CONVERSATION: OVERCOMING MAJOR CONSTRAINTS FACING SMALLHOLDERS

October 14, 2010 – 8:00 a.m.

Uma Lele – Senior Advisor (ret.), World Bank

Thank you very much. It's a great pleasure and an honor to come back to the World Food family, the World Food Prize Family. I wasn't born with this when the World Food Prize was established and went through with Dr. Norman Borlaug the trials and tribulations of getting the funding organized. Because I remember when we awarded the World Food Prize to the first few awardees there was a hiatus of support, and then Mr. John Ruan agreed to finance this. And I still remember the tremendous fond memories meeting him and attending the meetings in the first years when he took over the financing of the award.

I have known Dr. Norman Borlaug since I was a graduate student and post-graduate student. And the Green Revolution in India, which I remember – it was a very trying time in India. And Dr. Swaminathan, who is here, was of course the father of the Green Revolution; I saw Norman Borlaug and Dr. Swaminathan working together. I remember that there used to be a joke I the World Bank at the time, that Norm Borlaug had more access to Mrs. Gandhi than senior managers in the World Bank, so they used to say, "If you have any important message to tell Mrs. Gandhi, please convey to Norman Borlaug, and it's certain to get to her," but they were not sure that they could reach her.

I am going to just make a few preliminary remarks today and then leave the rest of the presentation to our eminent panel of experts; they come from various fields, and I will introduce them to you in a few minutes. But as I began to think about the panel of experts, I completely thought about my own life in dealing with issues of food security as an economist looking at the problems in South Asia and problems in Africa. And I think that the reason why it's important that we – that I'm going to urge our panel of experts to talk about things not just in the areas where they are experts, and what can be done in soils and water and seed, etc., but how to bring it all together. Because actually that is a big challenge that the development community faces.

One of the important reasons, in my view, why the Green Revolution was so successful in Asia: it wasn't just the seed and the fertilizers and all the ingredients that had to be put together in terms of policies and institutions and human capital and infrastructure, all the things that Prabhu Pingali talked about yesterday, but the fact that, first of all, there were the likes of Dr. Swaminathan in many Asian countries that were the leaders that helped to mobilize the political will to bring the different ingredients of success together. And the fact that there was an integrated approach. And I was reminded of this because of the fact that the donor community has gone through many cycles of assistance. And I think particularly, as foreign assistance is increasing yet once again, it's important that we have a sense of history and we remember the lessons both of what worked and what didn't work and, in point, cycles of fashions and fads, of things that come and go.

Just to mention them – for instance, the integrated approach was very successful in bringing policies, institutions together in South Asia and East Asia. The same approach was followed in the 1970s in Africa. They integrated all development projects. Many of them I had reviewed when I first joined, started my career, at the World Bank. They came into disrepute in the late 1970s, and then the donor interest in Africa completely vanished, and then that was replaced by T and V Extension, which also vanished. And then there were policy reforms for a while, and then there was really not much attention to food and agriculture for a long time. And now it has come back.

And I hear the discussions many times of the kinds of things we also wrestled with when I was working with Dr. Borlaug on the Sasakawa Foundation program – the whole question of how to move from pilot projects to scaling up by creating an environment at the national level of policies, institutions, infrastructure services,

were the challenges that were also facing in the Sasakawa program. So I'm hoping that our experts here are not only going to tell us about how important water or soils or seeds are, and how much they know about it, but how can we all bring it together? I think one other issues which were emphasized very much yesterday, and they hope they can talk about it, are the issues of risks and uncertainty that are quite important.

So now I'm going to introduce to you this distinguished panel. And I must say it's a great honor for me to introduce you to them. There is Rolf Derpsch, who is going to speak about issues related to soil management, and he has a great deal to say on conservation management and zero tillage, which has become quite a popular phenomenon this days — and the question is, how do we introduce it to small farmers on a large scale?

Joe DeVries, who is a champion with a lot of innovative work done on seeds, is going to talk about the experience in the Rockefeller Foundation and in AGRA in making seed available on a large scale to farmers.

Nuhu Hatibu has experience in water management, but he also has a lot of experience in looking at water in a larger context of reaching small farmers, so I hope he will not only talk about managing water but its impact on small farmers.

Then we have Jessica Adelman, who is the head of the Corporate Affairs for Syngenta Foundation, and she is going to talk about the relationship between technology and markets.

And we have Stephanie Hanson, a very young member of our panel, the youngest. She reminds me of my days when I started my career. She works on finance issues, and she's going to talk about microfinance and challenges of reaching small farmers with microfinance.

Most importantly, we have Sarah Munalula, who is a small farmer in Zambia, and she has an extremely interesting story about what it is like to be a small farmer in Zambia, and she will be the last speaker. After all the experts have spoken, she will remind us of what it all looks like from the perspective of the small farmer.

So it's a great delight for me. I think we'll start with Rolf and then go on from there.

Rolf Derpsch – Senior Expert, Soil Conservation (ret.), GTZ

Well, thank you very much, Uma, for this gentle introduction. When I was attending several meetings, I was wondering how an important issue about soils is not addressed. Everybody is speaking about increasing productivity and a lot of other things, but an important theme for this, for the sustainable food production, is our soil. And the only one that really spoke about the problems of degrading soils was Howard Buffett, and he talked about that we need a "Brown Revolution." That means we need to focus a little bit more on soils, because how can we eradicate hunger and poverty and ensure food security if our soils are eroding away? So this is the main part of my presentation.

And if I can have the first slide, please, and if I can have the changer for the slides also. So this is an important message: "There are more living creatures in a shovelful of rich soil than human beings on a planet, yet more is known about the dark side of the moon than about soil." With this statement, I would like to highlight our incredible ignorance about soils. And this is quoting the Museum of Natural History in Washington, DC.

When talking about overcoming constraints to productivity, first of all we need to analyze which could be the core constraints that global agriculture and farmers, as well as soils, are facing. Many studies in my own experience have shown that one of the core constraints is the degradation and sometimes irreversible destruction of soils, which has reached frightening proportions, obstructing the ability of producing more food. According to FAO, almost all agricultural soils show alarming signs of land degradation. More than 10 million hectares of agricultural land are lost each year to land degradation and desertification. The problem is especially severe in the developing countries of the tropics and the subtropics. The age-old practice of

plowing the soil before planting a new crop is a leading cause of farmland degradation. Intensive tilling destroys the biological and ecological integrity of the soil system so that productivity is significantly impaired. Soil degradation is one of the overriding factors that hinder the production of more food.

Tillage is a root cause of agricultural land degradation, and one of the most serious environmental problems worldwide, which poses a threat to food production and rural livelihoods all over the world. So controlling soil erosion and stopping soil degradation is a prerequisite for all other inputs to become effective. If soil erosion and degradation continue unchecked and production systems do not change, then it is most likely that soon we will not be able to meet our world food demands.

The challenge, therefore, is how will we be able to feed an increasing population while at the same time the resource base on which additional food production should be produced is fading away? So we have this one curve of population going up and the other curve of soil degradation going on. And as long as this is that way, I ask you — how can we try to increase food production?

To achieve this, first, we need to stop soil degradation. Not only is it possible to stop land degradation, [but] with available technology it is possible to revert the process of land degradation and start soil building. For this, the paradigms are agricultural production need to be changed. The available answer to soil degradation is called conservation agriculture, no-tillage. This soil-conserving and soil-building system is increasingly being applied by farmers all around the world. Conservation agriculture is based on three principles: permanent organic soil cover, no soil disturbance by tillage, and cropping diversity – that means crop rotation, use of green manure, cover crops, and so on.

Adoption of no-tillage systems has reversed the former trend of declining cropping activity and led to an economically, ecologically, and socially sustainable form of commercial cropping in South America. With the adoption of no-till farming, Brazil and Argentina have been able to double their grain production between 1999 and 2005 in a matter of only 15 years. As a result of applying this technology, soil erosion, soil degradation, and desertification have virtually been stopped in these countries. The system also preserves water, improves soil quality, and increases biodiversity. Therefore, it is considered to be the most sustainable production system available to farmers today.

Higher water infiltration rates in the soil and of the system increase the water-use efficiency by crops, reduce the surging of rivers and dams, and at the same time reduce the risk of clodding. Conservation agriculture [and] no-tillage systems secure the carbon into the soil, increasing soil fertility, as opposed to tillage systems that release CO_2 into the atmosphere and contribute to global warming.

To stop ongoing worldwide degradation of agricultural soils, we need to transfer this soil-regenerating and soil-building system more intensively and faster to farmers around the world. Conservation-agriculture, no-tillage are being applied on more than 117 million hectares worldwide. This shows that this way of farming cannot anymore be considered a temporary fashion; instead, this farming system has established itself as a technology that can no longer be ignored by donor agencies, scientists, universities, extension workers, farmers, politicians, as well as machine manufacturers, and other agricultural related industries.

Our challenge in the words of Norman Borlaug is: *Take it to the farmer.* And only with sustainable agriculture will we reach sustainable development at the local and the global scale. So if we do not apply sustainable agriculture at the local scale, we'll not be able to have sustainable development on the global scale. Thank you very much.

Uma Lele

Our next speaker is Joe DeVries. I'm going to appeal to all the panel members to not just tell us what needs to be done, but how can we take it to the small farmer. So this is a challenge that I, as a leader of this panel, am making to the speakers. So please don't only tell us about the importance of seed or importance of soils but also what do you know as an expert in how to take it to the small farmer — that's our charge.

Joe DeVries – Director, Program for Africa's Seed Systems, AGRA

Thank you very much, Uma, and thank you to the people of the World Food Prize for allowing me to come to speak to the group today. You know, I've been working in Africa for about 25 years now and in some of the worst famine situations that the continent has known over that time. And so it's been a journey with its ups and downs, but I'm happy to say I've never been more optimistic or excited about the possibility for achieving food security in Africa than I am right now. And a lot of that optimism is based on what I see happening with the supply of improved seed and farmers' response to that improved seed. And nothing I'm going to say now disagrees with what Rolf has said; I think these are parts of, components of, an agricultural system, all of which are important. I think seed may be the most deliverable of those components at this time among the farmers that we work with in Africa. And we will also get to conservation farming.

But let's start with the basics. Improved seed has really served as a foundation for Green Revolutions around the world. But so far, in Africa, most farmers have been deprived of this critical, game-changing technology, without which most farmers in the United States wouldn't even plant — that is, the supply of professionally developed, improved crop varieties. The situation, I think, for me, is made all the more urgent because I see it now as a very achievable solution, something that we really can take to farmers today and have some success with and get started on a more virtuous cycle for increasing productivity.

The problem historically has really been in two parts. On the one hand you've had a lack of improved varieties of Africa's crops; on the other, you've had no means of getting the seed to farmers, even if you had those improved varieties. What we're seeing now, through the support AGRA is giving to about 70 breeding programs around Africa, is that they have developed over 150 new varieties and officially released those, just over the past 3 years in the 13 countries where we work. And we're expecting another 50 to be released within the next quarter or two quarters. So the varieties are getting released.

But probably more important, we also have a means now for getting them to farmers. And the basic model is that of the private, independent seed company that works in close collaboration with the research institutes to finally provide that bridge between the research institutes and the breeders and the farmers. And this is in response to policy changes that have taken place in Africa that have allowed free competition of private companies to provide seed; but also a number of other factors, including financial support to their starting up, some key technical assistance, much of which is coming from the United States and the developed world, and also the development of a new phenomenon, which is the agrodealer — the village-based shop where farmers can go and get this seed and get some advice on how to plant it and also get some fertilizer and other productivity-enhancing technologies. So the problem looks – to a large part, the problem has just been there's just not been any access by farmers to this improved seed. We're working now with about 50 seed companies, and all of them report selling out all their stocks every year. We're working with about 9,000 agrodealers, and they are getting the seed out to farmers further into the agricultural landscape than ever before.

You know, in the early stages of the seed industry of the United States, there was a burgeoning competition and industry that was built on mom and pop seed companies — private, local seed companies — before it came to be dominated by several large ones. But still, in the United States, many of these small and medium-size companies are key. In India today there are over 300 seed companies, just counting those that have revenues of over $1 million. But in many of the countries where we have gone in over the past three years, we've discovered there are no seed companies at all. Today, in Cameroon, I don't know of a single seed company selling agronomic seed. I've just come from Liberia and found to our great surprise and delight that there are two seed companies. But they're each producing about 10 metric tons of seed a year. So this is something that really has to be now rolled out across Africa — public breeding and private seed supply.

If I could have the first slide, I'll just give some illustrations of what we're talking about here. On the left you'll see a local landrace of sorghum from Mali, and on the right a locally derived hybrid variety. Obviously the one on the right is going to yield about three, or even more, times the one on the left.

Next slide. Do I have the changer? Again in Mali – and I want to acknowledge the presence of the minister of agriculture of Mali, who has been instrumental in getting seed to farmers through liberalization of the seed sector and strong support to the IER, the national agriculture research institute there – on the left, a local landrace of maize, and on the right, the hybrid that's just now being rolled out by IER.

And it extends to the legume crops as well. Here you see a farmer in his field of ground nuts, or peanuts, in Uganda, and on the left the improved variety developed just recently, getting released hopefully at the end of this year with rosette resistance and leaf-spot resistance; on the right, the farmers' current variety.

But if you've got those new varieties, again, as I say, you've got to take them to the farmer. Farmers are demanding improved seed; seed companies and dealers are taking it to them. We've gone to some quite innovative methods, I think, based on this grassroots supply of seed, even supplying bicycle seed dealers in remote parts of Zambia. Another key part of this has been breaking the seed down into sizable chunks or packages that farmers can afford. Historically, I think we've tried to sell farmers the amount of seed we wanted to sell them, rather than the amount of seed they were able to buy. And then finally, as you see in the bottom there, an agrodealer selling his seed to farmers. Farmers are not asking to be recipients or target beneficiaries anymore in Africa. They're asking to be viable customers of an ongoing system that they can count on from year to year.

We've got data now that show that, on average in the areas where AGRA is working, farmers who have accessed seed report average doubling of their yields. Data from a panel survey in western Kenya has shown that with a local variety and no fertilizer, farmers are getting about 838 kilograms per hectare. With a bit of fertilizer and that local variety, they can boost it up to 1200 kilos. But with improved seed and the fertilizer, average yields among these panels of farmers was almost 2 tons — and that's the beginning of a Green Revolution.

And finally, just to show a bit of data across the companies that we've been working with — about 41 seed enterprises of different categories, some collectively owned, some owner-operated, and some public agencies — we've seen very strong growth rates. As you see, across the 2008 class of entrance into the business, very strong annual growth rates; 2008 was actually a drought year in East Africa, and growth rates were reduced by that. But in 2009, as you can see, very strong growth rates. We've now reached, just through these startup companies, about 15,400 metric tons of certified, improved seed produced and sold on to farmers this year. If you blend in a couple of the larger companies that are now benefiting from venture capital provided through AGRA, that number jumps to 25,000 metric tons.

So I think we've made a great start. I'm hoping that other donors would get interested in this. We've been provided generous support by the Rockefeller Foundation, the Bill & Melinda Gates Foundation, DFID, and now the Howard Buffett Foundation. But this is something that really is available. It's in modular form, and it can be rolled out across the African continent. It's one way that we can succeed, I think, in taking it to the farmers today.

Uma Lele

Thank you very much, thank you. Now Nuhu Hatibu from Uganda is going to tell us what it is like to be working with small farm organizations and actually take this technology to small farmers, including water management. Thank you.

Nuhu Hatibu – CEO, Kilimo Trust

Thank you very much, Uma. I think the main issue Uma has directed us to deal with [is] this issue of, how do we bring it all together? And one of the things that I want to start by saying, specifically with respect to sub-Saharan Africa, is that development is happening in Africa. Development is happening with the smallholder

farmers. And it will happen organically. And the challenge that we have in international and national development assistance is to decide whether we are part of that development or we are standing in the way of progress. And, to be frank with you, many of our do-good intentions and programs do stand in the way. What Uma said earlier about all these World Bank programs of T and V , integrated – they come in, they consume a lot of time of African experts, they consume a lot of time of farmers, then they are disbanded, and they leave nothing behind. Basically, they are standing in the way. So we all need to deal with those areas.

Now, many ag development experts have got this notion that sub-Saharan Africa was bypassed by the Green Revolution. As a person who grew up in the rural areas, [in] peasant farming communities, I think this is ridiculous. Africa had the Green Revolution in the '50s, even before it happened in Asia. When you look at – I grew up in north Tanzania, a coffee-growing area, and when I was young, there was plenty of Green Revolution there. There was plenty of application of fertilizer in this system, plenty of irrigation; plenty of everything we're walking about today was happening. And there was only one factor that was driving this: markets. There were markets, transparent markets, and farmers knew what to do. Green Revolution technologies were applied in the '50s in these areas.

The reason I'm sitting here is because I actually grew up in that area where there was coffee, which was traded transparently in those days, and therefore I remember when I was young something that a lot of consultants from the World Bank these days are paid $2,000 per day to come and introduce to us, like a warehouse-receipt system, was actually applied in those days. What my grandfather used to tell me is, if there is one thing you cannot lose, [it] is your receipt of the sale of your coffee. Because the system used to work like this: When you sell your coffee, you are given your cost of production up front and the receipt. Now, this receipt, you keep it, and then you use it to claim the extra, the profitable margin, which comes in after the coffee has been sold in the world market. So my grandfather used to tell me, "You cannot lose your coffee receipt." Actually there's even good folklore in my area. If you have really got a bad deal and you made a big loss, they say you have lost your coffee receipt. That's how important the warehouse-receipt system was in those days.

Now, if you come to this area, the tallest, the first tallest building in East Africa with a lift, was built by something that used to be called Kilimanjaro Native Coffee Union. In those days we had settlers and natives. But the good thing was they were very linked; they were linked with a very good private partnership where the natives organized, were producing the coffee, it was sold to the settler system, but in a very transparent and profitable way. So the first building with the lift in Tanzania was actually built by this Kilimanjaro Native Coffee Union. It was inaugurated by Princess Margaret, and I remember we used to contribute money when we were in primary school to go and ride on this lift.

But the most important message that I want to say here is we had these cooperative unions that actually were running – even the best schools in Tanzania in those days were run from money which was coming from transparent coffee market. And these people were actually applying Green Revolution technology in those areas. By the early 1980s, when I went to Sokoine University to teach, half of the professors at Sokoine University were educated [at] three schools, which were about 10 kilometers away from each other in Kilimanjaro Region. One was called a primary school that was owned by the Kilimanjaro Native Cooperative Union; this is the cooperative sector, private sector. Another one was a primary school that was owned by the Catholic mission; this is the NGO sector. And the other one was a primary school owned by the government. So three pillars – the NGO sector, private sector, and government – were actually driving this area. And this is the thing that we're talking about today.

So what I want to say really here is that, how do we bring it all together? I don't want to repeat what people said earlier, but we put emphasis – I'm a soil, water management expert. And the reason I'm talking about markets today is because of two experiences that happened to me.

The first one was when I was really driving rainwater-harvesting systems in Tanzania. And I went to the driest area in Central Tanzania, and I was talking to these farmers who were growing ground nuts, and I was trying to introduce rainwater harvesting to them. And after half an hour of discussion with a group of about 20

farmers, they asked me, "Then what? After we adopt your rainwater harvest, what is going to happen to us?" I said, "You're going to harvest more ground nuts." They said, "Then what happens?" I said, "Of course, you're going to be selling, making more money." They say, "Can you stop there and let us go?" So they took me to the village, to a house, and they opened the door. They said, "This is our ground nut from the season before last." And then they opened another one and they say, "These are our ground nuts from last season," and then they pointed to the ceiling and said, "These are our ground nuts from this season, and we have not yet adapted your rainwater harvesting. And so now what is going to happen to us, with three years of crop that has not been sold, if we adopt your rainwater harvesting? So, young man, go away. When you know how to sell this ground nut, then you can come back and talk to us about rainwater harvest."

So that is what made me to change rapidly from being a hard-nosed agricultural engineer to a market specialist. Overnight, I taught myself about the value chains, and actually, after two years I was teaching my own courses [on] value chains in East Africa. From an agricultural engineer promoting rainwater harvesting to that.

The second thing that happened to me was when I was writing a major IFAD program on water management and I went to Central Kenya, and I was trying to promote this program. This is the usual – having solutions, going around looking for problems. And I was talking to these farmers, and these farmers were very well organized. They were growing green beans. They had a contract [for] supply in the Netherlands, and what I saw they had done, they had developed a really good irrigation system. They were supplying water to each field in pipes with meters on each field so that they could control and apply water very, very efficiently, irrigating the plant instead of irrigating the soil.

And then when I told them about my program, they said, "You know what? Actually, what is happening here — we have a very efficient system, but we need more water. And we went to the government of Kenya and applied for more water, and we were told that we were going to be given more water as long as we do an environmental-impact assessment of this forest catchment where they were going to get their water from. Now what we have done is that we've already collected our own money, and we are hiring an expert to do this environmental-impact assessment. And what we want from you is to supervise this guy, because we don't know if what he's going to write is going to be correct. So the only thing you can give us is to supervise this expert we're going to hire." So these were farmers who have a good market and they were ready to invest even in an environmental-impact assessment, their own money. And the only thing they asked from me was to supervise the expert that they bring to hire to ensure that he actually does a good job.

So from these two experiences, I realized that we can have a lot of conservation agriculture, as Rolf was talking about, and apparently, actually, the data actually shows that even in Brazil and Latin America, the major, major adoption of conservation agriculture is by largest-scale farmers with good access to markets. There is only 20 percent or so adoption by smallholders that do not have access to markets. So even from that angle you can see the importance of access to markets in all these things.

So I'm told that I need to stop now. Okay, so I've got other stories to tell you, but I think I'll stop there and say that Dr. Borlaug's last words and the theme of this dialogue, is *Take it to the farmer*. And in this age and time, the smallholders of sub-Saharan Africa are saying, "Yes, but bring us genuine, transparent, and profitable markets, and we will do the rest by ourselves." In other words: Don't do good for us, but do business with us. Thank you very much.

Uma Lele

Thank you very much. Now, Jessica Adelman from Syngenta is going to add more reality to the question of value chains and markets and how to link small farmers to markets.

Jessica Adelman – Vice President of Corporate Affairs, Syngenta

Great. Thank you. While building on the theme of business: First, it's a great pleasure to be here today, having this albeit unexpected chance to participate on this important panel, which has a topic that we all care deeply about, and that is bringing agricultural productivity to the areas of the world where it seems to have passed them by.

Now, this isn't the first time that this topic has been covered, so let me begin with an observation. Norman Borlaug won his Nobel Prize 40 years ago. He did the work for which he won this prize 50 to 60 years ago. The world has changed profoundly in that time. Yet, our conversations around agriculture don't seem to have changed very much. Forty years from now, will people be sitting around talking about the same things we're talking about today, lamenting the same challenges? Think about it. Forty years ago there was only one personal computer in the whole world. It was owned by Thomas Watson Jr., and it filled an entire room at IBM headquarters. Forty years ago, the Internet was just an idea in the minds of the black ops team at DARPA. And forty years ago, who had a personal cell phone? Only the cool characters on *Star Trek*. But the technology that is used every day by the typical smallholder farmer hasn't changed in eons. Meanwhile, global food security depends heavily on smallholder farms, and it will continue to do so for some time.

There are approximately 450 million small farm units of up to 2 hectares in non-OECD countries. Assuming an average household of five, about one-third of the world's population depends on small-scale farming for at least part of its livelihood. Smallholders produce a large share of the food consumed in both the developing and the developed worlds. Their ability to earn incomes from farming and in turn pay for inputs, consumer goods, and, in the best case, education also affects general development prospects, the nature of economic transformation, and the environmental footprint that they create.

We need to ask ourselves: Why are we embracing technological innovation in some sectors, but denying it to those that need it most? Why are we denying it to the business of giving people the opportunity to feed themselves? Maybe the clue is in that word *business*. Maybe development isn't so much about aid, but it's about making farming work as a business. Maybe the key question we have to explore is: How can we help farmers make farming a viable commercial enterprise?

The private sector can't do it alone. It has to be a combined, unified effort of business, government, NGOs and academia, drawing on all of our knowledge and resources. And we must approach agricultural development holistically, taking into account what we at Syngenta consider the triangle of growth: people, land, and technology. We all know that the only choice that we have is to grow more for less. The economist Indur Goklany calculated that if the average yields of 1961 had prevailed in 1998, we would have to be using twice as much land to grow those yields on. If we extrapolate forward, growing twice as much food by 2050 without decimating our rain forests and habitat will require that we take advantage of all the sides of that triangle.

Now, rising to the challenge of our boss for the morning, Dr. Lele, let me give you a few practical examples of how that's working today. For example, Syngenta is working with a coalition of companies, the Tanzania government, and NGOs on the development of the South Tanzania Corridor Project that aims to develop market-based solutions to increase the productivity and profitability of smallholder farms in the reason.

Another example: Syngenta and the Syngenta Foundation are involved in the Laikipia project near Mt. Kenya, which involves interweaving all the sides of the triangle that I spoke about — people, land, and technology. Our goal is to reach 30,000 smallholders farmers in the next three to five years, helping them to become viable commercial enterprises. This involves a comprehensive training program, knowledge centers, and the help and advice of a team of trained agronomists. It also includes use of appropriate technologies, such as low-cost greenhouses, rainwater harvesting, and drip irrigation. Already, yields are up 50%. One farmer saw her potato crop increase from two bags per year to six, more than tripling her income. The extra $125 she made that year was the difference between being on the edge of starvation, or opening her own bank account and buying more land.

Another example of technology and knowledge in action is our Crop Advisory Through Mobile pilot project that we just completed with Nokia in India. It provides growers with tips on pest and disease management, tailored to specific crops, all via their cell phones. Syngenta provides the vital capacity-building information in terms of crop advisory tips around pests and diseases — so, from *Star Trek* to smallholder farms in India. Now that's progress.

Finally, let me make a comment about no-till. The benefits we've seen in the developed world are even more urgently needed in the developing world. And, as Rolf pointed out, we've seen impressive gains in both. In Ghana, for instance, farmers who have adopted no-till have increased their yields by 45% in maize, but no-till demands the application of modern crop-protection technologies. We can't allow the lifestyle choice of low productivity organic farming that's preferred by some in the wealthy nations to dictate the terms of, and hamper the development of, food security in those other areas of the world. And that's a real challenge that we see all the time today, certainly in my business.

All of the projects I've mentioned involve alliances between private-sector companies and, more often than not, between the private-sector, NGOs, and governments – many times all of the above. Business alone may not be able to ensure the growth in food supply that we need in developing and underdeveloped countries. But farming is a business that must have a seat at the table. Not all of the solutions can be strictly market-based, but the strengths of the marketplace must be brought to bear. By bringing together solutions that connect people, technology, and land, we can replicate in agriculture the amazing advances our world has made in other sectors. We can respond to new agricultural challenges with innovative integrated solutions for the 21st century — just like Norman Borlaug did with his miraculous and lifesaving work more than half a century ago.

Let me finish with a challenge, which to this particular audience is charged with purpose and promise: How can we, how can you, how can I contribute to put this edge into effect and change the conversation that we'll be having here in this room a year from now and in the many years to come? Thank you.

Uma Lele

Now, Stephanie is going to talk about the challenges of microfinance and reaching small farmers. Thanks.

Stephanie Hanson – Director of Policy and Outreach, One Acre Fund

I live in Western Kenya and work for an organization called One Acre Fund. We started in 2006 to address the constraint of finance for smallholder farmers. We work with about 30,000 smallholder farmers in Kenya and Rwanda. And Uma asked me to talk a little bit about the issue of finance and the constraint that that causes for smallholder farmers.

Traditional banks are not interested in doing agriculture lending. It's a very expensive endeavor, it's risky, and it's very difficult. And microfinance organizations, surprisingly, in most part feel the same way. Microfinance has over 100 million clients worldwide now, and most of those clients are in urban and suburban areas. Microfinance really has not penetrated deep into rural areas, where most smallholder farmers live. So One Acre Fund started to address that issue, and we provide what we call "microfinance plus" to smallholder farmers at the bottom of the pyramid that Howard Buffett talked about yesterday – so we're talking about that very large group of subsistence farmers who are growing for household food security.

The One Acre Fund lending model works as follows: We lend, instead of cash, we lend seed and fertilizer. So we are beneficiaries of the work that AGRA has done on developing seed companies in East Africa. We take certified seed and fertilizer, and we distribute it to a network of market points in Kenya and Rwanda, very deep in rural areas. So we have about 150 market points in Kenya and 200 market points now in Rwanda. Those points are within 1 kilometer of where our farmers live. So they can walk to that market point on input

delivery day, pick up their seed and fertilizer, and transport it home either on foot or on a little bicycle. This makes it really easy for farmers. In areas where – though the AGRA dealer network is increasing in Africa, it has not reached many places, and farmers don't have access to those shops.

Farmers are receiving those inputs from us on credit, so over the course of the growing season, they repay that input loan, but they repay it in cash, so we have a completely flexible repayment system. Someone could pay $1 one week and six weeks later $8; someone might wait until halfway through the growing season and clear their entire loan in one payment. It's completely, completely flexible to accommodate the irregular cash flows of the typical smallholder farmer.

Those repayments are collected by a network of field officers that function, essentially, as a combination loan officer and agriculture extension agent. So we have discovered that it's not enough to provide farmers with inputs; you have to show them how to use those inputs. A lot of our farmers have never used fertilizer before. We teach our farmers a planting technique that involves a simple spacing planting string. We teach them fertilizer application, weeding. Our field officers track germination rates in the field, and they're with their farmers five to six days a week, consulting them, listening to their concerns, and really helping them throughout that growing process. At harvest time they do a lot of training on post-harvest handling and storage, because post-harvest crop loss is a big problem for our farmers. And finally, at harvest time, if our farmers have surplus, our field officers assist with market access. So they will help farmers join together in a larger group and link those farmers with a local trader.

We have seen great results with this model, which doesn't just address the constraint of finance but brings all of these pieces that we've talked about on this panel together — from inputs to market access. And actually I didn't mention it yet, but we do some training on soil conservation and, in Rwanda in particular, erosion control. These are really important long-term sustainability issues for the farmers that we're working with.

We have a repayment rate of 98%, so that's 30,000 farmers with relatively limited income who are repaying their loans in full each season. And they're seeing great results in the field. We are roughly doubling farm income per planted acre, and that's in one growing season, so it makes a really big difference for a farmer with one acre of land who's seeing that extra $120 of income. That means secondary-school fees, that means a new roof for the house, and that means further investment in the farm.

And finally, we believe that this lending model can be operationally sustainable. So this year we'll receive $1.4 million in farmer loan revenue, and that will cover 65% of our field expenses. So, yes, agriculture lending – yes, it can be expensive. But if you go out to the rural areas and base your organization there and really focus on serving your client, the farmer, it's possible to do it in a sustainable way. Thank you.

Uma Lele

Now, I'm most excited about the fact that Sarah Munalula is here on our panel. She is a small farmer from Zambia, and she has an amazing story to tell about what it is like to be small farmer in Zambia. And it's a real challenge to the panel here about how they're going to solve not only the challenges that she faces as a small farmer, but we heard that there are agencies that are helping 30,000 farmers, and we want to be able to reach millions of farmers in Africa. And so her story is very I mean. Sara, we are really glad to have you.

Sarah Munalula – Farmer, Zambia

Thank you. Good morning, my fellow farmers. It's a pleasure to be in this meeting. I'd like to thank the Truth [About] Trade and Technology Foundation for inviting me into this important festival, so that I can express my problems as a small-scale farmer. My name is Sarah Munalula, as Uma has already mentioned; age 42. I was born in the western province of Zambia. I am Lozi by tribe. I own a family of four children, and they're all girls. I've been in this family business since 1990 when I stopped school. My parents: my dad died when I was only five years old, and I was brought up with my mother, who was a farmer.

In 1990 when I stopped school, I was involved into farming, and I found it very challenging, because as a small-scale farmer, I didn't have enough resources. Yes, I started my farming in 1990, but I hadn't been doing well all along from 1990 to 2007; during all these years I had been planting uncertified seeds because I had no option but to stick to farming. Before I started farming my parents used to talk about how good Pioneer variety is, but by then it is not in stock in the Ministry of Agriculture in Zambia. So that name of Pioneer stuck into my mind. It was in 2007 when Pioneer was introduced to Zambia through the Ministry of Agriculture and I remembered what my parents used to tell me about Pioneer. And I made an effort to look for some money to buy that variety for the first time. I planted 30D79.

Let me go back; I am forgetting some information. From 1990, I had been planting uncertified seed in some different varieties, but it was [to] no avail. I own land, which is 6 hectares, but I only manage 1 hectare due to lack of implements – farming implements and farming inputs. I have been planting that hectare all along, but it never progressed so well, until I when I met this Pioneer. I tried it. I planted this in 30D79. It was a hectare again. I used a method, so-called conservation type of method that Mr. [Derpsch] had mentioned. So it did wonders to me.

In 2007-2008 season, I managed to harvest 80 times 50 kilograms of maize. I managed to reserve part of them for food, and I sold 50, 50 times 50 kilograms to [the Zambian Food Reserve Agency]. I started [on] my way a step forward; I started to move a bit. Then 2008-2009, I again repeated the same variety, 30D79. This time I harvested 90 times 50 kilograms of maize. I sold some and reserved some for food. The money that I got after FRA payments, I paid for my children's school fees, bought some clothing, and reserved some money for the food balance, the diet for my children.

From there another variety was introduced under Pioneer. The extension officers through the Ministry of Agriculture came and tried to advertise the variety, and I got interested. I thought of changing, and I bought this time 30G19. That was 2009-2010 season. It has done wonders to me, and I promise to stick to Pioneer, because I am what I am today because of Pioneer. Without it, I wouldn't have traveled here. This time I managed to get 180 times 50 kilograms in a hectare and I managed – [applause] – I managed, from the money that I was paid from FRA that season, I managed to get a pack through the Ministry of Agriculture because in Zambia the fertilizer is only allocated to clubs and cooperatives.

So I'm in the club, and I'm the chairperson for the Mumbwa District Women's Association, which has a membership of about 30 women's associations. So I had access to a pack, and from that money that I raised, I had to buy some more fertilizers so that at least that hectare would be supplied with. And this time I sold 150 times 50 kilograms of maize and reserved 30 for food consumption at home. So I haven't yet been paid from FRA, but I'm expecting a good amount of money.

Now, what I can say this time is that, we've got a problem, as women's clubs in my area where I come from in Zambia – we've got some clubs that are organized. We are registered, we've got constituents, we meet. And all these clubs are rural-based, and they all depend on farming. But we don't have enough resources to improve. And I would like to appeal to the private sector, if they could come and give assistance to us so that we can be as you are here in America.

And I would like to express my problems as a farmer. We are facing a lot of problems in marketing, especially in maize. We've got only one institution that – this is a government institution, the Food Reserve Agency – that buys maize from farmers. Now, as you know, when there's no competition, then there's no demand. So if a lot of companies competing to buy the commodity, the prices rise. So we only rely on the Food Reserve Agency. I would appeal, if the private sector would come in and help us. There's some farmers who also grow cotton, but this time as for cotton they are okay because there are about three companies that buy cotton, so they compete on prices. We, as farmers, we've got a problem as groups. I would like to appeal to the private sector if they could come and work with the government so that they can be giving us some loans on borrowing – they lend us some inputs and some funds so that we can do well in farming.

Otherwise, it's a challenge to get peasant farmer – me, I'm a peasant farmer who only depends on conservation, and I don't use any reaper. I depend on my back with my children. They help me in the farm, dig the holes. If I don't have enough fertilizer, we go and look for cow dung, this animal manure, to apply into my field so that I can keep the family surviving. This is all about my story.

Uma Lele

Thank you. You know, Sara's story reminds us, those of us who are interested in monitoring and evaluation — if only we started doing monitoring and evaluation by, first and foremost ,going to the farmers and asking them how many services are they receiving in reality? And what are some of the things that are missing in their being able to increase their productivity? And then started to look at whether the delivery systems are delivering, and if not, why not? Why doesn't the private sector come in? Or what can the financial institutions do to bring other services there, etc.? I think we really need to think about integration in that sense to look at the farmers' needs from an integrated point of view and see what it means for monitoring and evaluation, for donors' interventions, and continuity and predictability of those interventions – not just by the donors but especially by policymakers. So I hope that this session is going to help in looking at the different elements and the interaction among them.

So we have very little time. I encourage some questions to the panel, and we have to end in less than ten minutes. Sorry? Twenty minutes, okay, twenty minutes. So please feel free to ask questions of the panel.

Question

My name is Betty from Purdue University, and my question is, I guess, to all people on the panel. First and foremost, I'd like to thank Nuhu for very well articulating the issue of markets and expanding food security. And then I'd like to ask a question in the sense that all of you have talked about soil conservation; you've talked about water catchment, and other issues. I haven't heard a whole lot of discussion on post-harvest issues. I know Stephanie mentioned something to the sense that they send their people and they teach the farmers about post-harvest. My general sense is that for us to be able to expand the markets, we really actually need to have some good focus on post-harvest processing of these products or these crops that we are encouraging the farmers to grow. So I'd like to hear from the panel —what is being done to the end of post-harvest processing so that we can expand, we can enhance the quality of the products these farmers produce and also expand the market value of those products. Thank you.

Uma Lele

Who would like to take the… Would you? Thank you.

Nuhu Hatibu

This is a very, very important question, and I just wanted to say two points: that post-harvest is actually very, very important in the sense of the examples we've just seen recently in East Africa where we quickly moved in Kenya, for example, from 10 million people with food shortage to, one year later, people throwing milk into the gutters and maize going to waste with aflatoxin, because of poor harvesting, poor drying, and poor storage.

Now, what is missing at the moment is, basically, this area has been very much neglected by the agricultural development system in the assumption that it is a private-sector area. Certainly this is good news, that basically it is a private-sector area, and we'd like to find ways of encouraging the private sector to come in and work on this. And, Kilimo Trust, for example – at the moment we're developing a program called the East African Agro-Enterprise and Agro-Industry Development Program. And what we want to do here is to

encourage more investment – certainly by private sector but also strategic investment under the public sector – to attract more activities and more investment in the post-harvest processing area.

Uma Lele

Does anyone have any other response? Because I think one of the things I was going to say, as someone who looked at the Green Revolution experience in Asia, is that when the new technologies were being introduced – it was the U.S. assistance, by the way, to India, which was persuading Indians to have a system of minimum prices. The Food Corporation of India was established at the advice of the U.S. government in the mid-'60s because there was this usual problem — I had done my PhD thesis on markets — that when the production increased, prices collapsed. And therefore there was no incentive for the farmers to adopt new technology.

So earlier when I alluded to the idea that there was an integrated approach to the Green Revolution, it was to provide inputs, provide finance. There was a tremendous amount of emphasis on providing agricultural finance — but also the minimum prices. And I think one of the things that I notice in the case of Africa is that governments being involved in providing a floor market price is not – it's considered to be a no-no. But we love that. I don't think there would have been a Green Revolution in India, and in many other countries, in Indonesia, etc.

I think some of these policy issues need a more active discussion and not just assume that the markets will also take care of the problem in situations where there is no infrastructure, no storage, no finance, etc. So it's a challenge to my economist colleagues about how we look at policy solutions which go beyond the supremacy of the markets or the supremacy of the government.

Question

I just want to have a question or two, but this will be addressed to Dr. Hatibu and Dr. DeVries. What – I mean, if you look at some of the countries in Africa, you know, producing a lot of foods; take, for example, Cameroon — food is not really a deep problem in the country as I know it, I mean, growing up in that country. I know of countries like Gabon and Chad, and they come into that country to buy food. The point I am making here is — to what extent, across the continent, are the nations working among themselves to develop markets within the continent, so that they can at least help feed each other across borders? Thank you.

Nuhu Hatibu

Actually, that's a very good question. One of the most important things that we need to remember, people like me who are advocates of markets, is that this issue of markets, there are several elephants in the room that we need to talk about. And these elephants, one of the elephants in the room is the hugely corrupt — or, I can say, not corrupt but a lack of willingness globally to have true, transparent agriculture and food trade. It is not there: not in Africa, not in the U.S., not in Europe. And this is a tremendous problem. So as we are advocating markets, we must really say markets must be opened up. I mean, Americans and Europeans have come to Africa, and they really preach about liberalizing markets – but they have not liberalized theirs. A Swiss farmer is actually a civil servant, because more than 50% of his income actually comes from government taxes, and is really not a farmer that can compete on a level basis with the smallholder farmer in Africa who is asked to be commercial.

So the same thing happens in Africa – that we really don't have markets across borders. One typical example is my country, Tanzania, where the largest production area for maize is in southern Tanzania. And this place has got a huge market just walking distance in eastern Congo, but people are not allowed to sell their maize to eastern Congo because this is another country — ridiculous, of course, but it's another country. So as a result, people are struggling. And now we've got this huge program, called the corridor program and whatever,

trying to solve this problem. These are not the problems. We're really having solutions looking for problems. Therefore I want to agree with the person who asked the question, that unless we truly liberalize national markets, regional markets, and global markets, of course, our ideas of markets will really seriously face limitation.

And, for example, I just want to say — in East Africa we are fortunate that we just actually finalized a protocol on the Common Market for the East African Community, five countries: Burundi, Rwanda, Tanzania, Uganda, and Kenya. And what is going now – actually, this is an area that I'm very proud that Kilimo Trust actually supported, a very innovative process of trying to make food security in East Africa to be trade-based and to be trade-based within the Common Market Protocol of East Africa.

Actually, we have got a summit of the presidents on the 2nd of December to agree on a ten-point resolution that will lead to this trade-based food security in East Africa. And we hope then that will open up the market, but certainly as my colleagues said earlier, without the processing and value-addition, you wouldn't be able to move this food across the entire East Africa. So all this needs to come together. But it is true liberalization of food and agricultural markets that will actually make agriculture and smallholder agriculture pay.

Uma Lele

Thank you. Short questions and short answers, because we have only ten minutes. Please go ahead.

Question

My name is Pam Johnson, and I'm a farmer from Iowa. I would like to put out the challenge to the audience. I've been privileged this week to sit on a panel with Sarah from Zambia and other farmers from around the world. There were 20 of us, and we spent this week listening to each other's stories. And I think she tells a story that I hope touched you as much as it has touched me this week. And that is how do we help small-shareholder farmers? It's by listening to their stories and asking them what they need.

And I think, poignantly, we have to think back and think about what happened in Sarah's country when the people there who were hungry were denied food because it was GMO corn that came over, and they were denied it by a government policy. And now Sarah is struggling just to feed her family and educate her kids from her farm. And yet there are certain government policies that disallow women like her, and other farmers, to be able to plant and use biotech seeds and use some of the techniques that I as a farmer have access to. And I think that's a travesty. And so I thank Sarah for telling her story, and I hope people will listen and that they will also listen to the stories of many farmers from around the world for what they need to feed the world.

Uma Lele

Joe, do you want to comment on this question of seed and biotechnology?

Joe DeVries

I think that we've got a long ways to go. We're just getting started, really, on improving seed supply among farmers, as I said in my comments. The vast majority of Africa's farmers have no reliable supply of seed. And seed has kind of been treated as a political football by governments historically. I agree that farmers need to be given the technologies that they require in order to increase food productivity. I think we're just at the beginning stages. We can achieve a major breakthrough in feeding people in Africa and productivity simply by hybridizing sorghum, hybridizing millet, and hybridizing maize. We've got a long ways to go, and I think as we build momentum we'll incorporate many new technologies as we go along.

Question

Good morning. My name is Tom Pesek. I work for the International Fund for Agricultural Development. Every two years we host a Farmers' Forum at our headquarters in Rome, Italy, which brings together representatives of farmers' organizations from around the world to discuss some of the challenges they're facing. At this year's forum, overwhelmingly, the biggest challenge that they highlighted was the issue of what to do with rural youth – how to engage them in agriculture, but also to find employment for them. But this isn't an issue that I've heard discussed either at this session or in the past couple of days here at the dialogue. So I was wondering if you can respond to that. Thank you.

Uma Lele

Could you repeat your question, please? Sorry. We had trouble hearing you. I heard about the farmers' organization which meets in Rome. What exactly would you like to…?

Question

So, basically, we had a couple hundred farmers and their representatives at our headquarters to discuss their biggest challenges. And what emerged was the issue of rural youth — youth not being interested in farming, not having employment opportunities, etc., but this isn't an issue I've heard discussed here, so I'm just wondering what the panel thinks.

Uma Lele

I see, okay. Maybe we should ask our youngest member who is less than 30 years old to talk about the youth in Africa. She's eminently qualified to speak on the subject.

Stephanie Hanson

I think one issue to think about with rural youth is, how do you make farming attractive as a business? And I've heard about a lot of organizations that have done that and have been able to engage rural youth. One that comes to mind in East Africa is the East Africa Dairy Development Project. That's a project that's using a cooperative model to help farmers increase their milk production. And it's linking all aspects of the value chain together, so it's showing youth that there's potentially work for them as an agro-vet, there's work at a milk production facility, there's work at a local organization, the cooperative that's providing finance to the farmers. So I think it's really important to show youth that farming doesn't have to be out working in the fields, planting, weeding, and harvesting — that there are other elements to the agricultural value chain that you can be involved in.

From my personal experience, One Acre Fund actually employs a lot of young rural individuals who otherwise might have been farming. In Kenya and Rwanda we now employ about 450 Kenyans and Rwandans, many of whom are under the age of 30. And I think that they're really passionate about the work that they're doing, because they're helping their communities, but they're also seeing a future that involves agriculture in a different way than they have been able to imagine before.

Uma Lele

I'd ask one panel member to respond, but we have two other questions. That's about all we can take because of the shortage of time, so please go ahead.

Question

This is a question for Dr. Derpsch. I'd like to know what is the status of the supplier industry for no-till equipment in terms of their [unintelligible], the amount of equipment that's available on the market, the affordability of that equipment – specifically scaled for applications by smallholder farmers and smallholder cooperatives.

Uma Lele

Very good question. Please, thank you.

Rolf Derpsch

Yes, that's an interesting question. We in Paraguay have about 8,000 large farmers doing no-tillage, but we have about 20,000 small farmers applying the technology. And you can use equipment like what that is built in Brazil or – even in Paraguay, they are building equipment for seeding, one-row or two-row seeding machines. But, of course ,you need either credit or subsidies to make these machines available.

But there are very simple machines. There is the matraca; this is a handheld machine that costs something between $15 and $30 depending on the quality of the equipment and if they have seeds and fertilizer boxes. And you can do no-tillage by hand just by digging a hole in the ground with a hoe and do no-tillage with a hoe. So it's not a great deal, what you really need. It's a matter of having, if possible, having equipment, and I'm sure that if Sarah would have a two-row, no-tillage machine, she could do all 6 hectares instead of 1 hectare of corn planting. But for this you need some financing and also some help to do that.

Uma Lele

So challenge to our private-sector colleagues who are looking for a market; there is an opportunity for you to sell the machines. One last question, because we are running out of time. All right — two very short questions, because we don't have… I'm afraid I'm being told only one, I'm afraid. No more. I'm sorry.

Question

Okay. Thank you very much. My name is Gabriela Cruz. I am a farmer in Portugal in Europe. And I would like to thank the speakers for sharing with us their experience. I was with Sarah and with Pam Johnson at the same farmer-to-farmer roundtable organized by the Truth About Trade and Technology association. And I was very sensibilized, because all of the speakers talk about conservation agriculture. So I'm addressing Mr. Rolf Derpsch a question.

In Europe and all over the world, one of our main problems, as you said, is erosion. Conservation agriculture is the most efficient way to control that problem, especially in Mediterranean countries and African countries and some other places in the world. One problem we are having in Europe is the surface under conservation agriculture is not increasing, and it's not increasing because the farmers are starting to have problems with controlling weeds. We don't have access to Roundup Ready, biotech crops. So my question would be to Mr. Rolf Derpsch. Do you think that farmers in Europe and in Africa will be able, in the long term, to continue doing no-till without the biotech crops, like Roundup Ready?

Rolf Derpsch

Yes, I think they will be able to do it, because you go to South America. We had millions of hectares of no-tillage before biotechnology came along. So the GMO crops are a helpful aid in the use of this no-tillage

technology, but it's not a condition. You can very well do no-tillage without using GMO crops. Of course, if you have GMO crops it will be easier, easier to control weeds.

But I think what I – I'm in Europe every year. I was three months in Germany this year, and I can tell you a list – of one page, at least – of reasons why in Europe no-tillage is not working; it's working, but it's not spreading more. And one of the main reasons is the myth of the necessity of tillage [for] row crops. And we have to change the mindset of the people. That mindset is, in my opinion, the greatest limitation to spread no-tillage around the world, and especially in Europe, and this is what we have to change first and then give them the knowledge to be able to do a system. But I have got a sign over here. I need to stop – because I could talk for hours about this, but I think the session is over.

Uma Lele

Thank you very much. I want to thank the panel, and I just want to remind ourselves that there is a huge gap in yields between South Asia and Africa, and there are many such slides I could have shown you. So we have a big challenge, millions of farmers to be reached, as Dr. Borlaug would have said, and we really need to pursue this question of how to reach them more actively. Thank you very much.