

2007 Norman E. Borlaug/World Food Prize International Symposium
Biofuels and Biofoods: The Global Challenges of Emerging Technologies
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LAUREATE LUNCHEON

October 19, 2007 – 12:00 – 2:00 p.m.

Speaker: Jeffrey Cox

Ambassador Kenneth Quinn

President - World Food Prize Foundation

Our luncheon speaker rounds out the discussions that began yesterday with the chairman and CEO of one of the world's biggest agribusinesses when Hugh Grant was here from Monsanto; in between we had Chris Policinski who was here from Land O'Lakes. This morning we had Chad Holliday, the chairman of DuPont and Pioneer. And we'll have this marvelous industry perspective be finished out now by the senior leader of Syngenta in North America, Jeffrey Cox.

Jeffrey Cox was appointed the global head of corn and soybeans in Syngenta in 2005, and he leads the business unit that is the primary driver of growth for Syngenta, including the development of new corn hybrids specifically tailored for biofuel production. Prior to his current position, Mr. Cox was global head of Syngenta Diverse Field Crops, where he set strategy for the sugar beets, oilseeds and cereals businesses.

It was during this time that Syngenta developed tropical sugar beets, significant advantages for food and biofuel production in semi-arid, tropical areas. The company has recently partnered with farmers in India to introduce this crop in the field, which I know is of interest to Dr. Swaminathan who is here. A native of England, Mr. Cox has over 20 years of global national management experience with a variety of leading agribusinesses, including Union Carbide, Stauffer, ICI, and Monsanto.

Please join me in welcoming Mr. Jeffrey Cox.

Jeffrey Cox

President, Global Corn and Soybeans, Syngenta

Well, good afternoon, ladies and gentlemen, and thank you for that welcome as well, Ambassador Quinn. It's a great honor to be here to speak to such a group of international and diverse people involved in agriculture. And just before I came in here, I had the honor to also have a private meeting with Dr. Borlaug. And much as I can say, Chad, you had him at the beginning of his career; he's actually now considering an offer from us, because we were so impressed with him.

To be serious, the inspiration and the insight of the man inspired me today, and I'm sure it's inspired you and whoever has been in contact with him in the past – a truly remarkable man.

Now, 12 months ago here in Des Moines, the question of, "Can we replicate the single greatest period of food production in all history, the Green Revolution?" was raised. And now just 12 months later, as we begin to feel the impact of the exploding biofuels revolution, the biorenewable energy, the question on how we produce not only enough food and feed but also how we produce biofuels has become a major source of debate in both the developing world but also here in the developed world as well.

Now, before I delve too much more deeply into the subject, I'd also want to congratulate Dr. Nelson for being named the 2007 Laureate. We remarked last night that some of his early work, in fact, is something that we're working on now. And he was trying to preserve the flavor of tomatoes by putting them through processing and ensuring that's carried through; and we're working hard now, so he's again on our list from a recruitment standpoint. So we'll be talking to you later, Dr. Nelson.

Now, on behalf of Syngenta, we would like to share with you some of our insights on some of the challenges that we do see going forward in addressing the food, feed and fuel debate.

Now, I think you heard from Chad this morning, and we know the statistics pretty well – in the next 30 years the world population is going to increase from around 6 billion to around 9 billion head, people. And it's a situation that's going to demand something like a 50 percent increase in food production.

The dynamic shift that's taking place in the emerging economies – and I think Dr. Borlaug referred to it as "the urban meat-eaters" – is really changing the demand on commodity crops worldwide. I think that really has been an inflection point that we've really only really felt in the past couple of years. Much like in China, where we felt the impact of their growing economy on the steel business, we're now feeling the impact of the Third World now on the commodities and the commodity crops.

Now, 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 biofuels phenomenon is going to require significant additional volumes of feedstocks, of products containing sugar, starch and oils.

And a good example of that has already been felt here in the United States where, in 2005, something like 11 percent of the corn crop was used in biofuel production. That's around 20 percent today, and it's going to rise by 2010 to around 35 percent of the crop.

Now, as a result, the whole production and supply chain is going to be put under considerably greater demand pressure. And that's going to necessitate considerable changes from the status quo as we see it today. I mean, 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. And I think, importantly, we're going to have to do that as well, particularly in the developing countries, with less hardship, where agricultural progress and technology adoption has been relatively slow. Without doubt, the pressure is on the industry to deliver.

But let's recognize also, we've accomplished a lot since the Green Revolution. The increase in corn yields has been quite mind-boggling. Advanced breeding and markers has increased the speed of genetic gain. Biotechnology traits now are moving on to their second generation, and we're seeing multiple-stack products arrive in the marketplace. Better use of crop protection products and integrated management practices have all attributed to us producing higher yields.

But we're really still at only the beginning of that journey. In corn alone, we predict that yields in the U.S. will more than double over the next 20 years. That's moving from the, let's say, around 150 bushels that we're at today per acre to somewhere near 300 bushels per acre – that is an achievable goal, and it will become a reality. But it's clear science that has been and will be at the core of meeting these challenges, whether it be in the developed or the developing world.

Now, Syngenta, let me tell you, is one of the world's largest crop protection in seeds and biotech companies. And we're proud to be part (and we are only part) of that solution. We have to forge new types of collaboration and cooperation within the technology industry but also outside of that industry to the other stakeholders who are going to be impacted by these changes.

It's also up to the technology players to work together and work with the food and the value chain to enable new ways of operating to occur that are going to ensure that these new and more value-added products are available to the growers and they're available in a sustainable way.

Now, each year at Syngenta we're investing somewhere in the region of \$800 million a year in our research and development pipeline, innovating our technology in crop protection and seed treatment and plant breeding and in biotechnology, and also in the interesting area that's emerging, the expression of enzymes in plants.

Now, we're pretty unique in the industry by having such a significant technology platform and commercial presence in all of these categories. And that gives us, and it gives our customers and our partners that we work with, new perspectives of how to integrate these,

leverage those technologies, and develop new solutions for sustainable growth in the future. And what I'd like to do is maybe just touch on one or two of those exciting developments.

Now, as a result of significant in-house research but also a wide range of collaboration across the world with institutes, we've developed a number of traits that are really helping grow and produce crops in areas prone to drought. But also where water resources are currently adequate, but they're inevitably going to become under higher demand because of the urbanization and industry and consumer use.

Now, chronic and periodic drought stress has always been a problem in certain areas of the world and at certain times. And it is becoming a more increasing problem. We also in Syngenta believe that climate change, particularly hotter and dryer conditions, are going to prevail over more parts of the world and particularly over parts of the world that so far have been high-production areas. So the game is much larger than just drought. It's also about the water utilization of today's current agricultural crops, because of this increased competition for scarce water.

Now, this technology has already been tested extensively here in the United States but also in Latin America, with consistent, positive yield results. And we're looking forward to 2011, when the first products are going to actually be launched out into the marketplace. And that in itself will be the start of the transition of drought products not only here in the United States but to other parts of the world as well, and particularly in developing countries.

Now, breakthroughs in these kind of high-technology drought traits are only one way to address our challenge. Opportunities also exist by looking at crops and markets differently. And this is one thing that we've done. If you think about sugar beets, they're grown predominantly in the Northern Hemisphere, and they've been bred over the years really to cope with those climates. And in fact they really thrive in my native England, which if any of you were there over the summer, doesn't see a lot of sun, and therefore the conversion to sugars must be quite a challenge to those beets there.

Now, 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 beets and sugar production but also towards the potential market of biofuels.

First, the crop requires only something like one fifth of the water that sugar cane requires, and it can be harvested in five months. And that means that you can actually grow a crop of sugar beets, and then you can grow possibly a vegetable crop afterwards; and thereby you're 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. Now, we just initiated our first full-scale project in India, in Pune, and we've got great hopes for that. And last night while I sat at the table with the South African Minister of Agriculture, they also were looking at beets in South Africa. And it is a major challenge. They're finding that these beets actually grow particularly well; in fact, they become huge. And they need some help there in terms of

understanding what kind of genetic solutions can be brought to play in order that they can grow beets in a way which are harvestable, processable, and can help supplement ethanol production in that country. So again exciting developments there.

Now, elsewhere in Asia the challenges are just as big, and they couldn't be more so than in China. Earlier this year we embarked upon a five-year collaboration with the Institute of Genetics and Development Biology, which is one of China's leading institutes looking into drought. In addition, we developed some new partnerships – and 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.

We developed a new partnership with Sanbei Seeds in China recently, which is also going to help us not only develop new seed lines from the material that we have here in the United States but to also combine that with Chinese germ plasm to be able to give them higher-yielding, higher productivity products.

Now, as the drive in China continues, our urban meat eaters there are beginning to eat even more. And as a result, there has been an impact not just on the crops there but on a global scale. And soybeans have been a particular example that have been caught in that particular demand cycle.

Now, fortunately we are on the cuff what can only be called a revolution in soybeans in North and in South America. Now, significant investments are being made across the industry in breeding and development traits. Now, the advances that we are talking about are going to be able to leverage the very same technology platforms that we've been using in corn – accelerating yield gain and introducing new agronomic traits, such as traits to be able to control glycosate-resistant wheat, rust and the important pesky nematodes.

Now, dramatic increases over soybean yields over the coming years is going to be really good news for all consumers, whether they come from food, whether they're in feed, or whether they're 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 on beans that will be required.

Now, these changes in producing crops are going to continue at an ever-accelerating pace. And technology is only part of the solution. As an industry focused on producing commodities, the value chain players have mainly focused on their next player in the chain. Seed companies related to farmers, farmers related to their grain traders, the grain traders to the processors and exporters and so on.

Now across the value chain there's a new realization that we have to go much farther than that and develop a new structure. If we're going to meet the new challenges for feed, fuel and food production, we've got to develop a much more seamless and rapid way of implementing new technology across the value chain and that's especially in commodity crops.

This is going to require a much more collaborative approach with both local and global contacts, because of the way commodities are traded. All players are going to need to bring a new flexibility to the existing systems, whether they be a farmer, whether they be a distributor, a grain handler, a processor. And that also means for us as technology providers.

And where the existing systems can accommodate that change, we look forward, as working with partners out there, to develop new ones.

And one word of caution, however. One of the serious limiting factors in realizing the benefits of these new production technologies, especially in commodity crops, is the lack of a synchronized global approval system and the challenges of moving grain in this environment. Until greater global harmonization occurs and with the support of global standards such as for adventitious presence, the products that can have an enormous potential for the world may not only be delayed but in fact some could fall by the wayside. Of course, any changes in the regulatory system are going to need to be backed by political will, and they'll need to be underpinned by sound science.

So returning then to the productivity challenge, it is imminently solvable, using new technology. And the demand for the new technology cannot be greater in the rapid biofuels market.

The increased demand for biofuels is truly a global phenomenon. Although it's driven by different factors in every region, here in NAFTA it's pretty much about food security and helping the rural economy. In Brazil it's being driven by fuel independence and export opportunities.

And I learned last night as well, from the minister of South Africa, that there as well it's about bringing new wealth and new opportunities in a small way and breaking the cycle of poverty in the rural environment in developing countries. It can bring cash, new forms of cash, into those communities.

Now, the size of demand on biofuels can sound frightening, given how this phenomenon has already been characterized by some as either/or – is it going to be food, or is it going to be fuel? I don't see it that way. And clearly biofuels can make sense and are going to be here to stay. From a social, from a technological, from an environmental and a political standpoint, there is not only acceptance but there are expectations and even demands in the form of incentives that are propelling the explosion of this industry.

Nevertheless, to sustain the 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.

Now, for Syngenta, solving this dilemma is still about increasing productivity. Firstly, you've got to consider that the feedstocks required for many of these crops consume something like 50-85 percent of the total cost as we speak today. Consequently, it's pretty obvious the initial focus is to increase the productivity of the units that you're bringing into that plant, and that's something that we're already doing today through productivity initiatives.

But secondly, we're developing seed varieties and traits for improving biofuel production, and our lead product is one called corn amylase. It's a value specialty grain for use in dry-growing plants. It contains a special enzyme that's essential, that's required, for the starch breakdown, and it's built into the seed, or into the grain, shall I say.

It is first expressed in corn to help growers and ethanol producers, and it's going to represent a breakthrough technology, we believe, which promises to not only increase ethanol output in the plant but also, more importantly, reduce the energy and the water consumed within that plant while also improving the quality of the distillers' dried grains.

Now, this product has already been through the FDA here in the United States, and it's under review by the USDA. And we anticipate taking full-scale plant trials into the field next year so that we can really prove that in an ethanol plant. But it is a great promise to be able to increase productivity not only in the field but also in the production plant on biofuels.

Now, we're also investing in technology in the cellulosic ethanol area. And we believe that some of those breakthroughs are going to be in the fairly long term, somewhere in the five-to-ten-year mark. But there's a huge amount of investment going into this marketplace and probably led by the United States and China. And we believe that it's going to take something like ten years to become a commercial reality.

Now, early this year Syngenta and the Diversa Corporation – they're now called Verenum – formed a new ten-year research agreement, which is focused on the discovering and the development of novel enzymes for converting pretreated cellulosic biomass into mixed sugars.

Now, we believe our ability in plant-expressed enzymes is going to have a direct impact on the viability of this industry, and initial developments are most likely going to be based on agriculture residues such as cornstalks, forestry waste, and the like. However, after the processing technology is developed and proven, we believe the specific biomass energy products and crops are going to be developed, and they will enhance productivity further.

Now, for sure, advances in technology are undoubtedly going to play their part in increasing productivity in the world. But they can also be employed to produce more with less hardship. And the Syngenta Foundation for Sustainable Agriculture is addressing this particular challenge by supporting research in projects on sustainable food security in the poorest regions of the world. One of these projects is in partnership with the government in Mali to support a research station to explore pest- and disease-resistant grain. Grains that are focused on are millet, sorghum, and a new one for me, cowpea.

Another is a land management project in Eritrea, focused on research and water conservation. And another is in Kenya to develop new varieties of corn resistant to devastating insect pests. Syngenta is also supporting, by transferring its learnings and its abilities on marker-assisted breeding into areas such as Niger, Nigeria, and into Ethiopia, on millet, sorghum and teff. And our technology in the development world can truly help these countries address their hunger issues.

Agriculture can meet the challenges that have been proposed – producing more, using less, by using and deploying more technology. Although Syngenta is proud to be part of this endeavor, it will take more than technology alone. We all need to participate in a new spirit of collaboration that enables sound science to prevail and allows the rapid deployment of these technologies around the world. Working together, we believe, agriculture can feed our world, and it can also fuel its programs.

Thank you for your kind attention. I look forward to the remainder of the schedule today, and I wish you well, returning to your various homes, to carry some of the very powerful messages that we've all heard here this week and spread the word.

I met with Dr. Borlaug, as I said before, and one of his messages to me was, "How can you influence more people to understand the role of science and technology in feeding the world?" And that was a pretty big challenge, so I'm going to go home this weekend and scratch my head on that one. Thank you.

Ambassador Kenneth Quinn

President - World Food Prize Foundation

Thank you so very, very much, Jeff Cox. This has been marvelous, and this is, I think, the note on which to end our deliberations. We will be having the African Ambassadors' group beginning right about now. But just wanted you to take away with you, as an expression of our thanks, both for you being here personally, for the wonderful support that Syngenta has provided to us, and for also, I know, of your interest, along with Dr. Borlaug, in all of our Youth Institute participants who are here. This is a special memento from us, so thank you very much.

Governor Ray, thank you so much for being with us today. You're hiding over there – I didn't see you before. And Mark Thomson was here, and where did he go? He left, but he did all the production for last night. I wanted to thank him.

A special word of thanks to the Nelson family. We're so glad you were able to be here this week, and we're happy to welcome you. And I should have said last night, but I've got to be on the record if I hope to live in Iowa much longer, that while last night at the Capitol we were all Boilermakers, this Saturday it'll be GO HAWKS. But Phil, Sue, I want to thank you for being here, and it's been our pleasure to honor you. So that's the conclusion of our luncheon, and I hope many of you can go over and join the African Ambassadors. Thank you for being with us.