



Semilla Nueva Standard Report First Semester January – June 2023

Table of Contents

LETTER FROM THE DIRECTOR	2
EXECUTIVE SUMMARY	3
CONTEXT AND KEY TERMS	5
SUBSIDIZED SEED SALES	7
INSTITUTIONALIZING THE SUBSIDY	12
DEVELOPING BETTER SEEDS	16
IMPACT	20
FUNDING AND ADMINISTRATION	25



LETTER FROM THE DIRECTOR

Kevin Starr, from the Mulago Foundation, trains all of us social entrepreneurs to identify and prioritize inflection points. Mulago sees groundbreaking organization as having three primary phases. In R&D, we figure out a scalable model through lots of experimentation, learning, and sometimes pivots. In growth, we take a model that is starting to work and begin to grow its impact linearly. In scale, that growth becomes exponential. In each one of those phases, we must simultaneously lay the groundwork for the next phase.

Semilla Nueva is firmly in the growth stage now. Our combination of better biofortified seeds and subsidies to seed companies to sell those seeds at lower costs is working. 9% of all of the maize seed sold in Guatemala in 2023 will be biofortified. It's the highest rate of commercial adoption we're aware of worldwide. It is because of this traction that our funders have provided us the resources to begin investing more heavily in laying the groundwork for scale. We owe a huge thank you to new donors (Rippleworks, Shockwave, Focus Central America, Praxis, and others) and significantly increased donations from our current donors (Mulago, Light a Single Candle, Vitol, Dovetail, Eric Martin, RA5, Focus Central America, Pulte, and many more).

The main thread that runs through this report is our attempt to balance the growth that is right in front of us *and* build the foundations for scale. I hope our readers can see how we are beginning to think about the strategies that create synergies between the two, and navigate the tradeoffs. Now more than ever, we must intentionally grow slower in some areas in order to maximize our long-term potential.

This year, this has meant (and means) investing heavily in getting the right, world class leaders on the team. It has meant investing in culture, office space, equipment and supporting policies for staff. It has meant doing our international expansion to El Salvador (and eventually Honduras) slower than we originally thought, in order to maximize our relationships with local governments to later capitalize on their existing seed subsidy programs. In seed development, it has meant diverting some resources away from having the best possible seed in two years, towards allowing us to have the technology that allows all companies to use biofortified seeds in five. In terms of monitoring and evaluation, it has meant prioritizing the development of third-party, publishable studies and randomized controlled trials (RCTs). And over the past years it has meant investing heavily in relationships with USAID and the Guatemalan government; we're proud to be negotiating a grant with them to fund a large subsidy program in Guatemala.

None of this would be possible without the support of our incredible board, advisory board, partners, staff, and donors. To create and support those relationships, we strive to present our dreams, our progress, our failures, and our data as cleanly and honestly as possible. Transparency has meant long nights, hard conversations, and sometimes losing partnerships. But that ethos is built on our conviction to "real development." The world has changed in the past due to efforts like ours, and we can change it now. Yes, it will take a decade more. Yes, I'm personally saying yes to year 15 of living in Guatemala. But our conviction has never been stronger. Thanks to all of you, our readers, hundreds of millions of the most vulnerable people on the planet will get the nutrition they deserve and need to flourish, we'll make millions of small farmers wealthier in the process, and we'll generate another story of audacity, optimism, transparency, rigorous self-monitoring, and hard work winning the day.

-Curt Bowen



EXECUTIVE SUMMARY

Subsidized Seed Sales

- Overall sales of biofortified seed increased 50% compared to mid-year 2022.
- Partner seed companies increased sales 123%.
- In 2023, 8% of the seed sold in Guatemala will be Semilla Nueva's new biofortified hybrid F5, the fastest rollout of a new seed by national seed companies in more than 20 years.
- Seed companies will continue producing F5, but we made mistakes in our rollout of our new hybrid F7 that are preventing seed company adoption. F7 may have lower yield than expected in some regions.
- Our seed subsidy increased 10% in order to compensate for higher seed production costs due to an 88% increase in fertilizer prices.
- In 2024, Semilla Nueva will stop promoting our brand and instead promote a brand that includes all partnering seed companies.
- NGO distribution of non-commercial seed to farmers will not meet goals, due to more efficient seed processing and a quality control problem in a new seed processing plant.

Institutionalizing the Subsidy

- In Guatemala, Semilla Nueva and USAID are in the co-creation phase of a grant which would fund the creation of a third-party program to design, oversee and fund a national seed subsidy for biofortified seeds. The award may be signed as early as September 2023.
- In El Salvador, we delayed sales from Guatemalan seed companies to El Salvador. Instead we signed an agreement with the government in May 2023 and began tests with farmers, seed companies, and the government—leading to a potential government led production and distribution pilot in 2024.
- In Honduras, initial steps are underway to register our seeds and to begin testing with the Honduran government and local seed companies by late 2023.

Developing Better Seeds

- Semilla Nueva hired a world class lead for its breeding program and restructured the team to increase its efficiency.
- Our protein quality lab is up and running.
- Several new biofortified hybrids showed competitive yields against some high segment seeds.
- Semilla Nueva's internal work to discover the genes that increase zinc reached an important milestone, with three genetic regions identified for further testing. Semilla Nueva's partnership with Bayer on gene discovery also continues, with results expected in a few months.
- We are preparing our first gene editing (which is not considered transgenic or GMO) project.

Impact

- 13,652 families planted biofortified seed in the first half of 2023, an 28% increase over the 10,607 families who planted in the first half of 2022.
- Semilla Nueva will not reach the 30,000 families that we originally projected for 2023. Families purchased 20% more seed on average than 2022, decreasing the number of families purchasing compared to the amount of seed sold. Combined with fewer families receiving free non-commercial seed from NGOs, we predict 20-24,000 families will use biofortified seed this year.



- While fewer families will be planting our seed, the increased area planted by these families, combined with the higher yields of our newer biofortified seeds, mean that we will reach our targets in terms of area under cultivation and the number of consumers who benefit. We will reach 428,770 indirect beneficiaries from the seed sold during the first six months of 2023, compared to 473,217 reached during all of 2022. 2.4% of the maize consumed in Guatemala will be biofortified, the equivalent of 1.8B tortillas.
- In 2022, 18% of farmers who purchased our F3 seed and 4% of farmers who purchased F5 were poorer, non-hybrid farmers who normally don't purchase seed. In 2023 to date, 32% of farmers purchasing F5 are from this farmer group, significantly beating our goal of 25%.
- We overcame challenges with our first nutrition Randomized Controlled Trial on nutritional impact (RCT). The study will conclude in August of 2023.
- We are collaborating with University of Chicago's Development Innovation Lab, the Abdul Latif Jameel Poverty Action Lab (JPAL) and the Paris School of Economics to transition our M&E systems from internal impact measurement to the creation of publishable impact studies and randomized controlled trials on livelihoods, food security, and climate resilience impact of our current strategy and new model strategies.

Funding and Administration

- Through renewals and new grants, Semilla Nueva received \$3.5M in funding from January to June 2023. Four funders renewed their support for a total of US\$765K/year. Six funders increased their support from US\$295K annually in 2022 to a total of US\$610K in 2023. Six new funders granted a total of US\$2.1M, with the largest being Rippleworks with a US\$1.5M donation of unrestricted funds.
- USAID Development Innovation Ventures (USAID-DIV) has approved a US\$800k-1M award, pending negotiations on a study design with the USAID Guatemala mission. Semilla Nueva and USAID Guatemala are currently in a co-creation process for a US\$5.7M award to fund our subsidy pilot, breeding efforts, and a nutrition RCT.
- Semilla Nueva hired a senior fundraiser with significant Central American agricultural experience to lead our fundraising team.
- Thanks to Rippleworks funding, Semilla Nueva expanded our budget from US\$2.9 to US\$3.3M and our 2024 budget is estimated at US\$4.1M; expenditures to date are 90% of our budget.
- Cash-on-hand, committed funding, and likely renewals will cover the next nine months.
- Our External Audit Report was issued without significant findings – this is Semilla Nueva's fourth clean opinion in a row.
- Semilla Nueva launched several new policies and benefits to support and retain our staff.



CONTEXT AND KEY TERMS

Semilla Nueva's Strategy

Malnutrition is decreasing worldwide, but for the 1.2B people who eat maize three times a day, the number of malnourished children is increasing. This population is fed by 53M poor smallholder farmers in Sub-Saharan Africa and Mesoamerica. Most are extremely poor and do not use improved maize seeds, let alone more nutritious, biofortified maize seeds.

Three market failures prevent farmers from adopting higher-yielding biofortified seeds at scale:

- 1) Consumers and farmers won't pay more for nutritious maize, preventing seed development.
- 2) Without subsidies, most poor farmers cannot afford any new, high yielding seeds.
- 3) Without a strong market, local seed companies don't develop and market new, higher yielding seeds, let alone high-yielding, biofortified seeds.

Semilla Nueva's solution is to:

- 1) Pilot subsidies for companies selling new, high-yielding biofortified seeds at affordable prices.
- 2) Work with governments to institutionalize these subsidies.
- 3) Develop high-yielding, more nutritious biofortified seeds, and techniques to make it cheap for all seed companies, including larger transnationals and governments to develop their own.

Maize market

Throughout this report, we use terms to describe the Guatemalan maize market and our goals in breeding new biofortified seeds. Elucidating this context can make this report easier to understand. In Guatemala, our goal is for more than half of the maize consumed to be biofortified. We plan to reach this goal by getting more farmers to use our seed and increasing their yields so they produce more of the maize consumed in Guatemala. The table and descriptions below provide an overview of the structure of the maize market in Guatemala, the types of farmers, and their contribution to annual maize consumption, in order to contextualize the number and type of farmers who will need to use our seed to reach this goal.

Table 1: Semilla Nueva estimate of maize market and maize farmer structure

Farmer Segment/Source	Hectares	Farmers	Average Yield (mt/ha)	Total Annual Production (mt)	% of Annual Consumption
Non-hybrid high elevation	157,990	320,000	2.6	410,364	19.2%
Non-hybrid low-mid elevation	315,000	550,000	2.3	715,909	33.5%
Low-segment hybrid	56,000	80,000	3.6	200,000	9.4%
Mid-segment hybrid	28,000	40,000	3.9	109,091	5.1%
High-segment hybrid	56,000	40,000	5.2	290,909	13.6%
Imported illegally from Mexico	0			409,091	19.2%
Total	612,990	1,030,000		2,135,364	100.0%

Non-hybrid farmers do not purchase seed annually, but instead save and replant seeds saved from their previous harvests. These farmers typically use a limited amount of chemical fertilizer, herbicides, and seed treatment, which they purchase each year. Most only grow enough maize for home



consumption, but some have large enough land holdings to produce enough maize to sell to the market. We estimate the 870,000 farmers who do not purchase seed produce 53% of the maize consumed in Guatemala¹. Our current seeds are suitable for farmers in the low and mid-elevations (0-1,800 MASL), but seeds have not yet been developed for higher elevation regions in Guatemala.

Low-segment farmers purchase cheap but low-yielding hybrid seeds produced by local companies. The seeds cost ~US\$45 per 20kg bag and provide farmers with only slightly higher yields than non-hybrid seeds. We estimate 80,000 low-segment farmers produce 9% of Guatemala's maize.

Mid-segment farmers use moderately priced seeds produced and sold by national Guatemalan companies. The seeds cost ~US\$71 per 20kg bag but only provide moderate yields. We estimate 40,000 mid-segment farmers produce 5% of the maize consumed in Guatemala.

High-segment farmers purchase the most expensive hybrid seeds from transnational seed companies every year. The seeds cost ~US\$150 per 20kg bag but provide farmers with high yields. We estimate 40,000 high-segment farmers produce 14% of Guatemala's maize consumption.

Breeding terms

Pure lines: Pure lines are seeds bred to be genetically homogeneous. They have specific traits (yield, nutrition, disease resistance, etc.) and are similar from generation to generation.

Hybrids: Most commercial maize seeds are hybrids. They result from pollinating one pure line with another. Commercial hybrids² generally have been bred for excellent yields and other positive traits. If a farmer buys a hybrid and saves seed from the grain produced, desired traits, such as yield, become less pronounced with each generation. Depending on a farmer's economic and agroecological context, it can be highly advantageous to buy hybrid seed every year (or every few years). Hybrids are not synonymous with GMO. The seeds used to produce hybrids commercially are normally called parental seeds.

Seed conversion: We use the term seed conversion to refer to backcrossing, a process to convert a pure line to have a new trait while maintaining as much of the genetics and desirable performance of the original line as possible. Imagine creating a golden retriever with poodle hair by crossing a golden retriever and a poodle, finding the puppies that are the most like golden retrievers but with full poodle hair. In the next generation, you cross those puppies with a golden retriever and pick the puppies that are even more like golden retrievers but still have poodle hair, etc. After several generations, you may have a few golden retrievers with poodle hair. Semilla Nueva backcrosses (or converts) the lines of high yielding hybrids to have improved nutritional traits while maintaining their yield.

¹ In 2020, the Guatemalan government estimated 20% of maize is imported illegally from Mexico. In our model we estimate 17%.

² If a (simple) hybrid is itself crossed with another line or another hybrid, it forms a triple or double hybrid. Most commercial seeds in Sub-Saharan Africa and Mesoamerica are triple or double hybrids.



SUBSIDIZED SEED SALES

Doer at Scale

Summary

- Overall sales of biofortified seed increased 50% compared to mid-year 2022.
- The primary contributor to the growth was sales by other seed companies that increased 123% compared to mid-year 2022. This is a critical validation of our model.
- In 2023, 8% of the seed sold in Guatemala will be Semilla Nueva's biofortified hybrid F5, only launched two years ago. This shows that our model can not only work to scale biofortified seed, but also address a critical market failure that prevents new, higher yielding hybrids from reaching farmers.
- We failed to provide high enough quality parental seed, or the right support to national seed producing companies to produce enough of our newest seed, F7. We learned critical lessons to improve our future support to seed companies.
- Additional testing of our newest seed, F7, shows it may not be a full replacement of F5, but may be a better seed in some regions.
- Our seed subsidy increased 10% in order to compensate for higher seed production costs due to an 88% increase in fertilizer prices.
- Semilla Nueva is preparing a new brand and promotional strategy that encompasses all biofortified seeds sold by all participating seed companies. Design for the campaign will finish in late 2023/early 2024.
- Semilla Nueva produced far less non-commercial seed for NGOs to distribute as free seed, given improvements in seed production and a quality control problem in a new seed processing plant. This will significantly decrease the number of farmers reached through these partnership programs.

Sales of biofortified seed increased 50% compared to mid-year 2022. Sales by other seed companies was the primary contributor, increasing 123% compared to mid-year 2022

Table 2: Past and projected sales of biofortified seed (20 kg bags)

20kg bags sold by	2021	June 2022	Total 2022	June 2023	Total 2023*	2024*	2025*
Semilla Nueva	3,637	4,092	5,213	5,552	5,688	8,500	9,000
Other seed growers	1,129	800	2,005	1,783	4,283	7,500	11,000
Valle Verde	1,129	800	2,005	1,504	4,283	5,000	6,000
Semillas del Trópico				279		1,000	2,000
Other seed growers						1,500	3,000
TOTAL	4,766	4,892	7,218	7,335	9,971	16,000	20,000

*estimates



In 2023 we saw our strongest growth of subsidized biofortified seed to date. Total sales of biofortified seed in Guatemala increased 50% from 4,892 20kg bags in the first six months of 2022 to 7,335 bags in the first six months of 2023. Overall, more bags were sold in the first six months of 2023 than in all of 2022. The most important data point was sales by other seed companies, which grew from 800 bags in the first 6 months of 2022 to 1,783 bags in the first six months of 2023. Semilla Nueva has only 136 bags of seed left to sell, and those will be sold out by early August, compared to selling out in October the previous year.

Semilla Nueva has begun to deliberately produce less seed than we believe we can sell, in order to further create demand and market opportunities for other seed companies. Valle Verde, our strongest seed company partner, has more than 2,500 bags currently in production, and plans to sell all of them in the year's second season, which is strongest in northern Guatemala where they make the majority of their sales.

The significant sales growth by Valle Verde is largely attributed to their faith in Semilla Nueva's second biofortified hybrid, F5—which they sell under their own brand as JC-5. They tested sales of the seed in 2022. Upon seeing higher yields and disease tolerance than our first seed, significantly increased their sales projections. Their sales are set to increase slightly in 2024, and we see additional growth will come from other seed companies and depend on launches of new biofortified seeds.

For Semilla Nueva, there could be no better indication of the success of our model than the fact that in 2023, 8% of the seed sold in Guatemala will be our F5: a biofortified hybrid which was only launched in 2021. This represents the fastest penetration of a new hybrid seed sold by Guatemalan seed companies in at least the last 20 years. After only two years, F5 is the third most common seed sold by national Guatemalan seed companies and the sixth most popular seed in Guatemala if we include those sold by transnational seed companies. The implication of this growth is important. Variety replacement, or the rate that new seeds are adopted, in seed markets in developing countries is notoriously slow and represents a major barrier to seed development programs throughout Central America and Africa. This data point shows that our subsidy program not only can serve to scale the use of biofortified seeds, but also as an important means to overcome the market failure that prevents farmers from using newer hybrid seeds in general. Our subsidy program can grow adoption of new seeds that will improve both farmer livelihoods and nutritional intake in ways that are appealing to various institutional allies and policy makers.

At least one new seed company intends to begin production in late 2023 for sales in 2024

Semilla Nueva's operations team has helped several new seed companies initiate trial production of our biofortified seed F5 and encouraged their participation in our field days and visits to our demonstration parcels. As a result, one or two new seed companies are likely to begin production in late 2023 for sales in 2024. As was the case with Valle Verde and Semillas del Trópico, our first two seed company partners, initial sales will be limited.

We failed to provide high enough quality parental seed, or the right support to companies in producing our newest seed, F7

Both Valle Verde and Semillas del Trópico were disappointed with their production of our newest seed, F7, and will not produce more for 2024. This was due to four factors. First, producing any new hybrid requires significant support. We transitioned our seed production coordinator to our R&D team in early



2023, and didn't have a new coordinator in place in time to provide the right support for seed production of F7. Without a constant technical presence, both Semillas del Trópico and Valle Verde ignored some of Semilla Nueva's technical recommendations. Second, Valle Verde also cut their fertilizer use significantly, attempting a new organic fertilization strategy with green manures. Third, the parental seed we provided showed genetic contamination (12% atypical male plants and 6% atypical female plants), requiring additional costs and decreasing yield. Lastly, the hybrid was also very new, and Semilla Nueva had never produced it at scale. It normally takes several years to master production of a new seed, and our recommendations could be improved. In 2023, Semilla Nueva also harvested our first commercial production of F7. We only reached 83% of our estimated yield in seed production. Combining these factors, Semillas del Trópico only reached 60% of their intended yield in seed production, and Valle Verde reached 18%. Both companies will continue with F5, but will not produce F7 next year, though it is possible that new results could convince them to return to this seed.

The issues surrounding F7 have several causes, all of which must be fixed in order to reliably guide new seed companies to new hybrid seeds. A combination of new leadership on the R&D team and finishing the implementation of quality control processes will mitigate future genetic contamination in parental lines. Additional hires in the R&D program and operations leadership will ensure the change of a single position on the team won't have such a significant impact on seed development and production. Finally, we'll need to launch new materials more slowly, allowing our production team to have better recommendations for new hybrids before bringing them to partner seed companies.

Some context is also important. We originally accepted a riskier, accelerated approach of launching new hybrids due to seed companies being unhappy with our first hybrid, F3—and very tentative on the results of F5. We were unsure if F5 would have strong enough results, and so pushed hard to have an additional seed in the hands of seed companies. Our bet on F5 paid off; our bet on F7 did not. Given that seed companies are largely happy with F5, we can take a slower and more deliberate approach to launching new seeds.

Further testing shows F7 may be better than F5 in some areas, and worse in others

It normally takes several years of sales to establish the potential of a new hybrid. There is a gap between what an R&D program predicts the performance of a seed will be and the results farmers achieve over multiple years and thousands of locations. The first pilot sales of our newest F7 seed took place in May/June 2023, and large-scale results from farmers won't be available until the end of the year. Unfortunately, the side-by-side demonstration parcels of F7 and F5 are making us more cautious about our strong initial testing results from the seed. F5 largely beat expectations, and F7 slightly underperformed our expectations. In 25 side-by-side farmer trials of F5 and F7 in the off season, F7 only maintained yields of 1% higher than F5 (compared to ~10% in our trials last year). Results varied by geography, F7 reached maturity and harvest dates four days earlier, which is a very attractive feature to farmers. However, in periods of drought or heavy rains, the ear opened more frequently, leading to rot. 80% of partnering farmers reported F5's good ear coverage, while only 58% said the same for F7. F7 performed better in higher elevation areas, while F5 performed best in lower elevation, tropical regions. If our results from farmers who purchased the seed this year mirror these results, Semilla Nueva may end up with a hybrid to promote heavily in tropical regions (F5) and a hybrid to promote more in sub-tropical regions (F7).



The effects of inflation led to an increase in subsidy cost

As mentioned in our *July-December 2022 Standard Report*, the war in Ukraine and global inflation led to significant impacts on input and labor prices in Guatemala. Average fertilizer prices increased 86% from US\$26 to US\$49 per 100 lb. sack, according to data tracked by the Ministry of Agriculture. This resulted in significantly higher seed production costs throughout Guatemala. In order to maintain our desired seed sale price, we increased our subsidy from US\$32/20kg bag to US\$35/20kg bag. Changes in the subsidized seed price or subsidy to seed companies may be necessary in the future, depending on further changes in labor and input prices.

Semilla Nueva continues its strategy to transition from our own sales and promotion to promoting other seed companies' sales

Semilla Nueva continued expanding seed promotion and farmer training, increasing from 49 field days that reached 1,737 farmers in the first half of 2022 to 64 field days reaching 2,104 farmers in the first half of 2023. We maintained the improvement in farmer targeting we achieved in 2022. 94% of farmers were from the non-hybrid or low-segment of the market, where our seeds have the greatest potential and impact.

As a step to transition away from being a Guatemalan seed company to become a supporter of other seed companies, our field staff began using our field events to promote other seed companies selling these same seeds under their own brand names. Farmers left the field days learning that Fortaleza F5 could also be purchased as Valle Verde's JC-5. The marketing team also created a first draft of an experimental brand that will cover all subsidized biofortified seeds in Guatemala. The team has contracted the marketing *Compass*, which we have used in the past for our farmer surveys to conduct two quantitative and one qualitative study in order to hone the concept. Tentatively, this brand will be titled "*semillas de poder*" or "*maiz de poder*" (seeds/maize of power/empowerment). The slogan could work well, since *poder* not only means power, but is the verb for "to be able to do X." Through this new brand, Semilla Nueva will begin to promote our subsidy system, the overall national project of accessing high-yielding, biofortified seeds at an affordable price. We will explain that we are promoting not just a seed that can be purchased, but a policy that makes those seeds (and better seeds in the future) accessible to all of Guatemala's farmers. Semilla Nueva's operations team is planning a new field day strategy that combines promotion of seeds from all participating companies with opportunities for policy makers and congresspeople to participate, hear testimonials, and see the impact the program is having on their constituents. Semilla Nueva will finish initial development, bring in participating seed companies in the last phases of design, and launch these new integrated field days in early 2024. This promotional strategy will coincide and facilitate Semilla Nueva's process of limiting and eventually spinning off our own seed production, and moving to a more commercially neutral role of promoting the subsidy program, subsidized seed, and participating seed companies.

Improvements in our seed production and a problem with one processor will significantly limit the amount of non-commercial seed to be gifted to farmers, reducing our estimate for farmers reached in 2023

In 2020-2022, Semilla Nueva provided non-commercial quality seed to thousands of families through NGO partners. This non-commercial seed consists of the smaller seed that is removed during seed processing and from seed with germination defects, due to problems in seed production. In 2023, neither issue provided a significant source of seed, decreasing the number of farmers we could serve through this program.



Improvements in our own quality control fully eliminated low quality, low germination seed. In 2022, 1,320 farmers received seed from this source. In 2023, all seed we produced met our germination control standards, eliminating it as a source of seed for NGO programs.

In terms of the small, non-commercial seed normally removed in processing, there are two situations. Several months before harvest, the processing center we have used for all of our seed production in the past closed unexpectedly. Semilla Nueva pivoted to process seed produced in Northern Guatemala with our partner Valle Verde. In the case of seed processed by Valle Verde, the company mixed all small non-commercial seed (and broken unusable seed) into the final product, causing problems for distributors, agrodealers, and farmers. 173 bags were returned to Semilla Nueva, which we reprocessed and re-utilized. In 2024, we will no longer process seed with Valle Verde. The seed we produced in Eastern and Southern Guatemala, we processed in the Guatemalan government's plant. An extra round of seed processing decreased the amount of non-commercial seed from our historic 15% to only 5%.

In total, Semilla Nueva will provide free commercial seed to 3,000 farmers through a partnership with Light a Single Candle as part of an effort to help non-hybrid farmers begin using improved seed. We will likely reach approximately 1,000 more farmers with non-commercial seed, lower than our initial goal of 4,000 farmers.



INSTITUTIONALIZING THE SUBSIDY

Payer at Scale

Summary

- In Guatemala, Semilla Nueva and USAID are in the co-creation phase of a grant which would fund the creation of a third-party program to design, oversee and fund a national seed subsidy for biofortified seeds. The award may be signed as early as September 2023.
- In El Salvador, we delayed sales from Guatemalan seed companies to El Salvador. Instead we signed an agreement with the government in May 2023 and began tests with farmers, seed companies, and the government—leading to a potential government led production and distribution pilot in 2024.
- In Honduras, initial steps are underway to register our seeds and to begin testing with the Honduran government and local seed companies by late 2023.

Guatemala: co-creation of a USAID award is underway to move our subsidy to third party implementation with the Guatemalan government

Semilla Nueva's strategy for institutionalizing our subsidy program in Guatemala involves: a) piloting the program ourselves, b) transitioning the program to one overseen by third parties and paid directly by philanthropy, in a way that can be later used by the Guatemalan government, and c) achieving a long-term funding commitment from the Guatemalan government. A USAID award currently in negotiation allows our best opportunity to move into the second phase of this plan.

The Guatemalan Institute of Agricultural Science and Technologies (ICTA) and the Ministry of Agriculture participated in the creation of an unsolicited proposal to USAID in 2021 to fund an expanded pilot of our biofortified seed subsidy program. Ultimately the proposal was approved by ICTA, as well as several local partners and submitted to USAID. The Ministry of Agriculture continues to review the proposal through its various committees. While less than 1% of unsolicited proposals are accepted by USAID, our program made it through initial due diligence and is now in co-creation, with a possible US\$5.7M, four-year award to be signed in September 2023. This award would support the creation of a third-party technical committee to refine our existing subsidy program, oversee its annual implementation, and use a legal instrument within a Guatemalan bank to pay seed companies based on the technical committee's approval of their sales. Instead of Semilla Nueva negotiating directly with seed companies, reviewing their results, and paying them for successful sales of biofortified seeds at reduced prices, this committee (of which Semilla Nueva would be a member) would lead these efforts. If successful, this committee would receive four years of funding from USAID to test the concept and more than double the number of farmers accessing subsidized seed.

Critically, leadership from the Guatemalan government's ICTA would allow the program to be a public-private partnership, which would facilitate subsequent institutionalization through long-term Guatemalan governmental funding. This plan was co-designed with ICTA and several of Semilla Nueva's board members, including two experts on Guatemalan legislation and advocacy. We held several meetings with the World Bank and explored the current subsidy impact data we've collected. The World Bank has significant experience in creating and improving agricultural input subsidy programs in Central America and the Caribbean and is exploring the possibility of participating in the technical committee upon launch.



The approach has several risks. Guatemala is currently undergoing a contentious presidential election, and the administration will change in January 2024. Moving to a third-party committee to oversee the subsidy will also decrease Semilla Nueva's control of the program. The challenges of moving from an NGO being the payer and doer of a program to third parties (especially governments) is one of the most common barriers to scale. Our strategy for confronting these challenges is to maximize strategic alignment and long-term pressure. We are negotiating the USAID award to allow payment only if the subsidy program is created and implemented annually in such a way as to maximize its impact on farmer livelihoods and nutritional outcomes. We've chosen allies to create the committee that have a proven track record of success in policy change and sound technical recommendations in other third-party programs. We're including partners, such as the semi-autonomous ICTA branch of the Guatemalan government, who could help add legitimacy to the results of the pilot and advocate for long-term budget allocations if the program is successful. We're tying in third-party impact evaluation from partners such as DIL and JPAL, who would create far more credible impact data than Semilla Nueva's internal reports. We're building a marketing plan (explained in our subsidized seed section above), which will include policy makers in events to promote biofortified seeds to farmers, creating political awareness and pressure. Lastly, if the USAID grant is not successfully approved, Semilla Nueva will seek other funders to allow this transition, albeit at a slower pace.

Our goal is not to have a set deadline by which we project the subsidy will be fully paid by the Guatemalan government, but rather to build a system that will continually maximize pressure until a political opportunity arises and allows for such a move.

There is an additional risk that deserves mention. Semilla Nueva is currently the biggest producer and seller of biofortified seeds in Guatemala. To allow for a long-term role as a leader of the subsidy program we are designing, Semilla Nueva will need to continue to accelerate our transition from producing and selling seeds, to supporting other seed companies to do so. This adds pressure to our existing plans to limit our sales while creating more demand for other seed companies, and eventually for a potential spin off or sale of Semilla Nueva's brand to another seed company. Semilla Nueva is now beginning initial conversations with potential partners on this topic.

El Salvador: slowing down so the Salvadoran government can launch the seeds as their own

In 2022, our Guatemalan partner seed companies presented Semilla Nueva with a plan for international expansion. They offered to begin sales in El Salvador, taking care of the registry process, importation, promotion, and sales, if we would offer them the same subsidy we were paying in Guatemala. The seed companies showed that they already sold in El Salvador and presented this as an easy win for Semilla Nueva. After some negotiation and financial support from Dovetail, we signed a deal.

Unfortunately, while partner seed companies do have the legal ability to sell seed already registered in Guatemala in El Salvador under Salvadoran law, the introduction was not seen as wise by our partners in the Salvadoran government. Our partner seed companies ran into delays and barriers from the Salvadoran government and asked for our assistance. Semilla Nueva held multiple meetings in El Salvador with the technical team and director of the Salvadoran national agricultural research system (CENTA) which is responsible for approving new seeds for their subsidy program. CENTA presented a different proposal. If our goal is for new biofortified seeds to become a (or the) primary seed in the Salvadoran seed subsidy program, then new biofortified seeds should be reviewed by the government,



produced by Salvadoran seed companies, and then launched in the seed subsidy program itself, rather than through private seed companies producing in Guatemala for direct sales to farmers. Further, these seeds should first appear in El Salvador as seeds with names and registries from the Salvadoran government, not as seeds originating from Guatemala.

Working with CENTA, Semilla Nueva signed an agreement with the government to begin testing our newest biofortified seeds with the government directly, through partners the government trusts, and with Salvadoran seed companies that already sell to the government subsidy program that serves most farmers in the country. Semilla Nueva transferred our best sales technician to a new role, responsible for overseeing the technical work directly and providing any funding or assistance needed to help partners complete their tests. By June 2023, with support from Semilla Nueva, CENTA established eight farmer trials, three multiseed field trials, and one small seed production trial. One seed production pilot is slated to begin by the first week of August with a Salvadoran seed company chosen by the government, which will allow locally produced seed for the next round of trials in late 2023. The InterAmerican Institute for Cooperation in Agriculture (IICA) established 13 trials in partnership with the government to gather additional data.

With the data produced from these trials, the Salvadoran government will be positioned to allow a small amount of seed to be produced during the main seed production season (November 2023-April 2024), in order to make possible an initial pilot of our newest biofortified seeds in the government's seed distribution program in 2024. We hope to set up this initial pilot as an RCT through our new partnership with University of Chicago's Development Innovation Lab, to allow published, third-party results on the impact of this pilot.

There was a very critical lesson learned in this process, which will guide our work in new countries going forward. Semilla Nueva jumped on an opportunity that sounded great from partner seed companies, whose relationships with the government we trusted. We didn't, however, do sufficient due diligence on the plan ourselves with the Salvadoran government. Ultimately, the seeds our Guatemalan partners produced for El Salvador were sold in Guatemala. The relationship with these companies didn't suffer, but this misstep created a situation we had to deal with in El Salvador and created expectations for donors of 2023 sales in El Salvador which we failed to complete. The lesson of putting the government relationship first is already guiding our work in Honduras and will serve us well as we lay the groundwork to launch new seeds in other countries.

Honduras: initial conversations and testing in late 2023

Semilla Nueva met with the Honduran government in March and May 2023 and began creating a plan to test our new biofortified seeds. The Honduran market is different from both that of Guatemala and El Salvador in that there are three primary groups of farmers: 1) A small group of ~40,000 relatively large farmers who purchase high segment, GMO seeds from Corteva and Bayer and use industrial agricultural techniques, 2) ~100-200,000 small farmers who receive free, low-yielding seeds from the government, and 3) ~400,000 small farmers who do not use improved seed varieties. Based on our conversations with the government, Semilla Nueva will begin registering our new biofortified seeds with the Honduran government (allowing the seeds to be considered a Honduran variety), test production with the local seed companies who currently provide seed to the government, and generate a testing strategy to see how using newer biofortified seeds could increase farmer incomes and justify their incorporation in an improved subsidy system. Testing with the government and seed



companies is slated to begin in late 2023. Similar to El Salvador, Guatemalan seed companies can legally use the Guatemalan registration of our biofortified seeds to begin sales now, bypassing the Honduran government's process, but the Honduran government expressed this would not be seen favorably and would damage the relationships necessary to build a longer-term program in Honduras.



DEVELOPING BETTER SEEDS

Making farmers and seed companies more money—and the subsidy cheaper

Summary:

- Semilla Nueva hired a world class lead for its breeding program and restructured the team to increase its efficiency.
- Our protein quality lab is up and running, allowing protein quality to be tested in all breeding efforts and for quality control.
- Several biofortified hybrids in development showed competitive yields against some high segment seeds. These seeds will enable higher farmer incomes and more profit for national seed companies, but will not yet be enough to change transnational seed companies' sales models.
- Semilla Nueva's internal work to discover the genes that increase zinc reached an important milestone, with three genetic regions identified for further testing. Semilla Nueva's partnership with Bayer on gene discovery also continues, with results expected in a few months.
- The first work on gene editing (which is not considered transgenic or GMO) is being prepared. Semilla Nueva will test several genes that may allow the organization to leapfrog into the use of this technology, but expectations must be moderated.

Most significant expansion of staff and leadership in three years

With the significant increases in support from our donors, Semilla Nueva hired five new staff members and restructured our breeding work. Dr. Enrique Kreff joined in May as head of the breeding team. Enrique worked for the Argentinian government's breeding program before spending nearly two decades supporting and then leading Pioneer's (Corteva) maize breeding efforts in Argentina and then two other countries. Enrique has an excellent track record growing and maturing breeding programs. Over 30% of the maize planted in Argentina (the fourth largest maize producer globally) uses seeds he developed or validated. Enrique also has significant experience discovering the genes behind complex traits (such as disease resistance), breeding those genes into highly competitive new materials, and launching those seeds commercially. Enrique is based in Argentina but travels to Guatemala monthly.

The breeding team was restructured to allow improvement in process management and efficiency. Technical leads were established for each major activity, including seed testing, seed development and lab/data work. Ricardo Ortiz was brought from our seed production unit to oversee day-to-day operations of each of these units. Before Semilla Nueva, Ricardo served as field manager for Syngenta's maize breeding program in Guatemala and has the technical experience to develop and optimize each technical program. Semilla Nueva also hired three additional technical staff members allowing the breeding program to begin testing new seeds in every major tropical and subtropical region in Guatemala, and support test efforts for the Salvadoran government.

Protein lab equipment is working

Semilla Nueva has tested over 10,000 samples for zinc and iron, but delays in calibration slowed analysis of protein quality. Semilla Nueva changed calibration service providers and finally achieved calibration of its protein quality lab equipment in June 2023. The Near Infrared Spectrometer (NIRs) will allow Semilla Nueva to run a protein quality test on every sample immediately after it is tested for zinc and iron. This will allow Semilla Nueva to complete its own quality control on protein quality as



well as begin to include protein quality data in efforts to discover the genes responsible for improved nutrition.



Figure 1: Semilla Nueva's new equipment for analyzing protein quality is in operation

New, better biofortified seeds are on the way, cementing Semilla Nueva's strategy

As noted in our *July-December Standard Report*, Semilla Nueva identified several hybrids with yields similar to certain high-segment seeds. The conversion process to breed in higher levels of protein quality, zinc and iron is still underway. From November 2022-April 2023, these seeds were tested again in five locations in Guatemala's off season with irrigation. Testing has confirmed they have higher yields than our existing biofortified materials and are competitive with some high-segment seeds in the market (DK410). Unfortunately, none of these seeds, when tested in multiple cycles and multiple sites, reliably show a higher yield than the best high-segment seed in the market, Monsanto's (Bayer) DK-390—although several had shown similar yields in the previous season's testing (see *July-December 2022 Standard Report*).

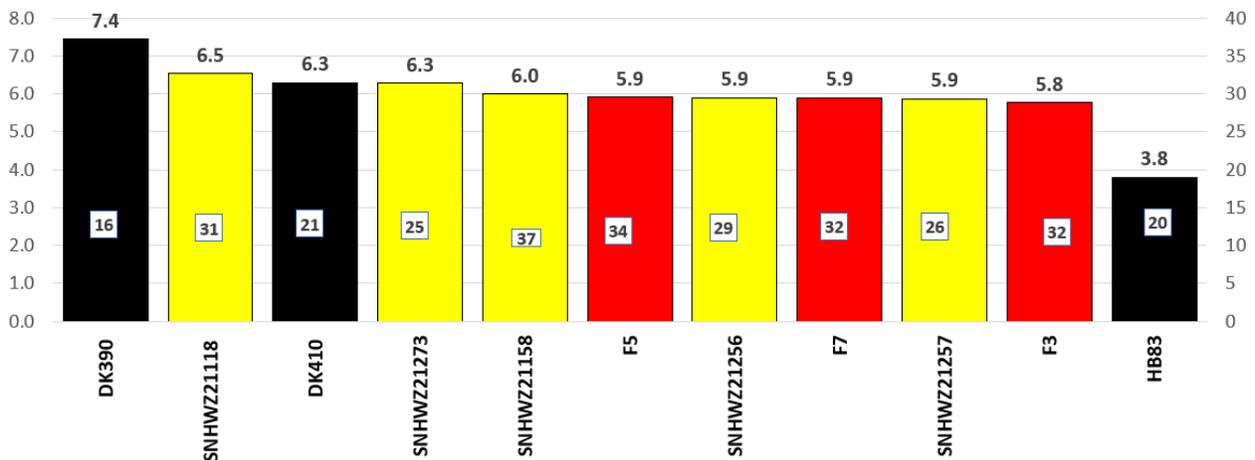


Figure 2: Yield (left axis, mt/ha) and zinc levels (boxes, PPM) of Semilla Nueva's current new generation of seeds, 5 locations, dry season, Guatemala



There are three critical implications of this testing data that reinforce Semilla Nueva's current strategy.

1.-Semilla Nueva's breeding program is producing what is needed for 92% of farmers and all national seed companies. Our biofortified seeds in development are higher yielding and more attractive than the biofortified seeds previously developed and launched by international partners. One new seed, SNHWZ21118 showed 10% higher yield than our current seeds in this season's test and showed nearly 20% higher yield in previous seasons. It also showed far higher yield than the common seeds sold by local seed companies (nearly double the yield of the country's most common hybrid seed, HB-83). Through our subsidy program, we are already seeing significant increases in adoption of biofortified seed among local Guatemalan seed companies and these newer and better biofortified seeds will further increase adoption and the livelihood and nutritional impacts we can offer farmers.

2.-It's tough to beat the world's best transnational seed companies, reliably, on yield. But we don't have to. It will be difficult to obtain open-source seeds from our research partners or develop our own hybrids that reliably beat all of the best seeds from the transnational seed companies in most geographies. Bayer's seed breeding efforts are among the world's best, and they are continually developing better seeds. After three years of work, our new biofortified seeds in development reliably beat some high-segment seeds, but not all of them and not always. Strategically, however, this is not our goal. As mentioned in table 1 in *Context and Key Terms*, the majority of farmers (85%) don't use any improved seed at all and another 8% use older seeds vastly inferior to our biofortified seeds that are far more attractive if combined with a subsidy. High segment seeds are used by only 8% of farmers in Guatemala (and produce 14% of the country's maize). Having biofortified seeds that are beginning to be competitive in this segment, however, does begin to create pressure on those transnational seed companies to take biofortification more seriously than they have in the past.

3.-In the long-run, gene editing will help the big transnational seed companies begin to use biofortified seeds as well. Our theory of change is that national seed companies will switch to biofortified seeds through our subsidy program. But larger transnational seed companies will need a combination of: a) market pressure, b) long-term government policy, and c) new technology. We believe that mass sales of biofortified seeds that are beginning to be competitive with the transnational seed companies and government implementation of our subsidy will satisfy the first two conditions. But these seed companies will still often have better yielding seeds than ours. For this reason, a third element is necessary—an inexpensive way for a seed company to convert their new, best seeds to become biofortified. Semilla Nueva has made significant progress on this task. The first step towards this goal is developing molecular markers to make backcrossing seeds faster and easier. The second step is generating gene-editing strategies.

Gene identification for molecular markers reaches next step, Bayer is analyzing data

Semilla Nueva began its first attempt to discover the genes responsible for increasing zinc and iron levels in maize in 2022. Data analysis continued in 2023, and Semilla Nueva identified three genetic regions, responsible for more than 50% of the additional zinc we see in our seeds. Semilla Nueva is now developing its second round of testing to establish gene markers that can allow marker-assisted breeding, a strategy which could cut the time and cost to convert a seed to higher zinc and iron by more than half. Semilla Nueva's second round of genetic testing will also include testing for protein



quality genetics, building on existing research already established by CIMMYT and other leading researchers.

Simultaneously, Semilla Nueva's partnership with Bayer, signed in early 2023, continues to advance. Bayer has developed more than 40 TB of genetic data on Semilla Nueva's materials and is currently processing the data to arrive at their own analysis of zinc genetics. This data and analysis will be shared with Semilla Nueva in the coming months and potentially used as the basis for a deeper partnership with Bayer on open-source, biofortified seed breeding.

Initial steps on gene editing

While working on marker-assisted breeding, Semilla Nueva is also beginning initial research into a gene editing strategy. Semilla Nueva developed a strategy to evaluate potential partners with our advisory board, created a list of several genes that may be ready for gene editing, and is currently evaluating partners for an initial test. It may be the case that several genes are already available in the scientific literature which can allow a short-cut to reach higher levels of protein quality and micronutrients without the complicated and time-consuming backcrossing work mentioned above. Semilla Nueva's goal is to test these potential, already known genes while simultaneously building the information around the genes in our current seeds that could allow a gene editing approach.

Continued progress on developing seeds for Africa

Semilla Nueva imported promising lines from Africa in 2022 and began the conversion process. The second cycle of the seed conversion process was planted in May 2023 in the higher elevation areas of Eastern Guatemala that more closely resemble our target regions in Eastern Africa. Two additional cycles will be necessary before seeds will be ready for initial testing in Africa with partners.



IMPACT

Summary

- 13,652 families planted biofortified seed in the first half of 2023, an 28% increase over the 10,607 families who planted in the first half of 2022.
- Semilla Nueva will not reach the 30,000 families that we originally projected for 2023. Families purchased 20% more seed on average than 2022, decreasing the number of families purchasing compared to the amount of seed sold. Semilla Nueva will also reach less families with handouts of non-commercial seed due to improved seed processing leaving less seed to handout. We currently see 20-24,000 families as a more realistic estimate for the year.
- Higher yields of our newer biofortified seeds (F5 and F7) combined with farmers planting larger amounts of seed increased the amount of maize sold to the market and the number of our indirect beneficiaries. We've biofortified 2.4% of the maize consumed in Guatemala so far this year, (that's 1.8B tortillas).
- We are reaching more of the hardest to reach, poorest farmers. In 2022, 18% of farmers who purchased our F3 seed and 4% of farmers who purchased F5 were the poorer, non-hybrid farmers who normally don't purchase seed. In 2023 to date, 32% of farmers purchasing F5 are from this farmer group.
- We overcame challenges with our first nutrition Randomized Controlled Trial on nutritional impact (RCT). The study will finish in August of 2023.
- We are collaborating with University of Chicago's Development Innovation Lab, the Abdul Latif Jameel Poverty Action Lab (JPAL) and the Paris School of Economics to transition our M&E systems from internal impact measurement to the creation of publishable impact studies and RCTs on livelihoods, food security, and climate resilience impact of our current strategy and new model strategies.

Semilla Nueva reached 28% more families in the first half of 2023 compared to 2022, even though sales increased 50%. This is due to farmers purchasing more seed on average per farmer and a decrease in our free seed donation programs with NGOs

In the first half of 2022, 10,607 families used biofortified seed. In the first half of 2023, this number increased to 13,652 families. Semilla Nueva hoped for a 50% increase in farmers using seed in 2023, and will likely not reach this goal. This underperformance on families utilizing seed is due to two primary factors. First, families purchased more seed per family. In 2022, the average family purchased 24 lbs. of seed. In 2023, this increased to 30 lbs. of seed. Increased farmer purchase volume is a positive indicator that average farmers have more confidence in the seed and will plant more of their land, but it also decreases the number of families reached per bag of seed sold. Secondly, as noted in the *Subsidized Seed Sales* section of this report, Semilla Nueva will reach only half of the estimated farmers with free seed from NGOs due to a lower production of non-commercial seed. Semilla Nueva estimates that we will reach between 20-24,000 families by the end of the year, showing a slight increase over 2022's numbers, but missing the 50% increase of families that we hoped for.

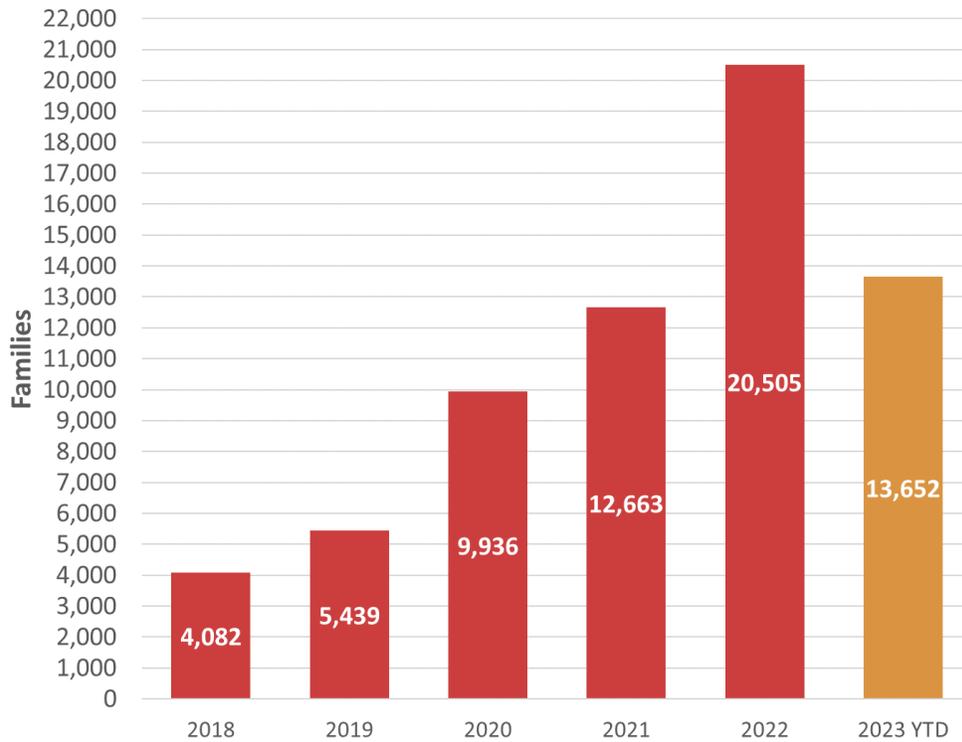


Figure 3: Families that planted Semilla Nueva biofortified maize seed (2018 – 2023 YTD)

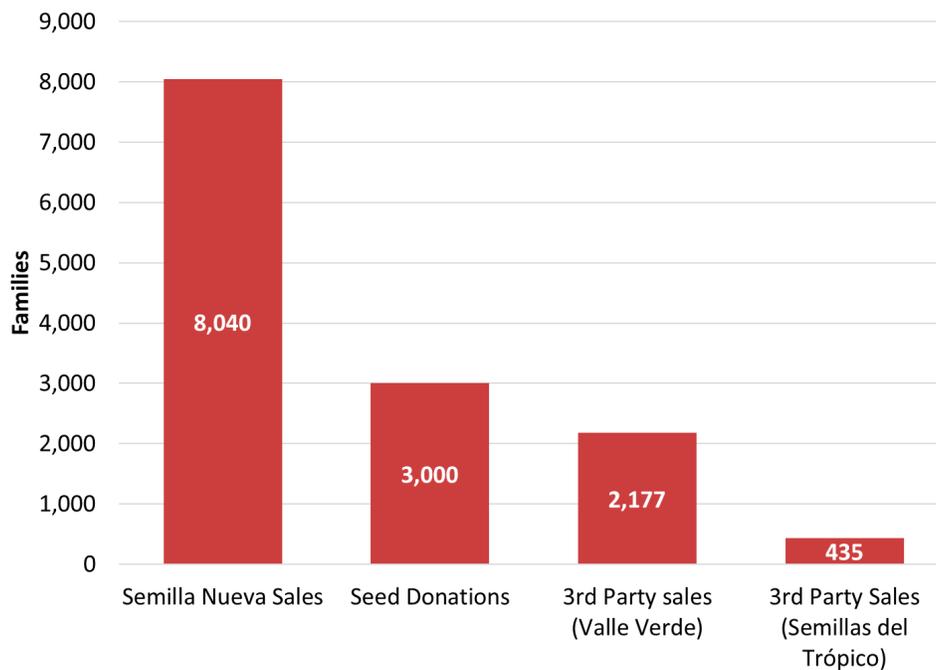


Figure 4: Breakdown of families planting biofortified maize in 2023 YTD by source of seed



Figure 5: Number of direct³ and indirect⁴ beneficiaries per year

Higher yields of our newer biofortified seeds (F5 and F7) combined with farmers planting larger amounts of seed increased the amount of maize farmers are selling to the market and the number of our indirect beneficiaries. We're at 2.4% of Guatemala's maize so far this year, (1.8B tortillas)

In 2022, 20,505 farmers sold enough biofortified maize to cover the annual maize consumption of 473,217 people. We project that the 13,652 farmers who have planted in the first 6 months of 2023 will sell enough maize to reach 428,770 consumers, nearly the same number as the entirety of 2022. In 2022, we estimate that of Guatemala's annual consumption of 2.1M mt, 2.1% was biofortified. In only the first 6 months of 2023, farmers planted enough biofortified seed to produce 50,717 mt, or 2.4% of Guatemala's total annual consumption (and 1.8B tortillas). For Guatemala, our ultimate goal is for at least 50% of the maize consumed by the national population to be biofortified. We only need to grow 20x to reach it.

In 2022, 18% of farmers who purchased our F3 seed and 4% of farmers who purchased F5 were the poorer, non-hybrid farmers who normally don't purchase seed. In 2023 to date, 32% of farmers who purchased F5 were from this farmer group

One of the key pillars of Semilla Nueva's strategy is to combine high yielding biofortified seed, low seed prices, and promotion efforts to make seed accessible and attractive to the 850,000 farmers in Guatemala who normally don't use improved seeds. We cannot reach our goal of 50% of Guatemala's maize being biofortified without this step. These farmers are also among the most malnourished and marginalized populations, and reaching them also offers up to twice the improvements in farmer

³ Direct beneficiaries are the farmers who planted biofortified seed and their families.

⁴ Indirect beneficiaries are the estimated number of individuals who consumed biofortified maize by buying excess production from the market.



incomes compared to the impact for farmers already using hybrid, non-biofortified seed. Significant changes in farmer promotion and changes to the geographical focus of our distribution strategy paid off, and we increased the portion of farmers coming from this segment to 34%, far beyond our annual goal of 25%. This accomplishment offers critical proof of the potential of our subsidy model to create structural changes in the seed market in Guatemala. This accomplishment, especially combined with farmers purchasing larger amounts of seed, will likely increase our total impact on farmer incomes after we measure yields later this year.

We overcame challenges for our first nutrition Randomized Controlled Trial (RCT), paving the way for a larger, more statistically significant trial

Semilla Nueva's first nutrition RCT was developed with Cornell University and the Institute of Nutrition of Central America and Panama (INCAP). The study's goal is to 1) test the use of novel zinc biomarkers to better predict zinc status and 2) use these new biomarkers and traditional biomarkers for iron, to evaluate the impact of consuming biofortified maize on zinc and iron status for young children. The study will also link these biomarkers to the results of much easier to use survey tools (24-hour recall and food frequency questionnaires), potentially allowing a less expensive and time-consuming methodology to predict nutritional outcomes in the future. The study took place in Guatemala's dry corridor, one of the country's poorest and most food insecure regions. World Vision identified families with high rates of food insecurity and provided half with biofortified maize seed in May 2022. INCAP and Cornell then selected 53 families with children under two for the study, including families who received biofortified seed from World Vision and others who did not. In August and September 2022, INCAP collected baseline data, including blood samples and fecal samples from children under two from each of the 53 families. A midline and endline collection of blood and fecal were scheduled for early 2023 to complete the study.

As noted in our *July-December 2022 Standard Report*, due to droughts and pest attacks, many farmers didn't harvest enough F3 for their entire annual consumption. Semilla Nueva responded by finding conventional and biofortified maize and providing it directly to farmers in late December and early January. By February, Semilla Nueva received reports that this maize had also run out and provided more. We also visited families individually and discovered that several were selling their maize, with the expectation they would receive more. Surveys indicated that while average consumption was 1.3 lbs. of maize per family member per day (slightly higher than average rural consumption of 1 lb./day), several families were utilizing over 3 lbs., with some of that maize being used for producing food products (such as tamales) for sale or feeding animals. Semilla Nueva now believes this was an unexpected downside of working in one of the regions in Guatemala with the highest presence of NGOs, government programs, and with farmers who are supported continually by these programs. After several meetings with INCAP and Cornell and several intensive surveys, INCAP approved continuing the study and selected 30 of the study's 53 original farm families to proceed. These families received enough maize from Semilla Nueva to allow for consumption until early September, agreed to solely consume this maize, and not sell any they received.

New midline blood and fecal samples were collected from these 30 families in April 2023, with the endline samples scheduled for August 2023. Data analysis should be completed by the fall. Nutrition RCTs are complicated, and Semilla Nueva originally launched this small pilot study to gain the experience needed to guide larger and more statistically powerful studies, in the future. We are currently negotiating a larger study, more statistically powered version of this study with one funder.



In collaboration with University of Chicago’s Development Innovation Lab, we are overhauling our internal M&E system to allow for annual, potentially publishable studies on our impacts on livelihoods, food security, and climate resilience

Semilla Nueva’s internal M&E systems reached a critical milestone in 2022, collecting data on the impact of our seeds on every major segment of Guatemalan farmers for climate resilience, income impacts, and food security. With this foundation, we approached the University of Chicago’s Development Innovation Lab, led by Michael Kramer, a Nobel laureate for his work on randomized controlled trials (RCTs). Semilla Nueva signed an agreement with DIL and contracted a researcher to improve Semilla Nueva’s monitoring systems, and retool them to collect data to allow for publishable RCTs. In 2023, instead of our traditional monitoring strategy, Semilla Nueva will contract agrodealers to collect names and phone numbers for five major farmer groups buying inputs, including those who:

- Bought non-biofortified hybrids in 2022 and continued in 2023
- Bought biofortified hybrids in 2022 and did so again in 2023
- Purchased non-biofortified hybrids in 2022 and then bought biofortified in 2023
- Grew maize without hybrid seeds in 2022 and did so again in 2023, and
- Grew maize without hybrid seed in 2022 and then purchased biofortified seeds in 2023.

After contacting farmers, DIL will select 20 farmers in each group and supervise Semilla Nueva as it collects demographic, food security, climate resilience, yield, and income data from each group. These farmers may also be followed in 2024. This first round of data will allow a publishable study on the impacts of a biofortified seed subsidy program on farmers in Guatemala and provide insights to more effectively target and design future subsidies.

The partnership with DIL will allow an important strategic shift in Semilla Nueva’s approach to monitoring and evaluation. Instead of building and perfecting an internal system for studying impact, Semilla Nueva will prioritize interlocking, periodic studies on different elements of our program. These studies will continue to allow Semilla Nueva to improve our work, but also for more reputable, publishable data. This has been noted as a strong need by partners such as the World Bank to enable their advocacy for improved seed subsidies with Central American governments.

Semilla Nueva is preparing a proposal and study design with the Abdul Latif Jameel Poverty Action Lab (JPAL) and the Paris School of Economics

One of the major debates among Semilla Nueva’s board members and subsidy experts, such as the World Bank, is whether it is more politically and technically feasible to scale the supply side subsidy model Semilla Nueva currently uses (seed companies receive a subsidy for selling seed at discounted rates) or a demand focused subsidy involving providing vouchers to farmers. After initial conversation in 2022, JPAL selected the Paris School of Economics as a partner to assist Semilla Nueva in designing several RCTs to measure the impact of our subsidy program and improve its design. The first study, conducted in partnership with Light a Single Candle, will evaluate providing seed without cost to 3,000 farmers in 2023, a voucher program with varying discounts for purchase of seed by these same farmers in 2024, and the number of these farmers who go on to pay the normal, subsidized price for biofortified seed in 2025. The first step of the study has been completed, with seed provided to farmers. Vouchers were designed in June 2023, and will be provided to farmers in August 2023. We hope to continue this research partnership and potentially involve the World Bank in the design of a second RCT in 2024.



FUNDING AND ADMINISTRATION

Summary

- Through renewals and new grants, Semilla Nueva received \$3.5M in funding from January to June 2023. Four funders renewed their support for a total of US\$765K/year. Five funders increased their support from US\$275K annually in 2022 to a total of US\$560K in 2023. Six new funders granted a total of US\$2.1M, with the largest being Rippleworks with a US\$1.5M donation of unrestricted funds.
- USAID Development Innovation Ventures (USAID-DIV) has approved a US\$800k-1M award, pending negotiations on a study design with the USAID Guatemala mission. Semilla Nueva and USAID Guatemala are currently in a co-creation process for a US\$5.7M award to fund our subsidy pilot, breeding efforts, and a nutrition RCT.
- Semilla Nueva hired a senior fundraiser with significant Central American agricultural experience to lead our fundraising team.
- Thanks to Rippleworks funding, Semilla Nueva expanded our budget from US\$2.9 to US\$3.3M and our 2024 budget is estimated at US\$4.1M; expenditures to date are 90% of our budget.
- Cash-on-hand, committed funding, and likely renewals will cover the next nine months.
- Our External Audit Report was issued without significant findings – this is Semilla Nueva’s fourth clean opinion in a row.
- Semilla Nueva launched several new policies and benefits to support and retain our staff.

Table 3: Semilla Nueva Fundraising through June 2023 (US\$ 1,000s)

	Funders previous annual gift in 2022	Funding received in 2023, YTD
Funders who expanded support	275,000	560,000
New funders		2,175,000
Funders who renewed support	765,000	765,000

New funding allowed Semilla Nueva to increase our budget from US\$2M in 2022 to US\$3.3M in 2023 and US\$4.1M in 2024. We believe we can sustain these higher budget levels

By June 2023, Semilla Nueva’s funding from Vitol, Dovetail, Eric Martin, John Trone, and Pulte expanded from US\$275k in 2022 to US\$560k in 2023. We received US\$765K in renewed or continued funding from Cartier, Mulago, Rotary, The Innocent Foundation, and others. Finally, we received US\$2.1M in new funding from Rippleworks, Shockwave, Focus Central America, Praxis, and USDA-CRIA and an individual major donor. The largest new donor, Rippleworks, provided a one time, US\$1.5M grant to catalyze Semilla Nueva’s growth. As a result of this grant, we increased our 2023 budget from US\$2.9M to US\$3.3M, and our projected 2024 budget to US\$4.1M.

This funding largely comes in support of our progress towards transitioning from a seed company selling biofortified seed to an integrated model dedicated to decreasing the costs of developing new biofortified seeds, scale subsidy pilots with seed companies, and institutionalizing these subsidies. Funders prioritize different impacts (nutrition, livelihoods, climate resilience), but each is betting on a scalable solution that contributes to the solution of one or more of these problems.



Given current likely and committed funding (excluding USAID), we currently have funding until May 2024 (see financial projections section below). The increased projected budgets will require significant increases in fundraising in future years, especially given the nature of the Rippleworks funding as a one-time award. We believe this increased fundraising is feasible given our projected growth in impact, developing partnerships to create third-party impact studies, potential funding from USAID, and new fundraising staff.

USAID Development Innovation Ventures (USAID-DIV) tentatively confirms US\$800k+ award; Semilla Nueva and USAID-Guatemala are co-creating a US\$5.7M grant

After our initial submission in early 2022, USAID-DIV and Semilla Nueva co-designed a new proposal in 2023. This new proposal focuses on collecting the most valuable evidence policymakers and technical experts need to understand the cost-effectiveness and impact of biofortified maize. Dr. Erick Boy, head of nutrition at HarvestPlus and member of our Board of Directors, assisted in designing the proposal strategy based on his knowledge of the literature and global demand for evidence on biofortified maize. The proposal consists of a bioavailability study (using isotopes to measure the absorption of zinc and iron in biofortified maize), a likely adopter study (more accurately assessing the number of maize farmers in Guatemala and how many could and would adopt subsidized biofortified maize seed), and a cost-effectiveness analysis and ex-ante impact model (using the above two studies to predict the costs, nutritional impact, and livelihood impact, of different levels of biofortified seed adoption in Guatemala). The award was approved by USAID-DIV, pending USAID Guatemala approval of the bioavailability study design. The award amount may increase based on additional requirements from USAID Guatemala.

As mentioned in the *Institutionalizing the Subsidy* section, USAID Guatemala and Semilla Nueva are co-creating a US\$5.7M, fixed amount award to be implemented by Semilla Nueva. A fixed amount award is a mechanism that allows payment against deliverables and significantly minimizes the amount of financial and administrative reporting that USAID grants normally entail. This award was made possible by Semilla Nueva's successful completion of two smaller USAID subcontracts in 2020-2022. Successful design and completion of the award could pave the way for future large grants from USAID, especially as Semilla Nueva expands to new countries.

New Development Director, Richard Knab, began in May

Richard began as a Peace Corp volunteer in Honduras' largest maize production area, before leading institutional fundraising at Zamorano, Central America's leading agriculture university for four years. He then led fundraising for an environmental nonprofit focused on the Galapagos Islands for 19 years. Richard worked with several Semilla Nueva board members during his time at Zamorano and came highly recommended. Given Richard's experience, he will be the first lead of fundraising to head up both Semilla Nueva's work with individual donors and foundations. His transition, development of more efficient fundraising systems, and staff-building strategy are being supported by Julia Berman, former head of fundraising at Muso, who is assisting Semilla Nueva in a consulting role.

Semilla Nueva expanded our budget from US\$2.9 to US\$3.3M after Rippleworks funding; expenditures to date are 90% of our budget

We started the year with an approved budget of US\$2.9M (a 31% increase over 2022 expenditures). After receiving our US\$1.5M grant from Rippleworks, the Board of Directors approved an increase of US\$400K in the 2023 budget, use of US\$800K to cover next year's operational expenses, and US\$300K



for our Operating Reserve. The modified approved budget for 2023 is US\$3.3M. As of May, the budget execution is 43% (US\$1.415M) out of a planned 48% (US\$1.575M).

Semilla Nueva will change our budget categories in 2024. Our current organizational departments are divided similarly to a seed company (sales, marketing, production, etc.). In 2024, departments will be divided according to our strategic focuses (subsidy, seed company support, government institutionalization, etc.).

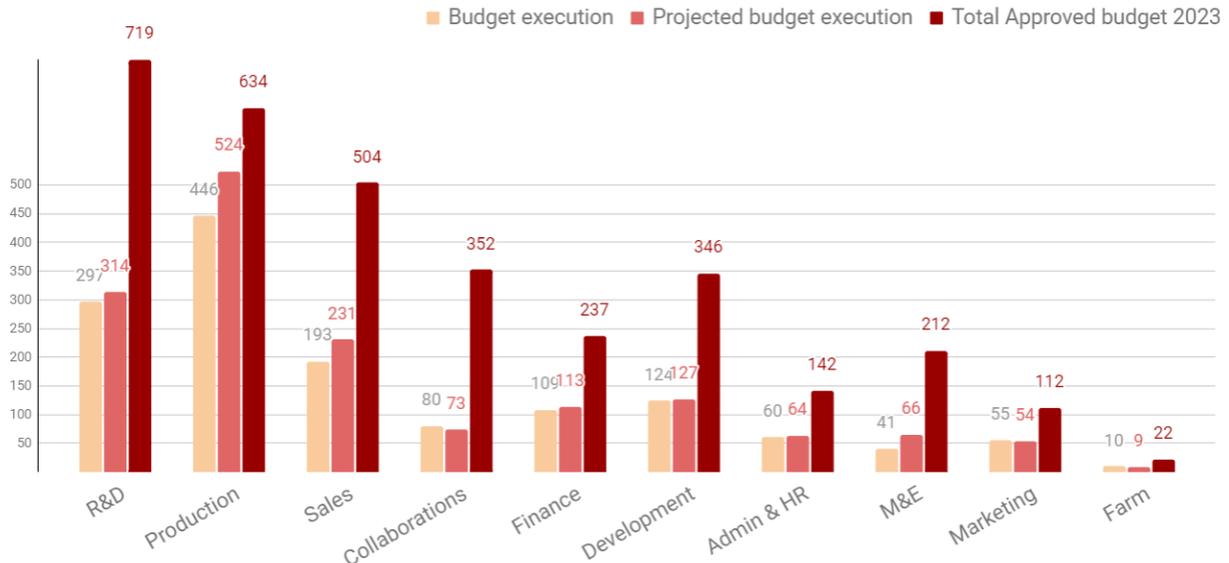


Figure 7: Semilla Nueva 2023 budget vs. actual as of May (US\$ 1,000s)

Semilla Nueva's cash-on-hand and committed funding covers nine months of operational expenses

With our increased funding, Semilla Nueva has fully covered our 2023 budget and projects having US\$1.6M in cash on hand, committed funding, and likely renewals at the beginning of 2024, covering 38% of the year's projected US\$4.1M budget. The Board of Directors has approved an Operating Reserve Policy with the goal of having 25% of the annual budget saved in an emergency account. This reserve now contains US\$701k, funding that is separate from our cash flow projections.



Projected cash flow 2023-2024 (US\$ 1,000s)	
Updated budget 2023	\$3,280
Available cash as of January 1	\$882
Received/confirmed funding	\$3,173
Cash + confirmed funding	\$4,055
Risk adjusted potential funding	\$784
Cash + confirmed + potential	\$4,839
Likely carry-over balance for 2024	\$1,559
* Estimated short-fall date	May 15, 2024
2024 estimated funding gap	\$2,541
Board designated reserves as of June 2023	\$701

Figure 6: Projected cash-flow and funding gap 2023-2024 (US\$ 1,000s)

Our 2022 audit produced no significant findings

Semilla Nueva hired a more rigorous auditing firm utilizing the accounting rules of the Financial Accounting Standards Board (FASB) and its most recent publication, *Presentation of Financial Statements of Not-for-Profit Entities (Topic 958)*. Our 2022 audit was conducted by Manuel Cervantes y Asociados, partners of LEA Global. This more rigorous approach was proposed as an intermediate step while Semilla Nueva implements the necessary controls to allow for the audit of our 2023 financials to be based on US-GAAP for nonprofits. During the second half of the year, we will restructure our Financial Statements to ensure 100% compliance. If you would like to receive a copy of the full audit report, please send your inquiry to mariacruz@semillanueva.org.

Hiring, retaining, and removing staff by and through our core values (conviction for real development, find the way, transparency that empowers, and congruence)

In the first half of 2023, we hired and onboarded 11 new staff members. Six were new positions and the other five replaced staff who left for graduate school (1), to start their own organization (1), or were let go (3). Semilla Nueva is still seeking a Research & Learning Director and has launched a new Operations Director position to help oversee growth with seed companies and international expansion.

Semilla Nueva launched new policies and benefits to support and retain our staff

Semilla Nueva has prioritized several new initiatives to help attract, retain, and develop the best talent for our organization. These include:

1. New headquarters in the city! After almost seven years in a hot office without AC or stable internet, we moved to a beautiful new office at the Technological Campus in Guatemala city’s Zone 4, the heart of the best bistros and coffee shops in the city. The Technological Campus has three connected towers with coworking spaces, meeting rooms, dozens of other startups, a certified biological laboratory, 3D printers, and is the headquarters of USAID’s biggest



agriculture project. With this change, we were able to address one of the three biggest complaints listed by our Guatemala City based team in our end of year surveys.

2. We significantly expanded our bonus system for field staff. Nearly all operations staff met their goals and most used their bonuses to purchase better vehicles, which we support with an insurance policy. We also improved the cell phones field staff members receive and allowed old phones to be kept for family use at the end of their estimated Semilla Nueva life cycle. Computers are next.
3. As the organization grew and new roles were created to lead international expansion, accounting, and others, we have successfully hired from within, which provides a motivational message for team members who want to keep growing with us. To support our continued growth and role transitions, team members are participating in a leadership development program, Rippleworks Leaders Studio, which offers a series of expert-led learning programs designed specifically for social ventures.
4. We assigned each team member US\$130, reimbursable when providing proof of completion of any course/training received, to improve their abilities in their current or dream role.
5. We took measures to improve work-life balance. Each department in the organization has periods that require extra hours of work. To compensate and thank our team, we have implemented a half day off per month for balance and wellness, which most employees have used for family events.