It all starts with a seed.

One seed. Planting and eating it can mean the difference between blindness and sight. Between a child stunted by poor nutrition, and a child growing to reach her true potential. Between a healthy, productive life, and one compromised at every turn.

Yes, one seed can make a difference.

HarvestPlus is a leader in the global effort to end hidden hunger caused by the lack of essential vitamins and minerals in the diet, such as vitamin A, zinc, and iron.

We develop these nutrient-rich seeds. We make sure they grow as well, if not better, than the ones farmers currently plant. We understand how they will provide better nutrition when eaten in different ways—and we promote them widely, so farmers and consumers know that these seeds mean a healthier future for their families, communities, and country.

All this requires extraordinary cooperation. With diverse partners in more than 40 countries, we bring extraordinary assets to the table. The ‘Plus’ in our name doesn’t merely refer to nutritious crops. It’s a symbol of our tenacity and commitment to bridge the divide between disciplines and sectors in search of robust solutions to hidden hunger. We challenge assumptions, embrace risk, and demonstrate impact—all in the pursuit of a global health revolution.

HarvestPlus
Seeding a better life. One seed at a time.
Bridging the Delta, the theme of our 2012 Annual Report, evokes our efforts to bring together a diverse range of partners to bridge the fertile delta that stretches between us. HarvestPlus operates on the premise that none of us can go it alone—only when we forge non-traditional partnerships can we find new and creative ways forward to end hidden hunger.

For biofortification, which is one approach, our delta lies between agriculture, nutrition, and public health. Bridging it has not always been easy. It took years of building interdisciplinary networks and evidence, as well as knocking on the doors of agricultural and nutrition decisionmakers, before biofortification gained traction. We’ve come a long way since then. Thanks to the dedication of our team, and our many partners around the world, several more biofortified crops were released in Africa and South Asia in 2012.

HarvestPlus also became part of the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) that unites institutions and researchers across the spectrum. Through A4NH, we extended the expertise gained from biofortification activities in Brazil into Latin America and the Caribbean.

As our program grew, we widened our net, bringing in advocacy, marketing, and standards experts to ensure that biofortified crops get into the hands of smallholder farmers and rural consumers. To this end, we reached out to more partners in policy and practice—from Dr. M.S. Swaminathan, the first recipient of the World Food Prize, to the Honourable Dr. Akinwumi Ayo Adesina, Nigeria’s Federal Minister of Agriculture and Rural Development. We were also fortunate to receive additional, critical funding from the UK government and to embark upon a new partnership with the World Food Programme.

In a blog post last August, I wrote that the UK government’s landmark Global Hunger Event “exemplified the approach that we need if we are to race, not inch, towards the finish line of significantly improving nutrition by the next Olympic Games...[to] bring down the historic and arbitrary barriers between agriculture, nutrition, and health.” I am gratified by the willingness of so many partners to sit down at the table and work with us in the spirit of challenging assumptions and embracing risk.

Thank you.

Howarth E. Bouis
HarvestPlus Director
What is Hidden Hunger?

Both children and adults need micronutrients for good health. Yet, one in three people in the world do not get enough of these crucial vitamins and minerals—such as vitamin A, zinc, and iron—resulting in what is known as hidden hunger, since its effects are usually not visible. People suffering from hidden hunger may seem healthy, but they are often tired and weak, easily falling prey to illness and infections. In more severe cases, hidden hunger can leave children blinded, stunted, or with a reduced IQ. And without the micronutrients that they need, women face a greater risk of dying during childbirth.

Changing the Game

A diverse diet that includes a variety of fruits, vegetables, and/or animal products usually provides enough micronutrients. However, millions of people, mostly in developing countries, rely upon staple foods such as rice or maize that fill up their stomachs but do not provide enough micronutrients. Foods that are more nutritious are often expensive or simply unavailable. Now, through a strategy called biofortification, HarvestPlus and its partners are providing a new approach to tackling hidden hunger, using familiar foods that poor people eat every day.

Since it was created in 2003, HarvestPlus has identified populations most at risk of hidden hunger and the staple food crops they eat. Scientists have been developing new varieties of these staple food crops with one important difference—they contain higher amounts of vitamin A, iron, and zinc—enough to improve nutrition. These new varieties have been evaluated by farmers in target countries to ensure they grow well in the field. Many of these crops have now been formally released. HarvestPlus has also established teams in target countries and focused on building a network of partners to disseminate and promote biofortified crops in these countries.

Biofortification has several advantages:

Targeted: Biofortification reaches rural communities often missed with other nutrition interventions such as supplementation and fortification.

Cost-effective: One up-front investment is all it takes to breed the nutrient into a crop variety. These crops can then be planted year after year.

Sustainable: Biofortification uses staple foods that people already eat regularly. Farmers can also save and share these nutritious seeds and stem cuttings freely with their neighbors.

Discovery
- Identify Target Populations & Set Nutrient Targets
- Validate Nutrient Targets
- Discover & Screen Crop Genes

Development
- Improve & Evaluate Crops
- Test Nutritional Efficacy of Crops
- Study Farmer Adoption & Consumer Acceptance

Delivery
- Release & Disseminate Crops in Target Countries
- Promote Consumption of Crops
- Measure Crop Adoption & Improvements in Nutritional Status
2012 Highlights

Fields of Biofortified Dreams

This year HarvestPlus came several steps closer to getting biofortified crops on tables throughout South Asia and Africa.

- At the official launch of vitamin A cassava in March, 2012, the Honourable Minister of Agriculture and Rural Development Dr. Adesina said that the government will support distribution of the new varieties to 1.8 million farmers in the coming years. The Government of Nigeria also released two vitamin A maize hybrids in 2012 (see page 9).

- The Rwandan government released five new varieties of iron beans to combat iron deficiency. There is widespread optimism that farmers will respond positively, as these colorful beans are both nutritionally superior and aesthetically appealing (see page 11).

- The Zambian government released three vitamin A maize varieties that were quickly taken up by three seed companies. These new varieties have met with widespread support from everyone from farmers to schoolchildren, and they even caught the eye of Zambia’s First Lady Dr. Christine Kaseba (see page 13).

- Thanks to a partnership with India-based Nirmal Seeds Pvt. Ltd., Maharashtrian farmers were the first to grow an improved version of a traditional pearl millet variety that not only provides more iron but also is higher yielding (see page 17).

The Verdict Is In: Orange Sweet Potato Improves Nutrition

New evidence shows conclusively that orange sweet potato (OSP) can provide significant amounts of vitamin A to malnourished Ugandan children and women. HarvestPlus is now scaling up OSP to reach another 225,000 households in Uganda by 2016 (see page 4 and 12).

HarvestPlus Expands Reach into Latin America and Caribbean

Latin American and Caribbean (LAC) countries will now benefit from a renewed effort to improve nutrition and public health. AgroSalud, a program that has been developing more nutritious staple food crops for LAC, has been integrated into HarvestPlus (see page 9).

Going Global with Biofortified Foods

Generating global demand for biofortified foods can contribute to biofortification’s positive impact on public health. In 2012 HarvestPlus obtained Member with Observer Status for the International Food Policy Research Institute in the Codex Alimentarius Commission in order to be able to directly contribute to the development of standards on biofortification (see page 21).

HarvestPlus Joins New CGIAR Program to Improve Nutrition

In 2012 HarvestPlus came under the umbrella of the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) that is led by IFPRI. The program brings together CGIAR centers and researchers across agriculture, nutrition, and health spectrums to develop solutions for improving human nutrition and health.
A study published in the Journal of Nutrition showed that orange sweet potato (OSP) can provide significant amounts of vitamin A to malnourished Ugandan children and women. From 2007–2009, OSP was disseminated to more than 10,000 farming households in Uganda where sweet potato is an important staple food. More than 60% of households adopted, grew, and ate the OSP.

As a result, vitamin A intake increased by two-thirds for older children and nearly doubled for younger children and women. OSP also contributed more than half of the total vitamin A intake for children age 6–35 months. There was also a small positive impact on the amount of vitamin A in the blood among children 5–7 years who had lower levels of vitamin A at the project start.

Children enjoying OSP at a farm in Maro village, Buyende District, Uganda. The fun was captured by Anna-Marie Ball, HarvestPlus Country Manager for Uganda.
Brazil

BioFORT Brasil, coordinated by Embrapa (the Brazilian Agricultural Research Corporation), brings together over 150 Brazilian partners—including 13 Embrapa units, numerous universities, state governments, NGOs, farmer associations, and researchers—to achieve its goal of improving health through foods that Brazilians eat every day.

In 2012 BioFORT continued to develop nutrient-rich varieties of rice, sweet potato, bean, cowpea, cassava, maize, wheat, and pumpkin. Ten nutrient-rich varieties of beans, cassava, cowpea, and sweet potato have already been released, with the release of vitamin A maize planned for 2013.

Thanks to renewed support and additional funding from the Brazilian government, BioFORT was able to expand even further in 2012. Over 60 demonstration plots were set up in 2012—double the amount of the previous year. These plots supplied 1,860 smallholder farming households in the poorest areas of northeast Brazil with biofortified seeds and stems. With the additional financial support, BioFORT has also committed more resources to studying the nutritional impact of biofortified crops in Brazil and identifying the most effective channels for reaching rural farmers with biofortified crops.

BioFORT has identified one potentially life-changing way to improve nutrition for children—school-feeding programs. These programs already rely on smallholder farmers for 30% of the produce used in the schools. But 10 cities are taking that commitment one step further and have added iron beans, vitamin A cassava, and OSP to their feeding programs as part of a pilot project. Not only does this benefit the children, it also ensures that small-scale farmers who grow biofortified crops have a secured market for their harvests.

HarvestPlus China

The HarvestPlus China (HPC) program is committed to developing nutrient-rich varieties of maize, OSP, rice, and wheat that Chinese farmers and households rely on. In 2012 HPC expanded its programmatic focus beyond the field of plant breeding. HPC identified an independent nutrition team that will be responsible for testing the efficacy and effectiveness of the biofortified crops. HPC also increased its efforts to promote public understanding of biofortification with the release of a new promotional brochure and an updated website (www.HarvestPlus-China.org), as well as additional outreach to the media.

Latin America and the Caribbean (LAC)

HarvestPlus expanded its reach in 2012 to include LAC. Previously, biofortification efforts in this region were coordinated by AgroSalud, based at CIAT, which has now been integrated into the HarvestPlus portfolio. With the backing of HarvestPlus, AgroSalud will focus its attention on three priority countries—Guatemala, Haiti, and Nicaragua—where women and children suffer from the highest levels of vitamin and mineral deficiencies in the region. The rural
poor in these countries get the majority of their calories, but few nutrients, from staple crops such as beans, maize, cassava, and rice that will be targeted for biofortification.

An initiative started by AgroSalud continues to provide technical support to Panama, where biofortification is already a priority. In 2012, partners from the Agricultural Research Institute of Panama (IDIAP), the National Board of Nutrition, the Ministry of Health, Office of the First Lady, Ministry of Social Development and Agriculture, and the University of Panama set priorities for biofortified rice, maize, beans, and cassava under the National Biofortification Project of Panama. HarvestPlus is also helping to strengthen seed systems in Panama that lack the capacity to multiply and distribute quality nutrient-rich seeds, which is a challenge in most developing countries.

Collaboration with the private sector in Colombia is paving the way for a future filled with biofortified processed foods, such as typical Colombian products (mazamorra and natilla) made from biofortified maize, biofortified rice noodles, and vitamin A cassava or sweet potato flour. In addition to supporting efforts to grow and multiply nutrient-rich crops in Colombia, a new partnership with Pampa Ltda. will guarantee a market for these crops grown by rural farmers.

**HarvestZinc Fertilizer Project**

Micronutrient deficiencies aren’t just a problem for people—they can also cause major problems for plant health. When plants lack zinc, for example, their productivity and nutrient content can decrease significantly. Today, nearly 50% of the soils used to grow cereal crops is believed to be zinc deficient, resulting in lower yields and poor health for the crops.

The HarvestZinc Fertilizer Project, supported by HarvestPlus and fertilizer companies, studies agronomic biofortification, a technique that uses fertilizers to improve the zinc content of food crops. With zinc-containing fertilizers, farmers are able to significantly increase the zinc content in staple crops like rice and wheat, thus building on already higher levels of zinc that have been bred into the crop through biofortification. The combination of these agricultural tools has a synergistic impact on the amount of zinc in the crop, benefiting both the plant and the people eating it. Depending on how zinc deficient the soil is, application of zinc fertilizers may also improve grain yield.

In 2012 HarvestZinc researchers continued building the evidence base for the use of zinc-rich fertilizers. New field studies confirmed previous findings that applying zinc to crops’ leaves through foliar spraying rather than to the soil results in substantial increases in levels of grain zinc, particularly in wheat. The studies also found that the impact was even greater when urea is included and that fungicides and insecticides could be added into spray solution without interfering with zinc accumulation in the grain. HarvestZinc also continued to spread the word about zinc fertilization with three “Zinc Days” in Pakistan, Mexico, and China. With presentations and field visits, these events attracted farmers and agronomists, as well as doctors, students, and private sector representatives.
Vitamin A SWEET POTATO
Released: 2007
Target country: Uganda
Benefits to farmers: High yielding, virus resistant, drought tolerant
Benefits to consumers: Provides up to 50–100% of daily vitamin A needs. Commonly grown sweet potato varieties provide almost none.

Vitamin A MAIZE
Released: 2012
Target country: Zambia
Other countries: Nigeria
Benefits to farmers: High yielding, disease and virus resistant, drought tolerant
Benefits to consumers: Provides up to 25% of daily vitamin A needs. Commonly grown maize varieties provide almost none.
Goal: Provide 60% of daily vitamin A needs through fully biofortified maize.

Vitamin A CASSAVA
Released: 2011
Target country: Nigeria
Other countries: DRC
Benefits to farmers: High yielding, virus resistant
Benefits to consumers: Provides up to 25% of daily vitamin A needs. Commonly grown cassava varieties provide almost none.
Goal: Provide 50% of daily vitamin A needs through fully biofortified cassava.

Iron BEANS
Released: 2012
Target country: Rwanda
Other countries: DRC, Uganda
Benefits to farmers: High yielding, virus resistant, heat and drought tolerant
Benefits to consumers: Provides up to 45% of daily iron needs. 14% more than commonly grown bean varieties.
Goal: Provide 60% of daily iron needs through fully biofortified beans.

Determining Benefits to Consumers
We use adult women in the target countries as a reference to determine potential nutritional benefits to consumers. Children age 4–6 years obtain about the same percentage of their daily needs as adult women because although their average daily food intake is lower, their requirements are also about half that of an adult. Dietary surveys are used to validate the average amount of the food crop eaten and how often it is eaten. The amount of a bioavailable nutrient each crop can provide also depends on local food storage and preparation methods and normal consumption habits in the target country. Thus, benefits for consumers in other countries may not be the same unless food consumption and preparation patterns are very similar. Note that our calculations are based on the best available data and can change. In any population, there are also people whose needs will be below or above the estimated average requirement. In most cases, biofortified crops can provide 50% to 70% of the nutrient requirement; other foods in the diet may provide additional amounts that are needed. Note: All crops are conventionally bred.
Whenever the Democratic Republic of Congo (DRC) is mentioned, many people will immediately think of a large country plagued by conflict. But for HarvestPlus, the DRC is a country full of promise—a promise of iron beans and vitamin A cassava. Six in ten children in DRC are estimated to be vitamin A deficient. These nutrient-rich crops could have a significant impact on reducing the staggering rates of hidden hunger, particularly among children.

**Iron BEANS**

In the eastern part of DRC, bordering Rwanda, HarvestPlus has partnered with over 30 international and local partners to deliver iron beans to rural farmers. More than 35,000 seed packs of previously released varieties were disseminated to farmers in six provinces this year. At least four new bush and climber varieties will be released in 2013 by DRC’s national agricultural research organization, the Institut National pour l’Etude et la Recherche Agronomiques (INERA). Partners began multiplying these seeds in preparation for dissemination to farmers in 2013. Radio and TV spots explaining the nutritional benefits and touting the high yields of iron beans were also broadcast throughout 2012 in French, Kiswahili, and local languages.

**Vitamin A CASSAVA**

Over 1,500 miles away in the western part of the country, HarvestPlus is introducing vitamin A cassava with the goal of reaching 25,000 households in 2014. INERA is leading the way for stem multiplication, growing plots of vitamin A cassava in 6 provinces. A dozen additional partners received planting materials to begin multiplying and were trained on how to ensure the highest yields and healthiest crops.

HarvestPlus is always looking for more efficient and cost-effective methods to improve the breeding process. In DRC, INERA is using iCheck™ Carotene to test the carotenoid (vitamin A) content of cassava samples. This portable device allows plant breeders to test samples in the field and rapidly identify the best cassava samples for breeding even more vitamin A-rich varieties.

Did You Know?

Cassava is considered a survivor crop, able to withstand higher temperatures—and even drought—brought on by climate change.

“I really appreciate the way this project is implemented: a participatory approach of testing micronutrient-rich varieties and regular monitoring of field activities. **When working together instead of working separately, there is an opportunity to discuss things, exchange experiences, and profit from others’ knowledge. Together we are engaged in spreading micronutrient-rich varieties in order to fight hidden hunger that is weakening our country.**”

— Ms. Mamie Basila, Coordinator, GROUPEDI
**Vitamin A CASSAVA**

In March 2012 yellow cassava gained national attention in Nigeria when the Honourable Minister of Agriculture, Akin Adesina, launched three new vitamin A cassava varieties at a colorful ceremony at the National Root Crops Research Institute (NRCRI). Adesina has set an ambitious goal of reaching almost two million farmers in the next three years under the government’s Agricultural Transformation Agenda. Achieving this goal would go a long way towards providing much needed vitamin A to the 30% of Nigerian children who are estimated to be vitamin A deficient.

In order to meet this challenge, HarvestPlus is building partnerships to rapidly multiply and distribute this vitamin A-rich root crop. Unlike most crops, cassava is grown from stem cuttings taken from mature plants, so the trick is to grow as many stems as possible, as quickly as possible. About 500 extension agents were trained on best practices for producing large amounts of planting material—a rather time consuming process, since cassava has only one growing season a year. Fifteen partners in Imo, Oyo, Akwa-Ibom, and Benue states joined forces with HarvestPlus to multiply cassava on more than 500 hectares.

This is a rather daunting task. To plant 1 hectare of cassava, you need about 3,000 one-meter stem cuttings. Throughout most of Nigeria, farmers use cutlasses, shears, or saws to cut stems and typically only cut about 600 stems a day using this method. To speed things up, HarvestPlus designed a new method for mass cutting of yellow cassava stems. Stems are piled up in a rack, and with a small gaspowered chainsaw, 2 people can cut through the pile of stems at once, producing 80,000 cassava cuttings from 20,000 stems over the course of a day. This has reduced labor costs for cutting stems from $US35 to $US5 per hectare. All HarvestPlus cassava multiplication partners are equipped with a rack and a chainsaw, allowing for a low-tech solution to a big problem.

Through other technological advances, HarvestPlus increased stem availability 500 fold from 500 bundles in 2010 to 250,000 in 2012, demonstrating that commercial stem multiplication is profitable. The HarvestPlus team also figured out a way to increase the shelf life and vigor of stems after planting. Basically, stems are bundled together and enclosed in a clear plastic bag. This provides a minigreenhouse environment in which the cuttings start producing roots and sprouting leaves, giving them a head start before being planted. NRCRI and IITA are also developing future varieties of vitamin A cassava with even more vitamin A that should be released next year at the same time as farmers will begin receiving over 250,000 bundles of vitamin A cassava stems.

Ask any Nigerian what she ate for lunch, and she will most likely answer gari, fufu, or some other version of prepared cassava. However, tastes vary by region. In Imo state, for example, they add palm oil to give their cassava a desirable yellow color, while residents of Oyo state prefer white...
HarvestPlus set out to test how well vitamin A cassava—which is naturally yellow in color—would be accepted in these two states.

The yellow color of this new root comes from beta-carotene, a form of vitamin A in the crop. Results showed that consumers in both states liked the vitamin A cassava, and, in this controlled scenario, were even willing to pay more for it when they knew about its added nutritional benefit. In some cases, consumers even preferred the yellow variety over the white varieties whether or not they knew about the additional vitamin A. These results and others from recent studies provide important insights that will inform marketing and dissemination strategies.

Researchers have found that when vitamin A cassava is eaten regularly, the body is able to use the vitamin A more effectively than originally assumed. But nutritionists also found that the longer the yellow cassava is stored as gari, a common Nigerian preparation of cassava that involves grating and drying, the less vitamin A it will provide. These findings will need to be integrated into nutrition and marketing messages.

**Vitamin A MAIZE**

The second most important staple crop in Nigeria after cassava is maize, which is eaten daily by about 20% of households, particularly in the northern part of the country. The Government of Nigeria released two vitamin A maize hybrids in 2012. These varieties were developed by IITA in partnership with the Institute of Agricultural Research and Training (IAR&T). IITA is bulking up seed quantities in order to provide farmers in maize-growing areas with seed by 2015. These new maize varieties are also well suited to the tropical lowlands of many West African countries and are expected to spread beyond Nigeria’s borders.
Did You Know?
Rwandans who eat iron beans get a big bang for their buck — almost 100% of the iron in the beans is retained during cooking.

Iron BEANS
Martha Birungi (pictured above) is a bean farmer in the Eastern Province and the first woman to start multiplying iron bean varieties. For Ms. Birungi and her community, beans are an essential part of their diets. She proudly shows off her rows of climber beans to fellow farmers, boasting about their high yields and resistance to disease and pests. As a woman farmer, she is particularly keen on encouraging other women to grow these nutrient-rich beans, which provide much needed iron for themselves and their children.

The Government of Rwanda officially released five iron-rich bean varieties that were developed by the Rwanda Agriculture Board (RAB), in collaboration with the International Center for Tropical Agriculture (CIAT) and HarvestPlus. Thanks to partnerships with cooperatives, agrodealers, and even churches, more than 136,000 Rwandan households received iron bean seed packs over the course of the year—well beyond the original goal of 100,000 households.

Iron beans are being backed by the World Food Programme, which is now including iron beans in its emergency relief programs. Biofortification is also receiving support from the Rwandan government, particularly from the Ministries of Agriculture, Health, and Education. And in communities, local leaders are eagerly devoting large plots of their land to the new varieties.

In order to connect with farmers who may not have access to traditional bean markets, the Rwandan team has partnered with extension agents to set up a new payback mechanism. Farmers receive iron beans from their local extension office and grow the seed with support and supervision from an extension officer. Thanks to the high yields that iron-rich varieties offer, farmers are able to pay back the seed they received and still have plenty left to eat, sell, or give to neighbors. It is a win-win system for farmers and for HarvestPlus, which then shares the payback beans with other partners such as the World Food Programme. So far the program has been popular among farmers, has increased bean production, and has shown payback rates of up to 80%.

Understanding how beans are distributed, and the various players involved, is essential. A 2012 study found that most farmers eat the beans that they grow, selling very few. This suggests that the added iron in the beans could improve nutrition for these household. In addition, nutrition studies on the medium-term impact of iron beans on the nutrition and health of young adult women are underway in southern Rwanda and will yield results by the end of 2013.

“This was my first time to work on biofortified beans. Thanks to HarvestPlus I can confidently sell quality, treated, labeled, and packed bean seed to farmers. HarvestPlus also helped me market my products in a way that farmers adopt the culture of buying seed. I see that through our partnership with HarvestPlus all farmers will grow and eat iron beans as we engage to reach as many farmers as possible.”
— James Akananiyundi, Agrodealer, Jabana, Gasabo
Did You Know?

Orange sweet potato is an excellent source of vitamin A. When children 6-35 months regularly eat just an ice cream scoop-sized portion of OSP, their vitamin A intake increases by 50%.

On a rainy Saturday morning in Kisoro district, Juliet Muhawe rides her bicycle to meet her farmers' group. Today she is going to train them on how to conserve their orange sweet potato (OSP) vines after harvest. OSP was distributed to 10,000 households from 2007–2009 to provide more vitamin A in Ugandan diets. Since then, the program has expanded to include 14 districts and also to feature a new crop—iron beans. Uganda is the first country in Africa where HarvestPlus is testing such a “food basket” approach, introducing more than one biofortified crop.

Ms. Muhawe is just one of over 300 community resource persons (CRPs) who were trained by local non-governmental organizations to provide farmers with agronomic and nutrition education about OSP and iron beans. Ms. Muhawe’s training has also empowered her to prepare balanced and healthy meals for her family.

In 2012, close to 10,000 Ugandan households received OSP vines and iron beans. An additional 11,000 households received OSP vines through a payback system in which project farmers shared vines with neighbors or family members. The project is growing in informal ways too. Specioza Kusemererwa is a primary school teacher in western Uganda. When she learned about OSP and its boost of vitamin A, she decided to grow some at her school and then share the vines with her students and their parents. Thanks to Ms. Kusemererwa and her impressive initiative, an additional 30 households are now growing OSP.

The goal of improving nutrition in Uganda is not limited to rural areas. Over 800 commercial farmers have also received OSP planting materials. The OSP they grow will be used to supply urban areas of the capital Kampala and ensure a supply of OSP all year.

But how does HarvestPlus and its partners keep track of all these activities? The team in Uganda trained partner organizations on how to collect data and show the impact of the program. They are now able to monitor project progress in a timely manner, identify weaknesses, and fix problems before it is too late. This data also aids in reporting to donors and stakeholders.

One of the benefits of OSP is that farmers can regrow the vines year after year. However, this recycling can cause viruses to build up over time in the vines, leading to lower yields. Often farmers will then reject these varieties in favor of higher yielding ones. That is why HarvestPlus has, for the first time, partnered with the private laboratory BioCrops to provide “clean” OSP planting materials. These “cleaned” OSP vines are virus free and will ultimately produce higher yields. BioCrops has sold the new vines to multipliers who will use demonstration plots to show off the high yields, encouraging farmers to keep growing OSP.

“Through this partnership we have the opportunity to develop the sweet potato seed system together. As a young company, we have appreciated the risk-sharing because alone it would have been too much of a risk for us. One of the goals of our company is using bio-innovation to bring sustainability to the agriculture sector, and this project was an opportunity for us to put this into action. We are scientists who want to translate our research results into high-value products that change people’s lives” — Dr. David Talengera, Director, BioCrops
Vitamin A MAIZE

It’s not often that you can get the attention of Zambia’s First Lady Dr. Christine Kaseba, but the bright orange display of vitamin A maize at a 2012 agricultural show caught her eye. She was even adventurous enough to pick up her own bag of orange vitamin A maize meal. The maize meal is the culmination of years of research in partnership with the International Maize and Wheat Improvement Center (CIMMYT) that led to the release of three vitamin A hybrid maize varieties in 2012 by the Zambia Agriculture Research Institute (ZARI).

More than 500 farmers, women’s groups, and schools were given these vitamin A maize varieties to test in 2012. These on-site demonstration plots were monitored by extension agents and have created quite a stir in local communities. In one village, extension agents learned that they couldn’t advertise which fields were orange maize test plots because some community members would come in and take the bright orange cobs.

To meet the growing demand for orange maize, HarvestPlus has partnered with three seed companies, Zambia Seed Company, SeedCo, and Kamano Seed Company, to produce vitamin A maize seed. This partnership with the private sector gives HarvestPlus a leg up in a rather competitive seed market and ensures that farmers will have access to the seed. HarvestPlus will also use the government-sponsored Farmer Input Support Programme to grow market demand for the new maize.

But will farmers snap up the new vitamin A maize? To get an idea, HarvestPlus followed up with farmers who tested vitamin A maize in their fields last year. Farmers said they liked the size of the cobs and the overall yield. They also rated the taste better than white maize whether as freshly boiled maize or nshima (a traditional porridge). These consumer insights are being used to design marketing campaigns to ensure adoption. A key part of the messaging is explaining the benefits of vitamin A in the diets. This is crucial given that more than half of children under five in Zambia are estimated to be vitamin A deficient.

Nutrition studies on the health benefits of vitamin A maize are also underway. Technicians from the Tropical Disease Research Centre (TDRC) and ZARI were trained in the complex process of testing carotenoid levels in orange maize samples. These samples previously had to be sent to Mexico for testing. Building local capacity speeds up the evaluation of carotenoid levels in maize. It is these carotenoids that are converted to vitamin A when the maize is eaten.

HarvestPlus also expanded its partnerships in the region to test vitamin A maize in Malawi, Zimbabwe, Ethiopia, Uganda, the Democratic Republic of Congo, and Rwanda. This large-scale testing will generate valuable data on how these crops perform in diverse environments, which helps get new varieties to market and into the hands of farmers throughout Africa more quickly.

“The decision to grow orange maize was a personal one. I believe in healthful living and thought HarvestPlus crops could contribute to my health and that of my family. This is something that I can support in my community. It will be easier for my fellow farmers to adopt these crops once they see us lead farmers growing these crops.”

— Mr. Maybin Mwinga, Lead farmer, Waterfalls, Lusaka district
Improving nutrition through food crops has at its heart a small seed. But this seed will not grow without a nurturing environment. HarvestPlus seeks to provide such an environment for biofortification through a variety of advocacy initiatives at all levels.

In February, HarvestPlus director Dr. Howarth Bouis spoke at the Economist’s inaugural Feeding the World Summit in Geneva and discussed how food price increases can result in poorer nutrition for rural households.

Soon after this, in May, the G8 countries pledged to “support the accelerated release, adoption, and consumption of biofortified crops, crop diversification, and related technologies to improve the nutritional quality of food in Africa.”

This endorsement was followed by the highlight of the year—the Global Hunger Event held in London. The event was held on the closing day of the 2012 Summer Olympics and was hosted by British Prime Minister David Cameron and Brazilian Vice President Michel Temer. Bouis was joined at the event by Ashish Wele, CEO of HarvestPlus’s private sector partner in India, Nirmal Seeds, and orange sweet potato breeder Maria Andrade from the International Potato Center. All three spoke convincingly about the progress made in biofortification. In his blog post following the event, Bouis invoked the Olympian spirit required to bridge the delta between agriculture, health, and nutrition.

Across the Atlantic, the Washington D.C.-based Center for Strategic and International Studies hosted a seminar, Biofortification: Leveraging Agriculture to Improve Nutrition, that included speakers and participants from the private sector, international agencies, non-governmental organizations, and universities.

Bouis was invited to participate in Nutrition on the Table: Micronutrients and Global Child Survival, a panel hosted by the Aga Khan Foundation and Micronutrient Initiative in Ottawa in September. He joined fellow panelists, including early childhood development expert Dr. Robert Black, to discuss how to ensure that all children get the vitamins and minerals they need early in life.

HarvestPlus also joined forces with the World Food Programme’s Purchase for Progress (P4P) initiative in Rwanda. Through this new collaboration, 1,700 P4P growers will multiply iron-rich beans for distribution to farming households. Some of these beans will also be used by P4P to provide a nutritional boost to the millions of displaced persons living in Rwanda’s refugee camps. In Zambia, the National Nutrition Strategy launched in 2012 calls for micronutrient enrichment as part of the government’s commitment to the global Scaling Up Nutrition (SUN) initiative. Biofortification is also being proposed in other countries’ national plans.

In the year to come, HarvestPlus will continue exploring new ways to link country-level activities with global advocacy, as well as vigorously pursuing the further integration of biofortification into regional and global entities. These include SUN, the Comprehensive Africa Agriculture Development Program (CADDP), the World Health Organization (WHO), and the Food and Agriculture Organization (FAO), among others.
Iron
PEARL MILLET

Released: 2012
Target country: India
Benefits to farmers: High yielding, mildew resistant, drought tolerant
Benefit to consumers: Provides up to 60% of daily iron needs, 20% more than commonly grown pearl millet varieties.
Goal: Provide 70% of daily iron needs through fully biofortified pearl millet.

Zinc
WHEAT

Release: 2013
Target country: India
Other countries: Pakistan
Benefits to farmers: High yielding, disease resistant
Goal: Provide 60% of daily zinc needs through fully biofortified wheat, 20% more than commonly grown varieties.

Zinc
RICE

Release: 2013
Target country: Bangladesh
Other countries: India
Benefits to farmers: High yielding, disease and pest resistant
Goal: Provide 80% of daily zinc needs through fully biofortified rice, 35% more than commonly grown varieties.

DETERMINING BENEFITS TO CONSUMERS
- We use adult women in the target countries as a reference to determine potential nutritional benefits to consumers. Children age 4–6 years obtain about the same percentage of their daily needs as adult women because although their average daily food intake is lower, their requirements are also about half that of an adult.
- Dietary surveys are used to validate the average amount of the food crop eaten and how often it is eaten. The amount of a bioavailable nutrient each crop can provide also depends on local food storage and preparation methods and normal consumption habits in the target country. Thus, benefits for consumers in other countries may not be the same unless food consumption and preparation patterns are very similar. Note that our calculations are based on the best available data and can change. In any population, there are also people whose needs will be below or above the estimated average requirement. In most cases, biofortified crops can provide 50% to 70% of the nutrient requirement; other foods in the diet may provide additional amounts that are needed. Note: All crops are conventionally bred.
Zinc RICE

Over 160 million Bangladeshis depend on good rice harvests to feed their families and provide some income. But the effects of climate change in this coastal country are having a devastating impact on harvests. Rising temperatures, erratic rainfall, rising sea levels, and frequent cyclones make growing rice even more challenging and costly. An increase in the price of rice results in households having less money to buy nutrient-rich foods. Bangladeshi children suffer from high rates of malnutrition. More than 40% of children are stunted, often caused by a lack of zinc in children’s diets.

What if it’s possible to increase the amount of zinc in rice while also helping Bangladeshi farmers deal with the unpredictable effects of climate change? Working with HarvestPlus researchers at IRRI, the Bangladesh Rice Research Institute (BRRI) is doing just that. Rather than following the common practice of flooding rice fields, farmers are now using alternate wetting and drying (AWD) irrigation, which reduces the need for electrical or diesel pumps and a large supply of water in the dry season. A trial of zinc-rich rice grown under AWD conditions found that the practice also results in higher levels of zinc, therefore increasing the nutritional content while requiring fewer inputs from the farmers.

BRRI is not only a research organization—it also partners with the private sector and non-governmental organizations to multiply and sell seed. Following two years of testing, three zinc-rich lines will be submitted for official release in 2013. BRRI will then use their vast network to multiply the officially released seed and distribute it to farmers.

Did You Know?

Zinc deficiency causes a wide range of problems in children, including diarrhea, slowed growth, lack of appetite, and increased risk of infection.

“BRRI has partnered with HarvestPlus for many years. Working together has a great value for us as we get support and benefit from a pool of versatile experts that HarvestPlus has gathered. We can own and celebrate our success together. We can also share the grief of our abortive attempts, which helps to relieve the pressure when taking risks.” — Dr. Alamgir Hossain, Bangladesh Rice Research Institute
Mr. R.O. Patil, Chairman and Managing Director of Nirmal Seeds, will be the first to tell you why iron pearl millet is so important for India. He said, “together with HarvestPlus, Nirmal Seeds is adding much-needed iron to Indian diets, thus helping communities overcome malnutrition.” It is thanks to this private-public partnership that ICTP-8203 Fe, a new iron pearl millet variety grown in the semi-arid regions of the country, was commercialized in Maharashtra, India in 2012. Over the course of the year, 35,000 farmers bought 180 tons of ICTP-8203 Fe to plant on their farms. In a region of India where 48% of women and 63% of children under five suffer from iron deficiency, ICTP-8203 Fe could provide much needed dietary iron.

As any marketing expert will tell you, a product’s packaging should make a bold statement to customers and is crucial for differentiating a product from its competitors. In collaboration with Indian marketing firm Tempest Advertising Pvt. Ltd., HarvestPlus designed branded seed packs and marketing materials to promote ICTP-8203 Fe. Now when farmers go to buy their pearl millet seed, they are greeted on the package by “Shaktiman”—the image of a strong farmer.

Farmers don’t just choose varieties based on how well they grow or fight off disease; they want to make sure they taste good too. A consumer acceptance study found that even in the absence of nutrition information about the benefits of the additional iron, pearl millet farmers preferred ICTP-8203 Fe, particularly in terms of color and grain size. Most families in Maharashtra mill their pearl millet into flour and use it to make bhakri, a flat bread, and the study found that participants liked the taste of bhakri made with ICTP-8203 Fe as much as that made with conventional pearl millet. The study also tested consumers’ reactions to different marketing approaches and found that they were willing to pay more for pearl millet that had an international certification and branded with the HarvestPlus logo.

While pearl millet is an important food crop for 50 million Indians, wheat and rice are the core of most Indian diets. Zinc rice and zinc wheat for India are under development and will be released in the coming years. Zinc is an important micronutrient that is needed for growth and development in children.
The development of zinc wheat varieties is a result of a large collaboration involving CIMMYT, the Banaras Hindu University, Punjab Agricultural University, the Directorate of Wheat Research, and the Indian Agricultural Research Institute. Three of the varieties that show promise—both in terms of increased zinc content as well as agronomic performance—are being multiplied by Shyam Seeds and Mahamana Krishak Cooperative. In 2013 Shyam Seeds and Banaras Hindu University will distribute 5 kg mini-kits of the new promising lines as truthfully labeled seeds to farmers. These mini-kits will be used to grow demonstration plots where farmers can evaluate the yield and performance of the zinc-rich potential varieties, as well as allowing partners to identify the best varieties to commercialize or submit for official release. The new varieties will eventually be distributed to farmers in eastern India where the majority of the country’s wheat is grown.

To ensure that Indian farmers have access to zinc rice, HarvestPlus relies on local breeders from the Directorate of Rice Research, the Central Rice Research Institute, and Indira Gandhi Krishi Vishwavidyalaya (IGKV) University, among others. In 2012, these partners identified over 70 promising rice leads with higher amounts of zinc. These leads will next be tested to see how well they perform in local farmers’ fields.

**Did You Know?**
The highest rates of anemia and stunting in India are associated with diets that rely heavily on wheat and rice.
**Zinc WHEAT**

When you walk into any home in Pakistan, chances are that the aroma of warm *chapatis* will be the first thing that greets you. In this country of 176 million people, some form of bread, whether as *chapatis*, *naan*, or *roti*, accompanies every meal. While no meal is complete without bread, it does not provide enough nutrients. In fact, almost half of women and 40% of children under five in Pakistan are estimated to be zinc deficient. HarvestPlus has therefore partnered with the Pakistan Agricultural Research Council (PARC) and the International Maize and Wheat Improvement Center (CIMMYT) to develop wheat that is rich in zinc.

In 2012, three zinc-rich wheat lead lines were chosen from regional trials in Pakistan’s four provinces to be entered into national trials. These leads have similar yields to varieties currently in the market and are resistant to yellow rust, leaf rust, and Ug99, a fungal infection that can devastate a crop. In addition to zinc, the three lines also have higher iron levels.

If all goes well, one or more of these new zinc-rich varieties will be released in Pakistan in 2015 following two years of national trials and a year of adaptability trials. HarvestPlus is laying the foundation now for the distribution of zinc wheat by building partnerships with Pakistan’s largest fertilizer company, as well as national and international seed companies, farmers associations, flour millers, food processors, and non-governmental organizations working in rural areas. This strong network will facilitate the organization of demonstration plots and farmers’ meetings and ensure the availability of seed and inputs.

Breeding for zinc wheat was greatly enhanced in 2012 with the use of X-Ray fluorescence analysis, a technology used in the mining industry to determine the mineral content of soil and plant samples. This compact machine is about the size of a desktop printer and was installed at the National Agricultural Research Centre (NARC) in Islamabad. The new technology allows local plant breeders to identify promising wheat varieties with higher levels of iron and zinc that can be used in future breeding efforts. Rather than having to send samples to Australia for analysis, NARC breeders can do it themselves in less time and at a lower cost.

“**In the present era, only a multidisciplinary approach can win the hearts of farmers and the public. Therefore, we chose to work with HarvestPlus. In addition to farmer education programs, we provide soil, water, and fertilizer testing services at a farmer’s doorstep, free of cost. Because of our already established farm advisory network, we feel no hesitation in shouldering the responsibility of disseminating high-zinc wheat varieties in collaboration with public sector partners across the country.**” — Dr. Munir Hussain Zia, R&D Coordinator, Fauji Fertilizer Company
A Maharashtran farmer poses with his purchase of a new iron-rich pearl millet variety that came on the market in 2012. He planted it during the kharif (summer) season which is when pearl millet is generally grown. Pleased with the results, he came back in December to buy more to plant in the rabi (winter) season.

Bhushana Karandikar, a HarvestPlus collaborator, happened to be in the shop conducting a farmer feedback survey and caught the moment on camera.
Setting Standards for Biofortification

As biofortified foods are shown to improve public health, these crops will begin to spread beyond rural areas to urban markets and consumers. Farmers stand to benefit economically when there is a stronger market for a range of products made with biofortified staple crops. The large-scale production of, demand for, and use of biofortified foods can contribute to the positive impact of biofortification on public health in the long term. With this in mind, HarvestPlus successfully undertook the process necessary to obtain Member with Observer Status for IFPRI in the Codex Alimentarius Commission in order to be able to directly influence any standards work on biofortification.

The Codex Alimentarius Commission, established in 1963 by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), develops harmonized international food standards, as well as guidelines and codes of practice to protect the health of the consumers and ensure fair practices in the food trade. The Commission also promotes coordination of all food standards work undertaken by international governmental and non-governmental organizations. Thus IFPRI’s membership links HarvestPlus and biofortification with the internationally recognized body that develops standards, codes of practice, guidelines, and recommendations on food.

One of the first challenges being addressed in Codex Committees is seeking a common internationally accepted definition of biofortification. In 2012, IFPRI provided Discussion Papers that are under consideration by both the Codex Committee on Food Labelling (CCFL) and the Codex Committee on Nutrition and Foods for Special Dietary Use (CCNFDU).
## Financial Summary

### 2012 HarvestPlus Disbursements by Category (In thousand US dollars)

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Development</td>
<td>9,874</td>
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<tr>
<td>Human Nutrition</td>
<td>4,878</td>
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<td>Impact &amp; Policy Analysis</td>
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<tr>
<td>Crop Delivery</td>
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<td>Communications &amp; Development</td>
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<td>Administration</td>
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<td>Country/Region Program Support</td>
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<tr>
<td><strong>Total Unrestricted</strong></td>
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<td>GC9 Project</td>
<td>981</td>
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<tr>
<td>HarvestZinc Project</td>
<td>366</td>
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<tr>
<td><strong>Total Restricted</strong></td>
<td><strong>1,347</strong></td>
</tr>
<tr>
<td><strong>Total Disbursements</strong></td>
<td><strong>29,570</strong></td>
</tr>
</tbody>
</table>

- **Crop Development**: 35%
- **Human Nutrition**: 17%
- **Impact & Policy Analysis**: 5%
- **Crop Delivery**: 26%
- **Communications & Development**: 5%
- **Administration**: 9%
- **Country/Region Program Support**: 3%

**2012 DONORS**

- Bill & Melinda Gates Foundation
- Syngenta Foundation
- CGIAR Stability Funding
- Zinc Project Group

- *Includes funds received in January 2013*
HarvestPlus Staff

Representing more than 20 countries, HarvestPlus team members bring many years of experience across different disciplines and from both the public and private sectors. HarvestPlus team members are based at the International Center for Tropical Agriculture (CIAT) in Colombia and the International Food Policy Research Institute (IFPRI) in Washington, DC. Many are posted in countries where nutrient-rich food crops are being released. There are now HarvestPlus offices or team members in Bangladesh, Brazil, the Democratic Republic of Congo, India, Nigeria, Pakistan, Rwanda, Uganda, and Zambia. A complete list of team members and their biographies can be found on the HarvestPlus website at www.HarvestPlus.org.

Publications & Media


Selected Media Coverage

- The Nutrition Puzzle, The Economist
- Can We Feed Seven Billion?, BBC Future
- Journey to Consumption of Pro-Vitamin A Cassava Varieties in Nigeria, Daily Trust
- X-ray Technology Harnessed to Grow More Nutritious Crops, SciDevNet
- World Must Change the Game to End Malnutrition – HarvestPlus DG, ReliefWeb
- Coffee? Or Lunch? You Choose, ONE blog
- Fighting Hunger with Ancient Genetic Engineering Techniques, Discover Magazine
- How to Transform African Farming: Return to ‘Orphan Crops’, The Christian Science Monitor
- Saving Lives in Africa with the Humble Sweet Potato, National Public Radio
- Combating Hunger, Science Magazine
- ‘Wonder’ Bean Variety Excites Farmers, New Times Rwanda
Partners

HarvestPlus is coordinated by the International Center for Tropical Agriculture (CIAT) and International Food Policy Research Institute (IFPRI), with staff in all countries where we are delivering biofortified crops. We also work with numerous partners across all sectors, truly bridging the delta.

Africa

DEMOCRATIC REPUBLIC OF CONGO

CGIAR Partners
International Institute of Tropical Agriculture (IITA)

Partners in DRC
Association des Cultivateurs et Éleveurs (AJECEDEKI)
Association des Femmes pour la Promotion et le Développement (AFPDE)
Association pour le Développement Endogène de Matadi (ADEM)
Catholic Relief Service (CRS)
Centre d’Adaptation et de Production des Semences Améliorées (CAPSA)
Centre de Développement Rural (CEDER)/Tshela
Centre de Développement Rural de Rutshuru (CEDERU)
DIOBASS
Ferme de Sarah
GIZ
Group Agro Pastoral du Kivu (GAP-Kivu)
LAYUKA
Ministry of Agriculture
Ministry of Health
Ministry of Health National Nutrition Department (PRONANUT)
National Institute for Agricultural Study and Research (INERA)
Plantation Bakulikira
Plantage Kakondo
Production et Multiplication des Semences (PROMUSEM)
SARCAF
Service National de Semences (SENASEM)
SISI Trading
Syndicat pour la Défense des Intérêts des Paysans (SYDIP)
Université Evangélique en Afrique
University of Bukavu
University of Goma
University of Kinshasa

NIGERIA

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Cassava Growers Association of Nigeria
Development Dynamics
Dominican Centre for Training and Development
ENVOY Agricultural Services
Federal College of Agriculture - Akure
Forward Africa
Institute of Agricultural Research & Training (IAR&T)
Ministries of Agriculture, Education, and Health
Justice Development and Peace Commission (JDPC)
National Orientation Agency
National Root Crops Research Institute (NRCRI)
Niji Farms Ltd.
Obafemi Awolowo University
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Senator Adeyemo Women Empowerment Cooperative (SAWEC)
Women in Agriculture

Other Partners
Brazilian Agricultural Research Corporation (Embrapa)
Delhi School of Economics
Greenwich University
SEED Solutions, SEED Infotech Ltd.

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CGIAR Partners
International Center for Tropical Agriculture (CIAT)

Partners in Rwanda
Belgian Technical Cooperation (BTC)
Développement Rural Durable (DRD)
Health and Development Initiative (HDI)
IMBARAGA Rwanda Farmer Federation
Kigali Institute of Science and Technology (KIST)
Ministry of Agriculture (MINAGRI)
Ministry of Education (MINEDUC)
Ministry of Health (MOH)
National Laboratory
National University of Rwanda
Rwanda Agriculture Board (RAB)
Win-Win Agritech
World Food Programme (WFP)

Other Partners
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Flinders University, Australia
Institut des Sciences Agronomiques du Burundi (ISABU), Burundi
Kansas State University
Michigan State University
National Crops Resources Research Institute (NaCRRRI), Uganda - Bean Program
North Dakota State University
Oklahoma State University
Pan-Africa Bean Research Alliance (PABRA)
Penn State University
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Selin Agricultural Research Institute (SARI), Tanzania
Swiss Federal Institute of Technology (ETH-Zurich)
United States Department of Agriculture, Agricultural Research Service (USDA-ARS), North Atlantic
Waite Analytical Laboratory, Australia

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CGIAR Partners
International Potato Center (CIP)

Partners
Africa 2000 Network - Uganda
Caritas - Hoima Diocese
Community Enterprise Development Organization (CEDO)
Makerere University
Mbarara University of Science and Technology - Healthy Child Uganda Project
Millennium Village Project
National Crops Resources Research Institute/ National Agricultural Research Organization (NaCRRRI) - Sweet Potato and Bean Program
Pan-African Bean Research Alliance (PABRA)
Rwanda Agriculture Board (RAB)
Samaritan’s Purse
Volunteer Efforts for Development Concerns (VEDCO)
World Food Programme
World Vision Uganda

Other Partners
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Virginia Tech University
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WorldFish Center
Partners in Zambia:
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Government Ministries: Agriculture, Education, Health
Indaba Agricultural Policy Research Institute (IAPRI)
Kamano Seed
Land O’ Lakes
Micronutrient Malnutrition Taskforce
National Food and Nutrition Commission
National Institute for Scientific and Industrial Research
Programme Against Malnutrition
SeedCo
Tropical Disease Research Center
University of Zambia
Zambia Agriculture Research Institute (ZARI)
Zambia Consumers Association
ZamSeed
Other Partners:
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SEED Solutions, SEED Infotech Ltd.
University of California, Davis
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INDIA

CGIAR Partners
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International Maize and Wheat Improvement Center (CIMMYT)
International Rice Research Institute (IRRI)

Partners in India
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All India Coordinated Pearl Millet Improvement Project (AICPMIP)
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Bayer BioScience Pvt. Ltd.
Bidhan Chandra Agricultural University
Bioseed Research India Pvt Ltd
Birsa Agricultural University
CCS Haryana Agricultural University-College of Home Science, Department of Food and Nutrition
Central Rice Research Institute
Delhi School of Economics
Desert Medicine Research Center, Rajasthan
DevGen Seeds and Crop Tech Pvt. Ltd.
Dhule College of Agriculture
Directorate of Rice Research-India
Directorate of Wheat Research-India
Ganga Kaveri Seeds Pvt. Ltd.
Haryana Agricultural University
Hytech Seed India Pvt. Ltd.
India Biofortification Program
Indian Agricultural Research Institute
Indian Council on Agricultural Research
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JK Agri Genetics Ltd.
J Nehru Medical College
Junagadh Agricultural University
Kaveri Seeds Co. Ltd.
Kesar Enterprises Ltd.
Mahamana Krishak Cooperative
Maharashtra State Seeds Corporation
Mahatma Phule Krishi Vidyapeeth
Mahyco
Metahelix Lifesciences Pvt. Ltd.
Ministries of Agriculture, Health, and Education
MS Baroda University, Gujarat
National Agricultural Research Project (NARP)
National Institute of Nutrition
Nirmal Seeds Pvt. Ltd.
Nuziveedu Seeds Pvt. Ltd.
Samridhi
Pearl Millet Hybrid Parents Research Consortium
Pioneer Overseas Corporation
Punjab Agricultural University

SEED Solutions, SEED Infotech Ltd
Shyam Seeds
SNDT Women’s University, Maharashtra
St. Johns Medical Research Center
Swami Keshvanand Rajasthan Agricultural University
Tempest Advertising Pvt. Ltd.
Vibha Seeds Pvt Ltd

Other Partners
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Commonwealth Scientific and Industrial Research Organization
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Harvard School of Public Health
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Swiss Federal Institute of Technology (ETH-Zurich)
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University of California, Davis
University of Colorado, Denver
United States Department of Agriculture, Agricultural Research Service (USDA-ARS), North Atlantic
Waite Analytical Laboratory
Western Human Nutrition Research Center

PAKISTAN

CGIAR Partners
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Partners in Pakistan:
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Fauji Fertilizer Company
Federal Seed Certification and Registration Department
Innovative Development Strategies
Ministry of Food Security and Research
Pakistan Agricultural Research Council (PARC)
Pakistan Flour Millers Association
Sindh Rural Support Program
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Asia

BANGLADESH

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International Rice Research Institute (IRRI)

Partners in Bangladesh
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Bangladesh Agricultural University
Bangladesh Rice Research Institute (BRRI)
BRAC
International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b)
Mymensingh University
University of Dhaka

Other Partners
Children’s Hospital Oakland Research Institute-CHORI
Commonwealth Scientific and Industrial Research Organization
Flinders University
Harvard School of Public Health
University of Adelaide
HarvestPlus leads a global effort to improve nutrition and public health by developing and disseminating staple food crops that are rich in vitamins and minerals. We work with public and private sector partners in more than 40 countries. HarvestPlus is part of the CGIAR Research Program on Agriculture for Nutrition and Health. CGIAR is a global agriculture research partnership for a food secure future. Its science is carried out by its 15 research centers in collaboration with hundreds of partner organizations. The HarvestPlus program is coordinated by two of these centers, the International Center for Tropical Agriculture (CIAT) and the International Food Policy Research Institute (IFPRI).