BILL & MELINDA GATES foundation

ALLIANCE FOR A GREEN REVOLUTION IN AFRICA:
Good Seeds, Better Lives for Poor Farmers

GRANTEE PROFILE

THE PROGRAM FOR AFRICA'S SEED SYSTEMS

In recent decades, agricultural productivity has increased significantly throughout much of the world. But that hasn't happened in many parts of Africa, where farmers—particularly in the Sub-Saharan region—still struggle to grow enough food to feed and care for their families.

Agricultural conditions vary widely across the continent, and for small farmers, seeds bred to thrive in specific soil and weather conditions can mean the difference between a meager harvest and an abundant one. But improved seeds—those bred for traits such as resistance to insects, disease, and drought—are scarce and expensive to produce.

The Program for Africa's Seed Systems (PASS) is the first initiative of the Alliance for a Green Revolution in Africa (AGRA). PASS was launched in 2006 with support from the Bill & Melinda Gates Foundation and the Rockefeller Foundation to help answer a very important question: How do you ensure poor farmers have access to the quality seeds they need?

GRANT SUMMARY

Grantee: Alliance for a Green Revolution in Africa
Amount: $100,000,000 (U.S.)
Term: 5 years
Region Served: Africa
Grantee Location: Kenya

Purpose: To educate agricultural scientists, help create and distribute new varieties of seeds, and train agrodealers who will provide supplies and advice for rural African farmers.

The goal of the PASS initiative is to help create new varieties of seeds and make improved seeds much more accessible in Africa, especially to rural farmers. This will help the farmers boost their productivity, increase their incomes, and lift themselves—and their families—out of hunger and poverty.

The following stories outline the investments PASS is making in four key areas, and introduce people who are benefiting from the initiative's early successes.

EDUCATING THE NEXT GENERATION

Chrispus Oduori has a lot of work to do. When he graduated from the African Center for Crop Improvement (ACCI) this year, he became the first plant breeder in all of Africa to receive a Ph.D. in the breeding of finger millet, an indigenous grain eaten by more than 100 million Africans.

For the past several decades, funders and scientists have focused on a few crops—including maize, wheat, and rice—despite the fact that people in Africa depend on dozens of different crops. There has been no significant improvement in finger millet productivity since the 1960s. As a result, farmers who grow finger millet struggle with low yields and a number of pests and diseases that plague their crops.

Chrispus Oduori discusses improving farming techniques, Kakamega District, Kenya.

Chrispus is one of nearly 90 students whose advanced degrees related to crop science have been sponsored by AGRA. The goal of the program is to enable African students to contribute their unique passion and perspective to agriculture on the continent.

When Chrispus was a child, he would watch his mother grind finger millet into flour, and then mix and cook it into a porridge called ugali. Being able to help others grow more and better finger millet has been his goal for years. Now he has that chance. "When I heard that I'd received the scholarship to study plant breeding at ACCI, it was like a dream come true," he says. "It was like throwing a fish into water." Chrispus is now putting his training to use at the Kenyan Agricultural Research Institute (KARI), where he has already immersed himself in valuable work.

The district of Teso, in western Kenya, is next door to the Busia district, where Chrispus was raised. He's familiar with the roads, speaks the language, and knows the people. On his way to meet one of the 16 farmer groups he sees each month, Chrispus pulls the car to the side of the rutted red road. About a hundred yards back from the road is a small hut with a thatched roof. Out front are two elderly farmers, several thin children, and a small plot of finger millet.

Chrispus points to the plants, which are bunched and small; the farmers have "broadcasted," or scattered their seeds across their small plot. Without enough space between them, the plants don't get enough nutrients and are hard to keep free of weeds. Chrispus estimates that the simple act of planting in rows instead of broadcasting their seeds would help these farmers increase their productivity by 25 percent.

This is just a small step on the road to productivity, but it represents progress. The expected yield of a finger millet farmer in Kenya is between 500 and 700 kilograms per hectare. On the fields where Chrispus conducts his research using improved seeds and fertilizer, he produces between 2,500 and 3,000 kilograms per hectare.

Farther down the road is a demonstration field where Chrispus is sharing the findings of his doctoral thesis with a group of farmers, many of whom never made it past primary school. His findings produced a set of finger millet seeds with higher yields and resistance to blast disease and Striga weed, two major problems for this crop. The farmers have planted a row of the seeds they currently use in the middle of the field. On either side, they've planted two rows of the improved seeds Chrispus has developed. The farmers' seeds have barely begun to sprout. Chrispus' seeds are green and growing vigorously. The value of his education—and AGRA's investment—is clear.

Many farmers in the local town have already planted Chrispus' seeds in order to help him test and improve them before distributing them more broadly. Members of two local farmer organizations sit on wooden pews in a stone

church, testifying to the way their lives have changed since planting the new seeds. One member, Gertrude Naududu, says that last year, with the earnings from her finger millet harvest, "I bought myself an ox. Now I have an ox plow." Another member, Constancia Barraza, proudly declares that "finger millet helped me build my house."

But do these individual benefits add up to something broader for the community? When asked, the members nod their heads vigorously and shout out answers. Beatrice Shiundu Etyang, the chairwoman of the farmer groups, steps in to sum up their responses: "It has improved the nutrition status of the people. It has empowered us. It has helped us to pay school fees for our children. It has helped us to sustain ourselves. The KARI teams showed us how to make buns, cakes, and chapattis, [which] we go and sell during market days."

> "And we really pray that they **continue to educate us** so that we may not go back to poverty."
>
> —Ruth Ekasiba

A member named Ruth Ekasiba stands up to add a point. Chrispus and KARI "have really given us education. And we really pray that they continue to educate us so that we may not go back to poverty."

Beatrice agrees: "When we started learning, we learned that we had been left behind. [KARI's] workshops have developed us. Even those of us who cannot read, when the workshops come, we say, 'You have to go and bring us the information.'"

Education, whether at the Ph.D. level or a more basic one, is a powerful thing.

DEVELOPING SEEDS TO MEET THE NEEDS OF LOCAL FARMERS

The road winds like a river through Katumani, a town in the eastern highlands of Kenya. Past brightly painted churches and beauty salons, past butcher shops and bars, and up through terraced swaths of land cut into sloping valleys lies KARI. This is where Clement Kamau and Joseph Kamau come to work each morning. And 10 years from now, if millions of Kenyans have managed to plant quality seeds that help boost their yields and increase their incomes, this will be a place worth coming back to visit.

Clement and Joseph have dedicated their lives to reducing hunger and poverty by improving agriculture. And they are experts in more than agriculture. "We know what it's like to be hungry. We know what it's like to not be able to concentrate at school due to an empty stomach," Clement says.

Clement and Joseph could almost be brothers. In addition to sharing a last name, they both grew up in poor farming families in Central Kenya; they both received scholarships—and Ph.D.s—from ACCI at the University of KwaZulu Natal in South Africa; and they are both working to develop improved crop varieties for African farmers with the support of AGRA.

KARI is located in a semi-arid region of Kenya where most farmers grow maize. Rainfall is rare, drought is common, and farmers frequently struggle to produce enough maize to feed their families. Every year, approximately 80 percent of the district receives emergency food assistance.

For the last 10 years, Joseph Kamau has been working to develop improved varieties of cassava, a starchy root crop that does much better than maize in harsh climates with little rain. He believes that growing cassava—instead of, or in addition to, maize—would protect farmers from vulnerability and ensure a steady and nutritious diet.

Monica Ndeti, 56, is one farmer in the area who is growing cassava. Ever since her husband passed away 20 years ago, she has followed his example and planted a traditional

Joseph Kamau discusses farming techniques in Machakos District, Kenya.

Francis and Juliana Mutungi, partial owners in a local farming cooperative, stand with their granddaughter in front of their cassava crops near Katumani, Machakos District, Kenya.

variety of cassava, along with maize, cowpeas, and several other crops, on three acres of well-tended land. The combination of crops has helped her put seven children through school. Unfortunately, the type of cassava variety she plants is outdated, and is susceptible to pests and diseases. This year, 80 to 90 percent of her cassava crop shows signs of cassava mosaic disease—an affliction that will cost her more than half the potential yield, and income, for each plant.

In a field an hour away from Monica's farm, Joseph Kamau walks among dozens of different cassava varieties. After listening to farmers such as Monica, he comes back to this test field to develop new varieties that solve the problems small farmers face. Then he goes back to the farmers to seek their input and continues refining. This process, called participatory variety selection, is essential to the success of his work. Listening to farmers ensures not only that the crop varieties he breeds meet their needs; it increases the chances that farmers will use them. Joseph explains: "You've got to move along with the farmers. If your statistics tell you one thing and the farmers tell you another, you've got to go back to the farmers."

After years of work, Joseph has developed a variety of cassava that is resistant to cassava mosaic disease and produces cassava in nine months instead of the customary 16, ensuring an additional harvest. But will the farmers like its taste, texture, and appearance? To find out, Joseph is off to yet another farm 90 minutes away—a demonstration plot.

Here, he's met by Francis and Juliana Mutungi, the owners of the farm, and 24 friends and neighbors who are part of a local farming cooperative. Earlier this year, the couple received a sample of Joseph's new cassava variety. They also received training. Francis says, "We learned to space the plants a meter apart, to check for pests and diseases."

Francis and Juliana planted their varieties at the same time Monica Ndeti did. But instead of foot-high plants with blighted leaves, today they stand amid plants that are three to four feet high, with healthy green leaves. They will have a bumper crop—enough not only to eat, but to sell to the local bakery, which will grind the cassava into flour and make bread, buns, and other cheap and nutritious foods. Francis, standing with his wife and a 3-year-old granddaughter, knows exactly what he'll do with the additional income.

"I would like to help my family. The kids are all here at home because we didn't have the school fees." He'd also like to buy more land so he can support his 10 children.

As Francis talks about his dreams, Joseph is talking about cassava. The 24 members of the farming cooperative are assembled in a circle, listening as he shares advice and encouragement.

He is transformed—no longer a crop breeder, but a teacher. And he knows that his passion can help farmers—those standing in the field with him and millions more throughout Kenya—transform their lives.

The demonstration has been a success. After three farms and hundreds of kilometers, it's time for Joseph to head back to his office in Katumani. As he leaves, the farmer group says goodbye through a song in Kikamba, a local language. They sing, "This is a blessed day. We are happy to see you."

Joseph Kamau is happy, too. "It makes me so happy to see them appreciate my work, to see these healthy plants. This is why I am here."

PRODUCING ENOUGH SEEDS TO MEET DEMAND

Linet Wanzunzi is an unlikely entrepreneur. Linet, 45, lives with her brother and two sisters in a house in the hills of Kakamega, Kenya. Directly in front of the house are slabs of stone that mark where her father and mother rest.

When her mother passed away a few years ago, it became Linet's duty as the eldest daughter to take care of her family, and to take over the farming. Initially, she continued on as her mother had—growing maize to eat and vegetables to sell.

Then one day two years ago, her neighbor Harriett Masinjila hosted a "farmer field day" to show fellow farmers a new variety of bean that she had been able to grow and sell with great success. Linet took the leap and bought a small sample of bean seeds from KARI to try for herself.

Linet Wanzunzi stands with her crops in front of her home in Kakamega District, Kenya.

The seeds cost 4,000 Kenyan shillings, or about $50 (U.S.). In three months, Linet grew beans that she was able to sell for 24,000 shillings—a five fold profit. "It made me [able to] afford to pay school fees for my daughters," Linet says proudly. She was so pleased that she went back to KARI to ask for more seeds. While there, she met Reuben Otsyula, the crop breeder who developed the bean she grew.

Reuben, whose work is supported by a grant from AGRA, is quick to explain why beans are so important. "I don't like hunger. [That's why] beans interest me so much. This is a crop that really saves farmers out of the hungry situation."

The common bean is a critical crop. Beans are a cheap source of protein for people living in poverty—the "meat of the poor." They are consumed at approximately 70 percent of all meals in Kenya and deliver important nutrients, including amino acids, vitamin B, iron, and zinc. They grow quickly, which is good for food security: Plant a bean seed, and three months later you'll have food. Growing beans is also good for the soil: It guards against erosion, improves soil fertility, and doesn't require much fertilizer or water.

A quality bean variety can result in between 1,500 and 2,500 kilograms of beans per hectare. However, most poor farmers in Kenya don't have access to good bean seeds, and produce only 400 kilograms per hectare. That means millions of poor farming families are losing between 70 and 85 percent of the food and income they could be getting.

Reuben's goal is to make sure many more farmers have access to high-quality bean seeds. He's already developed a good variety, but he doesn't have the capacity to produce enough seeds to meet the need across Kenya. So he and Linet have formed a sort of partnership. Reuben provides Linet with training and advice, and the high-yielding, disease-resistant bean variety he bred. In turn, Linet sells a portion of the beans she grows back to KARI. This year, Linet

provided KARI with 1,200 kilograms of beans. That's enough for Reuben to give away 2,400 half-kilogram samples to other curious farmers, who, like Linet, are looking for ways to improve their incomes and nutrition.

Reuben and Linet are doing more than boosting the supply of beans. They are also boosting awareness and demand in order to create a market. When thousands of farmers start asking for improved bean varieties, seed companies and stores take note. Reuben is currently in conversation with two private seed companies that will be able to take his new variety and produce it on a mass scale. When that happens, families and communities throughout Kenya and beyond will be able to grow quality beans to improve their health and food security.

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>
> —Reuben Otsyula

For Linet, the last two years have been tumultuous. Back in her house in Kakamega, she points to the portraits lining her living room wall. In addition to her mother, three of her siblings have passed away—two due to violence after Kenya's contested presidential election.

But the last two years have also been transformative. Linet used to labor in her field for six hours a day, six days a week. Now she hires other farmers—up to 10 at peak times of the year—to help her with the weeding, harvesting, and other tasks. Her family is well fed and well provided for. And her two daughters are enrolled in school, where they take steps each day toward a more stable and secure future.

For Linet and her family, the future holds prosperity, not hunger and poverty. And through her partnership with Reuben, ripples of opportunity are slowly spreading out through her community. Now Linet hosts a farmer field day of her own. One day in the near future, she will meet and motivate another unlikely entrepreneur.

DEVELOPING SEEDS TO MEET THE NEEDS OF LOCAL FARMERS

Sebulega John Bosco is standing in a field flowering with life. Sebulega, a soft-spoken farmer, lives in Mityana, a small village in rural Uganda whose name means "forty trees." In the background are a giant jackfruit tree and a stand of orange trees. On this patch of land are bean plants and banana trees that provide Sebulega and his family with food and income.

Nature has provided Sebulega with good health and a good piece of farmland. But he needs supplies such as quality seeds and fertilizer—as well as knowledge—to make the most of his labor and land. For that, he turns to Annet Mubiru.

Annet is an "agrodealer," a businesswoman who sells agricultural supplies to the community. Her shop is modest in appearance: 15 by 20 feet, dimly lit, furnished with simple shelves and a long wooden counter. It's what's on the shelves and behind the counter that matters.

On the shelves are essentials including quality seeds, fertilizer, and pesticides. Behind the counter is Annet, who in addition to selling these products dispenses advice to farmers about how and when to use them. "People don't come into my shop with no knowledge," she explains. "They come in with ideas they've gathered from their neighbors." These ideas may be correct, or they may not.

Annet has gone through extensive training, supported by AGRA, to make sure she can provide accurate advice about farming products and practices. She's also received specific professional training, including bookkeeping and business development, to make sure she can keep her shop up, running, and serving small farmers.

Because of her training and certification, farmers know they're getting genuine products and sound advice. Of course, the proof is in the yield. Sebulega, for example, recounts that before working with Annet he used no fertilizer on his bean plants. But after Annet explained the need to replace the nutrients in his soil, he applied a bottle-cap-size amount of fertilizer when he planted the bean seeds he bought from her store. The combination of supplies and advice helped him increase his yield from approximately 1 ton per acre to 2.5 tons per acre.

Too many farmers like Sebulega don't get the chance to work with well-stocked, well-informed agrodealers like Annet. There are three major obstacles: knowledge about the importance of quality supplies and farming practices, the distance to an agrodealer, and the affordability of products.

Agrodealer Annet Mubiru sells agricultural supplies to her community in Mityana, Uganda.

Sebulega's success is one of the most powerful answers to the first problem—farmers' lack of knowledge about good farming products and practices. When friends and neighbors see the difference between his harvest and theirs, their interest grows. Annet also works directly with farmers in Mityana to determine which products she stocks, increasing farmers' awareness. "When somebody comes with a new seed," she says, "they give us a bit for demonstration. We identify farmers [to grow the seeds] to see how that new variety works." If it's good, she'll sell it—and farmers will have evidence on which to base their decisions.

AGRA is also working to help reduce the distance farmers need to travel to get to an agrodealer. Since 2006, AGRA support has helped train and certify more than 5,000 new agrodealers, with the aim to reach 9,000 by 2011. These agrodealers are reaching deeper into rural areas, cutting down on the time and cost it takes for farmers to get quality supplies and information. The efforts are already helping make a difference. In 2006, the average farmer in western Kenya had to travel 17 kilometers to get to an agrodealer. Today the average trip is only five kilometers. Other innovative efforts will further cut down the distance. In Zambia, for example, agrodealers receive bicycles to travel to farmers who may not be able to get to a store in town.

Cost is the third challenge for small farmers. Two years ago, agricultural suppliers generally delivered 50-kilogram packages of fertilizer, seeds, and other farming supplies to agrodealers. These packages were too big and too costly for farmers with only a few acres of land—and too bulky for them to get back to their farms easily. Now, producers make bags in 10-, 5-, and 1-kilogram sizes as well. The smaller sizes far outsell the original size. In addition, AGRA is building partnerships with local banks and agrodealers to provide low-interest loans for small farmers who would like to purchase supplies that will boost their yields and incomes, but who don't fall into the traditional target market for banks. By providing loan guarantees, AGRA has helped unlock $100 million (U.S.) in financing that will allow millions of farmers in Sub-Saharan Africa to purchase quality seeds, fertilizer, and other basics.

Together, these efforts are helping make it easier for farmers to invest in their land, and to realize the full potential of their labor.

As a farmer, there are many things Sebulega John Bosco can't control. He can't make it rain. He can't wish away diseases and pests. He can't change the policies that guide agriculture in his country. But with the help of his local agrodealer, he can ensure that he is planting quality seeds, and using effective farming practices to raise his crops, renew his soil, and preserve his land. And that can make all the difference in the world for him and his family.

TO LEARN MORE

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www.agra-alliance.org

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www.gatesfoundation.org/global-development

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