest single donor to international food aid programs. Over the last ten years, we have provided 55 percent of the world’s total food aid given.

“Earlier this year we launched a new stocks-for-food barter initiative, exchanging bulk commodities for a processed food product like canned pork, canned poultry, and other products that will be distributed through our domestic and international food assistance programs. The President is seeking authority to buy locally up to 25 percent of the food we provide, rather than requiring that it all be shipped from the United States.”



Chuck Conner was named Acting Secretary of Agriculture three weeks before his address at the 2007 Borlaug Dialogue.



PUTTING EMERGING TECHNOLOGIES TO WORK

HON. DANIEL SULLIVAN
*Assistant Secretary of State
for Economic, Energy and Business Affairs*
UNITED STATES

“We believe that sustainable biofuels production holds the potential to reducing our dependence on foreign oil, improving environmental quality, and increasing farmers’ income, both in developed and developing countries. In fact, few other technologies offer such promise within our lifetime.”

“Gaining acceptance of many of the emerging technologies that have been talked about here and truly putting them to work will require an international effort that ensures that the benefits of these technologies are widely shared across the globe.

“The biofuels partnership that was launched by Secretary [of State Condoleezza] Rice and [Brazilian] Foreign Minister [Celso] Amorim focuses in three areas: cooperating on R&D together, Brazil and the United States; cooperation on third-country interests in domestic production of biofuels, particularly in Central America; and then multilaterally working through such international forums as the International Biofuels Forum on issues such as standards and different regulatory approaches to biofuels internationally.

“There will obviously be short-term challenges as the global economy adjusts to the biofuels revolution. But we believe that agriculture biotechnology will play an increasingly important role in delivering higher crop yields and better plant varieties for sustainable ethanol production.

“With regard to the subsidies and the effect on development, and it being a sticking point in the current round of the Doha negotiations...we have consistently, and even more so recently, signaled some flexibility and ambition with regard to what we would commit. And the President even stated in September 2005 at the U.N. that the U.S. would dramatically cut or eliminate agricultural subsidies, if other countries do so as well and we have commensurate market access.”

BIOFUELS’ RISKS FOR THE HUNGRY POOR

JOHN POWELL
*Deputy Executive Director,
The World Food Program*
AUSTRALIA

“Biofuels are only one factor in what is shaping up to be a perfect storm of global trends that is already hurting the hungry poor.”

“The advent of biofuels as a viable source of energy holds great promise to farmers, businesses and entrepreneurs around the world. It also carries risks to the poor, at least in the near term. The impact of biofuels [on the World Food Program] is that it is making our work more expensive at a time when the challenges and related costs are already multiplying.

“An apparent reversal in the long-term decline in food prices has created a mixed picture for the world’s poor. Farmers who were forced out of the global markets due to low prices may now stand a chance to sell their crops at a decent price. But for the poor farmers who lack capacity or output to even reach markets, and for the landless urban poor who need to buy their food, the impact of higher prices has already hit and will hit harder.



“While globalization and technological advances have lifted vast numbers out of poverty, they have left behind hundreds of millions who lack even the basics – clean water, adequate food, electricity. Never mind computers, credit, pesticides, fertilizers, or decent roads to market. Looking in Africa, where WFP does more than half its work, biofuels could provide opportunities for that continent’s hard-working farmers.

“Road density in Africa is several magnitudes behind what Asia had when it experienced its Green Revolution. Do poor African farmers have the roads, silos and access to markets, development facilities, capital to compete in the race for biofuels profit? Enabling them to do so will take planning, vision, and the necessary research and development to transform dream into reality.”



HON. JAMES GREENWOOD
CEO,
Biotechnology Industry Organization (BIO)
UNITED STATES



CHRIS POLICINSKI
CEO,
Land O' Lakes, Inc.
UNITED STATES

BIOTECH: THE FUTURE OF FOOD AND FUEL

“Biotech innovations can help solve some of the biggest global challenges: fighting disease and improving health, feeding a growing world population, and meeting the increasing world demand for energies in ways that are sustainable and eco-friendly.”

“We continue to see comments in the media that appear to come from critics who have not yet grasped that biotechnology has changed the ethanol picture and that we are not talking about meeting oil fuel needs solely with ethanol from starch. This misunderstanding has given rise to several myths, including the notion that increasing demand for corn to produce ethanol will create food shortages.

“That commercial cellulosic ethanol production is at least ten years off is a myth. Commercial cellulosic ethanol plants that are in operation today in Canada and elsewhere, as well as biorefineries scheduled to come online as early as next year. These first few plants will help find ways to make ethanol from cellulose more efficiently and cheaper, allowing the industry to continue to expand and to meet the growing consumer demand for cleaner alternative fuels.

“A comprehensive analysis by the United States Departments of Agriculture and Energy found that more than one billion tons of agricultural residues and dedicated energy crops could be sustainably harvested by 2030 for biofuels production in the United States. That is enough biomass to produce 30 times the current U.S. ethanol production – 30 times.

“I’ve been in elected politics for 24 years – I’ve never seen a coalition form so quickly around an issue as has formed around cellulosic ethanol. It has brought out the agricultural community; it has brought out the environmental community; it has been supported by those focused on foreign policy. When you get \$1.3 billion dollars that quickly into the Farm Bill, it demonstrates the width, the breadth of the public policy support.”

CHALLENGE, OPPORTUNITY, OPTIMISM

“We must determine how we can successfully meet our global food needs while also addressing the growing demand for biofuels. Instead of dwelling on and arguing about why it can’t be done, we must instead focus our attention on how best to get it done.”

“Future corn production can meet food and fuel needs if we can maintain stable acreage and a four-bushel-per-acre-per-year yield improvement – a rate of increase consistent with history. Between 2005 and 2015 there is an increase in corn available for export, ethanol, food uses and overall feed use... We can accelerate our progress towards meeting all these needs with the development of specific genetics that maximize food, feed or fuel value of each bushel.

“We need to optimize the efficiency of the ethanol and biodiesel production process itself. Not only in terms of biofuel energy produced per bushel but in terms of the volume of fossil fuel used in production. It takes one unit of fossil fuel energy to produce 1.3 units of corn-based ethanol energy, while one unit of fossil fuel energy is needed to produce 2.5 units of soy-based biodiesel energy.

“Corn, soybeans, and sugar cane are not the only potential sources of crop-based energy. Even if the U.S. turned the entire corn and soybean crop into biofuels, they replace just 12 percent of our gasoline and 6 percent of our diesel. Clearly, we need to be pursuing other renewable energy sources.

“Alfalfa makes sense as an energy crop from both an energy generation and economic value point of view. It offers environmental and rotational benefits. It’s a net contributor in terms of nitrogen and carbon in rotation, offering yield benefits to the following crop. It also offers soil erosion benefits, which row crops don’t. And it offers some economic advantages with relatively low input costs and high-value leaf co-products.”

A CONVERSATION ON... INDUSTRY, POLICY AND SUSTAINABILITY



Iowa State University President Gregory Geoffroy presided over a panel discussion featuring Chris Policinski, Daniel Sullivan, John Powell and James Greenwood.



"I saw some great research at Iowa State on cover-cropping with corn and double-cropping, in order to allow total harvest of the grain and the stover, but still having a cover crop to protect the surface from erosion as well as continue to replenish the soil with carbon. We are also doing thermochemical processing of biomass, leaves and char, and agrichar, that, when applied to poor soils, significantly increase the productivity of those soils. So there are potentials of enhancing the productivity of the soil while also generating biofuels."

- GREGORY GEOFFROY (Panel Moderator)
President, Iowa State University

"Public diplomacy, public outreach, is an area where we as a government often focus internationally. Sometimes we don't do such a good job. But it gets you to the point where you can gain or lose support for policies and development paths. And a lot of it depends on the knowledge base of the average citizen."

- HON. DANIEL SULLIVAN
Assistant Secretary of State for Economic, Energy and Business Affairs



"Those of us in agriculture and agribusiness have an obligation to lead the debate and the discussion, not just in our own community but in the broader public spectrum. This is especially challenging here at home where less than 2 percent of our population is involved in farming and rural residents are outnumbered by urban and suburban residents four to one. We need to generate widespread understanding and acceptance of the role technology can and must play in addressing food, feed and biofuels issues. That will be the key to our success or failure."

- CHRIS POLICINSKI
CEO, Land O'Lakes, Inc.

"Of the world's 47 poorest nations, 38 are net oil importers. Twenty-five import all of their oil, consuming much of their national income to pay for it. A bio-based economy based on clean, abundant, renewable energy can become a strong engine for sustainable international development. No one program or strategy will make sense for every country. But the people of every country can benefit from biotechnology innovations, choosing the policy options and technologies that best meet their needs."

- HON. JAMES GREENWOOD
CEO, Biotechnology Industry Organization (BIO)



"If you are sitting in Niger right now, three-quarters of you are living on less than a dollar a day. Three-quarters of you have never spent a day in school. Each family is going to have 8.7 children. Life expectancy, mid-forties. And one child in five will die before they reach five. Unless we can deal with that package of problems, which impinge directly on hunger, it's difficult for me to see how you can engage in a conversation about biotechnology. Who are you going to talk to?"

- JOHN POWELL
Deputy Executive Director, The World Food Program

THE 2007 LAUREATE AWARD CEREMONY



2007 Laureate Philip Nelson was presented the World Food Prize by Dr. Norman Borlaug and World Food Prize Chairman John Ruan III. In the back row, Ambassador Kenneth Quinn and Iowa Governor Chet Culver look on.

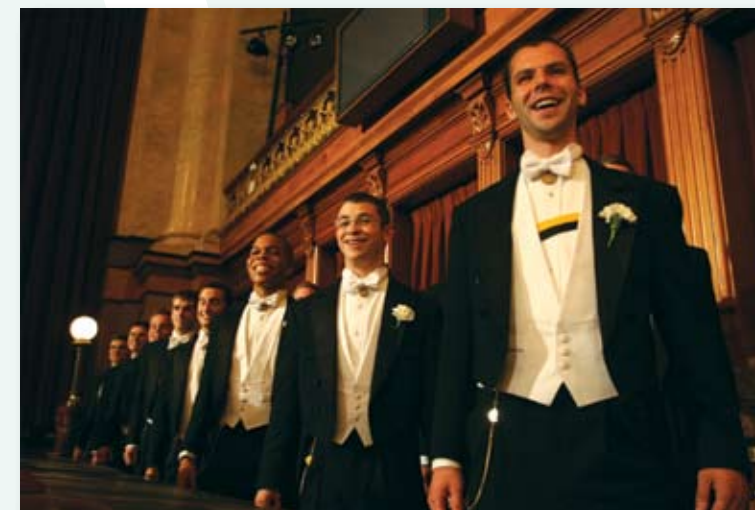


Dr. Norman Borlaug was given a hero's welcome as he entered the Chamber escorted by John Ruan III and Ambassador Kenneth Quinn.

Diane Brown and Stephen Lauer were honored as the top Borlaug-Ruan International Interns by Amanda Fletcher and Michael Gartner.



Over 700 guests from more than 60 countries filled the House Chamber of the Iowa State Capitol for the annual ceremony.



The evening was capped by an emotional performance by the Purdue University Varsity Glee Club. Their participation was a surprise for Dr. Nelson, himself a former member of this prestigious singing group.

THE 2007 WORLD FOOD PRIZE LAUREATE

Dr. Philip E. Nelson was named the 2007 World Food Prize Laureate for orchestrating the scientific breakthroughs that would revolutionize the food industry.

Dr. Nelson's food science research has significantly reduced post-harvest waste and spoilage and greatly increased the availability and accessibility of nutritious food worldwide, particularly in emergency situations.

His work, which began with tomatoes and later included a variety of seasonal crops, has made it possible to produce ultra-large scale quantities of high quality food. This food can then be stored for long periods of time and transported to all corners of the world without losing nutritional value or taste.

Nelson's research led to the discovery of methods and equipment to preserve perishable food at ambient temperatures in very large carbon steel tanks (beginning with 100 gallon tanks and increasing in capacity to 8 million gallons), allowing for enormous quantities of pathogen-free food to be distributed to plants around the world for final processing and packaging.

Nelson was also instrumental in developing a low-cost aseptic "bag-in-box" system which allowed for polyurethane bags to be filled aseptically, sealed, and placed in boxes for easy and inexpensive transport. The technology to store and transport foods in bags would spread throughout the food industry, replacing metal drums and tanks.

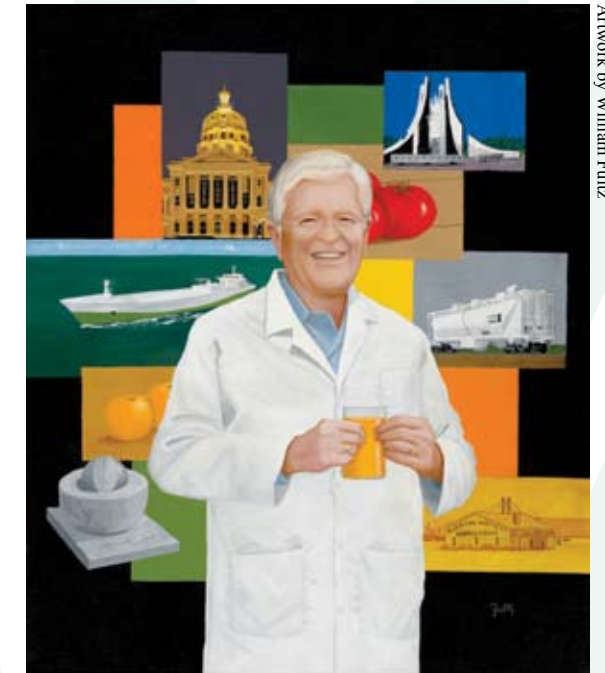
In the developing world, these technologies have made it affordable and convenient to transport and deliver a variety of safe food products without the need for refrigeration, averting loss due to spoilage. New humanitarian applications have also arisen from Nelson's technology. Feeding programs have provided aseptically packaged milk and biscuit products as part of school nutritional programs in the Philippines, Vietnam, Indonesia, Pakistan and Bangladesh.

Nelson's systems are being applied to provide emergency crisis relief, and were used to deliver potable water and emergency food aid to survivors of the 2004 tsunami in Southeast Asia and the victims of Hurricane Katrina in 2005, as well as to other crisis situations worldwide.

By developing the technologies that can now be found in almost every country in the world, Nelson has made major contributions to the availability of nutritious food for millions of people around the globe, and his legacy will continue to grow as many of the emerging uses of aseptic processing and storage are applied and adopted globally.



Dr. Nelson's research began with tomatoes but soon spread to other fruit and vegetable products.



Dr. Philip Nelson has greatly impacted the way the world packages, stores and transports food.

Artwork by William Fultz

The World Food Prize Foundation was proud to honor the 75th Anniversary of the Ruan companies, founded by World Food Prize Chairman Emeritus John Ruan. Ruan stepped forward in 1990 to rescue the World Food Prize when the original sponsor withdrew. Shown here presiding over the 1996 ceremony with the late John Denver, Ruan's support has been instrumental in bringing the award to the point where world leaders refer to it as "The Nobel Prize for Food."



Clay Mathile (shown at right), the chairman of the Mathile Institute and a longtime friend of Dr. Borlaug, announced at the Laureate Award Ceremony that the Mathile Institute will make an initial five-year commitment of \$750,000 to expand the Global Youth Institute nationally as a tribute to Dr. Borlaug's vision. The announced expansion has a potential ten-year investment totaling \$2 million.

The World Food Prize was pleased to announce that an architectural team consisting of Gensler Architecture, RDG Planning & Design and Douglass Hoerr Landscape Architecture has begun transforming the historic Des Moines Public Library into the new Norman E. Borlaug Hall of Laureates. The Foundation is endeavoring to raise the necessary money to complete the project in time for the 2010 Borlaug Dialogue.





CHARLES O. HOLLIDAY, JR.
*Chairman and CEO,
 DuPont*
 UNITED STATES

The Role of Industry in

CONFRONTING GLOBAL CHALLENGES

“The total system we’re a part of, and that’s food, energy, and material ... if one is stressed, the other two can’t get by without being stressed, and vice-versa. If we try to solve food without thinking about energy, without thinking about materials, the equation won’t work.”

“Growth in population is the fundamental driver of some of the greatest opportunities in the world, and also the greatest hazards. Population growth is coming essentially all in developing countries. We in the developed countries must be sure we’re bringing the whole world along with us.

“In the last ten years we’ve had a 13 percent increase in global population, but a 32 percent increase in meat production, 29 percent increase in corn production, 59 percent increase in soybeans. We clearly see a multiplier effect – as developing countries move up to a higher standard of living, they want to consume their protein in different ways. And the reality, is the amount of land available for farming has only gone up 2 percent in that period of time.

“Climate change is real. We were involved in the ozone layer issue and the phase-out of CFCs with the Montreal Protocol – a quite successful effort when the world came together to deal with a major environmental problem effectively. Climate change is so many orders of magnitude larger an issue, that I can’t even compare them, but the world did it once, so let’s do it again.

“The problem today is we don’t have the rules of the road. If companies take very early action now to reduce energy consumption, to reduce CO₂ emissions, they’re not sure they’re going to get credit for that. And so we have companies holding back. The quicker we can know the rules and we can know the price of carbon, I think you’ll see an unleashing of technical capability to make a difference.

“If we’re looking for that one answer to ninety-dollar oil, it will not be there. It will be multiple steps.

“Our company is working very heavily in biofuels. We started with the Department of Energy seven years ago on cellulosic ethanol. Hopefully by about 2010 we could see a real opportunity for farmers where their cellulosic could be a new crop, and it could deal with food issues and deal with energy issues at the same time.

“The second area we’re working on is biobutanol. It’s more of a technology challenge. We’ve partnered with BP on this because we thought it was very critical to have a major oil company as part of what we’re doing. We’re very encouraged, and we’ll be selling a little bit commercial biobutanol at the end of the year. Hopefully by about 2010, we could have some commercial facilities there.

“We have [biotech] projects in Africa in sorghum. We support a banana plantation, and we’re eager to take our fundamental technology around maize and soybeans. We think this technology is not discriminating for the big farmer where other forms of productivity improvement, such as mechanization may be.

“One of our biggest challenges of the times is, how do we get the public to understand science enough to accept it and trust scientists? I think we can look at the example in AIDS drugs. The pharmaceutical companies have come around in finding regimens that will work for the treatment of AIDS and making the drugs available at a reasonable cost. Our industry must follow that model. We’ve just got to break through the conception.”



Charles Holliday shared a laugh with Dr. Norman Borlaug prior to his keynote breakfast address.



AMB. MELINDA KIMBLE
*Senior Vice President,
United Nations Foundation*
UNITED STATES



ANDREA KUTTER
*Senior Natural Resources
Management Specialist,
The Global Environment Facility*
GERMANY

BIOENERGY IMPACTS ON GLOBAL DEVELOPMENT

“Total primary energy consumption will double between now and 2030. That has huge implications for greenhouse gas emissions, but also for development and economic growth.”

“Early on [the UN Foundation] became engaged in a number of pilot initiatives to advance the goal of clean energy access in the developing world. Many of these activities took place in Africa. That work convinced us that we had to engage at the policy level, because solving the energy-access problem is critical.

“Today, Africa consumes 3 percent of total energy consumption in the world. In all the current best-case scenarios, in 2030 Africa would still consume only 5 percent. What’s wrong with this picture? You cannot grow without more energy. The population will grow, but if energy consumption use and investment in energy services don’t grow, you still have 700 to 800 million people without access to modern energy services. That paradigm has to change.

“Africa consumes biomass. It is the source of energy for 70 to 80 percent of the population in many countries. The way Africa consumes biomass, however, is unsustainable. It is causing land degradation. It is causing more poverty. It causes the inability of soils to regain their fertility. It creates many critical problems that compromise the development agenda.

“Africa’s current energy infrastructure is 30 to 40 years old. This presents an opportunity to reframe Africa’s energy system in a new, cleaner energy paradigm. Bioenergy – not just biofuels but all sorts of modern biomass energy – can be a key component of that in conjunction with other renewable sources of energy.”

BIOFUELS – REALIZING THE CHALLENGE

“We have to manage this hype going on with biofuels by discussing pros and cons. We have to engage countries in a discussion of trade-offs. They have to know what they are getting into. Short-term economic gain might have long-term environmental damage issues related and an economic decline over time.”

“Finding alternatives to fossil fuels is driven by two different debates. One comes from the debate on global climate change. But in other countries the debate comes from an economic point of view. It’s commonly agreed that we need not only one strategy but a dual strategy. Number one is, develop clean sources for fuels. The other one is, maximize energy efficiency and minimize energy use. Our major challenge right now is to put these two agendas into one or align them properly, that they enhance, instead of conflict with, each other.

“The debate on biofuel is actually nothing new. For instance, in India, biofuels have been used for quite some time. It is not a new debate. What is new is the dimension. We are talking about large-scale industrial use of biofuels, or biomass production for biofuels.

“Production of biomass is linked to monoculture; you need

large feedstock masses to produce biofuels. That is linked to large landscape conversions, destruction of habitats and carbon stock/carbon sequestration potential, loss of biodiversity, use of herbicides and pesticides, and of course they affect negatively water and soil quality, and some biomass species might even become invasive. What that means for our ecosystems, I think we are pretty aware.

“Developing countries are very much focused on short-term economic gain because they deal with this ravaging poverty in their own backyard. They have cheap labor, they have weak enforcement of human rights, and they have a very limited level of awareness of cause-impact chains. We have to discuss trade-offs when we talk about biofuels. It is not a win-win situation. Whenever you do something that might have an impact on another side, we have to discuss if these trade-offs are viable, if they are acceptable.”



FUELING GROWTH IN SUB-SAHARAN AFRICA

HIS EXCELLENCY IBRAHIM MAYAKI

*Executive Director, The Hub for Rural Development, West & Central Africa
Former Prime Minister*

NIGER

“The main aim of the use of biofuels in sub-Saharan Africa must be to reduce rural poverty. And the public policies must deal with the issue of the use of biofuels at the local level, at the level of a village. Let us not forget – and this figure is very important – 90 percent of rural West and Central Africa lives without electricity.”

“The West and Central Africa demographic growth rate is the highest in the world: between 2.6 and 3.2 percent. Every year between 12 and 16 million young people enter the market economy and don't have any 'job' besides agriculture. But most dropouts from primary school – and we have a lot – don't have any skills linked with agriculture. That is the main challenge of African governments: how to give employment to those young people.

“The myth is that Africa is poor. Yes, Africa is poor, but it is important to notice that we import \$13 billion in food, and capital flight per annum is \$30 billion. And of those \$30 billion of capital flight, a good part is corruption. The difference we have with Asia is not that we are more corrupt; the problem is that the 'fruits' of corruption stay in Asia, but they don't stay in Africa.

“The first goal would be a technological leap from a situation of a lack of fuel to an advanced technology. The second goal would be to use plants which do not compete with food crops so as to secure food security. The third goal would be local management. The producers must have the opportunity to manage this process locally so that the added value stays in local areas, and this is a very important aspect.

“Two main risks that we have to take in account when constructing public policy would be food insecurity and land ownership concentration. There are three main conditions: the political conditions, which are protecting the small farmers – most of our farmers are very small; the scientific conditions; and the economic and commercial dimension to build regional markets. Regional integration is a key factor if we want to have a sound and effective policy dealing with biofuels.”

A MODEL FOR NEXT-GENERATION BIOFUELS

BIRGITTE KLÆR AHRING

*Professor,
Technical University of Denmark*

DENMARK



“We can produce renewable fuels like electricity in many different ways; we have all kinds of possibilities. When it comes to making liquid fuel, we have very few options. One of the options we have is to use biomass. This is a very important statement: if liquid fuel will be renewable, it has to include biomass.”

“In the year 2050, there will be maybe even more than 50 percent more people, and 50 percent more cars in the world. That's probably even a low number. And it puts the conflict on the table – Are we going to feed the cars, or are we going to feed the people?

“When we come to second-generation biofuels, we are dealing with a raw material whose sugar is in a different form than in a starch-based crop. The sugar will be in cellulosic or hemicellulosic form, and a third molecule, the lignin molecule, would be there in up to 25 percent of the whole raw material. Lignin is made with the purpose of giving the plant strength and also for prevention of microbial degradation. So basically, if we want to do second-generation biofuels, we have to have a technology that detaches the lignin molecule away from our sugars. This is the number-one technology we need.

“If we do not make the solutions now, if we do not succeed getting second generation now, and very fast, on the table, what is the alternative? The alternative is not that the car will be in the garage. The alternative will be that people will start with tar sands – and you get much more CO₂ emitted compared to crude oil. Or you use coal to liquid – a really, really bad solution when it comes to our atmosphere.

“You harvest what you sow; that is a very important lesson. Sugar cane can harvest around 7 percent of the incoming sun, while corn would only harvest around 2.2 percent. You can see there is an enormous difference. And if it's wheat, it's even worse. So we have to really think about what we do for the future when we are going into this field.”



A SUSTAINABLE FUTURE FOR BIOENERGY?

SUZANNE HUNT

Biofuels Consultant, Natural Resources Defense Council; Inter-American Development Bank; Global Bioenergy Partnership

UNITED STATES

“Transportation is responsible for a quarter of the world’s energy-related greenhouse gas emissions, and that is increasing. We’ve made progress in electricity, we’ve made progress in industry, but the transportation sector has really been eluding us. Currently, despite all of the rapid growth and excitement, biofuels supply about 1 percent of our transport fuels.”

“Cars traditionally have been the symbol of mobility, personal expression, movement, choice, independence. Now they’re so ubiquitous that they’re actually limiting our mobility and our choice. We sit in traffic jams, they’re polluting our air, and they’re threatening the planet with greenhouse gas emissions. So we really need to push the auto industry, and governments need to make these industries evolve. Instead of focusing on the individual car, we need to focus on high-quality, low-carbon transport.

“If we just caught up with Europe’s average vehicle efficiency, we would halve our fuel needs. This is not using advanced technology; this is not reducing our quality of life. This is just driving more efficient cars.

“There are many cases where you can find win/wins; you just have to be a little craftier and try a little bit harder. There are some folks looking at wastewater treatment plants. They grow massive amounts of algae in the runways, take this algae and turn it into energy. They’re cleaning wastewater, they’re producing energy, and they’re dealing with a waste problem.

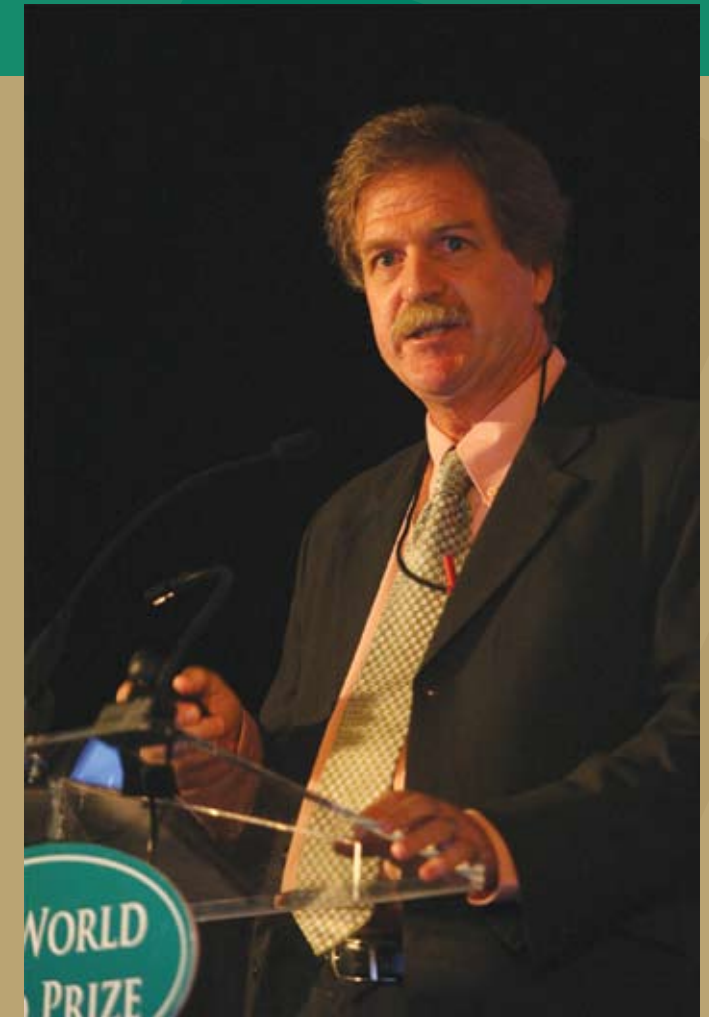
“The largest tilapia fish producer in the world, in Honduras, spent half a million dollars on a fish waste processing plant. They took the protein fraction and made fish meal for animal feed; they took the fat and made biodiesel. They are displacing all of their diesel fuel needs and also selling low-cost fuel to their employees, who then go out and educate the community about the fuel.”

WILL THERE BE ENOUGH WATER?

DAVID MOLDEN

Deputy Director General, International Water Management Institute

SRI LANKA



“Will there be enough water to grow food and to produce the biofuels we need? No. The way we do business now, it’ll be more than 2.6 billion people that will have to deal with water scarcity – unless we really change our policies and actions and the way we think about water. We have to change the way the water business is done.”

“Two big things drive water use – our diets and energy. So it’s not a question of food versus fuels. It’s a question of cars versus carnivores. On a daily basis, we need about two to five liters of drinking water. For household use, about 20 liters is an absolute minimum; we probably use 500 liters. But if we look at how much water crops convert into evapotranspiration, it’s about a ton of water to produce 1 kilogram of grain. Then if you feed that grain to livestock, the conversion is about 5,000 to 15,000 liters per kilogram of meat.

“Poverty, hunger and gender inequality are not really because of our technology here. It’s because of the way we *manage* water. It’s our policy and institutional failings. Water flows to money, and somehow we have to reverse that trend and

make sure that poor people get access of that water. They can be extremely good at increasing water productivity.

“Over 1 billion people face physical water scarcity: intense competition for water, falling water tables, high pollution with little water to dilute it, and very little water for environmental flows going out to the coastal ecosystems. It’s not just a problem of developing countries; it’s an issue in the Colorado River Basin, in Australia in the Murray-Darling River Basin. But you see in Africa, a lot of South Asia, and some in the Andes, where there is water in nature, but people are water scarce because they can’t tap it. So we have another 1.6 billion people living in these *economically* water-scarce areas where people are feeling the pinch.”



CYNTHIA ROSENZWEIG
Senior Scientist,
NASA Goddard Institute for Space Studies
UNITED STATES

A CONVERSATION ON... FUTURE SCIENCE AND POLICY CHALLENGES

“There’s no single solution. When we’re talking about alternatives to fossil fuel energy, the biosolutions are there, but they must be real, they must be varied, and anybody that privileges one uniquely over others is taking us in the wrong direction. And the theoretical models have to be mitigated by the way people live, the way they think, the way institutions operate. We cannot make a contribution unless we put these two things together.”

- MARGARET CATLEY-CARLSON (Panel Moderator)
Chair, Global Water Partnership



CAN BIOFUELS CONFRONT CLIMATE CHANGE?

“Agriculture is a major player, probably after the energy sector, as one of the greenhouse gas emissions contributors.”

“In each of the major greenhouse gas trajectories, agriculture plays a leading role. Of the primary source of increase, carbon dioxide...land use change provides a significant contribution, about 20 percent. In terms of methane, rice production and ruminants are major, dominant sources. In terms of nitrous oxide more than a third is agricultural, predominantly from fertilizer.

“There are possible benefits. CO₂ is a building block for photosynthesis and helps to improve water-use efficiency. Longer growing seasons in many regions limited by cold temperatures – at high latitudes and also at high elevations – may expand the potential for agricultural land. Precipitation will increase, and there are places that have a deficit of precipitation for crops. But on the other hand, climate change is going to bring more frequent droughts, increases of pests, heat stress, and faster growing periods... And it’s not just crops, but the whole agro-ecosystem with the associated

weeds, insects and diseases. It’s hard to know how strongly CO₂ effects will really take hold.

“As we work to reduce agriculture’s contribution to greenhouse gas emissions, we are living in and working in changing climate conditions. Farmers in the agricultural sector need to mitigate and adapt at the same time to reduce risk. There are multiple pathways – bioenergy, improved efficiency and productivity in farm operations, carbon storage and agroforestry and soils, improved nitrogen fertilizer efficiency, methane emission reductions in rice and ruminants, and manure management.

“On bioenergy, climate change will affect greenhouse gas emission calculations, productivity, crop types, etc. So as part of the long-term perspective that has been brought forward, climate change has to be part of the thinking. Making a calculation without taking climate change into account will contribute to less than robust projections and calculations.”

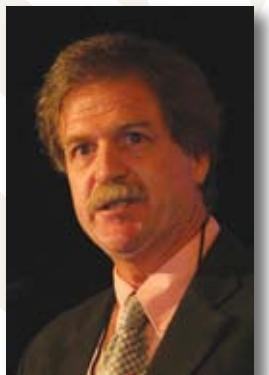


“It’s interesting to interact with industry folks and then interact with the scientific community and then interact with the policymakers. They’re definitely not saying the same things, and they’re not getting the same information. We need to put our heads together to create a forum, because it’s happening at the international level, and I’ve not seen it in the U.S.”

- SUZANNE HUNT
Consultant, Natural Resources Defense Council; Inter-American Development Bank; Global Bioenergy Partnership

“How are we going to deal with water scarcity, unless we change the way we do things? We know that a lot of times yield going up means more water. Somehow we have to make it, yield going up, but using less water. We have to stop the water use in agriculture. And improved biofuel technology and practices play a big role in that.”

- DAVID MOLDEN
Deputy Director General, International Water Management Institute



“Agriculture has an important leadership role in mitigation and adaptation to climate change through a diverse mix of activities. Solving the climate change challenge requires strong continuing interactions, since climate, science and solutions continue to evolve. This is not something that policymakers can say to researchers and scientists, ‘Thank you very much. We have the idea. We’ll take it from here.’”

- CYNTHIA ROSENZWEIG
Senior Scientist, NASA Goddard Institute for Space Studies



PHILIP E. NELSON
2007 World Food Prize Laureate
Scholle Chair Professor, Purdue University
UNITED STATES

The Laureate's Address

FOOD TECHNOLOGY FOR FOOD SECURITY

“Teach a man to fish, and he can catch a lot of fish. But what happens to that fish? These fish will spoil. We’ve seen what can be done with simple installation where their goal is to market that product: those fish can be saved.”

“In 1999 the World Bank said that post-harvest losses amounted to 12 to 16 million metric tons of food grains each year – an amount that, the World Bank stipulates, could feed one third of India’s poor.

“Post-harvest losses occur when a harvested product does not reach its intended use – in most cases, a hungry stomach. We know post-harvest losses...can be as high as 50 percent. And we know it’s not as simple as saying, ‘Okay, let’s put a factory there, and we’ll take care of everything.’ It’s a process that requires step-by-step scrutiny in order to reduce those losses.

“In a province in Afghanistan, 50 percent of the fruits and vegetables will spoil. They’ve been very well supported, and the farmers have really prospered. They’ve done a great job in agriculture. [There were] reports in Vietnam that, of a bumper crop of rice, only half of it was used; the other half was lost, where it could have been preserved and reached a much wider reception by people. It breaks one’s heart to think of product that you’ve really done a great job in growing and producing and getting the yields up.

“Ninety percent of tomatoes harvested globally are aseptically processed and packaged for off-season remanufacture. China leads the world in tomato paste production, followed by the United States and, down the line, India. India produces 7.6 million tons of tomato products a year, but due to the lack of proper processing, the export of these products is limited. And they have tremendous food losses.

“As nations develop, milk becomes a very important commodity to the nutrition of the countries. India has over 15 million gallons of aseptic milk. This will continue to grow. Pakistan, 43 million gallons. And China, about 156 million gallons. And...it’s being distributed without refrigeration throughout [those] parts of the world.

“We are a global society. We want our product on the grocery shelf year-round. So there are concerns of imports and developing markets that we will be facing in the next decade. Security, not only from food pathogens but from bioterrorism, is important. And we have opportunities with many countries, where we actually are on their shores or they are on our shores, to be assured that what goes into the container is what it says it is and it’s safe.”

FOOD TECHNOLOGISTS HONOR ONE OF THEIR OWN



World Food Prize co-founder and Institute of Food Technologists past president Al Clausi introduced Dr. Nelson

This year’s World Food Prize Laureate, Philip Nelson, was introduced to the Borlaug Dialogue stage by the founding chairman of the World Food Prize, Al Clausi. Like Nelson, Clausi is also a former president of the Institute of Food Technologists. In his introduction, Clausi points out that Nelson’s selection as the World Food Prize Laureate represents a new field for the award.

“[Nelson] is truly a post-harvest food scientist and food engineer. And I emphasize that point, because . . . when you look at the food chain, most of [the recognition] has been at the production end of the food chain, and appropriately so, because without food there really isn’t much you can do with it. But the message of the Prize is to recognize all links in the chain, from growing it to putting it on the table. And so it’s special, I think, this year that we honor a Laureate who is a post-harvest food scientist and food engineer. Not only does it bring credit to all of us who participate in that discipline, but more importantly I think it underscores the relevance of post-harvest technology in preventing loss and preventing waste, in making more foods available for more people globally than otherwise would be possible, in a safe, nutritious and usable form.”



JEFFREY COX
President, Global Corn and Soybeans
 Syngenta
 UNITED KINGDOM

“There’s absolutely no question we’re going to have to produce more, and productivity is at the core. More food, more feed, and more fuel. And we’re going to have to do that by using less of our limited land resources, less water, and less nutrients.

“Chronic and periodic drought stress has always been a problem in certain areas and at certain times. And it is becoming a more increasing problem. Climate change conditions are going to prevail over more of the world and particularly over parts of the world that so far have been high-production areas. The game is much larger than drought. It’s about water utilization of today’s agricultural crops, this increased competition for scarce water.

“Opportunities exist by looking at crops and markets differently. Sugar beets are grown predominantly in the Northern Hemisphere, and they’ve been bred over the years to cope with those climates. Several years ago we started developing and selecting beets that would be able to be commercially grown in the equatorial regions and tropics, targeted not only for sugar production but also towards the potential market of biofuels.

“The crop requires something like one fifth of the water that sugar cane requires, and it can be harvested in five months. You can grow a crop of sugar beets and then grow a vegetable crop afterwards, thereby increasing the economic value of that land to the grower and also the productivity overall of the enterprise. Second, sugar processing plants can come much closer to operating 12 months of the year instead of just in a short period, using both sugar beets and cane.

“The challenges couldn’t be more so than in China. As the drive in China continues, urban meat eaters there are beginning to eat even more. There has been an impact not just on the crops there but on a global scale. Soybeans have been caught in that particular demand cycle. Fortunately, we are on the cuff of a revolution in soybeans. The advances are going to leverage the same technology platforms that we’ve been using in corn – accelerating yield gain and introducing new agronomic traits, such as to control glyphosate-resistant weeds, rust, and nematodes.

“Increases over soybean yields are going to be really good news for consumers, whether from food, in feed, or in the growing biofuels industry. And it’s a good news story as well for the environment because we’re going to be able to use less land in order to be able to grow the demands.

“To sustain biofuels expansion, there’s going to be required lifecycle improvements in the field, in the production plant, and in logistics of those particular biofuel products. For Syngenta, this is about increasing productivity. The feedstocks required for many of these crops consume something like 50-85 percent of the total cost as we speak today.

“We’re developing seed varieties and traits for improving biofuel production. Our lead product is corn amylase. It contains a special enzyme that’s essential for the starch breakdown, and it’s built into the seed, into the grain. First expressed in corn, it’s going to represent a breakthrough technology to not only increase ethanol output in the plant but also reduce the energy and the water consumed within that plant while also improving the quality of the distillers’ dried grains.

“Syngenta is also transferring its learnings and its abilities on marker-assisted breeding into areas such as Niger, Nigeria, and into Ethiopia, on millet, sorghum and teff. Particularly in the developing world, the area of developing new and innovative partnerships is going to be critical to us if we’re going to be successful in technology transfer from one side to the other. It’s not just a one-way street.”



Jeffrey Cox and Dr. Norman Borlaug spent time discussing the future of agriculture.

A New Generation of Crops for **A NEW GENERATION OF CHALLENGES**

“The dynamic shift taking place in emerging economies is changing the demand on commodity crops worldwide. In China, we felt the impact of their growing economy on the steel business; we’re feeling the impact of the Third World now on commodities. That, coupled with the acceleration of the developing biofuels industry, is going to have to completely change the way in which we look at agriculture.”

THE WORLD FOOD PRIZE GLOBAL YOUTH INSTITUTE



Youth Institute participants present research papers, discuss cutting-edge topics in food security and hear about the “life-changing” experiences of Borlaug-Ruan International Interns, graduates of the Youth Institute program.



At the World Food Prize Global Youth Institute, 90 high school students from Iowa and beyond are given the opportunity to interact with experts in food and agriculture, including Norman Borlaug (at left).



World Food Prize Laureates such as Denmark’s Per Pinstrup-Andersen (left) hear the research findings of the students and offer feedback and encouragement.

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Complete transcripts from the 2007 Borlaug Dialogue can be found at <http://www.worldfoodprize.org/symposium/2007/transcripts.htm>.

For additional information on the Borlaug Dialogue, please contact Frank Swoboda of the World Food Prize Foundation at 515-245-3798 or fswoboda@worldfoodprize.org.

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