



STANDARD REPORT

JULY - DECEMBER 2024



Semilla Nueva



Semilla Nueva Standard Report Second Semester July – December 2024

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LETTER FROM THE DIRECTOR – USAID Situation

Semilla Nueva still finds itself at the most significant inflection point in the history of the organization. In Guatemala, seed companies increased their sales of biofortified seed by 89% and are set to double again in 2025. 70% of our seed subsidy will be covered by the Guatemalan government. In El Salvador, the first subsidized sales are set for May 2025, with the government overseeing the subsidy. One Acre Fund is testing our seed in Africa, and we'll have their Rwandan seeds, fully biofortified, back to them in 2027. Our two randomized controlled trials finished their first stage and our new ex-ante model shows that if the majority of corn in Guatemala is biofortified, we can drop stunting and generate billions in health benefits to Guatemala's poorest people. Our seeds helped increase farmer profits by 67% and our new seeds in 2026 should double that. We're set to more than double the farmers we serve in 2025. Our model is working.

But amidst all of this, we're also facing our biggest crisis in a decade.

Semilla Nueva began the year with our \$6.5M 2025 budget fully covered, which included \$3.6M of funding from our USAID project and our USAID-DIV grant. The proportion of USAID funding was particularly high because it included over \$1M allocated for 2024. Of this amount, \$875k had already been approved for payment, and was pending transfer from USAID. With the USAID funding frozen, we had cashflow until only April. We cut our budget by \$1.2M and eliminated contributions to our emergency reserves for 2025. Livelihood Impact Fund gave us a \$250k grant, and Cartier sent us our 2026 funding early. We now have cash flow through the beginning of July and a \$1.1M budget gap.

Budget cuts: Before February 1st, we cut \$1.2M from the budget by:

1. Pausing our two RCTs in progress, cutting impact studies, scaling back breeding
2. Laying off eight of our current 56 staff and not hiring six open positions, including 35% of our farmer promotion, outreach and data collection staff and not rehiring a head of M&E
3. Decreasing our policy efforts in El Salvador, Guatemala, and Honduras

We've prioritized maintaining momentum in:

1. The number of seed companies we work with and the farmers they reach,
2. Seed handouts with the Guatemalan government to continue our alliances,
3. Our leadership team, because improving efficiency and good strategic choices is critical
4. Our fundraising team, and
5. Gene editing, the technology we feel will enable radical scale.

We made these choices prioritizing elements which couldn't be paused or easily restarted (seed production and gene editing) and to maximize results and farmer pressure for local governments to expand payment. Kevin Starr once quipped that there were four payers at scale, governments, customers, NGOs and Big Aid. My guess is that many of our organizations will start focusing on a lot of hybrid models of government and customers going forward—and that's going to require a very big change in strategy and thinking from doers and donors alike.

-Curt



EXECUTIVE SUMMARY

Subsidized Seed Sales

- In Guatemala, subsidized seed companies increased sales to 3,594 bags, an 89% increase from 2023. Seven seed companies planted seed in late 2024, to produce an estimated 5,602 bags for early 2025. Reaching our annual goal of 8,752 bags will require several companies to produce seed during the rainy season.
- Semilla Nueva's Guatemala sales decreased 14% from 2023, as a result of diverting over 30% of seed to handout pilots with the Guatemalan government. Semilla Nueva significantly increased production in late 2024, which will allow a 52% increase in sales while maintaining collaborations with the Guatemalan government.
- Production remained a challenge in the 2024 rainy season, with seed companies planting less land than expected and getting lower yields than expected. New systems developed in late 2024 did pay off, and we're on track to meet our goal of producing 110 20kg bags per ha, compared to 83 in the main production season of 2023-4.
- In El Salvador, three seed companies and the Salvadoran government are producing an estimated 1,925 bags for subsidized sale and distribution. Additional companies are interested, but growth has stalled due to the USAID spending freeze.
- In Honduras, the seed registration process is nearly complete, but seed promotion plans are also on hold due to the USAID spending freeze.

Institutionalizing the Subsidy

- The Guatemalan congress assigned ~\$650,000 for our biofortified seed subsidy program in the 2025 national budget, which will cover approximately 70% of projected costs for the year. This was made possible through an excellent lobbying firm and a collaboration with Guatemalan congresspeople to experiment with the seeds with their local farmers in 2024.
- We formed a new NGO, *Maiz de Poder*, to implement the Guatemalan subsidy, overseen by a technical committee of leading NGOs and government agencies.
- The Guatemalan Ministry of Agriculture was unable to execute its part of our collaboration because they shifted priority to an unexpected, large fertilizer handout program approved by the Guatemalan congress.
- The Salvadoran government signed an agreement with Semilla Nueva to launch our biofortified seed subsidy, with the government approving new companies, providing in-kind support, and Semilla Nueva covering the initial subsidy amounts.

Developing Better Seeds

- Semilla Nueva's new hybrids for Central America are in the final stages of testing in Guatemala and El Salvador. Six potential seeds will finish validation in 2025, each ready for sales of 6,000 new bags in 2026 and 20,000-40,000 bags by 2027.
- Semilla Nueva's gene editing project with the Wisconsin Crop Improvement Center (WCIC) at University of Wisconsin is underway and running ahead of schedule. We've edited 13 genes for zinc, iron, and protein quality in the most common research seed and will have our first results for protein in March and results for all the nutritional impacts in the fall. Simultaneously, WCIC successfully transformed Semilla Nueva's most important line with the major gene for protein quality, and is in the process of transforming Semilla Nueva's favorite non-biofortified lines



from Central America, several target lines from Africa, and a new open-pollinated seed for the Guatemalan highlands.

- All of One Acre Fund's Rwandan seeds have finished their first cycle on our research farm, showing we can breed them successfully in short cycles in the tropics. This accomplishment will allow us to cut the total breeding time by 33%, allowing us to send fully developed seeds by 2027, instead of initial versions in 2026 with breeding completed in 2028-9.
- One Acre Fund received and planted our Guatemalan biofortified seeds in Rwanda, where they will test farmer perception of the taste of our biofortified grain and buyers' perceptions of the color and size.

Impact

- Semilla Nueva reached 30,881 farmers in 2024, a 25% increase from 2023.
- Farmers earned an average of \$85 in additional profits with our seeds (a 76% increase from their normal seeds).
- Our F5 seed showed strong results in climate resilience, reducing losses from rot by 26-35% and lodging (storm damage) by 95% compared to conventional seeds. Our other seed, F7 underperformed—while losses from lodging were still 83% lower than farmers' control seeds, rot was 19% higher. This is the primary reason why we will be discontinuing F7.
- Our postdoc at Michael Kremer's Development Innovation Lab is preparing a paper on the improved climate resilience of farmers using biofortified seeds.
- Our initial ex-ante impact model for stunting predicts that if 75% of Guatemala's maize is biofortified, it would cut stunting from 46% of the population down to 32%, generating several billion dollars in health outcomes annually.
- Our biomarker nutrition RCT was presented at a conference and is currently being prepared for publication.
- Our bioavailability RCT finished its field work, but sample analysis is on hold due to the USAID funding freeze.
- We wrapped up our initial subsidy design RCT whose key learnings were guiding a focused and scaled-up RCT for 2025. The research measured 1) how different subsidy models and subsidy amounts impact initial adoption and repurchase rates of biofortified seeds among low-income, smallholder farmers and 2) impacts on the livelihoods, food security, and climate resilience of participating farmers. The collected data would allow us to produce cost-benefit ratios for each subsidy type. Fieldwork is led by Semilla Nueva, with the design, oversight, and publication of results conducted by the Paris School of Economics and University of Chicago's Development Innovation Lab (DIL). This has been put on hold due to the USAID funding freeze.

Funding, Administration, People

- Semilla Nueva received US\$4.9M in new grants, renewals, individuals and public funding throughout 2024.
- 2024 budget execution reached 92% of a US\$5.4M budget.
- \$4.2M in cash and commitments cover our expenses until July 2025, leaving us with a \$1.1M funding gap.
- Our 2024 financial audit in full compliance with US-GAAP for nonprofits will be available by mid-March.
- Due to USAID's funding freeze, we had to lay off 7 of our staff and close vacant positions.



CONTEXT AND KEY TERMS

Semilla Nueva's Strategy

Malnutrition rates are decreasing globally, but for the 1.2B people who eat maize three times a day, the number of malnourished children is still on the rise. This population is fed by 53M smallholder farmers in Sub-Saharan Africa and Mesoamerica. Most are extremely poor and use low-quality maize seeds with low nutritional content. Almost none grow more nutritious, biofortified maize.

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 or biofortified seeds.

Semilla Nueva's solution is to:

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

Maize Market

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 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 Guatemala's 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 the maize consumed in Guatemala.

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 commonly 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

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Other seed companies increased subsidized sales by 89%, from 1,906 bags in 2023 to 3,594 in 2024, but didn't meet 2024 goals

Semilla Nueva's two existing partner seed companies expanded their production and sales targets, while Semilla Nueva also brought on three new seed companies. As mentioned in the *Jan-Jun 2024 Standard Report*, seed companies faced the worst year of seed production in over a decade, with losses of more than 40% for both biofortified and conventional seed production. Semilla Nueva had hoped to nearly triple seed production by other seed companies, but an 89% growth rate was still satisfactory.

Turnover in seed companies highlights production challenges

Among the three new seed companies who produced biofortified seed for the first time in 2024, one—the smallest—won't continue. CASAGRI is a small agricultural inputs company, which only produced 1 hectare of seed, and their production represented only 0.8% of the total sales by other seed companies. In contrast, the two larger companies, with stronger technical teams and sales bases, will expand production and sales 2-5x this year. The larger companies also strongly identified the project as a commercial venture that also served for social good, which they felt was good for their business. Smaller companies may lack the resources to launch and sustain seed production, a hypothesis that we will test this year with our new seed companies.

Similarly, Semillas del Tropic, which has produced our seed for two years, also paused production for 2025, citing a combination of internal logistical challenges in finding land for seed production as well as the poor seed production in 2023 and 2024. Semillas del Tropic is interested in continuing the subsidy program by planting one of our newer seeds in 2026.



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

20 Kg bags sold by	2021	2022	2023	2024	2025	2026	2027
Semilla Nueva	3,637	5,213	5,688	5,000	7,910	8,000	8,000
Other seed growers (GT)	1,129	2,005	1,906	3,594	8,752	13,875	21,080
Valle Verde	1,129	2,005	1,627	2,498	4,350	3,320	5,100
Agropher	0	0	0	663	3,054	2,470	3,400
Semillas del Trópico	0	0	279	305	0	1,020	1,275
BG Seeds	0	0	0	100	231	1,490	1,700
CASAGRI	0	0	0	28	0	0	425
ATESCATEL	0	0	0	0	116	1,235	1,275
Semillas Morales	0	0	0	0	539	810	1,275
Semiagro	0	0	0	0	154	725	850
RIKA	0	0	0	0	308	425	425
Other seed growers GT (6)	0	0	87	0	0	2,380	5,355
Other seed growers (ES)	0	0	0	0	1,540	3,540	6,985
Semillas El Progreso	0	0	0	0	385	385	770
Semillas M&M	0	0	0	0	770	1,195	1,660
Agrícola Los Blancos	0	0	0	0	385	810	1,235
Other seed growers ES	0	0	0	0	385*	1,150	3,320
Other seed growers (Hn)	0	0	0	0	0	1,000	2,000
Other seed growers HN	0	0	0	0	0	1,000	2,000
TOTAL	4,766	7,218	7,594	8,594	18,587	26,415	38,065



Seven seed companies planted for production in late 2024, doubling estimates for 2025 sales

Seven seed companies, including four new partners, planted in late 2024 to produce seed for 2025 sales. Companies signed subsidy contracts for 58.7 ha, but only planted 50.75 ha in late 2024, due to one company facing labor shortages for land preparation. As a result, out of a goal of 79.6 ha for production of 8,753 subsidized bags, seed companies have so far planted enough to produce an estimated 5,602 bags. Our two largest partners, Valle Verde and Agropher will plant in the rainy season to allow us to meet our targets.

Table 3: Seed production estimates and actual for 2024 and 2025 for other seed companies (20kg bags/ha)

	Main season '24	Rainy season '24	Main season '25	Rainy season '25
F5 expectation	140	82.85	110	75
F5 results	81	74.21	110 (est)	75(est)

One of the main reasons that Semilla Nueva failed to meet seed production goals in 2023-4 was a resistance to update our own estimates for seed production per hectare. To make our estimations going forward more accurate, we've significantly decreased projected yield, as evidenced above.

TikTok reached over 1.8M views

Semilla Nueva's farmer outreach strategy is shifting in two ways. First, the tools to get 100,000 or 200,000 farmers to learn about the seed and purchase, won't be the same tools that we used to reach the first 10,000 farmers. We'll need more mass promotion. Secondly, the aim of our promotion is no longer just buying seed, but also leading to mass awareness of the importance of our seed subsidy program, *Maiz de Poder*. Tiktok has become the most important media platform for political and social influence in Central America, which is one of the major reasons we've prioritized its growth.

Table 4: Maiz de Poder TikTok Results

	May-June 2024	Jul-Dec 2024	2025 goal
Videos	4	78	150
Views	282K	1.8M	10M
Likes	4.2K	21K	100K

In the second half of 2024, the channel gained momentum, uploading 78 videos, highlighting farmer success stories that generated over 1.8 million organic views, 21K+ likes and 3.1K followers. Farmer testimonies drove the highest engagement.



The audience demographics have also evolved, reflecting broader reach and engagement. Previously, the audience was 86% male and 14% female, with most followers aged 23 to 34. Now, 72% of followers are male and 27% are female. The 18 to 24 age group now represents 34% of followers, followed closely by the 25 to 34 age group at 32.6%. Geographically, 73.6% of viewers are from Guatemala, followed by Mexico (7.6%), Honduras (7.1%), and El Salvador (4.8%).

Shifting to a younger demographic may pose an interesting challenge, given that the majority of farmers are older, although it may help us more with the larger and more politically vocal younger generation. 2025 will be the first year in which farmers will see TikTok videos before planting, and will allow us to begin to track which content is most influencing farmers.

Repurchase study shows weaknesses and strengths; a more robust study is needed in 2025

While we made a mistake in survey implementation and didn't collect in depth information on farmers who planted in 2022 and 2024, we did collect useful information on the repurchasing rates of customers and the purchasing rates of farmers who received donated seed.

Table 5: Purchase/repurchase rates of 2022 and 2023 farmers

Farmers Replanting	# of farmers	% Purchase in 2024
Farmers who received donated seed in 2022	5,865	4.76%
Farmers who purchased seed in 2022	12,275	58.33%
Farmers who received donated seed in 2023	4,221	32.56%
Farmers who purchased seed in 2023	14,738	50.65%

58% of farmers who purchased in 2022 purchased again in 2024, compared to 51% of farmers who purchased in 2023. This is higher than previously reported values of 39%, and shows a combination of better seed and better commercial coverage. While this study didn't explore why farmers didn't repurchase, previous studies have given us several important potential causes:

- 1) **Stocking:** seed sold out or wasn't available in their local agrodealer
- 2) **High-segment farmers** normally return to their higher yielding, more expensive seeds
- 3) **Brand recall:** a significant number of farmers remember liking their biofortified seed, but don't remember it's name or brand

The purchase rates for farmers who received donated seed are striking and require more analysis. Nearly 5% of farmers who received free seed in 2022 purchased seed in 2024, two years later. Given all of the issues of NGOs providing seed in regions with no market presence of biofortified seed and to farmers with no previous habits of purchasing seed, this is a very encouraging number. Purchase rates in 2024 of farmers receiving seed in 2023 was far higher, at 32.56%. Part of this may be due to a significant number of farmers participating in the RCTs which provided vouchers and other incentives to purchase, but we need to more deeply evaluate these questions in 2025—and potentially with a deeper follow up survey of 2022 and 2023 farmers.



2024 rainy season production didn't reach goals; Seed companies planted 76% of the planned area and reached 78% of planned yields

Producing seed during the rainy season continues to be a difficulty for Semilla Nueva's contracted farmers and partner seed companies. Two seed companies prefer planting in both the main seed production season as well as the rainy season, in order to always have fresh seed and avoid storage costs. Unfortunately the rainy season offers several significant challenges, which were compounded by this being Agrofer's first year of commercial seed production. Challenges and solutions are detailed below, with the team confident it will prevent the majority of these issues for seed companies this coming year.

Table 6: Seed Production Area (Planned vs. Actual), Rainy Season (Aug-Dec 2024)

Rainy Season 2024				
Seed Company	Ha planted (Planned)	Ha planted (real)	Reasons for not planting	Proposed Solutions
Valle Verde	21.00	21.00	Met plan	Met plan
AGROPHER	14.70	6.30	Agropher is new to seed production and produces on rented land. Their agreement with a partner farmer for 8.4 ha of land was cancelled and they were unable to find necessary land until September when it was too late to plant given high amounts of rain during this month which would limit land preparation and saturate soil to allow for good seed germination.	Agropher is currently scouting 28 ha under a long term contract where they plan to invest in concrete, roofed seed drying patios. This infrastructure will allow for 5,000 bags of production per year during recommended dates of planting for both dry and rainy seasons.
TOTAL	36.40	27.90		



Table 7: Seed Production (Planned vs. Actual), Rainy Season (Aug-Dec 2024)

Seed	ha	Planned yield (mt/ha)	Actual yield (mt/ha)	Loss	Preventable with existing recommendations (% of loss attributable)	Preventable with additional recommendations (% of loss attributable)	Unpreventable (% of loss attributable)
Semilla Nueva (F7 - 4 sites)	14	1.66	0.75	54%	- Tar spot infection (<i>Rhytisma acerinum</i>) (20%)	- Tar spot infections (<i>Rhytisma acerinum</i>) (10%) - Inadequate of infrastructure for seed drying (20%) - High humidity, temperature & pollen viability (40%)	- Harvest delays due to heavy rains (10%)
Terceros Total	28	1.71	1.47	14%			
Valle Verde (F5)	21	1.71	1.6	9%	- Low fertilizer application (100%)	NA	NA
Agropher (F5)	6.3	1.71	1.2	27%	Tar spot infections (<i>Rhytisma acerinum</i>) (20%)	- Tar spot infections (<i>Rhytisma acerinum</i>) (10%) - Inadequate of infrastructure for seed drying (35%) - High humidity & pollen viability (15%)	- Harvest delays due to heavy rains (20%)
TOTAL	42	1.70	1.32	22%			



Table 8: Problems and solutions Rainy Season (Aug-Dec 2024)

Problem	Description	Planned Solution
Preventable with existing recommendations (% of loss attributable)		
Low pollen viability due to high environmental humidity and temperatures	1. A later than planned planting in one location in the southern coast led to flowering during 38-40°C affecting flowering synchronization and pollen production.	1. Rainy season plantings must take place in mid-June to allow seed formation in August/September, the driest and coolest period during the rainy season.
Fertilization	1. Valle Verde uses 860 lbs/ha of fertilizer for their conventional seed, but will get a better ROI with biofortified seeds if they use a higher fertilizer dose.	1. Semilla Nueva paid for soil testing and a custom fertilizer recommendation for Valle Verde, and will provide an increased payment advance if Valle Verde follows recommendations.
- Tar spot infections (<i>Rhizoma acerinum</i>) (20%)	Tar spot multiplies in areas with moderate temperatures and high humidity. Farmers planted after the recommended time, leading to perfect tar spot conditions.	1. Planting must take place during the recommended period of mid-June to allow growth during lower humidity periods with lower tar spot pressure.
Preventable with additional recommendations (% of loss attributable)		
- Tar spot infections (<i>Rhizoma acerinum</i>) (10%)	Semilla Nueva recommended two preventative fungicide applications in tar spot prone areas. This was insufficient	1. We increased recommendations to four preventative applications in areas of high tar spot prevalence.
Lack of infrastructure for drying seed in high humidity (35%)	1. Heavy rains meant workers couldn't harvest or dry seed. ~35% of seed rotted.	1. Agropher wil rent concrete and roofed drying patios while beginning construction of their own.
Unpreventable (% of loss attributable)		
Harvest delays due to heavy rains	1. Excess rain can delay harvest and lead to rot, regardless of other infrastructure.	



El Salvador and Honduras

Three Salvadoran seed companies began production of subsidized biofortified seed

Three Salvadoran seed companies planted 14 ha of NB-H24 (the Salvadoran name for F5) in December of 2024. They expect to produce 2,000 bags of seed which will be sold under the *Maiz de Poder* brand with support from the Salvadoran government. The companies are interested in doubling production for the following year, pending results.

Honduras expansion slows due to USAID freeze

The Honduran government approved all testing data from 2024 and is in the final steps of approving the commercial registration of Fortaleza F5 in Honduras. Semilla Nueva was in negotiations with two seed companies for a pilot production of seed in 2025, before launching commercial sales in 2026, but placed these steps and our hiring for our first full-time staff member in Honduras on hold due to the USAID funding freeze. An alliance with Catholic Relief Services to promote the seed is also going slower than expected due to the USAID freeze.



INSTITUTIONALIZING THE SUBSIDY

Payer at Scale

Summary

- The Guatemalan congress assigned ~\$650,000 for our biofortified seed subsidy program in the 2025 national budget, which will cover approximately 70% of projected costs for the year. This was made possible through an excellent lobbying firm and a collaboration with Guatemalan congresspeople to experiment with the seeds with their local farmers in 2024.
- We formed a new NGO, *Maiz de Poder*, to implement the Guatemalan subsidy, overseen by a technical committee of leading NGOs and government agencies.
- The Guatemalan Ministry of Agriculture was unable to execute its part of our collaboration because they shifted priority to an unexpected, large fertilizer handout program approved by the Guatemalan congress.
- The Salvadoran government signed an agreement with Semilla Nueva to launch our biofortified seed subsidy, with the government approving new companies, providing in-kind support, and Semilla Nueva covering the initial subsidy amounts.

GUATEMALA

Guatemalan congress approves US\$650,000 towards biofortified seed subsidies in the national budget

One of Semilla Nueva's biggest achievements to date was getting the Guatemalan congress to approve \$650,000 in their national budget to fund our subsidy program, which will cover close to 70% of the estimated subsidy cost in 2025.

To secure this funding, we partnered with a leading lobbying firm led by a former minister of finance. Our strategy focused on engaging key congresspeople from the budget committee and aligned with the current presidential administration. We provided our biofortified seed for congresspeople to donate to 1,880 farmers in their regions, with involvement from local municipal politicians. Our staff supervised seed donations, trained farmers, and collected contact information for follow-up. Farmers provided their local politicians with positive feedback. During our follow up meetings with congresspeople, they would often share videos of the maize plants that their constituents or local politicians had sent to them, excited about the results. In other meetings, they would call their local teams and have them go visit farmers while we were in their offices in the capital, calling back with their reports in real time.

Our request for funding was very simple: one budget line, one amount, strictly for subsidy costs. In December the budget was passed, with 5 million Quetzales assigned directly to "Semilla Nueva – Fondo Maiz de Poder." The success of our approach brings a key insight— working with the Guatemalan congress may prove to be more critical and more effective than working with the executive branch. Congresspeople have direct control over the national budget. The majority are elected in a quasi-parliamentary system with numerous parties, meaning there are few "safe" seats. As a result, there are strong electoral incentives for congresspeople to support programs which provide direct tangible benefits to their districts.



NGO *Fondo Maiz de Poder* founded to serve as a third-party subsidy mechanism

In December 2024, Semilla Nueva finalized the constitution, recruited the board, and formed a new non-profit, *Fondo Maiz de Poder*. This NGO will serve as a third-party subsidy mechanism with involvement from the Guatemalan government. It is overseen by a board of directors, with recommendations on the subsidy terms, quality control, and payments handled by a technical committee of government and institutional partners. Semilla Nueva will transfer subsidy contracts already signed with seed companies to this new entity by February 2025.

An NGO wasn't our first choice. Originally, we aimed to build a trust with shared ownership by government and local institutions. This would optimize government ownership, which we believed would be critical for long-term public sector adoption. It was surprising to us that the government and our institutional partners rejected our plan due to concerns over legal accountability and risk. Instead, all partners opted instead for a model where their input would be only advisory, allowing for influence without legal risks.

For the model to succeed, the NGO's board must respect its role as legal steward, ensuring that the advisory committee retains its critical decision-making power while remaining within legal and strategic boundaries. If balanced correctly, this structure could provide both government involvement and long-term sustainability.

Semilla Nueva collaboration with the Guatemalan Ministry of Agriculture slows

In mid-2024, Semilla Nueva had several active collaborations with the Guatemalan Ministry of Agriculture, assisting in the development of a national plan for food security, rolling out Semilla Nueva's M&E system to cover all handouts of biofortified and non-biofortified seed, and working to address structural issues in the seed purchase program which would enable the government to purchase biofortified seeds from local seed companies at advantageous terms.

All these programs slowed considerably when the Guatemalan congress approved a major budget expansion, including the largest purchase of fertilizer for handout programs in nearly two decades. With the Ministry of Agriculture shifting its focus to fertilizer procurement and distribution, our collaborative M&E efforts were left incomplete (no parcels were visited in the scheduled third and fourth visits) and the national plan for food security was put on hold.

This experience confirms one important takeaway: in a democracy like Guatemala, the legislative branch may be a more reliable partner than the executive, given frequent turnover of key personnel (between and within new administrations) and continual changes of executive priorities, and decision making power largely constrained by the national budget.



Table 9: Monitoring parcels implemented by Semilla Nueva, Guatemalan Government, and Salvadoran Government

	SN monitoring of purchasing farmers (Goal 40)	SN monitoring of Guatemalan gov't donation farmers (Goal 60)	Guatemalan gov't monitoring of donation farmers (Goal 60)	Salvadoran gov't monitoring of donation farmers (Goal 200)
Visit 1	46	40	38	160
Visit 2	46	40	13	152
Visit 3	46	40	0	146
Visit 4	N/A	10	0	N/A

EL SALVADOR

Salvadoran government begins co-implementation of seed subsidy pilot

After six months of discussions with multiple branches of the Salvadoran government, the Salvadoran National Agricultural Research System, CENTA, approved a framework outlining the terms and pricing of a collaborative biofortified seed subsidy program and authorized the first three participating companies. As part of this process, Semilla Nueva collects applications from interested seed companies and submits them to the government for approval for both planting and payment. The government then provides follow up, using a modified version of Semilla Nueva's M&E system. The government has been highly engaged, participating in negotiations with seed companies, already rejecting one company due to poor financial systems, visiting seed company land before planting, and visiting parcels during production. Due to significant restructuring processes within the government, further progress on government-funded subsidies in El Salvador will likely need to wait until mid-2025.

There are several factors that have contributed to the success of this past year's work in El Salvador. We developed a strong relationship with key members of the Salvadoran government at multiple levels, with our CEO traveling to the country at least once a month throughout the year. We provided support for government travel and testing expenses, and launched collaborative demonstration parcels and field days, with the government identifying the participants to invite. We also let the Salvadoran government determine the subsidy levels, changing our initial proposals. Seed, labor, and inputs are all more expensive in El Salvador, and so we agreed to a subsidy amount that was higher than what worked in Guatemala.

Above all, however, we think there has been one critical lesson. At several important points, we've slowed our own plans due to political realities and recommendations from the government. Originally we planned for subsidized sales to begin in 2024, with Semilla Nueva providing subsidies to Guatemalan seed companies to sell in El Salvador. The government advised us in 2024 to change our plans and instead focus only on Salvadoran seed companies, or companies willing to produce in Salvador. We accepted the delay and changed our approach, which allowed us to also gather data from the 1,550 farmers who received free seed, co-design the subsidy terms, and launch it with Salvadoran seed companies—ultimately creating a far stronger foundation for long-term growth.



Looking forward, there is significant interest from the government in expanding collaborations to additional seed companies, conducting more rigorous impact studies, and conducting events to show results to the Salvadoran president. For the first time, unfortunately, Semilla Nueva is now unable to meet demand from the government due to the USAID spending freeze. Expanded collaborations are on hold while we work to cover our core operating expenses.

The Salvadoran government used Semilla Nueva’s M&E systems to conduct collaborative harvests with 146 farmers of the 1,550 who received seed in 2024

The Salvadoran government trained nearly 100 extensionists on how to use Semilla Nueva’s monitoring and evaluation system. The government provided contact information of all farmers who received seed to Dr. Jessica Rudder at Michael Kremer’s Development Innovation Lab, who created a random sample for the evaluation. The government successfully implemented Semilla Nueva’s M&E system, which includes three visits and participatory harvests for 146 farmers, surpassing Semilla Nueva’s own data collection in Guatemala from 86 farmers. Data will be analyzed in late February.



Figure 1: Top: Semilla Nueva training of Salvadoran extensionists; bottom left: field day; bottom right: participatory harvest



DEVELOPING BETTER SEEDS

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

Summary

- Semilla Nueva’s new hybrids for Central America are in the final stages of testing in Guatemala and El Salvador. Six potential seeds will finish validation in 2025, each ready for sales of 6,000 new bags in 2026 and 20,000-40,000 bags by 2027.
- Semilla Nueva’s gene editing project with the Wisconsin Crop Improvement Center (WCIC) at University of Wisconsin is underway and running ahead of schedule. We’ve edited 13 genes for zinc, iron, and protein quality in the most common research seed and will have our first results for protein in March and results for all the nutritional impacts in the fall. Simultaneously, WCIC successfully transformed Semilla Nueva’s most important line with the major gene for protein quality, and is in the process of transforming Semilla Nueva’s favorite non-biofortified lines from Central America, several target lines from Africa, and a new open-pollinated seed for the Guatemalan highlands.
- All of One Acre Fund’s Rwandan seeds have finished their first cycle on our research farm, showing we can breed them successfully in short cycles in the tropics. This accomplishment will allow us to cut the total breeding time by 33%, allowing us to send fully developed seeds by 2027, instead of initial versions in 2026 with breeding completed in 2028-9.
- One Acre Fund received and planted our Guatemalan biofortified seeds in Rwanda, where they will test farmer perception of the taste of our biofortified grain and buyers’ perceptions of the color and size.

Semilla Nueva is finishing testing on six potential new hybrids and remains on track to have 6,000 bags (~9,000 farmers) of seed for each in Guatemala and El Salvador by May 2026

Typically, breeding programs spend 2-3 years testing new seeds before spending 2-3 years scaling up production of the parental seed that allows for commercial production. Given the considerable climate-related challenges that seed companies face when producing our current biofortified seeds (as well as their conventional seeds!) Semilla Nueva is utilizing a fast-track strategy to get seeds to seed companies as quickly as possible.

Semilla Nueva has identified four new hybrids with 1) higher farmer yields than F5 and F7, 2) similar nutritional levels, 3) more production for seed companies during periods of stress. We also have two hybrids with similar nutritional levels that are either a) higher yielding for farmers or b) easier to produce for seed companies. We are simultaneously testing these seeds and producing parental seeds, allowing us to choose which to launch by fall of 2025 and begin production with seed companies for 2026 sales. We remain on track for each of our six potential hybrids to produce 6,000 bags of seed in 2026 (around 10,000 farmers each). Based on our next round of tests, we may launch only the best seed, or launch multiple hybrids, potentially allowing some seed companies an exclusive biofortified seed and replacing F5 and F7 faster.

Testing of these new seeds in the May-Nov 2024 cycle was highly encouraging.

- 1) Yields for new seeds in field trials ranged from 15-45% higher than F5 and F7. This could increase our average farmer’s profit by 150%, compared to 75% with F5 and F7 in 2024.
- 2) The four best hybrids showed similar resistance to storms and winds as our current seeds, and 12% lower rot than F5 and 38% lower rot than F7, which has been a major issue for farmers.



Rot was still slightly higher than Guatemala's leading seed, DK390, but better than all low and mid-segment commercial and government seeds tested.

- 3) Initial trials show that seed companies will produce 26-30% more seed per hectare, with four of the new hybrids, significantly cutting their costs compared to F5 and F7.
- 4) One of the hybrids uses our new genetics for larger and whiter biofortified seeds. We now have a methodology for converting our biofortified seeds to have this characteristic, and hope to standardize it in all future biofortified seeds.



Figure 2: Our biofortified hybrid F7 with darker and smaller grain characteristic of biofortified seeds



Figure 3: DK 390, Guatemala's most preferred conventional hybrid seed



Figure 4: A new biofortified hybrid with our genetics for larger, whiter seeds

Gene editing is ahead of schedule, with experimental results in March and November 2025 and successful transformation of our most important Central American line

Our gene editing program contains three simultaneous projects, all carried out with the Wisconsin Crop Innovation Center (WCIC) at University of Wisconsin-Madison.

- 1) **Test nutrition edits on the standard US seed:** We have selected gene edits that we suspect are the most viable to achieve high levels of zinc, iron, and protein quality on the standard seed used by most research programs in the US, LH244. This will give us a good initial insight into whether these edits can increase nutrition without causing yield loss or other issues for farmers.
- 2) **Learn how to edit our leading Central American and Sub-Saharan African seeds and then test edits on them:** We're developing protocols for how to edit the most important (high-yielding and climate resilient) lines from Central America and Africa, after which we will prioritize the best edits identified in our first project in our locally adapted seeds.



- 3) **Working with seeds from the Guatemalan highlands:** We're developing a protocol to do editing on the Guatemalan government's newly launched, open pollinated (non-hybrid) seed for the Guatemalan highlands.

All our gene editing work is on track or ahead of schedule. For our test of experimental genes, we have 7/8 genes knocked out and 4/4 genes over-expressed in the standard research seed LH244. We'll be able to test seeds for protein quality in March, and then plant all in May, allowing for a complete testing of zinc, iron, and protein quality in the fall.

A recent notable win was the most important non-biofortified Central American line in our breeding program successfully demonstrated "transformation" which is the most difficult step for gene editing. WCIC is now working on increasing the efficiency of this step with all of our target seeds. After this proof of concept, we now should be able to begin testing our leading experimental edits in our most important lines by May.

Finally, our seed from the Guatemalan highlands has initial transformation in callus tissue, and we've learned how to use lighting and other techniques to grow the seeds (which inconveniently continue trying to grow too tall for the greenhouse) successfully in Wisconsin.



Figure 5: Our first transformed plantlet of SN1111, the most important conventional seed in our breeding and new hybrid program.

Rwandan seeds can survive the tropics: One Acre Fund will have their best seeds fully converted and ready for registration and production in 2027

A risky bet is paying off, and we'll be able to get One Acre Fund fully converted hybrids faster than we thought. After receiving One Acre Fund's seed in mid-2024, we took a risk and grew the first cycle at our experimental farm, which was successful. High heat at the farm allows us to grow and test three cycles of corn per year. We had originally planned to backcross One Acre Fund's seed in a subtropical zone, given most of their seeds were developed for such regions. Unfortunately, the cooler temperatures mean that we would only get two cycles of corn per year, meaning we could have initial (partially backcrossed) seeds to test in Rwanda by late 2026, but wouldn't have final products until 2028. Given



the success of growing Rwandan lines on our farm, we're now scheduled to have final, converted hybrids ready for One Acre Fund to test by 2027.

Semilla Nueva's seeds make it to Rwanda

If the backcrossing is successful, the biggest barriers to the success of biofortified maize seed in Rwanda may come down to the slightly darker color of biofortified grain or the taste of biofortified maize in local dishes. Previous studies on biofortified maize in East Africa haven't shown this to be a problem, but to proceed cautiously, Semilla Nueva successfully sent our two Guatemalan biofortified seeds, F5 and F7 to Rwanda for testing. One Acre Fund successfully imported the seeds and planted them at their research farms.

In mid-2025, they'll host taste testing events with farmers and events with grain purchasers to evaluate if there are barriers to marketability. This exercise also was a major milestone. In 2024, One Acre Fund successfully sent seed from Rwanda to Guatemala. In December of 2024, Semilla Nueva successfully sent seed from Guatemala to Rwanda. Both of these steps required months of intensive work from both organizations, because no one had sent seed between the two countries before. As a result of our efforts, both governments now have a relationship and procedures for sending seed back and forth, making future shipments easier and setting a precedent for relationships between the Guatemalan Ministry of Agriculture and other African countries.



Figure 6: Rwandan farmers planting F5 and F7 biofortified seeds



IMPACT

Summary

- Semilla Nueva reached 30,881 farmers in 2024, a 25% increase from 2023.
- Farmers earned an average of \$85 in additional profits with our seeds (a 76% increase from their normal seeds).
- Our F5 seed showed strong results in climate resilience, reducing losses from rot by 26-35% and lodging (storm damage) by 95% compared to conventional seeds. Our other seed, F7 underperformed—while losses from lodging were still 83% lower than farmers’ control seeds, rot was 19% higher. This is the primary reason why we will be discontinuing F7.
- Our postdoc at Michael Kremer’s Development Innovation Lab is preparing a paper on the improved climate resilience of farmers using biofortified seeds.
- Our initial ex-ante impact model for stunting predicts that if 75% of Guatemala’s maize is biofortified, it would cut stunting from 46% of the population down to 32%, generating several billion dollars in health outcomes annually.
- Our biomarker nutrition RCT was presented at a conference and is currently being prepared for publication.
- Our bioavailability RCT finished its field work, but sample analysis is on hold due to the USAID funding freeze.
- We wrapped up our initial subsidy design RCT whose key learnings were guiding a focused and scaled-up RCT for 2025. The research measured 1) how different subsidy models and subsidy amounts impact initial adoption and repurchase rates of biofortified seeds among low-income, smallholder farmers and 2) impacts on the livelihoods, food security, and climate resilience of participating farmers. The collected data would allow us to produce cost-benefit ratios for each subsidy type. Fieldwork is led by Semilla Nueva, with the design, oversight, and publication of results conducted by the Paris School of Economics and University of Chicago’s Development Innovation Lab (DIL). This has been put on hold due to the USAID funding freeze.

Semilla Nueva reached 30,881 farmers in 2024, a 25% increase over 2023

For the first time, our impact graphics now include metrics from El Salvador, with 1,550 farmers in the seed donation category coming from the government’s pilot project in 2024.

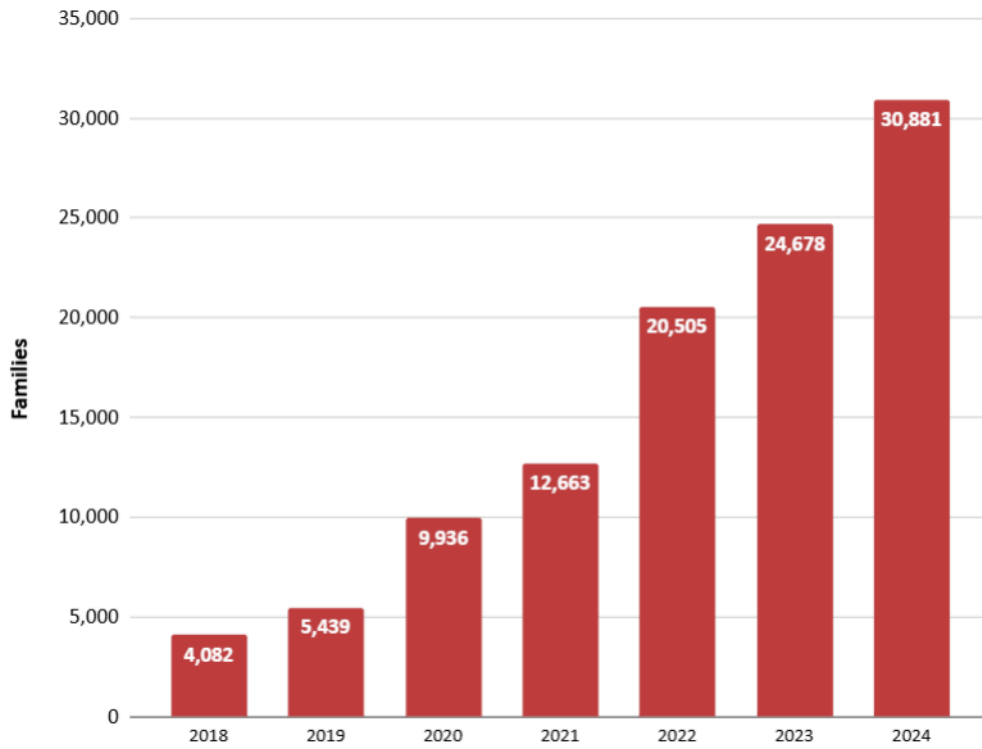


Figure 7: Families that planted Semilla Nueva biofortified maize seed (2018 – 2024)

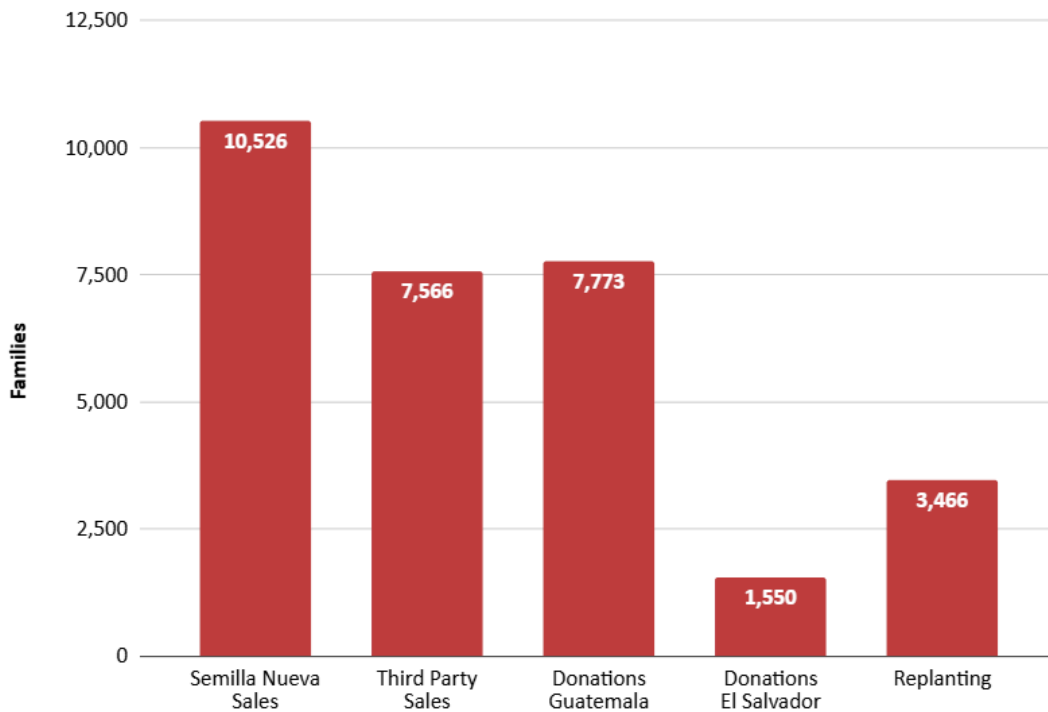


Figure 8: Breakdown of families planting biofortified maize in 2024 by source of seed



Farmers reached

- Farmers purchased 29 lbs of seed on average, a significantly larger portion than what they purchased in 2022 and 2023. If farmers had purchased the same (smaller) amount as in previous years, Semilla Nueva would have reached nearly 40,000 farmers in 2024 instead of 30,881.
- Subsidized seed companies expanded from selling to 3,699 farmers in 2023, to 7,566 farmers in 2024, a 104% increase.
- Purchasing farmers who saved seed and replanted it the following year (instead of purchasing) fell from 23% to 11%. This may coincide with more farmers purchasing seed, but more analysis is needed.
- In 2023, our surveys showed that we were underreporting the number of farmers reached by 34%, because we had not been counting the number of farmers purchasing seed and then providing some of it to friends and family. The Mulago Foundation recommended that we verify this new data with an in-person survey. We visited 43 farmers who reported sharing seed, and 46 of the farmers they shared seed with. In all cases, we were able to verify that what farmers had reported in their previous phone survey had indeed happened. In 2024, we saw less farmers sharing, with nearly 11% of purchasing farmers that gave seed to friends and family, increasing the number of farmers reached by 14%.

Table 10: Purchasing farmers giving seed to friends and family

How many families did purchasing farmers give purchased seed to?	Percent of purchasing farmers
1	7.50%
2	2.86%
3	0.36%

LIVELIHOOD IMPACTS

In 2024, we collected the most detailed livelihood metrics to date. We randomly identified farmers who grew both our seeds and seeds from each of the major segments among both purchasing farmers and half of the segments among farmers who received seed from the government. This allowed us to have the most complete panorama of our economic impact to date. By returning to our methodology of finding farmers who grow both a biofortified seed and a leading conventional seed from different segments, we also improved the statistical significance of our results, which are presented in the annex.



Table 11: Yield of biofortified seed vs. conventional seed, grown side by side, 2024 (mt/ha)

	Farmer Segment (% of farmers)	F5/F7	Conventional seeds	F5/F7 Difference	Percent change
Purchasing Farmers Average land size: 0.53 ha	Non-hybrid (28%)	5.17	3.93	1.24	31.6%
	Low-segment (43.40%)	3.87	3.08	0.79	25.6%
	Mid-segment (11.79%)	3.90	3.83	0.07	1.8%
	High-segment (16.51%)	4.39	5.09	-0.70	-13.8%
	Weighted average	4.31	3.73	0.63	17.9%
Government Donations Average land size: 0.31 ha	Non-hybrid (57.35%)	4.00	2.93	1.07	36.5%
	Low-segment (16.18%)	3.70	2.92	0.78	26.7%
	Mid-segment* (12.50%)	4.48	2.94	1.54	52.4%
	High-segment** (13.97%)	4.39	5.09	-0.70	-13.8%
	Weighted average	4.07	3.23	0.56	29.89%
Weighted average - all		4.28	3.66	0.62	21.38%

Table 12: Yield of biofortified seed vs. conventional seed, grown side by side, 2024 (\$/farmer)

	Farmer Segment	F5/F7 (\$20)	Conventional seeds	F5/F7 Difference	Percent change
Purchasing Farmers Average land size: 0.53 ha	Non-hybrid (28%)	\$5.62	-\$189.61	\$195.23	103.0%
	\$20 Low-segment (43.40%)	-\$51.01	-\$154.71	\$103.70	67.0%
	\$40 Mid-segment (11.79%)	\$92.15	\$72.85	\$19.31	26.5%
	\$85 High-segment (16.51%)	\$169.34	\$157.66	\$11.68	7.4%
	Weighted average	\$18.26	-\$85.62	\$93.65	62.3%
Government Donations Average land size: 0.31 ha	Non-hybrid (57.35%)	\$17.88	-\$41.94	\$59.82	142.6%
	Low-segment (16.18%)	-\$13.48	-\$112.08	\$98.60	88.0%
	Mid-segment* (12.50%)	-\$1.26	-\$172.49	\$171.23	99.3%
	High-segment** (13.97%)	\$69.99	\$65.17	\$4.83	7.4%
	Weighted average	\$17.70	-\$54.65	\$63.93	109.48%
Weighted average - all		\$18.09	-\$76.66	\$85.05	75.92%

*Mid-segment, donation farmers, N=2

**high-segment, donation farmers, N=0, so purchasing farmers used as a reference



Key takeaways:

- On average, farmers using biofortified maize seeds increased their profits by \$85 (+75%)
- The vast majority of farmers using conventional maize seeds lost money in 2024. Only farmers using the most expensive high-segment seeds largely escaped this trend.
- F5 and F7 provided a reliable increase in income for farmers who normally do not purchase seeds and farmers who use low-segment seeds, but marginal benefits for mid-segment farmers.
- High-segment seeds yielded 17% more than F5 and F7, but farmer profits were 7% lower for high-segment seeds due to the high cost of those seeds.
- There weren't significant differences in the economic benefits for farmers who purchased biofortified seeds or farmers who received those seeds from the Guatemalan government as a donation.
- Farmers receiving seed from the Guatemalan government were poorly targeted. The programs are designed to give seed to farmers who are too poor to purchase seed, but as shown below, only 57% of farmers were from this segment. 14% of the farmers who received seed normally purchase the most expensive seed in the market.

The loss of profitability for maize farming overall can be largely attributed to increased labor prices due to immigration to the US, increased agricultural input prices due to inflation, and a lowering in the price of maize due to importation of contraband, subsidized maize from Mexico, and the Guatemalan government approving significant additional imports of white maize legally. These trends may help create demand for scaling Semilla Nueva's program, but also represent significant risks to increasing poverty in Guatemala.

CLIMATE RESILIENCE

F5 performed similarly to previous years on two critical climate resilience indicators: cutting loss from rot by 26-35% and lodging (storm damage) by 95%; F7 underperformed

We observed a significant difference in the climate resilience of our two seeds, F5 and F7. In the field, we primarily evaluate climate resilience through rot (which increases after stress periods, especially drought) and lodging (how many plants are blown over by storms).

F5 showed 26% less rot than conventional seeds for purchasing farmers than their normal seed and 35% less for farmers who received the seed through government handouts. F5 showed a 95% reduction in losses from lodging overall. Interestingly, F5 had similar rates of rot to heirloom seeds, but cut loss from rot by 38% compared to locally produced low-segment and mid-segment hybrid seeds.

F7 had mixed results. Losses from lodging were still 83% lower than farmers' control seeds, but rot was 19% higher. Combined with difficulty in commercial seed production, this is the primary reason that Semilla Nueva has largely cut F7, with no other seed companies producing the seed for 2025 and Semilla Nueva cutting it to less than 20% of our production.

Semilla Nueva missed one critical element of our climate resilience indicators: plant density

In previous years, we measured the number of plants that sprout and compared to the number of plants that survive until production. We're then able to analyze how these changes relate to rot and lodging, and how they affect farmers who reported significant storms or droughts. Using this data, we



were able to estimate the economic impact of those storms and droughts, as well as how much better our seeds weather them than farmers' normal seeds. This year, our field team didn't arrive in time for sprouting, largely due to their heavy focus on our RCTs. As a result, we do not have this critical measurement for 2024.

Dr. Jessica Rudder at Michael Kremer's Development Innovation Lab (DIL) has initial results for a paper on the climate resilience of Semilla Nueva's biofortified seed

Semilla Nueva's supported post-doc at DIL is evaluating three years of Semilla Nueva's farmer harvest data (known in agricultural economics circles as crop cuts). The study correlates the GPS locations of farmers and historical satellite weather data to examine how climate variation affects maize performance for different seeds - including yields, profits, rot, and lodging. Data for 2023 has been analyzed and finds statistically significant improvements in farmers' resilience to climate events for Semilla Nueva's biofortified seeds vs. local seeds. In normal rain conditions, Fortaleza growers had 40% higher yields compared to non-hybrid growers. During droughts, Fortaleza growers had 52% higher yields. Fortaleza growers also had significantly higher density, illustrating how Fortaleza seeds were more resilient to dry weather conditions. We hope to have a finalized publication in review by 2025.

If 75% of Guatemala's maize is biofortified, could we cut stunting from 46% to 32%?

Semilla Nueva commissioned the *Fundación Iberoamericano de Nutrición* (FINUT) to create an ex-ante model predicting the impact of biofortified maize consumption on the national population. The model uses Guatemala's nationally representative home consumption and expenditure survey and health survey to predict and quantify the causes of stunted growth. The model then evaluates how much stunting could be prevented if 25%, 50%, 75%, or 100% of Guatemala's maize was biofortified. The model is available on our [website](#), with descriptions of the methodology. A more robust model using Guatemala's new 2023 data is in progress, but was paused due to the USAID funding freeze.

Paper from our first nutrition Randomized Controlled Trial (RCT) in preparation for publication

Dr. Elad Tako at Cornell University and the Institute of Nutrition of Central America and Panama (INCAP) are preparing a publication on their randomized controlled trial showing that consumption of our biofortified maize improved the zinc status of mothers and young children. A conference presentation summary is available [here](#).

Field work was finished for UC Denver and INCAP's bioavailability RCT, which would solidify the evidence base for the nutritional impact of zinc and iron biofortified maize in Mesoamerica

A group of leading nutrition experts, including Dr. Erick Boy, board member of Semilla Nueva and head of nutrition for Harvest Plus, agreed that a Bioavailability Randomized Controlled Trial (RCT) is the primary study needed to consolidate the evidence base for the nutritional impact of our intervention in Central America. Bioavailability studies represent the gold standard in nutrition work for micronutrients since they measure the exact amount of a nutrient absorbed by a given population. While a study on zinc biofortified maize had been completed in Zambia, which showed that biofortified maize consumption led to similar absorption as flour fortification, a study in Guatemala with local maize milling and processing techniques and local maize preparation (tortillas) will solidify this evidence for our local context. Additionally, the study includes an analysis of iron absorption, which has never been done before for biofortified maize. The study was funded by USAID-DIV and is



led by Dr. Nancy Krebs at UC Denver, one of the two leading institutes for bioavailability studies in low and middle-income countries.

The UC Denver and INCAP team completed all field work for the study, which involved 56 children in the municipality of Tecpan, Chimaltenango. Laboratory work and data analysis are now on hold due to the USAID funding freeze.

All field work, except an endline study, has been completed for Semilla Nueva’s subsidy design RCT pilot; an expanded study was designed but is on hold due to the USAID freeze

In 2023, Semilla Nueva began a series of studies to evaluate the most cost-effective subsidy design to increase the adoption of biofortified maize seeds in Guatemala. In 2024, this expanded into two pilots, with the plan to create a more statistically powerful study in 2025 based on initial results. This research measures 1) how different subsidy models and subsidy amounts affect initial adoption and repurchase rates of biofortified seeds among low-income, smallholder farmers and 2) the impacts of the different models and our seeds on the livelihoods, food security, and climate resilience of participating farmers. The collected data will allow us to produce cost-benefit ratios for each subsidy type. Fieldwork is led by Semilla Nueva, with RTC design, oversight, and publication of results conducted by the Paris School of Economics and University of Chicago’s Development Innovation Lab (DIL).

While the Paris School of Economics team is currently designing an endline data collection to be implemented by a third party, there are several new results that the team has presented. Voucher redemption was modest overall (31%), with seed discounts that varied between 26-77% beyond our already subsidized price. Vouchers are normally far more expensive and complicated to implement than a supply-side subsidy like Semilla Nueva’s, but it is arguable that vouchers allow more control because you can provide the vouchers directly to target farmers. From Semilla Nueva’s perspective (not DIL’s or PSE’s) if only 31% of farmers redeem the voucher, the benefits of targeting decrease significantly, and a supply-side subsidy may be the most cost-effective way to reach the highest quantity of poorer farmers who normally don’t purchase seed. This evaluation is the goal of our expanded RCT.

The study also sought to test price elasticity, i.e. would more farmers buy if the seed was far cheaper? We found that male farmers who normally purchase the most expensive seeds would adopt at higher rates with a far higher subsidy (lower seed price), but this is not our target customer. There was very little price-dependent change in redemption of vouchers for women farmers, indigenous farmers, and poorer farmers who normally do not purchase seed. This may point to Semilla Nueva’s current price point already being adequate for our target farmers—and that promotion and accessibility may be areas of higher prioritization.

After reviewing initial results, the PSE, DIL, and Semilla Nueva teams consolidated on an expanded RCT to take place in 2025. The study would include four treatment groups of communities.

1. Vouchers
2. Information sessions + Semilla Nueva seed available in agrodealers
3. Promotion of the agrodealer (not our seed) and biofortified seed available in the agrodealer
4. Biofortified seed available in a local agrodealer but no promotion to farmers.

This study was covered by our USAID-DIV grant and has been unfortunately put on hold.



FUNDING, ADMINISTRATION, PEOPLE

Summary

- Semilla Nueva received US\$4.9M in new grants, renewals, individuals and public funding throughout 2024.
- 2024 budget execution reached 92% of a US\$5.4M budget.
- \$4.2M in cash and commitments cover our expenses until July 2025, leaving us with a \$1.1M funding gap.
- Our 2024 financial audit in full compliance with US-GAAP for nonprofits will be available by mid-March.
- Due to USAID's funding freeze, we had to lay off 7 of our staff and close vacant positions.

\$4.9 million in new grants, renewals, individuals and public funding throughout 2024

Semilla Nueva received US\$505,000 from new foundations (The IROH Foundation, Prairie Creek Partners Charitable Foundation, Global Health Funding Circle, Pilot House, and The Kirby Prize). Renewals from existing partners (Cartier, Mulago, Light a Single Candle, Shockwave, Pulte, The International Foundation, Vitol, Dovetail, Rippleworks, Rotary International and Harbourton Foundation) reached \$3.5M. Donations from individuals increased to US\$464,650 and public (government) funding received was US\$447,727.

Semilla Nueva reached a 92% execution out of a US\$5.4M budget

As of December 31st, Semilla Nueva executed 92% of the total approved budget. The expenditure by cost center is shown in Figure 9.

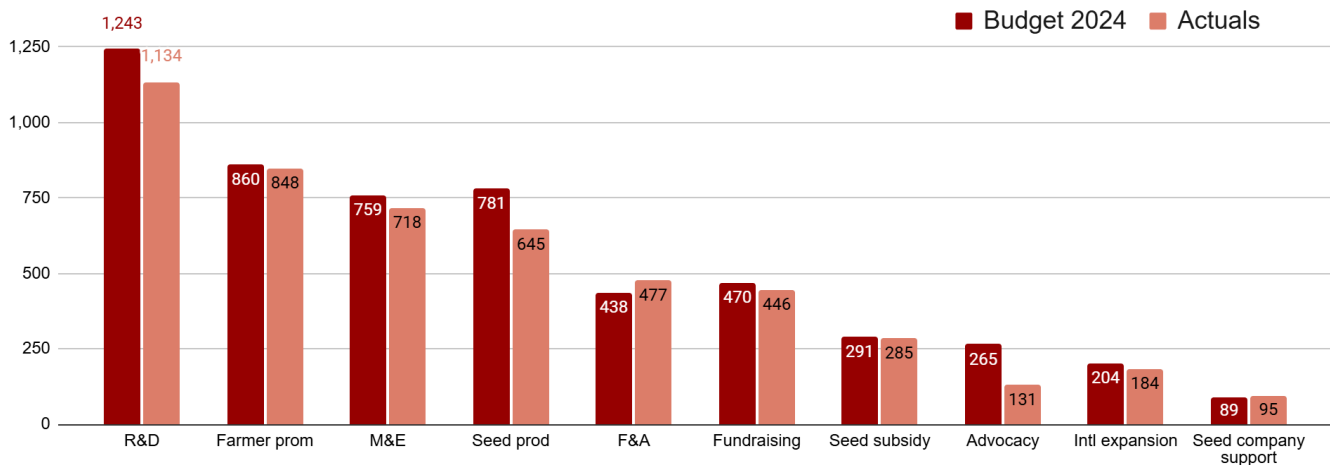


Figure 9: Semilla Nueva 2024 budget vs. actuals (US\$1,000s)

Semilla Nueva started the year with a projected budget of US\$6.6M, representing a 33% increase vs 2024 expenditures. January 24th, we received the Stop-Work-Order from USAID after the Trump Administration took office, resulting in a freeze and potential loss of US\$3.3M in funding from USAID. This represents half of the projected income for 2025.

Immediate actions were taken in order to stretch our cash availability. These included 1) Postponing our two RCTs in progress and cutting impact studies, 2) Laying off eight of our current 56 staff and not



hiring six open positions, including 35% of our farmer promotion, outreach and data collection staff and not rehiring a head of M&E, and 3) Decreasing our policy efforts in El Salvador, Guatemala, and Honduras, totaling US\$1.3M in budget cuts, resulting in a reduced 2025 budget of US\$5.3M.

Table 13 shows our historical financial data, the original and reduced version of 2025 projections, and forecast for the next three years.

Table 13: Semilla Nueva Financial history and projections (US\$ 1,000s)

Financial history and projections							
Costs (\$)	2023	2024	2025 V1	2025 Reduced	2026	2027	2028
FUNDING SOURCES							
Bilaterals and multilaterals	0	448	3,285	0	0	0	0
Foundations	4,470	3,596	3,200	3,800	4,700	5,300	5,800
Individual donors	180	75	275	278	1,200	2,000	2,500
OTHER INCOME SOURCES							
Net sales income	138	131	190	190	192	192	192
Bank interest/other	47	133	120	33	36	60	60
TOTAL INCOME	4,836	4,383	7,070	4,300	6,128	7,552	8,552
EXPENSES							
SN seed production	490	645	959	959	1,192	1,276	1,365
Seed company support		95	126	126	157	168	180
International expansion		184	257	201	285	313	345
Promotion, training, and sales	574	848	883	513	686	755	830
Subsidy to other seed companies	82	285	686	670	551	1,353	1,353
Advocacy and partnerships	151	131	385	246	354	389	428
Seed development	756	1,134	1,553	1,347	1,829	2,103	2,419
Impact evaluation/M&E	129	718	728	360	447	492	541
Admin and HR	438	477	598	453	611	672	740
Development	323	446	422	392	487	536	589
TOTAL EXPENSES	2,943	4,962	6,598	5,267	6,600	8,058	8,790
Exchange rate gain	(14)	(185)	0	0	0	0	0
Profit (loss) financial statement conversion	(18)	(77)	0	0	0	0	0
Net assets, at the beginning of the year	1,363	3,224	1,307	1,307	339	(132)	(638)
Net assets, at the end of the year	3,224	2,383	1,779	339	(132)	(638)	(876)
Board designated reserve	1,876	1,076	310	0	0	0	0
Available cash at the end of the year	1,348	1,307	1,470	339	(132)	(638)	(876)



Cash and commitments for 2025 cover six months of operating expenses

As shown in Table 14, cash availability at the beginning of 2025 was US\$1.3M. Confirmed funding from Cartier, Dovetail, Vitol, LIF, Shockwave, Pilot House among others, totals US\$2.8M. Semilla Nueva’s emergency reserve is fed by sales income and interest gain, however, because of revenue shortfall at this time, we have decided not to set the funds in reserve sales and interest gain and instead put it towards our core budget.

The current funding gap is US\$1.1M, which covers our expenses until July of this year. Risk-adjusted projections for likely renewals and emergency reserves represent an additional 3 months of cash.

Table 14: Projected cash-flow and funding gap 2025 (US\$ 1,000s)

Financial projections 2025 (US\$ 1,000s)		
Cash beginning balance	\$1,307	31%
Confirmed funding	\$2,681	64%
Sales income and interest gain	\$223	5%
Total cash available	\$4,210	100%
Expenses projections 2025	\$5,267	
Funding gap	-\$1,058	-20%
Cash availability in months	5	months
Other leverage sources		
Risk adjusted likely renewals	\$545	1 month
Emergency reserves	\$860	2 months

FY 2024 financial audit in full compliance with US-GAAP for nonprofits is underway

After the signature of the Cooperative Agreement with USAID in August 2024, Semilla Nueva engaged in a more robust and detailed external audit for FY 2024 from the firm Manuel Cervantes y Asociados (LEA Global). Along with the external audit report and management letter, a specific report for USAID will be issued as per their requirements, which we expect to receive by mid-March. After this date, please visit semillanueva.org/who-we-are/reports/ to get a copy.

7 layoffs, 1 offer letter on hold, and 6 vacant positions on pause due to USAID’s funding freeze

As a result of the USAID funding freeze, Semilla Nueva cut its budget which resulted in layoffs and a hiring freeze. The following are the good staff that we lost. We thank them for all they contributed to the organization and will miss them.

- finance and HR manager (recently hired)
- coordinator for investigation and development of new hybrids
- marketing coordinator
- commercial coordinator
- field technicians (3)
- deputy chief of party (DCOP) for the USAID project



We also closed the following positions, several which had offers

- monitoring and evaluation director
- communications coordinator
- R&D field technicians (2)
- accounting assistant
- COO



Annex 1: Yield of biofortified seed vs. conventional seed, grown side by side, 2024 (mt/ha)

	Farmer Segment (% of farmers)	F5/F7	Conventional seeds	F5/F7 Difference	Percent change		Sample size	Pvalues - F5/F7 Difference
Purchasing Farmers Average land size: 0.53 ha	Non-hybrid (28%)	5.17	3.93	1.24	31.6%		9	0.066*
	Low-segment (43.40%)	3.87	3.08	0.79	25.6%		7	0.154
	Mid-segment (11.79%)	3.90	3.83	0.07	1.8%		10	0.861
	High-segment (16.51%)	4.39	5.09	-0.70	-13.8%		16	0.147
	Total/Weighted average	4.31	3.73	0.63	17.9%		42	0.601
Government Donations Average land size: 0.31 ha	Non-hybrid (57.35%)	4.00	2.93	1.07	36.5%		24	0.018**
	Low-segment (16.18%)	3.70	2.92	0.78	26.7%		5	0.667
	Mid-segment* (12.50%)	4.48	2.94	1.54	52.4%		2	0.464
	High-segment** (13.97%)	4.39	5.09	-0.70	-13.8%		0	0.927
	Total/Weighted average	4.07	3.23	0.56	29.89%		31	0.029**
Weighted average - all		4.28	3.66	0.62	21.38%		73	0.043**



Annex 2: Yield of biofortified seed vs. conventional seed, grown side by side, 2024 (\$/farmer)

	Farmer Segment	F5/F7 (\$20)	Conventional seeds	F5/F7 Difference	Percent change	Sample size	Pvalues - F5/F7 Difference
Purchasing Farmers Average land size: 0.53 ha	Non-hybrid (28%)	\$5.62	-\$189.61	\$195.23	103.0%	9	0.518
	\$20 Low-segment (43.40%)	-\$51.01	-\$154.71	\$103.70	67.0%	7	0.565
	\$40 Mid-segment (11.79%)	\$92.15	\$72.85	\$19.31	26.5%	10	0.895
	\$85 High-segment (16.51%)	\$169.34	\$157.66	\$11.68	7.4%	16	0.95
	Weighted average	\$18.26	-\$85.62	\$93.65	62.3%	42	0.486
Government Donations Average land size: 0.31 ha	Non-hybrid (57.35%)	\$17.88	-\$41.94	\$59.82	142.6%	24	0.17
	Low-segment (16.18%)	-\$13.48	-\$112.08	\$98.60	88.0%	5	0.623
	Mid-segment* (12.50%)	-\$1.26	-\$172.49	\$171.23	99.3%	2	0.736
	High-segment** (13.97%)	\$69.99	\$65.17	\$4.83	7.4%	0	0.979
	Weighted average	\$17.70	-\$54.65	\$63.93	109.48%	31	0.146
Weighted average - all		\$18.09	-\$76.66	\$85.05	75.92%	73	0.129