

OPERATING MODELS FOR EARLY GENERATION SEED PRODUCTION: 10 CASE STUDIES

PRESENTATION AUDIO TRANSCRIPT

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Jennifer Leopold:

Hi. Good morning, everyone, good afternoon, and evening, depending on where you're calling in from today. Thanks for your patience in getting us started. We're ready to begin. On behalf of Agrilinks, Feed the Future, and the USA Bureau for Resilience and Food Security or RFS, I'd like to welcome you to our webinar today on Operating Models for Early Generation Seed Production: 10 Case Studies.

Jennifer Leopold:

My name's Jennifer Leopold. I'll be your Agrilinks webinar host today. I'll be your webinar facilitator, so you'll hear my voice periodically, especially during the Q&A or the question and answer session at the end.

Jennifer Leopold:

Before we dive into content, I just want to go over a few items to orient you to the webinar. Please do you use the chat box to introduce yourselves, as many of you have done already, and use this chat box to ask questions at any time and share your own resources with the group. We love our webinars to be very interactive. We'll be collecting your questions throughout the webinar, and then we'll be asking them at the Q&A session after the presentations. We'll also try to answer some in the chat along the way.

Jennifer Leopold:

You'll see that the slides are available to download in the file downloads box. We also have a few recommended links there.

Jennifer Leopold:

Lastly, as I mentioned, this webinar is being recorded. We'll email you the recording transcript and additional resources once they're ready. They'll also be posted on Agrilinks.

Jennifer Leopold:

All right, so we have a really great program today. Let me go over the agenda real quick and introduce our speakers, and then we can dive into content.

Jennifer Leopold:

For the webinar today, we will start off with an introduction from Mark Huisenga from USAID. Then we'll have presentations from Lauren Good and Jason Nickerson. Lauren is a senior program officer with the Bill & Melinda Gates Foundation, and has been a leader in private and nonprofit arenas as a business owner, board member, and consultant. Jason Nickerson is a senior program manager with the Context Global Development, an NGO that provides management consulting for industry leading agriculture and biotechnology companies, governmental and nongovernmental agencies, and public research

institutions. At Context, Jason is responsible for leading cross functional teams in the design and implementation of corporate strategy projects and global development initiatives.

Jennifer Leopold:

After the presentation, we'll have an expert round table discussion with Amsale Mengistu, senior program officer with the Bill & Melinda Gates Foundation. Also, joining that round table is Dr. Mohammad Khalequzzaman, the head of Genetic Research and Seed Division of the Bangladesh Rice Research Institute. And Dr. Tokula [inaudible 00:03:00] connected hopefully with National Root Crops Research Institute in Nigeria and he is also the head of the DKC.

Jennifer Leopold:

Finally, we'll enter the Q&A questions, where we'll try and respond to any other questions that you have as possible. With that, I will introduce you to our first speaker. Mark Huisenga is an agriculture professional with over 20 years of professional experience in grain, fertilizer, and feed value chain in Africa, Asia, Europe, and the Americas. At USAID, Mr. Huisenga is responsible for commercialization and scaling of new technologies as well as managing the Partnership for Inclusive Agricultural Transformation in in Africa. This is a Global Development Alliance between the Bill & Melinda Gates Foundation, the Rockefeller Foundation, and the Alliance for a Green Revolution in Africa or AGRA.

Jennifer Leopold:

Mark, over to you.

Mark Huisenga:

Thank you very much, Jennifer. Thank you also, everyone for participating today in this webinar. I hope you'll learn something from it.

Mark Huisenga:

This webinar follows on from research that began about five years ago on early generation seed, stemming from the challenge that we had in trying to get seed systems to function more effectively in many of our Feed the Future in other countries. It's been funded by Bill & Melinda Gates Foundation and USAID. As a start for this, the initial set of studies, we developed an analytical framework and then tested it in 14 countries against 17 crops. You learned quite a bit from that series of studies. One thing we learned is that there are, for certain crops, a very straight commercial pathway to scale. So crops like hybrid maize, vegetables, there are great profit potentials and opportunities for companies to commercialize and scale those varieties.

Mark Huisenga:

For other crops such as some of the legume crops, open pollinated varieties, and vegetatively propagated crops, we found that there were often supply constraints or demand constraints to the production of the early generation seeds for those crops and challenges getting them to scale. For

instance, for some of the open pollinated varieties, it's very difficult for seed companies to estimate demand because farmers will often save seed, and so there's a need to really be able to understand it and forecast a challenge that we have a very difficult times estimating.

Mark Huisenga:

We also found that, for certain crops such as sorghum or millet, there's not at all a straight pathway to scale and, oftentimes, there was a need to push those seeds, early generation seeds, our private sector seed companies really didn't want to touch them. But they have left us with a set of questions around, so, okay, what are the institutional arrangements that can be put in place that would allow for private seed companies to be able to produce these other crops and be able to profit from them? We said, so, what are the global best practices? We looked around in North America, South America, Asia and started to understand what some of the institutional arrangements that have been put in place for these crops to get those seeds out to scale.

Mark Huisenga:

With that brief introduction, I'm going to turn over to Lauren Good to continue with the introduction to this webinar today.

Lauren Good:

Thank you, Mark. I think, what we have here if we can advance... [inaudible 00:07:38] advancing the slides here. I'm sorry... Are we advancing the slides? There we go. Okay.

Lauren Good:

Thanks, Mark, and all of you. It's great to see so many people online for this here. I think most of us have worked with some kind of a theory of change around seeds and what it takes for a healthy seed system. It's something that we talked about at the Bill & Melinda Gates Foundation is our series of change is really based on, first of all: Do you have a good breeding program? Is the breeding program, robust and able to continually produce better variety that actually has a place and that are needed by farmers and can adapt for increasing climate challenges? Are the products coming out of these breeding programs really meeting the needs? Are they desired by smallholder farmers? Are they desired by offtake markets? Do they have a place to go? And can seed producers produce seeds? And then the effectiveness of the seed systems is really how it connects back to that breeding program, and can you actually effectively get the seeds out.

Lauren Good:

But what we see here too often, and what Mark alluded to, is that it's very often broken between research and getting and moving new varieties out. That's through the early generation seed, really having availability for seed producers to be able to get access to some of the newer varieties, but also just good, clean varieties pure seeds and early generation seeds so that one can produce a commercial grade one that a farmer can do.

Lauren Good:

I think this is what Mark talked about as far as some crops have a clear pathway than others. We feel that, often, there are no such thing as public crops and private crops. All crops are eventually produced and grown by private farmers. And so, what is the arrangements? What is it that we need to do from a public standpoint to make sure that those are accessible and available for use there?

Lauren Good:

The thing that we were really interested, in following the case studies, was where can we look for good examples of how some of these similar crops that people see as more difficult, how do these work? How have the systems evolved in some of the more mature markets? And [inaudible 00:10:31] make them work and make them tick? I think that we see that in these functional systems, there's really a number of common elements that came up over and over again in these different systems, and that was around having this [inaudible 00:10:49] to actually get the production and marketing of the early generation seeds and then having a quality component that that assure that what was going out was really [inaudible 00:11:03].

Lauren Good:

With that, I'll-

Jennifer Leopold:

Lauren, sorry to interrupt. Can you'll try and get closer to your microphone? We'll see if we can get a louder audio or you can turn up your audio. People are having a hard time hearing.

Lauren Good:

Okay, all right.

Jennifer Leopold:

Super thanks.

Lauren Good:

I will finish then just by saying that I think these case studies were ones that really helped us understand some of the common elements we see in these more mature systems while they don't all look the same, and they won't look the same being implemented in Africa that they might as if they were in the US or Europe. They still have the same common elements that are required if you're going to have a functioning public-private partnership for producing early generation seed.

Lauren Good:

With that, to talk a little bit more about the studies and what we learned from the studies, I'm delighted to turn this over to Context Global Development, who is our partner who led the case study. It was a

great partnership with USAID and AGRA, who participated in many of these study tours. I'll introduce to Mark Nelson and Jason Nickerson of Context Global Development.

Jason Nickerson:

Great, thanks, Lauren. Good morning, good afternoon, and good evening, everyone. My name is Jason Nickerson. I'm with Context Global Development. As Lauren and Mark have noted, we had the privilege to study a diverse set of early generation seed systems to understand how they function and evolve. Over the next 40 minutes, I'm going to share some insights gained in hopes that there's some useful nuggets that you can take home to the agricultural systems and stakeholders that you serve. I'll start by providing a vision for what an effective formal seed system looks like. I'll then provide some context on common supply and demand side constraints and challenges before turning to lessons learned.

Jason Nickerson:

As Mark noted in the 14-country studies, EGS was identified as a primary bottleneck that constraints agricultural development, and that partnerships between public and private sector actors would be needed to resolve it. Public agriculture research institutions aren't able or capable of moving downstream because they lack the mandate, incentives, infrastructure, staffing to meet EGS demand unilaterally. Similarly, in the private sector side, companies lack the profit incentive to move upstream into early generation seed production, which is characterized by small volumes and high production cost as most of the folks on this call understand.

Jason Nickerson:

To bridge this unprofitable gap, partnerships based on shared value are needed to make this thing work. But what do partnerships for EGS production and distribution look like? What are the typical roles and responsibilities of public and private sector actors? How is EGS sustainably finance? These are some of the questions that we sought to answer to this project, and that we'll be shedding light on through this session.

Jason Nickerson:

Our hope is that you come away with a renewed appreciation for the criticality of early generation seed as a means to enable agriculture development, the catalytic role that the public sector can play by enabling the sustainable supply of high quality foundation seed, the role that the private sector can play in scaling public sector innovations, as well as some perspective from the various forms the partnerships for EGS can take.

Jason Nickerson:

We're going to be talking a lot about the formal seed system throughout this session. It makes sense to start with the definition description of what constitutes a formal seed system. As depicted on the slide here, a formal seed system has been defined as a deliberately constructed system that involves a chain of activities leading to clear products, namely certified seed, verified varieties. It consists of the

development of new varieties and the physical flow of seed through successive multiplication stages over time. We'll refer to these value chain stages discreetly as product development or varietal development line maintenance, breeder seed, foundation seed, and commercial seed. We're using commercial seed as kind of a catchall term to capture certified and quality declared seed.

Jason Nickerson:

A formal system also consists of the supporting seed production and distribution infrastructure like storage, processing equipment, quality testing laboratories, irrigated fields, et cetera. The policy legal regulatory environment that key production is nested in situ, the quality assurance mechanism that safeguard farmers and safeguard the integrity of the industry, and the network of interpersonal relationships, institutional arrangements between stakeholders and their organizations.

Jason Nickerson:

Within a formal seed system, EGS represents the critical link between product development and commercialization. Its primary function is to maintain the genetic potential and identity of variety and to provide a regular supply of high quality breeder and foundation seed, which is the basis for commercial seed production. If the quality or genetics of a variety slip through the production system and farmers lose, then the system doesn't stand a chance to expanding because the value proposition of improved seed is undermined.

Jason Nickerson:

In an effective EGF system, these elements converge such that sufficient volumes of parent seed is available of right varieties at the right time to commercial seed producers. The volume of seed expands from stage to stage, and there's a quality/quantity tradeoff that happens as you move from breeder, foundation, commercial seed. An EGS system requires some advanced planning that is ideally informed by credible demand signals because the progeny of the seed, that you see on the left, may not reach farmers for over three years. In this intervening time, there are a number of assumptions that introduce variants including the expected multiplication rate of a given crop or variety versus the actual seed yields realized at a stage and how demand actually materializes.

Jason Nickerson:

In a perfect world, this process is made simpler when farmers are aware of new varieties, they're able to observe the benefits of replacing old varieties with newer ones that are more productive, climate smart, and aligned with market demand. They have a trusted source of seeds, and are able to trial new varieties around the farm. There's a well-functioning extension system that's complemented by an agri dealer distribution network which can send these demand signals upstream to commercial seed producers who have the operational agility to respond to these signals and to develop and finance multiyear seed production plants. This enables commercial seed producers to make early ordering commitments for EGS to a public or not-for-profit organization that assumes the response ability for and risk of parental seed demand planning and production.

Jason Nickerson:

While there are challenges inherent in any production system that require three-year lead time on production plans, it's too important not to get right because, without EGF, there is no commercial seed, and farmers' access to innovation is constrained.

Jason Nickerson:

Like many folks on this call, we've seen, through a combination of adaptive leadership, efficient resource deployment and a level of shared responsibility that this can be done. Adaptive leadership is about uniting stakeholders around exciting aspirational vision for what a seed system could be, building a strategy for achieving that vision, and having an intense focus on quality control and the needs of commercial seed producers. Efficient resource deployment starts with attracting, developing, retaining the best possible talent, structuring the deployment strategy around a focus seed production plan and mobilizing a base of resources into action and localizing seed production and distribution to minimize costs where possible.

Jason Nickerson:

Shared responsibilities help to define the roles and responsibilities of individuals and organizations because, unlike hybrid maize, where all the activities may exist within a single seed company, these minor crops often require coordination across multiple organizations to hit quality and volume targets. The connectivity between value chain actors is also really important for strengthening feedback loops, promoting timely information flow, which is critical for decision making, as we saw on the previous slide.

Jason Nickerson:

As noted, 14-country studies indicated that the lack of early generation seed production is a primary bottleneck that constrains agricultural development. In contrast to the vision for an effective EGS system that we discussed earlier, the situation on ground is much different. There's limited awareness of new varieties and their benefits. Demand for commercial seed is often late, and long after production decisions have already been made. Essentially, people are producing seed on speculation because they don't have solid demand signals. To the extent that the public sector plays a meaningful role in seed procurement, large purchase contracts have led to bumpy cash flows and sometimes long repayment windows to commercial seed producers. In many contexts, it's not easy to do business. Seed producers and agri dealers are capital constrained. Public budgets are hard to rely on, and the physical resources that are needed for seed production are antiquated or missing altogether.

Jason Nickerson:

These supply and demand side issues converge to result in an EGS system, that can be sometimes typified as having low volumes, marginal quality, and inconsistent reliability, which limits the ability of commercial seed producers to build a business case around multiplying, marketing, and selling quality seed of publicly developed and released seed varieties. The opportunity to overcome these EGS challenges, especially for non-hybrid crops, starts with collaboration between the public and private

sector. Now, collaboration will take a number of forms. At the most basic level, it can be based on commercial transactions for seed alone, no MOUs, no contractual arrangements, just buying and selling seed. It can, of course, become more involved including varietal licensing by commodity associations, and co-investment, research, and infrastructure. At the other extreme, it can mean setting up a special purpose entity for production/distribution of EGS.

Jason Nickerson:

Regardless of the form that the collaboration takes, there are typically three common objectives at the core. The first is to produce enough EGS to meet current and future demand. The second, produce seeds at the lowest possible costs while continuing to meet quality standards. And third... well, the first two are more supply-oriented, there's also a demand component to the partnership, and that's to stimulate demand for improved varieties and quality seed at the farm level.

Jason Nickerson:

To provide more clarity on the form that partnerships can take, we studied and developed case studies on 10 early generation seed systems. The studies covered diverse set of crop categories, including pulses, rice, roots, tubers, and bananas. They span different geographies, including North America, South America and South Asia. Each of the study is available as a standalone PowerPoint presentation on the event page if you're interested in getting into the weeds.

Jason Nickerson:

The systems differ pretty dramatically by size as measured by area under improved seed and by seed replacement rates or the frequency with which farmers replace their seed with a North American systems being smaller, serving a more targeted geography with commercialized value chains. This is in contrast to the larger state level systems in India, the lentil and peas system at Saskatchewan, and the Bangladesh rice system, which was taken at a country level, not a subnational level.

Jason Nickerson:

The systems also differed by their stage of maturity. Now, maturity is a subjective measure, as I'm sure many of you, teenagers can attest. But for seed systems, maturity can be generalized based on farmers' perceived access to and adoption of quality seed, improved varieties, and the proportion of public sector funding required to produce and distribute EGS.

Jason Nickerson:

We saw big differences in who does and who pays. Between the systems, we saw really big differences between emerging, expanding and mature systems. In emerging systems where demand is slight, public sector plays an outsider role as indicated by the blue color boxes on the breeder and foundation seed side. Often agricultural research institutions are responsible for breeding and releasing new varieties. They're also responsible for EGS production. Commercial seed is distributed through a combination of government entities, parastatals seed companies, and NGOs that subsidize rates, and through a small

number of private seed producers as indicated by the blue and green patterned box at the commercial seed stage.

Jason Nickerson:

Example of emerging seed system that we'd like to feature is the cassava seed system in north and northeast Brazil. In this system, which differs markedly from the much more commercially-oriented starch-centric system in the south. Embrapa partners with not-for-profit biofactories to increase and distribute breeders into government extension organizations and to cassava seed entrepreneurs or men of arrows.

Jason Nickerson:

In this picture, we're looking at the lab on the left. Unfortunately, it looks like the video didn't come through of the screen house multiplication facility at the Instituto Biofábrica de Cacau. This institute receives breeder seed for tissue culture multiplication from Embrapa before moving to the screen house for stem multiplication. The institute has four hectares on the screen house production which is quite something. From here, from the institute, at Instituto Biofábrica, distributes foundation seed and 50 stem bags to cassava seed entrepreneurs like Benedito Dutra, picture to the right, who has ambitions to become the largest cassava seed entrepreneur in the world and the state governments for subsequent multiplication and distribution to the farmers. The public sector pulls the weight and this EGS production system and covers an estimated of 70% of seed production and foundation seed costs.

Jason Nickerson:

In expanding seed system, the public sector also plays a meaningful role in finding and managing EGS production while quality seed production or commercial seed production is done largely on a commercial basis by a combination of private seed companies, parastatal seed companies, and NGOs. This is indicated again by the difference in colors at each stage with the public sector, the breeder stage is indicated by blue, and both private and public sector taking on foundation and commercial seed stages is indicated by the blue and green patterned boxes.

Jason Nickerson:

A good example of an expanding system is the Bangladesh rice example, which has seen a meteoric rise and expansion over the past 20 years. Coming into the 2000s, the Bangladesh Rice Research Institute was producing several tons of breeder seeds for 20 clients. Fast forward to today, BRRRI is producing over 125 metric tons and is serving over 800 mostly private sector clients. Within Bangladesh efforts are on to improve the private system, remove policy bottlenecks, gradually phase out subsidies, and hold regular consultations to improve the effectiveness of the rice seed system for farmers. This evolution has turned BRRRI from a research institution into a research institution plus a full-fledge production organization.

Jason Nickerson:

This expansion hasn't come without a cost; placed a heavy load on BRRRI with ever increasing demand stretching its available capacity. This is a phenomenon that Dr. Khalequzzaman has had a front row seat for as the head of Genetic Resources and Seed Division for BRRRI. We're fortunate to have him as a panelist and have the opportunity to hear his perspective on what this expansion has meant for his organization.

Jason Nickerson:

In mature systems we studied, we saw quite a bit of variation in the institutional arrangement and partnership structures for early generation seed. In a number of systems including North Carolina sweet potato and Arkansas rice, public sector organizations had the responsibility for breeder and foundation seed production. While breeder seed production is often the responsibility of breeders, foundation seed was managed by a second university-affiliated entity. In both cases, Arkansas and North Carolina, the second organization leveraged university resources in the form of personnel and facilities to produce EGS for commercial seed producers. The motivations for these foundation seed production organizations is to bridge the commercialization gap, not to generate profits.

Jason Nickerson:

In other mature systems, like the Michigan dry bean system, not-for-profit service organization, Michigan Crop Improvement Association, contracts the production of EGS by private seed companies. It's an interesting and practical model, and one that we see being piloted in places like Burkina Faso, where the public sector recognizes the quality and efficiency that private seed producers can bring to the table. When it becomes commercially attractive for private companies to move upstream in the foundation seed production, they do it. As is the case in the Idaho Irish potato system, which is highly commercial system linked to McDonald's French fry supply chain. In this system certified seed use is compulsory which makes demand playing a heck of a lot easier.

Jason Nickerson:

And yet another model in the mature segment is where a commodity association with farmer members license varieties directly from the breeding institution and take the responsibility for EGS production and... My slide's not advancing; give me one second. That's what I want.

Jason Nickerson:

In Saskatchewan, the pulse growers association licenses new lentil and pea varieties from the Crop Development Centre at the University of Saskatchewan. The pulse growers association then partners up with the Crop Development Centre on demand forecasting and production planning, and the commodity association contracts and pays the university to produce EGS on its behalf. In taking a closer look at emerging, expanding and mature EGS system that we studied, there's an evident transition from the high need for the public sector in emerging systems towards more public-private partnerships and expanding systems which ultimately paves the way for greater participation and investment for the private sector in mature systems.

Jason Nickerson:

Ultimately, stakeholders have to choose the resourcing mechanisms that work best for their unique situations. We did, however, observe that the menu of funding options for early generation seed production/distribution seems to expand with the commodity value chain that the seed system serves.

Jason Nickerson:

This table depicts the resourcing options that we observed by stage. Again, recall that the blue indicates public sector funding source and, green, a private sector funding source. The three core funding sources which vary level and composition by system are recurring public sector funding, public sector grants and resources including land, personnel cost, storage, greenhouses and labs to name a few, and seed sales to commercial seed producers. Generalizing a bit, the public sector resourcing is most prominent on the product development stage and trails off into EGS production, while the revenue from seed sales is most concentrated the foundation seed stage. Together the public and private sector funding sources form a sort of bridge; as one drops off, the other picks up. Gradually, over time and with increased demand, you'd like to see sales play a larger role in funding the next season's production.

Jason Nickerson:

This ability to reinvest earnings isn't a given. It's only possible when the public sector EGS producer has the discretion to manage revenue from seed sales, which is often not the case. An example of the situation is at the National Root Crop Institute in Nigeria, which has the country level mandate for root and tuber crops like cassava, yam and sweet potato. To create a pathway to more sustainably finance and to define the roles and responsibilities, National Root Crop Institution leadership established Umudike Seeds which will be managed privately as its own entity. We'll have the opportunity to hear more about this initiative from Dr. Mark Tokula who is the operational head of this EGS seed company.

Jason Nickerson:

As systems become more mature, which maturity is synonymous with becoming more commercial, the menu of resourcing options tends to expand to include royalties on varieties, private sector sponsored research investment, and checkoff dollars. We recognize the legal structures are coming to existence that when able plant breeders rise through the OECD push, but until there is strong demand for IP-ed varieties, the flow of funding back to research and, potentially, the EGS production will be negligible.

Jason Nickerson:

That's a summary of some of the who does and who pays by just maturity. I next want to turn to some of the synthesized building blocks of effective seed systems.

Jason Nickerson:

Now, seed systems exist in different contexts and stage of maturity. Their evolution is shaped by the larger agricultural, economic, educational, and political systems that they're components of. Despite the

uniqueness of any given system, there are characteristics of effective seed systems that cut across borders and crops. We identified seven such characteristics through case studies, which we refer to as the seven building blocks of effective seed systems. Some of these building blocks are more public sector-oriented, including reliable public sector funding or varietal development agriculture extension and an intense focus on the needs of farmers by breeding programs while others, to the right, are more private sector-oriented, including commercial seed producers establishing trusted brands and private sector resourcing support for research and seed production activities. There are others that are more partnership-oriented including public sector organizations assuming responsibility for and risk of EGS demand forecasting and production. A fit-for-purpose quality assurance system that adds more value to farmers than it imposes and strong institutional interpersonal linkages between stakeholders that support trust building, information flow, and decision making.

Jason Nickerson:

Let's step through each of these. The first is around reliable public sector funding for product development in agriculture extension. This funding is critical at the product development stage moving up to EGS and at the point of sale where farmers are trying to make the best decisions for their farms. In systems we analyzed, the public sector recognized the tradeoffs between investing in crop A versus crop B, and placed their bets where relatively modest investments were able to catalyze considerable amounts of private investment. This is true in India, Brazil, and even in the US we're breeders report that over half of their operating funding comes from public sector sources. We also know that an effective system's breeding programs focus on the needs of farmers and work closely with the seed companies and processors through a participatory breeding process to develop varieties that are superior to those that farmers are currently planting.

Jason Nickerson:

A good example of this comes with the Covington variety of sweet potato in North Carolina, which was released by Dr. Craig Yencho and his team at NC State in 2005. Covington took the industry by storm and sustained its position as the market-leading variety. Today, it's estimated that it's planted on 90% of sweet potato acres in North Carolina. Its success is attributed to two factors. First, Covington showed better pack out and more dependability in disease testing compared to popular sweet potato varieties like Beauregard, which was the leading variety prior to Covington's release. The second was that Covington was the first release from NC state that was developed through its grower participatory breeding program. This program allows for on-farm testing by select growers of new varieties, not only where the selected test growers receiving information about this new variety from the trials, but they're also passing this information along to fellow sweet potato growers in the region, and the ability for growers to see how Covington performed in real growing conditions by fellow, trusted growers led to higher adoption rates when Covington was ultimately released.

Jason Nickerson:

We also observed that, in fact, the seed system's commercial seed producers recognized that they can only go as far as their reputation. As a result, they put a premium on ensuring seed quality and service

to their distribution and farmer customers. In the India rice system demand for proprietary OPV and hybrid rice seed varieties is increasing because farmers recognize that the incremental cost of purchasing seed is more than offset by the higher yields that they receive. This is evident in how the market has evolved from a small commercial system served by state seed corporations and a few larger seed companies at the turn of the century to an increasingly private sector-led system in which companies rely on brands, which are synonymous with quality, to grow their businesses.

Jason Nickerson:

Another building block that we observed in the mature system is that private and public sector actors are jointly committed to finding the operations that enabled varietal development, agronomic research and seed production activities. A good example of this comes from Arkansas rice seed system, where rice farmers desire for quality and seed supply improved varieties predates the required checkoff program started in 1985. Prior to 1985, growers voluntarily contributed funds directly towards industry promotion and, later specifically, to the research new rice varieties. Farmers' willingness to pay out of their own profits factored into the success of the breeding program and overall rice industry.

Jason Nickerson:

The state-of-the-art seed processing and packaging facility that you see here in the background is a testament to farmers' commitment as it was built with the support of three commodity associations including the Arkansas rice, soybean and wheat promotion boards along with funding from the public sector.

Jason Nickerson:

We also observed that a public sector organization/organizations has the responsibility for breeder and/or foundation seed production. This organization combines attentive cost management with preordering of seeds to support its ability to recover at least a portion of its operating costs.

Jason Nickerson:

India, a well-coordinated, efficient process for breeder seed demand forecasting and production planning is in place for national varieties. Demand is tabulated using a bottom-up approach with seed associations and state departments of agriculture collecting and submitting orders on behalf of their stakeholders to the Ministry of Agriculture and farmer's welfare. Production planning is done top-down with the ministry seed division compiling and submitting demand information to the Indian Council of Agriculture Research, which performs the final allotment of production responsibility to ICAR institutions and state agriculture universities. The whole process is tracked digitally with the Seed Management Information System or SMIS for short, which is maintained and coordinated by the Government of India and provides information access and transparency around seed production and order fulfillment, seed certification, seed law enforcement, lab testing, and a database of information on notified variety.

Jason Nickerson:

Now, to quality assurance, we also observed that quality assurance systems and these effective systems were fit for purpose and encourage the supply and trade of seed that is varietally pure, has good vigor, and free of major seed-borne diseases. And these system certification agencies were viewed as partners and trust with being the custodian of industry, and not as a policing agency. A good example of this comes from the Brazil banana seed system where disease pressure at various points in history have reestablished trust in tissue culture material. All TC materials are required to be tested for disease and must meet minimum quality and genetic variation standards.

Jason Nickerson:

Finally, another characteristic that we saw on effective seed systems is that they're strengthened by long standing interpersonal relationships and close geographic proximity of seed sector actors, which enables a well-coordinated seed production planning process and helps to reduce costs. A good example of this comes from the Saskatchewan pulse system. Located in the heart of Saskatchewan's main pulse growing region, the University of Saskatchewan acts as a central hub for important actors in EGS system. The main organization involved a new variety development testing. The commodity association, key bridging institutions and organizations, and the national research organizations are either on the university campus or located within a 15-minute drive.

Jason Nickerson:

In summary, we found that these building blocks, which extend beyond just the production/distribution of EGS are present in the effective seed system partnerships that we studied. They may serve as guidepost to indicate when things are working well for the public sector, private sector and, most importantly, for farmers.

Jason Nickerson:

Thank you.

Jennifer Leopold:

We'll move into our round table session now. Amsale, if you want to go ahead and enable your audio and webcam. I see you.

Amsale Mengistu:

Yes, good morning, good afternoon, good evening depending where you are. Thank you for inviting me to facilitate this session. I think I will start by brief introduction of the two distinguished panelists.

Amsale Mengistu:

My name is Amsale Mengistu. I'm with the Bill & Melinda Gates Foundation. I work closely with Lauren.

Amsale Mengistu:

The two panelists are Mark Tokula. He is an assistant director and coordinator of the Seed Technology Program at the National Root Crops Research Institute located in Umudike, Nigeria. He leads the Umudike Seeds, the early generation seed company established by the National Root Crops Research Institute for production and sale of EGS, and also not only produce early generation seeds but they also render advisory services to their clients.

Amsale Mengistu:

Welcome, Mark.

Amsale Mengistu:

The next panelist is Dr. Mohammad Khalequzzaman. He is an accomplished plant breeder, researcher, seed production expert. He serves as the head of the Genetic Resource and Seed Division of Bangladesh Rice Research Institute, BRRI. I think that's one of the institutes that was highlighted during the presentation by Jason.

Amsale Mengistu:

Thank you Dr. Mohammad.

Amsale Mengistu:

We have about 20 minutes for this. I have a set of questions. I will start with the first question with Dr. Khalequzzaman.

Amsale Mengistu:

Dr. Khalequzzaman, welcome. As we saw from the presentation, I think that the various seed production operation have expanded significantly, I would say significantly, over the past 20 years from a handful of clients and less than five tons of seed in early 2000, which is 20 years ago, to over 800 clients and over 125 tons of breeder seeds. That's a significant growth. My question to you is, Dr. Mohammad, what do you attribute the market expansion to? If you can just highlight two or three top attributes, and also if you can tell us how has the expansion impacted your team's operation. It could be around land availability, quality control system. So with that, if you can take three to four minutes to respond to these questions. I have a list of questions I can come back to you as well.

Amsale Mengistu:

Thank you. Over to you.

Dr. Khalequzzaman:

Thank you very much. Thank you very much for giving me the chance to speak in this year's gorgeous occasion. Actually, the breeder seed, what we are producing in Bangladesh is sufficient for the certificate because the [inaudible 00:46:12] generation seed, as you told, there's about thousand seed entrepreneurs or some companies also are dealing with the seed business. They are receiving benefit

from BIRRI and also from Bangladesh Agricultural Research Institute from rice and [inaudible 00:46:43]. Actually, what they are doing, they're not getting any produce and these are certified seeds in most cases. Then in few cases, they are producing [inaudible 00:46:52]. The [inaudible 00:46:52], actually, in the last 10 years, mostly the government fund, actually, were used for the breeder seed production and management of our variety maintenance in the institute.

Dr. Khalequzzaman:

What else [inaudible 00:47:08]? As I told you, the last 10 year that we are [inaudible 00:47:21] mostly from the fund of the government. [inaudible 00:47:27] do not also involved in the [inaudible 00:47:37] also the area we are getting some funds, actually. Some EP also, recently, recently, they are handling and [inaudible 00:47:39] especially for the [inaudible 00:47:39] varietal dissemination for promoting various seed production so that the farmers can get the [inaudible 00:47:39] variety in an efficient way.

Dr. Khalequzzaman:

This other thing that you mentioned, for the EGS, actually in our case, the [inaudible 00:47:39] getting is very easy, actually, up to now because once you get a dealership from Ministry of Agriculture and then you are capable or you are eligible for applying for breedership and [inaudible 00:48:58] but we are trying to... capacity of research and R&D in some field also. That's why we are [inaudible 00:49:08] different stakeholders in different [inaudible 00:49:13] and although that's not the final [inaudible 00:49:17] by the Ministry [inaudible 00:49:21] National Seed Board but we are applying this change in our country so that the bigger company, who has this infrastructure development, they can get a maximum amount of breeder seed.

Dr. Khalequzzaman:

There's other thing. In our case, for breeder seed, we breed partnership within the country. As I told earlier, more than thousand seed dealer or entrepreneurs are across the country. They are producing and getting dealership, and they are producing different variety [inaudible 00:50:09]. The problem is they are not interested to produce a newly released variety. Mostly, the popular variety they are cultivating and they use because they think they get less profit out of the megavariety. That's a huge area covered by the Bangladesh area.

Dr. Khalequzzaman:

In our country, we have three main growing seasons. In boro season, we don't have the mixed seed produced in that season and the private sector also involved in the boro season but the problem is that in aman and aus season, the private sector [inaudible 00:50:54] to produce foundation and, subsequently, certified or commercial seeds or subsequent seed. That's the one problem we are facing. We need the intervention in there to produce private sector [inaudible 00:51:12] aman and aus season for getting certified breeder seed to produce more foundation-certified seed.

Dr. Khalequzzaman:

Other thing actually in our country, that's in Bangladesh, the private sector mostly interested in the [inaudible 00:51:35] for hybrid rice because the prices of hybrid rice is more higher than the inbred rice. That's another issue. The government policy is very, very relaxed in this case and, many companies, they release their own variety and disseminate in the field. That's why they are interested in the [inaudible 00:52:01] as the price is more higher compared to inbred seed.

Dr. Khalequzzaman:

Thanks all.

Amsale Mengistu:

Thank you, Dr. Mohammad.

Amsale Mengistu:

The question to Mark. Mark, your organization, Umudike Seeds, is an offshoot of a national agricultural research institute which is called National Root Crops Institute or NRCI, that has a mandate for root and tuber crops in Nigeria like yams, cassava and sweet potato. Why did it make sense to set up a separate seed company? That's the first question. A follow-up question to you is root and tuber seed business are notoriously tough between the bulkiness and the delicate nature of the crops. What is the biggest pain point for your team as you are trying to operationalize the business? If you can respond, react to those two questions in maybe five minutes.

Mark Tokula:

Thank you very much [inaudible 00:53:12] and then thank you for giving me this opportunity to address the issues of importance of the National Root Crops Research Institute [inaudible 00:53:24] Umudike Seeds as an arm to work on the early generation seed, the breeder seed, foundation seed, which are very key to the seed system evolution in Nigeria. It becomes very important because, before, various varieties are common from breeder activity, farmers are used to recycle their old seeds and then there is no monitoring for seeds and then for quality assurance and then adoption to the increased [inaudible 00:54:01] will become a business as it should be. It required an entity that is commercialized, that can handle this, and then bring about the seed system sustainability in Nigeria.

Mark Tokula:

Good seed is very important key to productivity in root and tubers. Cassava is a major food; yam is major and then sweet potato in Nigeria. In order to [inaudible 00:54:32] on the food security apparatus of the country, we work with the National Agricultural Seed Council to bring about quality, and then to organize farmers, and then, from the top to the bottom, to work on the seed system. These being done help farmer to get quality seeds, help them to increase productivity, help them to make more money in embarking on seeds business and all the control measures because seeds in our country a legislative matter and with the [inaudible 00:55:15] coming out of the National Root Crops Research Institute is not separate and research [inaudible 00:55:21] complete business because research is not [inaudible

00:55:25] and then the business aspect of this that have to handle issues of quality seed. It's handled by [inaudible 00:55:35] that is separate entity.

Mark Tokula:

Now, having done than that, the seed [inaudible 00:55:38] that we are putting up and then developing other [inaudible 00:55:51] to meet the needs of the farmers becomes very, very important and this is going on and somewhat are now making money from embarking seed business. [inaudible 00:56:01] found in between the government agency and trying to now leverage on the activities of agriculture [inaudible 00:56:13] project to be able to get gain of the work the scientists by developing variety to now make [inaudible 00:56:30] technology that help us to multiply rapidly [inaudible 00:56:34] and then move them to the farmers where these would [inaudible 00:56:47] to remove the difficulty and conflict of farmers to have testing and getting in contact with good seeds.

Mark Tokula:

The hope of agricultural food [inaudible 00:56:55] is quality seeds. Where you don't have the [inaudible 00:56:59] available to commercial seed producers, it becomes very difficult to share good seed with the other farmers that are consistent. The [inaudible 00:57:09] seed is to bring about commercialization and then the mandate of the National Root Crops Research Institute will now have a very good impact on the farmer downstream to whom [inaudible 00:57:12] come directly to the institute but [inaudible 00:57:12] and getting them the quality that they need. So, the then [inaudible 00:57:12] is that [inaudible 00:57:12] in our country and since that is moving out, a [inaudible 00:57:12] in the roots and tubers are now level, and then you move [inaudible 00:57:12] so that each [inaudible 00:57:22] is now eliminated and farmers [inaudible 00:57:55] all the exchanges on [inaudible 00:57:58] if they need to go for quality seed, if they need for purity, and if they need now to increase the productivity and when you ask for a particular variety, they give it to you. That is the very, very key point where [inaudible 00:58:16] and then it's making life better for farmers in Nigeria.

Amsale Mengistu:

Thank you, Mark, for that comprehensive response. Back to Dr. Mohammad, I have one more question for you. As we heard from the presentation, to have effective seed system, we need both the private sector as well as the public sector. How has BRRI, your organization as a public sector, is relating with the private seed companies? Is that relationship evolving over the years? Where do you see the key areas of partnership now and in the future?

Amsale Mengistu:

Dr. Mohammad? Have we lost Dr. Mohammad?

Speaker 1:

Yes, it appears that we lost Dr. Mohammad right now. I'll work with him to establish his audio.

Amsale Mengistu:

Okay. Mark, I can I come back to you?

Mark Tokula:

Yes.

Amsale Mengistu:

Dr. Mohammad, you are back. Good. I have one more question for you, Dr. Mohammad. Like we heard from the presentation, we need both the private sector and the public sector to play their relative role effectively to have an effective seed system. How has the BRRRI relationship with the private sector companies evolving over the years? Where do you see the key areas of partnership now, also in the future?

Amsale Mengistu:

Seems like he's on mute.

Dr. Khalequzzaman:

Can you hear me?

Amsale Mengistu:

Yes, we can.

Dr. Khalequzzaman:

As I told earlier that, in our country, seed policy is very liberal and private sector getting involved for seed production since 1998. Before that, only public sector, the Bangladesh Agricultural Development Corporation, they used to produce the foundation [inaudible 01:01:23] and [fruit tree 01:01:26] level seed. After the policy liberalization in 1998, private sector getting start to involve in [inaudible 01:01:37] for getting breeder seed. Initially, two, three companies receive breeder seed. After that, the dealership also is getting very easy and then it's fee of cost at that time. Some fee is also involved nowadays but, before that, that is free, of course. Lots of the entrepreneur or seed entrepreneurs come forward in seed sector and they [inaudible 01:02:11] to apply breedership from BRRRI. They receive breedership to produce foundation and subsequent foundation-certified seed.

Dr. Khalequzzaman:

The issue actually, in our country, we [inaudible 01:02:11] private sector in umbrella. We call this the rice seed network in our institute. All the organization, they're continuously connecting us and communicate to us. They communicate to us to where the seed they get and then we advise them that, "If you take foundation seed, you can get foundation seed from that company or X company. If you want

a breeder seed, you can come here. We will supply you with breeder seed with minimum cost." Actually, in our country, less than \$2 actually the price of per kilo of breeder seed.

Dr. Khalequzzaman:

Then this later expanded in the whole country. How much [inaudible 01:03:32] seed from that seed dealer or partner that we have produced. More than thousand seed dealer are involved in that seed network. This network partnership will move forward in the future even though [inaudible 01:03:54] and that we are [inaudible 01:03:58] them to come to us in an efficient way in [inaudible 01:04:02] research and development, R&D to more efficient way [inaudible 01:04:08] seed network so that that can get more breeder seed and produce more foundation and subsequent certified seed so that [inaudible 01:04:15] in their goal state.

Dr. Khalequzzaman:

Thank you all.

Amsale Mengistu:

Thank you, Dr. Mohammad.

Amsale Mengistu:

Mark, to you, and maybe the same question but maybe worded differently, where do you see opportunity to collaborate with the private sector?

Mark Tokula:

Hello? I didn't get you.

Amsale Mengistu:

Can you hear me, Mark?

Mark Tokula:

Yes, I can hear you now.

Amsale Mengistu:

I'm posing the same question to you but may be worded differently. Where do you see opportunities to collaborate with the private sector? Is that in, for example, demand planning or early ordering, promotion or trials? Also just to add to that, what role is the public sector playing to enable the establishment of the business? Are they paying employee salaries, availing land or equipment or operational resources? If you can respond to those two questions at the same time would be great.

Mark Tokula:

Yeah, [inaudible 01:05:36] in production and their collaboration [inaudible 01:05:40] and work into activities. Like you can see, the National Root Crops Research Institute is a public organization and all the public organizations and institutions that we collaborate with are very willing to make available land and everything that is needed with the [inaudible 01:06:01] to move on.

Mark Tokula:

Then in terms of the private sector also, they are a huge development of an NGO and then other cooperatives that are being put together. In terms of the work and to ensure quality, the National Agricultural Seeds Council is the very strong body that is working [inaudible 01:06:05] that would give both early generation seed and then the certified seed that they are all satisfied. It's a known fact here now that if it is not satisfied, it is not seed in our nation. With that [inaudible 01:06:05] together to enable us to work down to the different stages and get this material available to the end users and that is the farmer. So, as our activities and our interaction is very, very strong, the market is very, very vibrant. It's promising. The demands are very huge, and then they're working through everything that we needed in terms of land, infrastructure, and the [inaudible 01:07:24] that we need to decentralize [inaudible 01:07:26] with all are working from the [inaudible 01:07:32] of the government and from the private sectors.

Mark Tokula:

On that [inaudible 01:07:38] companies that are not playing in the [inaudible 01:07:42]. In Nigeria, the National Root Crops Research Institute is the only root and tuber crop research institute that have that mandate. With that, others are key into those who collaborate resources, private companies are expressing interest with the [inaudible 01:08:02] for us to be able to now move and fast track the commercialization and then for [inaudible 01:08:19] commercialization of [inaudible 01:08:19] the producers and then, from here, get to the farmers. So, it is a whole of activities going on and we are having the potentials and market is [inaudible 01:08:32] good. That is it.

Amsale Mengistu:

Thank you, Mark. Now, we heard from both Dr. Mohammad and Mark in terms of how they are implementing it on the ground in terms of producing early generation seed. Unfortunately, we are running out of time already. I will hand it over to Jennifer to lead us through the Q&A session. Thank you so much.

Jennifer Leopold:

Thanks, Amsale. Thanks so much to our presenters and our participants, and your patience with the audio challenges that we've had today. We've got a lot of great questions. We've got about 15 minutes left, so we'll try and address as many of these as we can. The first one I have here is from Hari Kumar Shrestha. If it's a pipeline product, how could you classify seed as a breeder foundation seed? Mark, is this something you could respond to, Mark Huisenga?

Mark Huisenga:

Yes. Hello?

Jennifer Leopold:

Yes, we can hear you.

Mark Huisenga:

I would defer that to Jason.

Jennifer Leopold:

Okay.

Jason Nickerson:

Sure.

Jennifer Leopold:

Jason, are you on?

Jason Nickerson:

Yeah, sure. Jason here. If I understand the question, we're talking about products as part of a pipeline and we're talking about the breeder and foundation seed more as classifications of seed that are linked to an individual product. I think that the classification seed follow from a variety or a product out of a product pipeline but that the classes are distinct from the pipeline itself. [crosstalk 01:10:35] understand the question correctly.

Jennifer Leopold:

Kind of following that question from Edo Lin in Cambodia, who is responsible to use foundation seed? Here in Cambodia, foundation seed production is the sole responsibility of the public sector which does not have the capacity. Would you be able to respond to that?

Mark Huisenga:

I could probably respond to that. What we have found is that these types of situations are often driven by national legal systems. Until not long ago in Ghana, it was mandated by law that foundation seed was the responsibility of the Grains & Legumes Development Board. There are similar laws like that in different countries around the world. These are the most advantageous types of institutional arrangements for a number of reasons. It's much more effective to allow or provide institutional arrangements that will coopt private sector investment into the foundation seed production. But again, if it's a matter of national law in those cases, the laws should change.

Jennifer Leopold:

Great. Thank you, Mark. I have a question from Mohammad Islam for Dr. Zaman. I think this is Dr. Mohammad. Do you think the breeder seed produced by public organization is enough [inaudible 01:12:17] they will produce quality commercial seed? If, yes, would you consider?

Jennifer Leopold:

Can you enable your audio? I see you talking. Dr. Khalequzzaman, we don't have any audio for you. Oh.

Jennifer Leopold:

Are you all able to hear me?

Speaker 1:

Yes, we [crosstalk 01:13:01].

Jennifer Leopold:

Okay. Shall we wait to see if you can-

Speaker 1:

So passionate on his response, it's a shame.

Jennifer Leopold:

I know. Okay, let's see if we can get him enabled. Yes, we hear you now.

Dr. Khalequzzaman:

Is it working now?

Jennifer Leopold:

Yes.

Dr. Khalequzzaman:

That question raised by somebody, actually if you consider, we are producing maximum amount of breeder seed and it's actually three times higher than the total requirement. If you follow the seed multiplication ratio, [inaudible 01:13:37], then it should be three times higher than we are producing the total requirement. Thus, follow the seed multiplication ratio and the seed flow from breeder to foundation seed, and then certified seed, it should be three times higher.

Dr. Khalequzzaman:

Actually, the bottleneck is what are the dealer or seed producer doing. They are selling the foundation seed for more profit. That's the bottleneck, actually. We need to intervene there. That's actually not for

sale, the foundation seed, in the farmers' level. It should be certified seed or fruit tree level seed to the farmer and then seed replacement rate should be more than 50% if you consider that way.

Dr. Khalequzzaman:

Thank you.

Jennifer Leopold:

Thank you so much. I have another question from David Spielman around checkoff dollars asking, is that similar to an endpoint royalty system or a levy on commodity producers? What are those example checkoff systems? Yeah, thank you.

Jason Nickerson:

I can take that question. Good question, David. I guess, to clarify, we're thinking about those things as distinct things, the checkoff funds being largely managed by commodity associations which are marketing and potentially a reinvestment in research institutions whereas the endpoint royalty is more on the collecting IP or collecting revenue from IP-ed varieties that go back to research institutions or breeding programs.

Jennifer Leopold:

Great. Thank you, Jason.

Jennifer Leopold:

All right, I'm looking through some additional questions. Let's see. Please continue to include questions in the chat as we have a few minutes remaining.

Jennifer Leopold:

Jason, maybe you could also clarify the commercial adoption rates versus seed recycling and the resulting implications for early generation seeds requirement planning?

Jason Nickerson:

Sure. This is my perspective. I'm sure others on phone have different ones. Commercial adoption, for me, is that a farmer has adopted a particular variety. They may not refresh that variety or repurchase it every year and maybe the disease pressure that yield degradation isn't there which doesn't warrant reinvestment but that it's commercially adopted. The replacement rate is they're more around the frequency with which those varieties are replaced by farmers.

Jennifer Leopold:

Anyone else want to contribute for that question? Okay, we'll move on to the next question from Chris Ojiewo. What is the experience in terms of, one, foundation seed company specializing in foundation

seed only, two, a commercial seed company producing its own foundation seed, say, under a license from the breeder and, three, public institutions supplying foundation seed? How do these differ in terms of quality, quantity, and timeliness?

Jennifer Leopold:

Great question, Chris.

Jennifer Leopold:

Who would like to be the first to respond to that?

Dr. Khalequzzaman:

I think I can talk about this.

Jennifer Leopold:

Please go ahead.

Dr. Khalequzzaman:

Yeah, the question about, one, foundation seed company specializing in foundation seed only, sometimes, it has to do with the arrangement that have to bring about the law as it goes. For instance, getting the breeder seeds and the foundation seeds, if the foundation seed company is there to [inaudible 01:18:10] and then there is a need for there to be synergies in one to two, the company that would produce foundation seed require a breeder seed from where a breeder can be found. In that case, if it is not [inaudible 01:18:35], then the supply systems and the demand for [inaudible 01:18:39] for the foundation seed, there's a seed flow and who are the uptakers will be an issue. It is needed that this company will be able to handle the situation and then have the license.

Dr. Khalequzzaman:

Like in the case of Nigeria, we have a National Seed Council that license them [inaudible 01:19:00]. So, whatever the foundation seed company is supposed to service [inaudible 01:19:05] use up initially to produce certified seed for [inaudible 01:19:10] able to collect. If there are two or three of them that way, it was fine so that, if one is having issue, there can be a fallback. That is the way it's arranged. Then the quality is not compromised at this level. The certification and the assessment is being done and licensing and then renewal of certificate is handled by the National Seed Council that will be under that umbrella organization.

Jennifer Leopold:

Great. Thank you, Mark. Anyone else wanted to add to that?

Jennifer Leopold:

All right, we've some other questions coming in from Andrew Julius. Where do we stand in all of the EGS seed production chains in regards to GMO seed?

Mark Huisenga:

[crosstalk 01:20:05]

Jennifer Leopold:

Oh, go ahead, Mark, and then we'll proceed with the next.

Mark Huisenga:

I was just going to add to that on foundation seed. What we find it really is that the interest of producing foundation seed really often is a function of what crop we're talking about. Hybrid maize can be done by a single company under one roof, so to speak, and that company can take responsibility all the way from breeding to distribution through the product lifecycle and retiring that seed. On the other hand, for certain crops, so common beans might be a good example where producing the foundation seed of common beans is really an expensive proposition. They multiply very slowly over time producing maybe a dozen seeds a plant. They're heavy. There's not a certain demand for them. So that we find in some of those instances there's often government or other public-private partnership arrangements that will be responsible for multiplying the foundation seed. So, again, it's often crop dependent.

Jennifer Leopold:

Thanks for that, Mark. Great.

Jennifer Leopold:

I'll guess I'll return to that last question I was posing here from Andrew. Where do we stand in all of the EGS seed production chain in regards to GMO seed? Lauren, is it something you could respond to?

Lauren Good:

Can you hear me?

Jennifer Leopold:

Yes, we can hear you. Just speak up just a bit more. It's a little muffled.

Lauren Good:

All right. Well, there were two questions. One was, I think, [inaudible 01:22:18] asking about kind of what we've learned about foundation seeds and/or supporting the seed sector. I think there's a couple things that are fairly clear. One thing is that some kind of early generation seed system needs to be a very intentional process in a country. It just doesn't happen on its own, and so you can't just simply support something like a [inaudible 01:22:46] that produce some breeder seeds one time because you

still have are going to have that problem. This idea that someone needs to take... It can't be just someone part-time job supporting this, then, it needs to be actually very conscientiously a business unit, somewhat like Mark described they're doing at Umudike to actually have independent businesses around that.

Lauren Good:

I would say for other seeds, certainly, I think with hybrids, there's a case for having a company... CBS is one example of a company that's specializing in just the parent seed and not doing any commercial to compete with the seed company customers. That, I think, is a good way for a seed company to be able to tap into quality seed production. I think there are both those public and a private example.

Lauren Good:

As far as GM products, there's very limited acceptance so far. I wish it were not the case but, outside of South Africa, there isn't any countries doing active maize, hybrid maize production, although we are starting to see some changes. Ethiopia, certainly, is opening up a bit more and other countries are getting a little further along. I think when this happens, foundation seed and early generation seed will become much more critical because there are stewardship issues around that. That's something that we certainly want to be aware of and make sure that that is held responsibly because, as we all know, if there a problem, there is a lot of anti-GM voices out there, and they will be happy to exploit any failures in the system.

Lauren Good:

The whole issue around quality assurance that was brought out in the case studies are just amplified when you're talking about new technologies brought into seeds. I think that's something that we will watch and will be an increasingly important part of the work that we do is to make sure that the quality standards are up to ensuring the best results for the seed trade, for the seed industry to be able to take up any technologies whether they're GM or not and also to provide more confidence for the farmer that what they're buying is really that's quality prototype and unadulterated.

Jennifer Leopold:

Wonderful. Thanks, Lauren, for that response. We are at the top of the hour. I wanted to go ahead and close out the session, but I do want to call your attention to the next Agrilinks we'll be hosting on July 1, Market-led Interventions for Seed Security Response. Please go to the Agrilinks, the website, to register for this webinar. It's sure to be a really good one. We're also planning for another webinar in September that will focus on innovations in global seed systems. Stay tuned for registration information as we get closer to that date.

Jennifer Leopold:

In closing, I want to thank our wonderful presenters for your depths in answering all the questions and for the content you presented today. Most of all, I really want to thank our attendees for your

participation. All of the conversation in the chat is really valuable and, certainly, your patience as we navigated the challenges with the audio today.

Jennifer Leopold:

We want to thank the Feed the Future Knowledge, Data, Learning, and Training Project for helping to manage these Agrilinks webinar series. We hope that you all have a great rest of your day. We'll leave this open and put some polls up, so that you can help us improve our webinars going forward. We'll leave the chat box open for a bit here too as you close out your conversations.

Jennifer Leopold:

Thanks so much.

Jennifer Leopold:

Bye-bye.