Semilla Nueva Standard Report
January – June 2020

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EXECUTIVE SUMMARY

Improving nutrition is one of the most important tools to reduce global poverty. It's even more critical now to help people build resilience in the face of the pandemic. COVID-19 is erasing years of progress globally – it is increasing poverty, decreasing rural job opportunities, increasing mortality, and pushing hundreds of millions of people deeper into food and nutritional insecurity. An alarming new Lancet study reports that 10,000 children will die per month due to COVID-19 related acute malnutrition. As the poorest of the poor lose access to income, they have become more reliant on the cheapest and least nutritious foods, like maize. Semilla Nueva's mission is to improve maize yields and nutritional content for the 900 million people who depend on this crop. Now, it is even more important.

At the time of writing, Guatemala hovers in the top 15 countries globally for new COVID-19 deaths per capita and in the top 20 for new deaths in absolute numbers. The need for emergency food aid has more than doubled and acute malnutrition cases have tripled since the crisis began. When the first local case was detected in March, our team had to make difficult decisions quickly. We needed to find a way to keep showing up for farmers while ensuring our staff members' safety. In the face of travel and safety restrictions, Semilla Nueva reoriented its farmer engagement strategy. Despite the huge challenges, we still grew sales by 70% in the first six months of 2020 compared to the same period in 2019. The number of farmers adopting biofortified maize seed has nearly doubled and should reach more than 10,000 by the end of the year, thanks to sales success by Semilla Nueva, our collaborators, and a new emergency program to provide seeds directly. These farmers are feeding over 60,000 people in their own families and producing enough maize to improve the nutrition of at least 160,000 additional people who buy their production. We launched a new monitoring and evaluation system to provide representative measurements of our impact, and we prepared to bring our second biofortified seed to farmers in 2021.

We hope that the COVID-19 crisis will become a catalyst for bigger, positive changes. During the first half of 2020, we built the partnerships, plans, and government relationships to advocate for a public policy in Guatemala that would bring biofortified seeds to 200,000 families in four years and improve the nutrition of 8 million people. This is a challenging and exhilarating time, and perhaps the most important time to be working on some of the world's biggest problems. Highlights from the past six months include:

Sales and Marketing success despite COVID-19: Traditionally, promotion for Semilla Nueva's biofortified seed is done primarily through person to-person visits and events—as is standard in the seed sector. After the first case in mid-March, the government ordered a full shut down of all events and severe travel restrictions during the year's most important period for seed promotion: the two months before the May planting season. The team quickly pivoted to new tactics including text and WhatsApp mobile messages, phone calls, radio, billboards, and hiring of temporary local promoters who worked directly in the agrodealers that sell our seed. In the first six months of the year, we sold 2,435 bags of our Fortaleza F3 seed, a 70% increase over the same period from the year before. Halfway through the year, we have already reached 71% of our annual goals. Some regions exceeded expectations, while others faced problems because some grain buyers are offering farmers lower prices for the smaller grain our seed produces. We piloted new programs to highlight the improved

taste and texture of tortillas produced by our grain to drive demand for the grain and mitigate some of these penalties.

Seed Production: We exceeded our seed production goals by 17%. Higher yields and improved efficiencies allowed us to compensate for a decision to sell 11% bigger bags of seed at the same price to improve our competitiveness in the market. Unfortunately, we also identified that the region that provides us the highest seed yields also has climatic conditions which reduce quality of our seed; production in this region will be discontinued.

Collaborations: Semilla Nueva launched a COVID-19 relief program to support farmers facing food crisis. Semilla Nueva provided non-commercial yet viable seed to local farming associations in some of Guatemala's poorest regions. The program provided seed to 1,835 farming families, allowing them to improve yields enough to meet their annual consumption needs and improve the nutrition of their family members. The two farming associations we've assisted in selling biofortified seed also grew sales, with their sales to farmers augmented by sales to NGOs and local governments.

Policy Advocacy: Semilla Nueva began advocacy efforts to assist the national government to develop policies to scale the use of biofortified seeds. We hired a former congressman to assist our efforts, worked with several of the largest international agriculture and nutrition organizations to design a proposal, and began meetings with the relevant ministries and congressional organizations. The proposed policy would provide a small incentive to seed companies for every bag of biofortified seed they produce and sell at a reduced price. such a program would improve nutrition nationally, increase income for farmers, and enhance market access for national seed companies. Guatemala's largest national seed companies are already participating in the creation of the plan.

Research and Development: A new high zinc, high iron and quality protein seed has been selected and is being prepared for a pre-launch in 2021. The seed has 17% higher yield than our current Fortaleza F3, opening another significant phase of growth of biofortified maize seed possible. COVID-19 made it impossible to expand our R&D team and led to delays in development of our new nutrition laboratory in Guatemala. These delays will add 3 months to our original timeline for developing new, Semilla Nueva bred, seeds for evaluation in 2022.

Impact Evaluation: Based on growth in Semilla Nueva's sales, our collaboration with farming associations, and our COVID-19 response program, adoption should surpass 10,000 families in 2020, almost double the 5,400 in 2019. A new monitoring and evaluation system will allow us to collect representative economic and consumption data from these farmers. In the recently harvested second planting season, mid-segment farmers' net incomes decreased by 1% with our seeds, while low-segment farmers increased net incomes by 26%.

Development, Finance and Administration: A combination of unrestricted funds, permissions for funding reallocations, and two emergency COVID-19 grants made it possible to continue our work and pivot marketing and sales tactics and launch our COVID-19 response program. We took extensive measures to adapt and protect our team. We thank the Vitol Foundation for becoming a new donor to Semilla Nueva. We thank all our donors and partners for their continued and enhanced assistance, flexibility, and support. It's during times like these, we're exceptionally grateful to be part of this community.

MARKETING & COVID-19 RESPONSE

Summary:

- In mid-March, Guatemala detected its first local case of COVID-19. The Government quickly issued restrictions on travel and gatherings. The measures made Semilla Nueva's traditional marketing and sales strategy, using in person farmer engagement, impossible.
- Semilla Nueva pivoted to a digital and alternative marketing campaign to mitigate potential losses. We used SMS, WhatsApp messages, and calls to reach farmers. This was complemented by mass media using billboards and radio ads, and a team of promoters who work directly out of agrodealers.
- Semilla Nueva also launched two initiatives to combat the grain penalties impacting sales in several regions, emphasizing the better taste and texture of biofortified tortillas.

COVID-19 led to significant restrictions on Semilla Nueva's three primary means of promoting seed: field days with farmers, events with retailers, and one-on-one farmer visits.

In mid-March, Guatemala registered its first COVID-19 case, leading to a national lockdown and measures that remain in place at the time of the writing of this report. All public events and gatherings were banned. The population was required to shelter in place for 12 to 14 hours each day, depending on the caseload. Travel between regions was restricted or prohibited, and total isolation of certain areas was enforced based on outbreaks. Weekends involved mandatory lockdowns, of increasing lengths, peaking at a 40 hours where people were not allowed to leave their homes aside from emergencies and essential services.

While Semilla Nueva was technically exempt from several of these restrictions because agriculture is considered an essential industry, the Guatemalan president announced new rules on a weekly or biweekly basis. The near constant changes created confusion and required a weekly revision, and often re-elaboration, of paperwork for each staff member to allow them to travel. Further, each municipality in the country enforced their own restrictions. Unofficial and official checkpoints sprang up throughout the country, often changing on a weekly basis. The checkpoints would often enforce local rules that contradicted national policies. Many communities denied entry to our staff members, ignoring government documentation that permitted travel. Even when obeying national regulations, checkpoints created hours of delays. Guatemala has 344 municipalities, squeezed into an area the size of Tennessee. Many of our field staff pass through 3-5 municipalities a day to visit parcels and farmers. As a result, our staff was able to conduct only a quarter to half of the work normally possible.

The combination of these factors meant that Semilla Nueva's field team:

1) Visited far fewer farmers and agrodealers than is normal during a sales season
2) Had to abandon promotion of some areas altogether
3) And most importantly, discontinued farmer field days and agrodealer events, which are the primary means of promotion during the year's main sales season.

Through the end of June, we were only able to reach 429 people through 18 field days and events. These all occurred prior to the first case in mid-March. To give this context, our initial 2020 goal was to reach 2,000 people, an increase from the 1,451 people who were reached with events in 2019 during the same

period. The sales team established 39 demonstration parcels at the beginning of the year but was only able to access 28 prior to harvest.

These circumstances are particularly worrisome for Semilla Nueva as a growing, new seed brand. We need to maintain momentum that has been built each year and increase sales by getting seeds in front of new farmers for the first time. Semilla Nueva lost access to the most important tools for promotion at the worst possible time—right before the year's major sales season in May.

Restrictions also made it difficult for farmers to buy inputs like fertilizers and pesticides. All public transportation was prohibited, and some farmers were without a means to reach the agrodealers from which they normally purchased seed and inputs. Tropical Storm Amanda also caused major flooding during the planting season, leading many farmers to avoid planting all together. The sales team reports these factors contributed to a decreased market size for the maize seed in 2020. Several agrodealers in the southern coast region anecdotally noted that their sales had dropped by 50%, however there is not official data to quantify the level of market contraction.

Semilla Nueva adapted to the COVID-19 context by launching new sales and promotional strategies to continue building farmer demand.
Semilla Nueva reached farmers and agrodealers through phones messages, calls, billboards, radio, temporary community-based seed promoters, and a promotional campaign in tortilla shops. Each facet of the revised strategy is detailed in this section below.

Mobile Messaging
Our most immediate step was to reach both farmers and agrodealers via text (SMS), WhatsApp messages, and phone calls. Using lists of farmers from previous events, messages were sent weekly via SMS to all farmers on our lists and via WhatsApp for the approximately 40% of farmers who had WhatsApp active on their phone number as well as agrodealer staff. We used a combination of text and picture messages to overcome any literacy barriers. In total, we managed to send 6,813 messages through WhatsApp and 6,161 messages through SMS (Fig. 1).

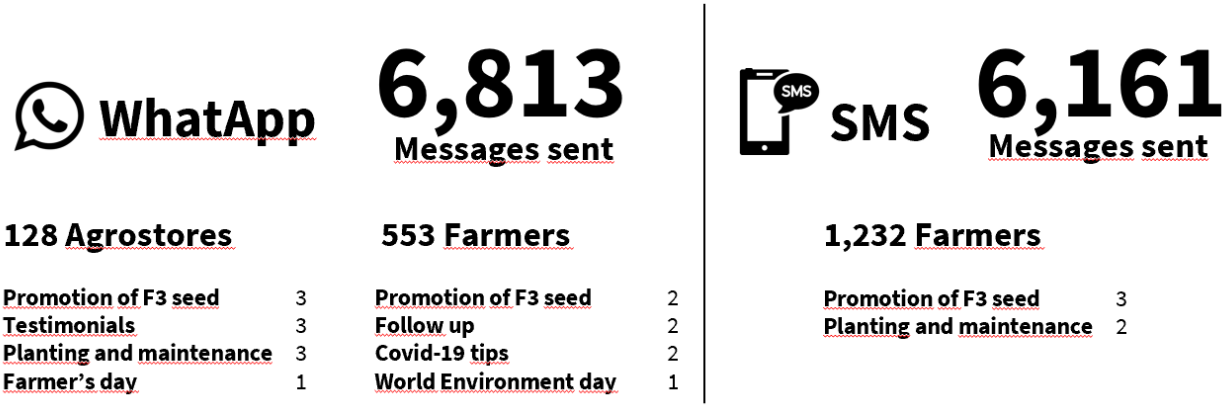


Figure 1: Total number of messages by target audiences and message type used Apr - June 2020.

The mobile messaging campaign had two main focuses: 1) promotion of F3 seed before planting season, including general information on the seed, special promotions, and testimonials of users of Fortaleza F3, and 2) technical assistance and best practices for maize once planting began. Messages were regionally tailored, allowing us to include the contact info for the Semilla Nueva field technician working in the area (Fig. 2). Later this year, we will evaluate the strategy to determine the impact it had on farmers' purchasing decisions.

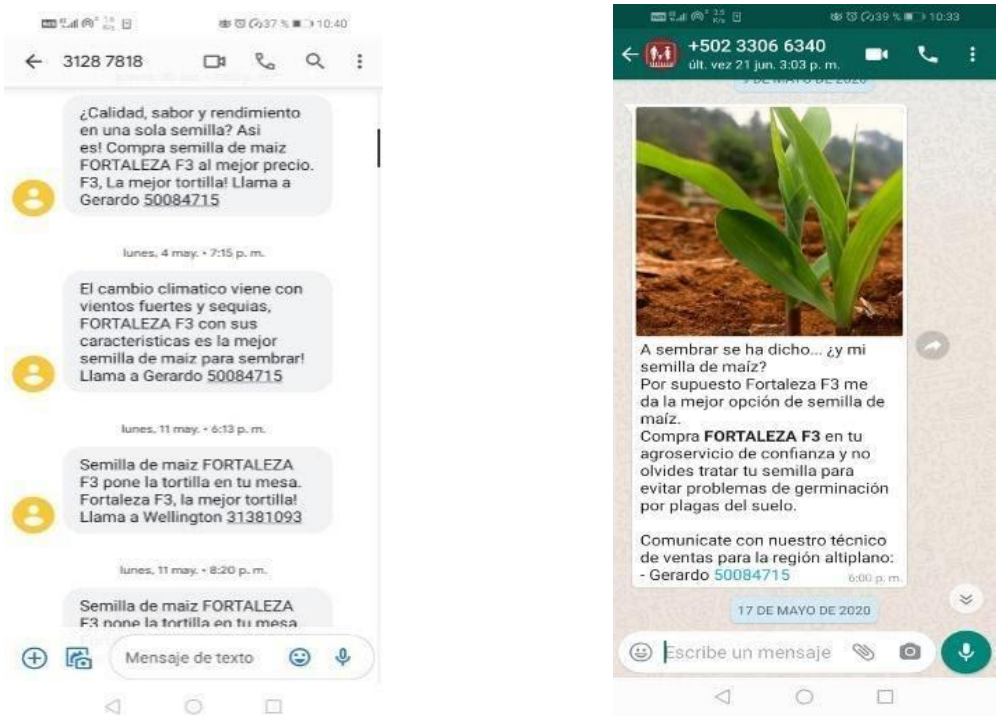


Figure 2: Example of messages sent through SMS (left) and WhatsApp (right).

***WhatsApp message translation**: Everyone is saying it is time to plant, so what seed should I use? Obviously, Fortaleza F3 is the best choice. Buy your Fortaleza F3 seed in your local agrodealer, but do not forget to use a trustworthy seed treatment to avoid germination problems and soil pests. Talk to Gerardo, your local technician in the highlands!*

Billboards and Radio

Semilla Nueva placed 7 large billboards in our most important target markets, highlighting the taste and texture of the tortillas produced with F3 grain (Fig. 3). This served a double purpose: in our most successful markets such as eastern Guatemala, families use maize for home consumption or sell in local markets, making tortilla taste very important. In markets where we have struggled, such as the southern coast, which is dominated by higher yielding seeds, many farmers will grow a small amount of maize for home consumption using a tastier, lower yielding seed. Fortaleza is working to position itself in both market niches.

Semilla Nueva also doubled its radio presence, launching new ads focusing on the quality of our tortillas and the overall competitiveness of F3's seed. The radio spots aired between April and June on 6 stations in total, 3 in the eastern Guatemala, 2 in the southern coast, and 1 in northern Guatemala. We aired 10 spots per day per station.

Figure 3: Example of new promotional billboards (April 2020).

Figure 4: A promoter at an agrodealer in Yupiltepeque, Jutiapa.

Direct promotion in agrodealers

To overcome travel restrictions in many municipalities, Semilla Nueva launched a new strategy to promote F3 directly. In 12 of the most important agrodealers, Semilla Nueva hired and trained a local 'promoter' (Fig. 4). Promoters were stationed at agrodealers for the entire day, promoting seed directly to farmers who entered the store. Approximately 19% of seed sales to date occurred in locations where promoters were present.

They also collected demographic and contact information for every farmer that purchased our seed (Table 1). This data will improve our monitoring and evaluation efforts later this year, helping us reach a more representative sample for economic and nutrition surveys. We will also interview farmers to determine which marketing tactic influenced their purchase decision, which is critical to inform our future strategies.

Table 1: Regional results from promoter campaign (May to June 2020).

Region	Number of promoters	Farmers reached with F3 sales	Farmers reached with F3 samples	Total farmers reached	F3 bags sold by promoter	F3 bags sold 2020 Jan-Jun	Agrodealers participating
Northern	3	65	24	89	47	103	3
Southern	2	116	3	119	51	81	3
Eastern	5	358	9	367	118	289	7
Total	10	539	36	575	216	473	13

Counteracting grain penalties with "the best tortilla" marketing campaign

As mentioned in the past two reports, one of the biggest barriers to expanding the use of biofortified maize seed in Guatemala is the penalty that many grain buyers apply to biofortified grain because of its smaller and slightly darker (opaque) appearance. The penalization is especially important in the southern coast and northern regions where intermediaries buy large quantities of grain directly from farmers to sell in other parts of the country. In the latter half of 2019, Semilla Nueva launched a 'Better Tortilla' campaign to counteract this penalty. Based on initial success, we continued and expanded the campaign over the past six months. The campaign emphasizes the superior taste and texture of tortillas made with our seed, a feature that farmer families have proclaimed nearly universally. The campaign focuses on branding our seed, Fortaleza F3, as the source of the best tortilla.

In 2020, we launched a pilot to expand our engagement to tortilla shops. The pilot campaign aims to influence the perception of tortillas made with F3 and drive demand for the seed by not only targeting farmers but also tortilla shop staff, women in the community, and grain suppliers. We provide tortilla shops with F3 grain, promotional materials like t-shirts and aprons, and training on how to promote F3 (Fig. 5). We launched the campaign in the southern coast, where grain penalties are highest.

Initial results indicate that tortilla shop owners prefer our grain, evidenced by comments like "higher performance" (more tortillas for the same quantity of grain), "better flavor and taste", and "easy to work with". The program will end in August. We will then connect these tortilla shop owners with current F3 farmers; the farmers will be able to sell their grain directly to the shop owners, avoiding penalties. The model is too small and labor intensive to scale nationally, but we hope it could give us insights that could later be used in a larger regional strategy.

In conjunction with one of our major donors, we are also launching a study with one of Guatemala's leading social marketing companies to explore more scalable solutions and campaigns before 2021's main sale season.

Figure 5: A tortilla shop promoting Fortaleza tortillas, La Máquina Centro II, Retalhuleu.

Pricing Survey

Semilla Nueva implemented its annual agrodealer survey to compare the price of the different seeds in the market before the beginning of the main sales season. The mobility restrictions due to COVID-19 required us to complete the interviews using a mix of personal visits and phone calls to agrodealers. In total, we surveyed 114 agrodealers in 15 of Guatemala's 24 departments. Costs largely remained similar with those from 2019. The most notable finding is that hybrid seeds are more expensive in the Western Highlands compared to prices than in other regions. This increases Semilla Nueva's cost advantage in a region with high potential for growth and which has the country's highest rate of malnutrition (Fig. 6 and 7).

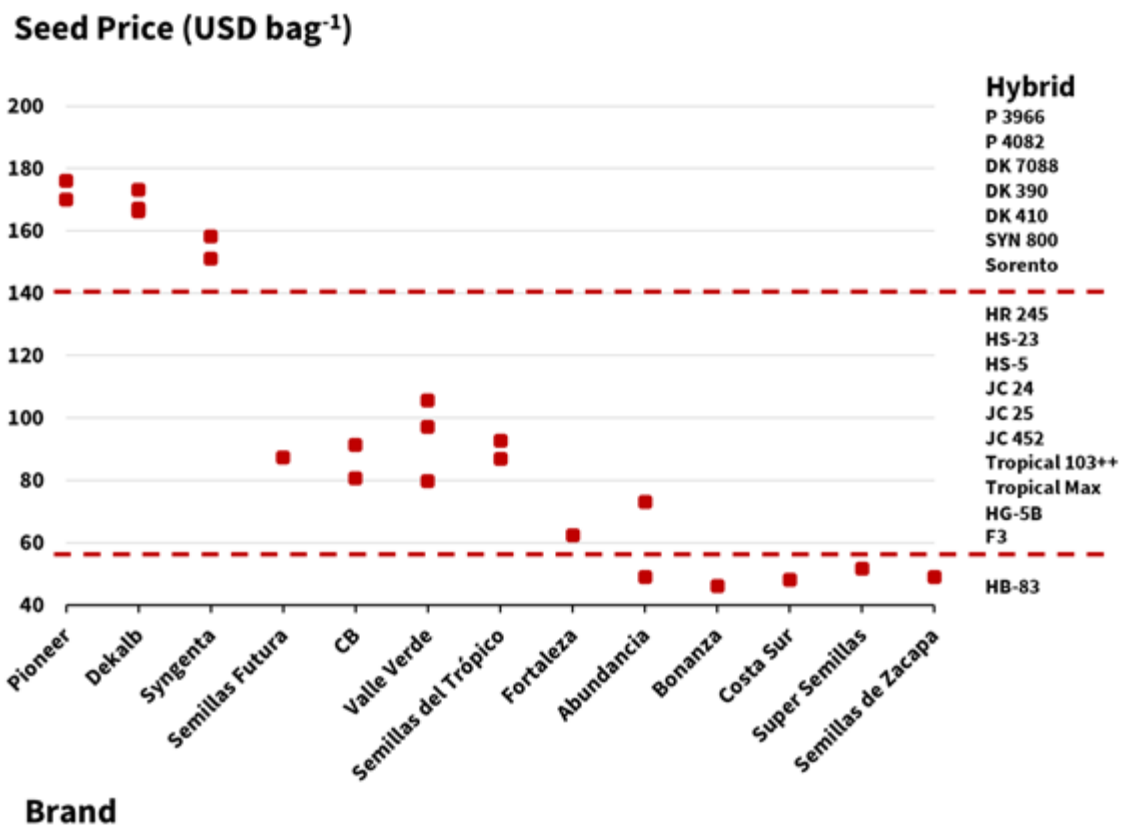


Figure 6: Seed price for primary commercial seeds and companies 2020.
Red lines divide high, mid, and low market segments.

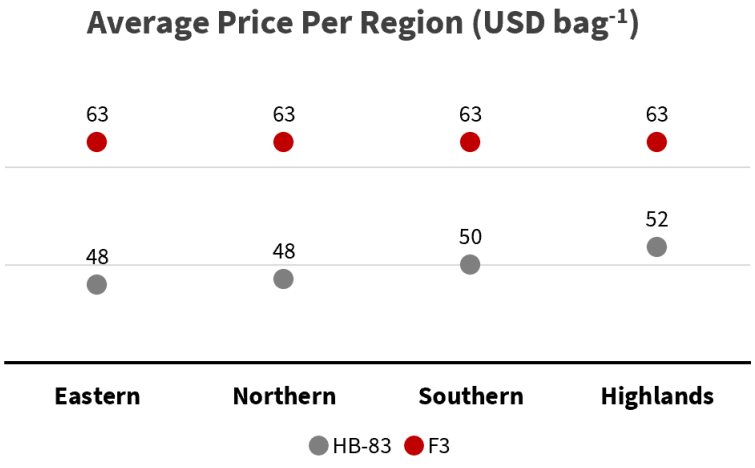


Figure 7: Comparison of Fortaleza F3 cost vs. low-segment seed by geographical area.

SALES

2020 Sales Results

- Year to date sales have increased 70% compared to 2019 and may meet 2020 annual goals despite COVID-19 challenges. Semilla Nueva sold 2,465 bags of F3 during the first six months of the year. This is a 70% increase in sales compared to the same period in 2019. Even with COVID-19 complications, 71% of the 2020 sales goals have been met, and Semilla Nueva may meet total annual sales goals (Table 2).
- COVID-19 restrictions impacted regional sales numbers differently, hitting the southern coast and the northern region hardest. The strategy for improving sales in these regions relied heavily on reaching new farmers, which proved impossible. These two regions remain opportunities for growth in Semilla Nueva's overall strategy.
- Quality control and data collection represents one of the sales team's biggest opportunities for growth.

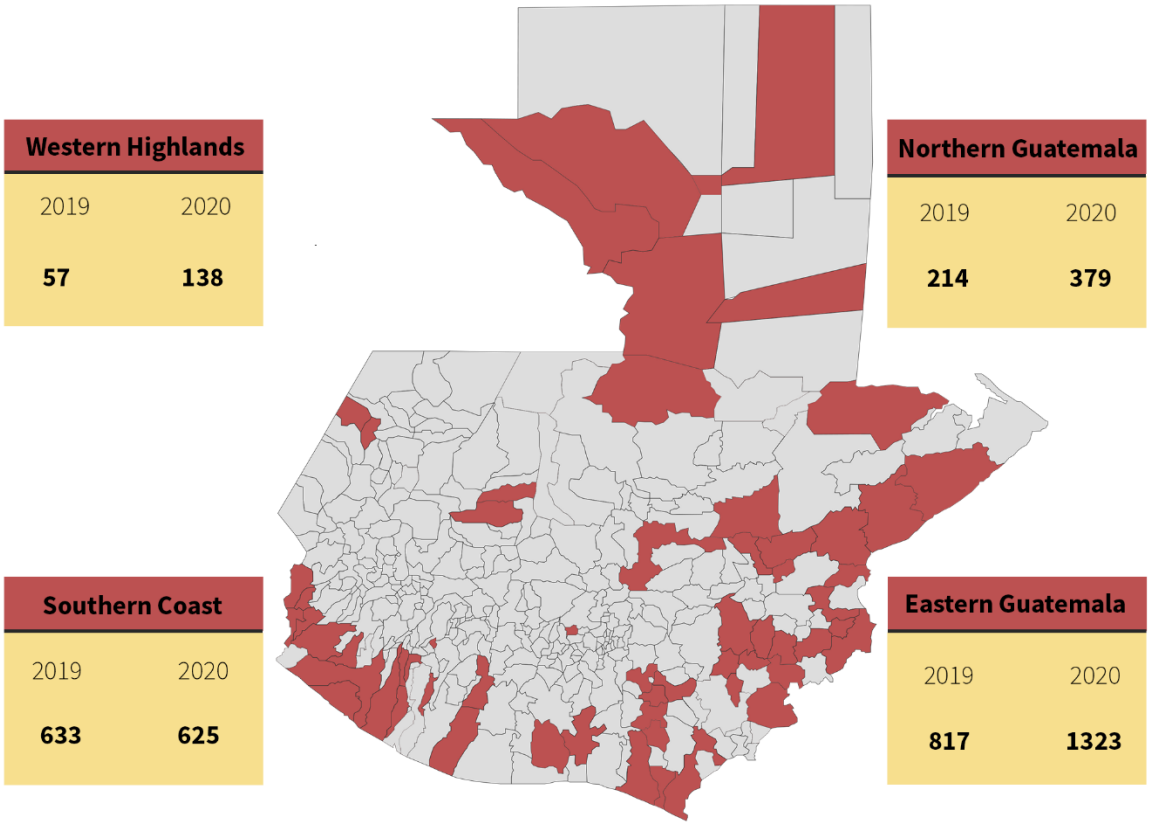


Figure 8: Comparison of sales for the January through June period in 2019 and 2020 respectively. Municipalities with 2020 sales are marked in red.

Table 2: F3 Bags sold by region.

	2017	2018	2019	2020		
Region	**Total**	**Total**	**Total**	**Sales Forecast Jan-Dec**	**Sales Jan-Jun**	**%**
Southern Coast	34	583	826	970	625	64%
Eastern	0	512	985	1748	1323	76%
Northern	3	139	315	659	379	58%
Highlands	0	0	57	125	138	110%
Total	37	1234	2183	3502	2465	70%

During 2020, F3 was sold in 61 municipalities, a slight increase compared to 55 municipalities in 2019 (Fig. 8). The eastern region continued to lead sales due to farmer's positive perception of the seed yields and lack of grain penalization (farmers in the region produce grain primarily for home and community consumption, avoiding sales to intermediaries). While the total number of bags sold in the highlands was low, the numbers of bags sold outperforms the annual goal. The highlands has a lower number of hybrid farmers to begin with, so even modest sales represent a significant success. This is especially important given this region has the highest level of malnutrition and is the focus of many major donors and partners. In contrast, sales targets in the northern region and southern coast were not met for several reasons. These regions have the highest percentage of high-segment farmers who primarily use high-segment seeds. Our seed cannot compete with the yields these seeds offer. Further, grain penalties are highest in these regions which impacts farmer profit margins and deters them from buying our seed. Third, Fortaleza F3 performs better in mid-level elevations, like those found in eastern Guatemala whereas the seed yields slightly lower in hotter, low elevation climates like the southern coast and northern region. Finally, a combination of COVID-19 challenges, droughts, and floods have driven more famers to convert to the production of more profitable crops or simply not planting, reducing overall maize production in the southern coast and northern Guatemala.

While the sales team is nearly on track to meet goals, Semilla Nueva is continuing to refine our strategy to address potential weaknesses. First, more sales team members need to be concentrated in eastern Guatemala, where our market advantage is strongest. The addition of an extra sales technician in the region for 2020 significantly increased sales; these results warrant a third technician in the region. Second, tracking of sales technicians' activities, quality control related to the effectiveness of these activities, and farmer targeting improved significantly versus 2019, but new systems are going to be required to continue improvements given that our primary form of promotion and sales has changed so radically.

As a new seed brand, managing farmer feedback is critical to ensure our reputation is not damaged by a handful of complaints. Even with COVID-19 restrictions, the sales team responded quickly to any

reports of dissatisfaction from farmers and agrodealers. The technicians replaced seed where necessary and visited nearly all farmers who filed complaints personally. Table 3, below, shows reported claims from agrodealers and farmers during the first half of 2020. In total, 13 complaints were received, regarding 17 bags. 53% of complaints were due to poor germination. The poor germination was traced to seed inventories from last year's production which were delivered to agrodealers in early March 2020 but not sold to farmers until late April or May 2020, over 60 days in the agrodealers without proper conditions to store seed. Semilla Nueva has a robust physiological inhouse testing process to maintain seed quality and verify seeds before delivery. However, poor agrodealer storage conditions make the seed vulnerable to damage and loss of quality. It is important to remind the reader that these claims represent less than 1% of the total seed sold.

Table 3: Reported complaints with Fortaleza F3 seed sold from January to June 30th, 2020.

	Agrodealers	Farmers
Total number of complaints	6	7
Total number of bags	7	10
Claim Description		
Poor germination	5	4
Poor seed appearance	-	6
Pest presence	2	-
Impacted Area (ha)		
Eastern Region	7	6
Southern Region	-	4

The number of agrodealers selling seed largely stayed the same, but volumes increased

Total sales increased 70%, however the number of agrodealers selling F3 decreased slightly. Semilla Nueva sold through 128 agrodealers in 2019 and 124 in 2020. This is because our distributors discontinued sales to several agrodealers due to credit and payment issues, and new agrodealers were selected in their place. In addition, several agrodealers began selling seed to sub-agrodealers, a complicated process which has made exact sale per municipality difficult to track. Distributors carried out their role successfully, paying for 100% of seed sold, absorbing losses from agrodealers who became truant, and leaving Semilla Nueva free of managing 124 difficult relationships.

Semilla Nueva finished selling remaining F17 inventory

In 2019, Semilla Nueva discontinued production of Fortaleza F17 because its nutrition level were lower than anticipated. In the first half of 2020, we sold the remaining inventory of 523 bags of F17, which are not included in our sales numbers or impact calculations.

SEED PRODUCTION

Summary:

- Semilla Nueva exceeded production goals of 3,100 bags by 17%, producing 3,641 bags of seed.
- Semilla Nueva shifted to selling seed in 20kg bags instead of in bags of 60,000 seeds. The shift from seed count (a standard used in the high segment of the market) to weighted bags (a standard used in the low and mid segments of the market) increased our competitiveness in the lower market segments, providing 11% more seed to farmers.
- Improved yields for farmers contracted to produce seed for Semilla Nueva's allowed maintenance of a positive margin even with more seeds sold per bag.
- Semilla Nueva's most productive region, Chiquimula, has been shown to produce seed with germination rates that deteriorate quickly; this will require a shift of commercial seed production to other regions.
- We established a new warehouse, greenhouse, and storage facility to facilitate improved seed storage, dispatch, and quality control testing, providing critical infrastructure for the next several years.

Record yields allowed Semilla Nueva to break even on seed production costs, even as we increased the amount of seed per bag to make our price more competitive:
In late 2019, Semilla Nueva made the decision to shift from selling bags based on seed count to bags based on weight. In our first two years of sales, we had sold in bags of 60,000 seeds, which is the standard practice for companies in the high segment. Unfortunately, given the slightly smaller seed size, our seed bags often weighed less than competitors, averaging 18kg. Semilla Nueva decided to move to 20kg bags like all other companies in the low and mid segments of the market. While this increased the amount of seeds per bag by 11%, we decided to maintain our sales price to the farmers who buy seed to improve our cost advantage and increase sales. To ensure this change did not lead to a loss of profit in sales compared to production costs, we improved efficiencies across the production process to reduce its costs per bag. Semilla Nueva achieved this goal, as is shown in table 4, below.

Six contract farmers planted 17 hectares to produce Fortaleza F3 seed between October and the end of November 2019. Twelve hectares were planted in the department of Chiquimula in eastern Guatemala and five in the department of Retalhuleu on the southern coast. Both regions adopted systems with improved crop management practices, including the safe use of approved pesticides, as well as crop cultivation recommendations, with improved selection, dosage, and timing of fertilizer applications. Semilla Nueva's production coordinator visited contract farmers on a biweekly basis, offering technical assistance and ensuring all environmental and health safety practices were observed.

Production in eastern Guatemala provided a welcome surprise, with contracted farmers experiencing higher yields than the previous year (Fig. 9). In total, 3,641 bags of Fortaleza F3 were produced. Experience from previous years allowed for improved technical supervision and higher pay for contract farmers that led to higher production quality and seed yields. Semilla Nueva surpassed the production goal of 3,100 bags of F3, producing a total of 3,641 bags of seed, but overall cost per bag in the 2019-2020 production season was 16% higher than 2018-2019 season (see Table 4). Guatemalan government agriculture authorities approved 100% of the seed as ready for commercial sales but only 30% of the bags received an official label because the sudden closure of the government testing lab due COVID-19.

Table 4: Historic and Current Fortaleza F3 Seed Production Costs in USD.

Fortaleza F3 (costs per bag, $)	2017-2018 main	2018 off-season	2018-2019 main season, Jutiapa	2018-2019 main season, Chiquimula	2019-2020 main season, Chiquimula	2019-2020 main season, South
Seed Production Contracts	27	25	26	23	28	30
Processing Fees & Seed Treatment	5	3	3	3	4	2
Field to Processing Site Transportation	3	2	1	1	1	1
Bags, Labels & Quality Control Tests	3	2	2	2	2	1
Total Expenses	38	33	32	29	34	35
Revenue (Expected)	35	35	35	35	35	35
Gross Margin (Expected)	-3	2	3	6	1	0
Bags Produced	907	700	511	2543	3,030	611

Figure 9: Historic Fortaleza F3 Seed Production Yields (Mg ha^{-1}).

Unfortunately, our highest-yielding production area produces seed with germination problems: Despite improvements in seed yield, a new concern for F3 seed production became evident this year. Seed produced in our most cost-effective and high-yielding region (Chiquimula) exhibited germination rates (the percentage of seeds that sprout under standard test conditions) that deteriorated more quickly in storage, compared to seed produced in other regions. Seed produced in other regions such as Jutiapa maintained high germination rates, dropping only from 99% to only 98.6% over the course of a year. However, the germination rates of seed produced in the 2018-2019 season in Chiquimula

dropped on average from 94.1% to 89% within a year, with some lots dropping below 85%, the minimum level required to sell the seed. For seed produced in the 2019-2020 production season, germination rates were even lower, with initial germination rates of 90.8%, that dropped to 87.7% in a matter of months. Several lots of seed have already dropped below the minimum rate of 85%, meaning they will have to be given away and not sold commercially.

Semilla Nueva's technical team investigated the source of the problem and identified a leading theory. While Chiquimula offers high yields for seed production, it also has high humidity and rainfall during the drying and harvesting period, which may be responsible for decreasing germination. Given that these conditions cannot be controlled, Semilla Nueva will move seed production from Chiquimula to other regions, such as the southern coast, where Semilla Nueva carried out a production pilot this year. Semilla Nueva's current inventory of approximately 2,100 bags of seed largely consists of seed from the Chiquimula region. This seed is being continually tested and is the first sold to ensure we meet our strict seed quality standards. Seed which does not meet standards will be used for emergency COVID-19 efforts as mentioned in the collaborations section below.

Semilla Nueva's pricing structure has made seed production a very attractive option for seed producing farmers. Data on the costs and incomes for production farmers is provided below (Table 5). Given that average profit margins for a hectare of normal maize production are between $400-600 during the off-season, seed production is multiplying income for these farmers between 2-6 fold, allowing Semilla Nueva to only select the very best farmers for seed production and incentivize them to follow all required seed production practices.

Table 5: Historic and current Fortaleza F3 seed production costs and income for contract farmers.

Farmer's Seed Production Cost ($ ha^{-1})	2018-2019 main season, Chiquimula	2019-2020 main season, Chiquimula	2019-2020 main season, South
Fixed Expenses (rent, water, electricity)	939	921	865
Field Inputs (Fertilizer and Pesticides)	1,101	1,442	775
Field planting and management labor	950	720	656
Detasseling, Harvest, Cleaning and Drying, Transportation	633	692	437
Total Expenses	3,623	3,776	2,733
Seed Yield	4.3	5.4	3.0
Revenue (Expected)	5,387	6,930	3,758
Gross Margin before taxes (Expected)	1,764	3,154	1,025

Semilla Nueva invested in a warehouse for improved seed storage and distribution and built a greenhouse for improved seed testing and quality control:
Beginning in late 2019, Semilla Nueva relocated additional inventory to a 150 square meter warehouse an hour outside Guatemala City. It is located 2,025 meters above sea level and has appropriate climatic conditions for the storage of commercial maize seeds. Conditions that improve seed storage include naturally cool temperatures and low humidity to extend seed life during storage and a 7-meter-high

ceiling allowing for good air circulation. We installed a temperature and humidity-controlled room for Semilla Nueva's parental seed and promising seeds from our breeding program. The warehouse can house up to 6,000 bags of seed, which should allow for 4-5 years of continued growth (Fig. 10).

In 2020, we completed the modifications needed to make warehouse fully operable and meet the quality standards of leading seed companies. We hired a full-time operator. We installed shelving, storage pallets, manual equipment to move pallets, and hygro-thermometers. We designed and implemented integrated pest management strategies. The success of these measures is evidenced by temperature and humidity remaining within respective, required ranges all year.

Figure 10: Semilla Nueva's warehouse. Empty (left) vs. full main warehouse for commercial seed storage (center). Control room for parental and select seeds from breeding program (right).

Semilla Nueva also finished the construction of a new greenhouse and a storage room at our experimental farm in La Máquina, Suchitepéquez (Fig. 11). The purpose of this new greenhouse is to carry out large-scale, controlled vigor and germination tests, the standard methodology to evaluate seed physiological quality. Given Semilla Nueva's increasing production and sales volumes, the only alternative to building our own greenhouse would have been hiring a third-party laboratory, which would have dramatically increased costs. The new greenhouse has the capacity to hold about 500 trays, enough to carry out tests of future production batches and conduct quality control testing and traceability of current inventories from our warehouse, distributors, and agrodealers for the foreseeable future

This greenhouse will support our operations for the next five years. Our staff have been trained, following international seed company standards, and utilizing methodologies from the International Seed Testing Association (ISTA). The new capacity allows us to track seed quality for every seed lot and even allowed us to quickly address complaints from individual farmers who bought seed. To date, 94 tests have been run this year.





Figure 11: Above, new greenhouse and storage room. Below, seed quality testing at planting and after eight days.

COLLABORATIONS

Summary:

- Semilla Nueva began efforts to develop a public policy for biofortified seeds that could scale their use throughout the country. Alliances with major agricultural and nutritional organizations in Guatemala and several of the largest national seed companies led to the creation of an initial proposal. Conversations are ongoing with government ministries and several major donors. The proposed pilot would reach nearly 200,000 families in four years and improve the nutrition of over 8 million people.
- A new COVID-19 response program was launched which provided non-commercial seed to farming associations in some of Guatemala's poorest agricultural regions. 1,878 families received seed in April and May. Economic and family consumption surveys are planned to measure the impact of the program.
- Farming associations ATESCATEL and APALH continued to sell biofortified seeds, reaching 1,912 families this year.

Semilla Nueva hired a consultant, built a group of allies, refined an initial proposal for the Guatemalan government, and began conversations with several national seed companies:
Semilla Nueva's seed company in Guatemala is a means to an end. Semilla Nueva's vision is for biofortified maize to become the norm in countries like Guatemala, and significantly reduce the nutritional gaps of the national population. For this goal to become a reality, some sort of government policy or public private partnership will have to move most of Guatemala's seed companies to use biofortified seed. After several years of exploratory conversations and research, in 2020 we launched our first efforts to build the groundwork for the program we believe has the best chance of being cost effective, politically acceptable, and sufficiently advantageous to Guatemala's farmers and seed industry. The proposal is based on Guatemala's most successful laws surrounding the fortification of sugar and subsidies for forest protection. In essence, a government fund would pay seed companies a small incentive for every bag of biofortified seed they sell at a reduced price to farmers. Seed companies would be able to reach new clients. Farmers would have access to new seeds at a reduced price. Millions of Guatemala's poorest families would have significantly improved nutrition without any behavior change.

Semilla Nueva began conversations with Guatemala's two largest national seed companies. Both companies had already done their own testing of Fortaleza F3. They shared Semilla Nueva's perception of the situation: farmers will not pay extra for nutrition, consumers will not pay extra for nutrition, and current biofortified seeds are not good enough yet to justify switching their companies' portfolios to biofortified crops. They also shared major worries that international seed companies are effectively strangling Guatemala's local seed industry. One of the seed companies quickly developed a proposal for the incentives necessary for them to sell biofortified seed at a reduced price, incentivizing farmers to adopt it through price advantage. The proposed incentives were in line with Semilla Nueva's original projections. The second company is developing their proposal currently.

In March 2020, Semilla Nueva hired a well-known, former Guatemalan congressman who led major legislative initiatives around immigration and farming to help design a plan to build consensus and strategically position our plan. An initial outline of a pilot project was developed with World Food

Programme (WFP), the United States Department of Agriculture (USDA), and Guatemala's leading nutrition think tank, INCAP, all of which have all become official and public allies of the initiative. The pilot would cost the government less than $3 million dollars over four years and would provide seed to nearly 200,000 farmers. This would reach the level of market penetration necessary to begin making national level impacts on Guatemala's existing diet deficiencies (200,000-400,000 people a year with dietary gaps fully closed and improved nutrition for over 7 million others). Additionally, it would decrease Guatemala's corn importation from neighboring Mexico by 8% in its final year.

Seven meetings were held with influential, pro-business groups that have significant influence over new government policies and over the current government in particular. Reactions have been positive given the high return on investment, the efficacy of our program compared to the many disappointing past experiences of previous efforts to diversify maize based diets, and because the program focuses on an open, transparent public-private partnership. Initial meetings were also held with high-ranking technical staff in the Ministry of Agriculture, the Ministry of Economy, and the Parliamentary Front against Hunger, the leading working group on nutrition and hunger in the Guatemalan congress. Initially government officials provided guidance and offered to create technical groups to evaluate the proposal, but progress slowed in the last two months of the semester due to more pressing COVID-19 response measures and intense public scrutiny of the current response.

We are also currently developing relationships with national media outlets to bring national attention on the benefits of biofortified seeds. Given the government's more immediate focus on the COVID-19 crisis, we may opt to try and pilot the program with philanthropic funding in the short-term. Public policy change in Guatemala normally occurs through widespread consensus or public demand for a particular action. By piloting the program (bringing in several national seed companies and dropping seed prices) we hope to engage tens of thousands of farmers who can drive public demand for the program. In this way, we will combine a critical mass of farmer demand, participation across the national seed sector, advocacy from national and international nutrition experts and development leaders, and interest from the public, mounting an increasing consensus of demand for biofortified seed policy.

In response to COVID-19, Semilla Nueva launched a new program to provide non-commercial seed to subsistence farmers in two of Guatemala's most vulnerable regions:
Semilla Nueva's work thus far has focused on selling biofortified seeds to small and medium sized farmers who purchase hybrid seed. While hybrid seeds have been available for decades and are generally economically superior to open-pollinated seeds saved from year-to-year, most of Guatemala's maize farmers are still subsistence farmers and often only use hybrid seeds when they are provided for free. Given the COVID-19 crisis, acute malnutrition rates in Guatemala have already tripled and much larger spikes in poverty, malnutrition and food insecurity are expected. In response, Semilla Nueva worked to find a new mechanism with which we could support vulnerable farmers in a way that will not cannibalize our commercial work or distract our focus.

Figure 12: A woman registers attendance at seed distribution event.

Every year Semilla Nueva produces a small amount of non-commercial seed as a byproduct of seed processing. These seeds are too small to commercialize and combined with bits of broken grain, stems, and other materials that would require expensive manual sorting to recover. Semilla Nueva decided to pilot a program to provide this unprocessed byproduct to associations of subsistence farmers. We provide the seed by-product for free and the associations recover the seed, train local families, and track the distribution of the seed. As mentioned in the production section of this report, we also had a small amount of seed that had fallen below the 85% germination rates required for commercial sales. We included this seed in the program with training on how to increase the planting density to compensate for the lower germination rates.

We hired a coordinator to lead the project and began work with two associations: 1) Association of Coffee Producers of Filincas (APROCAFIL), which has coverage in the municipalities of Jocotán and Camotán of the eastern department of Chiquimula, and 2) Integral Association of Social Development, Agricultural, Social and Forestry of Alta Verapaz (ASIDESAFAV), which has coverage in the northern municipalities of Raxruhá, in the department of Alta Verapaz and the southern part of Sayaxché, in the department of Petén. With 19,200 lb. (8.7 Mg) of seed we reached 1,878 beneficiary families, 263 families with APROCAFIL (Fig. 13) and 1615 families with ASIDESAFAV. Each family received an average of a 10lb. bag of seed. Given typical yields, this would allow families to produce enough maize for a year of home consumption and some additional maize to sell for income. Given that one of our policy focuses will be to track the impact these improved seeds have on subsistence farmers, we also set up ten monitoring parcels in each association where farmers grow the improved seed and their traditional seed side-by-side with the same agronomic management. During the harvest in October of this year we will collect data on the economic impact of this model.

Figure 13: Community leaders stand at seed distribution and training activity in Jocotán, Chiquimula.

Farming associations ATESCATEL and APALH continued to sell biofortified seed with minimal support from Semilla Nueva. Sales increased slightly from 2019:
Semilla Nueva began working with ATESCATEL and APALH in 2017 and provided training, technical support, and resources to assist them in launching production and sales of biofortified seed to small farmers. Overall, both organizations increased sales of biofortified seeds, expanding from 1,492 families in 2019 families to 1,912 so far this year. The associations have moved from primarily selling ICTA HB-18 (the generic government name for Fortaleza F3) to selling easier to produce open pollinated varieties (different from hybrids, open pollinated seeds offer a more constant yield if they are replanted by farmers, but generally are significantly lower-yielding). This decision was made to avoid competing with Semilla Nueva with the same seed and allowed the two associations to continue working with biofortified seeds but in their own niche. Both associations have participated in conversations about the seed incentive program mentioned above and are strongly interested in participating.

RESEARCH AND DEVELOPMENT

Summary:

- A new seed with high zinc, iron, and protein quality and 17% higher yields (compared to F3) has been identified in our field trials. It is now licensed from CIMMYT, has passed initial nutrition tests, and parental material was imported to Guatemala. A commercial pre-launch is expected in 2021 with full commercial sales possible by 2022.
- COVID-19 travel restrictions have prevented hiring a breeder and caused delays in launching our nutrition lab. We hope to have both issues resolved by October 2020.
- The first breeding cycle of Semilla Nueva's backcross program will be harvested by early August. Nutritional testing should begin in October once our nutrition lab is ready and will provide an initial validation of the feasibility of Semilla Nueva's breeding program.
- The results of initial tests on agronomic biofortification (spraying maize with zinc fertilizer to increase nutritional content of grain) showed a moderate increase in zinc. A second round of tests were launched in May with results pending.

A second seed with high protein quality, zinc, and iron will go through pre-launch activities in 2021 and potentially full launch in 2022:
After a year and a half of testing, Semilla Nueva is preparing a pre-launch of a superior high protein quality, high zinc, and high iron seed in 2021. In trials so far, the new hybrid yields 17% higher than Fortaleza F3 and has a slightly larger grain size. Additionally, initial tests have shown a more complete amino acid profile than Fortaleza F3. CIMMYT has granted Semilla Nueva a license to produce the new hybrid and provided parental seeds. Semilla Nueva has also used the initial testing process to complete licensing requirements with the Guatemalan government. Over the next 12 months, Semilla Nueva will test seed producibility (the yields and ease with which we can produce the seeds for sale), create promotional parcels with farmers, and conduct additional nutritional testing of all stages of the seed production process under field conditions and commercial production with farmers. This seed could be far more competitive in yield than currently available conventional seeds in the low and mid-segment, opening a path for large scale farmer adoption and additional revenue for Semilla Nueva's seed venture. Additionally, we requested two other new seeds from CIMMYT to begin the evaluation process for future launches and ensure we are building a continuous pipeline.

There have been delays in hiring a breeder and finalizing our lab due to COVID-19 travel restrictions:
In February, Semilla Nueva began a hiring process for a full-time crop breeder. Semilla Nueva was in final stages of contracting an international candidate when the lockdown began in mid-March. International travel and visa restrictions made it impossible to bring the candidate to Guatemala. Semilla Nueva has begun recruiting for the position locally. Semilla Nueva also faced delays in fully launching a nutrition lab with partner INCAP, because significant technical decisions on lab setup and supervision cannot be made without a full-time researcher overseeing the process.

First breeding cycle of new biofortified seed lines is nearly complete; the next step is nutritional analysis pending lab startup:
In mid-2019, Semilla Nueva launched a program to convert four non-biofortified commercial seeds originally produced by CIMMYT to biofortified versions. All four hybrids have yields 20-35% above

Fortaleza F3 and could be considered high-segment seeds. After three generations, Semilla Nueva began harvesting its first batch of crossed seeds ready for nutritional evaluation, with the harvest expected to finish in August. If we have the lab operational by October, we will begin the nutritional evaluation of these seeds. After evaluation, we will begin a second year-long cycle to finish the conversion process. Note that this process is experimental. Initial testing done in early 2020, combined with the review from various experts has shown that zinc and iron content is less heritable than protein quality. While backcross breeding is a standardized process for protein quality traits, it has not yet been done for zinc and iron due to the novelty of these traits (Our seed, F3, was the first commercial high zinc hybrid launched worldwide in 2018). Semilla Nueva has attempted to compensate for this risk by producing over 20x the amount of seeds a normal protein quality breeding process would require, and by trying to convert four seeds at once to maximize our chances of success.

Agronomic biofortification study shows modest increases in zinc levels:
CIMMYT offers non-biofortified, hybrid maize seeds with 20-35% higher yields than Fortaleza F3 and with far more attractive grain for farmers. Studies have shown that coating seeds with zinc and spraying maize plants with zinc can both increase yield and the zinc levels of the grain produced. Semilla Nueva tested foliar zinc applications (spraying leaves with zinc) with non-biofortified seeds to determine the how much the practice could increase the zinc content of farmers' grain and the cost effectiveness of this model. After conversations with international experts on similar studies in other crops, agronomic biofortification trials were launched in September 2019 in two contrasting locations. Results showed that grain yield was not influenced by any of the zinc treatments, but zinc grain content could be increased. In the warm conditions of the southern coast, zinc foliar applications after flowering stage increased zinc grain content by 27% compared with no application. In the cooler conditions of eastern Guatemala, zinc foliar applications in the pre-flowering stage increased zinc grain content by 19% compared with no application. When applications were done during the normal times that farmers apply foliar fertilizers, more modest results of an average increase of 13% were obtained. It should be noted that Fortaleza F3, on average, has 39% higher levels of zinc than normal corn and agronomic biofortification would not improve protein quality levels. Semilla Nueva has launched a second round of tests to continue exploring the use of this technology.

IMPACT EVALUATION

Summary:

- Initial estimates show Semilla Nueva reached 9,363 families in the first six months of 2020, vs 5,439 during the entirety of 2019. Representative sampling later this year may change these estimates slightly, but increased sales by Semilla Nueva and partnering organizations, plus the new COVID-19 relief program have allowed for substantial growth in families planting biofortified seed and the amount of biofortified grain consumed across Guatemala.
- Semilla Nueva launched a new promoter program, which directly collected contact information for farmers who purchased F3; this should allow for representative sampling of farmers to evaluate economic and nutritional benefits. The first surveys will launch in fall 2020.
- Semilla Nueva expanded its capacity for M&E and data analysis from two staff in 2019 to four in 2020.
- Nutritional analysis is currently behind schedule, with CIMMYT's nutrition lab operating at partial capacity and Semilla Nueva's lab remaining unfinished.
- Survey results in the second planting season showed 1% less income for mid-segment farmers, 26% higher income for low-segment farmers and 181% increase in income for non-hybrid farmers. These results shouldn't be weighted as heavily as results from the main planting season when most maize is produced.

Semilla Nueva launched a new strategy for representative impact surveys, with results pending for end of 2020:

Semilla Nueva's biggest limitation in impact evaluation over the past two and a half years has been the lack of a representative survey sample in economic and nutrition evaluations. The farmers surveyed were either those known personally by our field technicians or those who had participated in promotional events, creating a biased sample. Semilla Nueva could only survey these farmers because the agrodealers which sell our seed are unwilling to write down customer information or share it with any companies.

Semilla Nueva launched our promoter program in April 2020, where local workers were contracted to promote seed in numerous participating agrodealers throughout Guatemala (see Marketing & COVID-19 Response, above). These ten promoters not only promoted seed but also recorded contact information for all farmers who purchased seed at each location. In two months, they captured information from 631 farmers at 13 agrodealers where 19% of seed was sold. Over the course of September-November, a sample of these farmers will be surveyed over the phone. Surveyed farmers who purchased our seed as well as seed from another competitor and provided the same management to both seeds during the growing cycle will be visited during harvest to measure yields. Later these families will be surveyed on the level of home consumption of biofortified maize vs. normal maize. Given that the program has captured the data of hundreds of farmers and based on analysis of previous data economic data, we estimate achieving a representative sample of farmers in the low and mid-segment. This new system will be improved and repeated annually, allowing a much more rigorous understanding of the economic and nutritional benefits provided to the farming families purchasing seed.

Semilla Nueva doubled the size of the team collecting data on farmers:
Semilla Nueva had two staff working on ex-ante modeling and farmer impact evaluation in 2019. In 2020, Semilla Nueva hired a coordinator with extensive marketing and data collection experience from Central America's largest agricultural input company and a new M&E and development coordinator, doubling the size of the team working on impact evaluation. Given that the number of farmers growing biofortified seed is expected to double between 2019 and 2020, these new staff will help us conduct a representative evaluation of:

1. the economic impacts for farmers purchasing our seed
2. the amount of improved maize farming families are consuming
3. and the amount of grain farmers are selling into the market.

By linking this new data with our ex-ante model, we will be able to provide more complete picture of current and projected impact by the end of the year.

Nutritional analysis was completed, but due to COVID-19 delays, results are not yet ready:
As discussed in July - December 2019 Standard Report, Semilla Nueva worked to improve parental seed to counteract lower than expected levels of the amino acid tryptophan. While lysine levels were largely adequate, tryptophan levels were lower than expected. Samples of this new seed, along with samples from farmers who grew F3, were sent to CIMMYT for nutritional analysis. Unfortunately, CIMMYT's lab is operating at limited capacity and results are expected by August. They will be included in the next report.

Ex-Ante work is continuing:
Semilla Nueva's M&E coordinator left in late 2019 to lead One Acre Fund's impact evaluation in Tanzania. Semilla Nueva hired a consultant who had previously assisted in ex-ante modeling for Harvest Plus to continue developing components for iron, protein quality, and use of seed by subsistence farmers. The work is ongoing.

Survey results in the second planting season showed 1% less income for mid-segment farmers, 26% higher income for low-segment farmers, and 181% increase in income for non-hybrid farmers:
From October-April, there is a secondary planting season for farmers who have access to irrigation or a secondary rainy season in certain regions. While not as critical as the main planting season for sales, it offers us an additional period of evaluation. During this period, Semilla Nueva's field team monitored costs and yield with 25 farmers who planted F3 and a competitor's seed at the same time, utilizing the same farming practices for both seeds. On average, F3 performed slightly worse than mid-segment seeds, providing 1% less net income when taking all costs into account ($320 ha^{-1} vs. $324 ha^{-1}). For low-segment seeds, F3 provided 9% higher yields and 26% higher net income ($469 ha^{-1} vs. $371 ha^{-1}) (Table 6). Two parcels comparing non-hybrid, local seeds to F3 were monitored and showed a 35% increase in yield and a 181% increase in net income. It's important to note that two parcels is not sufficient to make a reasonable conclusion on the potential income increase for subsistence farmers, and further data must be collected.

Table 6. Yield and income per hectare for F3 and competitor seed under the same management with 25 farmers in the 2019-2020 second planting season.

Segment	F3 Yield (Mg ha^{-1})	F3 Economic Benefit ($ ha^{-1})	Competitor Yield (Mg ha^{-1})	Competitior Economic Benefit ($ ha^{-1})	Difference ($ ha^{-1})
Mid	7.4	820	5.8	239	581
Mid	4.4	-279	4.5	-238	-41
Mid	4.9	112	5.6	364	-252
Mid	5.2	876	4.4	572	305
Mid	5.2	336	5.6	485	-148
Mid	5.3	65	6.6	500	-435
Mid	7.4	843	7.9	977	-134
Mid	7.0	688	7.1	715	-27
Mid	5.9	447	5.6	292	155
Mid	3.4	-704	3.6	-666	-39
Average	**5.6**	**320**	**5.7**	**324**	**-3**
Low	4.1	545	3.3	320	225
Low	3.8	679	3.2	485	194
Low	4.9	611	5.8	1005	-394
Low	4.9	273	4.8	252	21
Low	5.2	165	4.9	61	104
Low	5.7	686	5.1	452	234
Low	4.8	360	4.5	237	123
Low	5.6	732	5.1	547	185
Low	3.4	118	3.2	20	98
Low	5.2	518	5.4	588	-70
Low	5.6	1102	5.4	1020	82
Low	5.9	1047	4.9	617	430
Low	3.8	-737	3.6	-775	38
Average	**4.8**	**469**	**4.5**	**371**	**98**
Non-hybrid	2.5	242	2.0	131	111
Non-hybrid	2.8	236	2.1	40	196
Average	**2.7**	**239**	**2.0**	**85**	**153**

Applying this information to the average amount of seeds that farmers purchased in 2019 and the average amount of land planted (0.49 bags covering 0.49 hectares), we can calculate the average additional income per farming family in the second planting season vs. data from 2019 (Table 7). Seeds perform differently in different seasons and different years based on pest pressures, temperatures, rainfall, and a number of other environmental factors. Given that 70% of Semilla Nueva's seed is sold in the primary, rainy season, this data must be weighted more heavily and new data from the 2020 rainy season will create a much more complete picture of the 2020 economic impact of Fortaleza F3.

Table 7. Average increased income for farmers in mid and low-segment 2019 vs. 2020 second planting season, based on average purchase size.

Segment	2019 F3 vs Competitor Difference ($)	2020 F3 vs Competitor Difference Irrigation Season ($)
Mid-Segment	46	-2
Low-Segment	37	48

Families planting nearly doubled between the first six months of 2020 and 2019:
A combination of higher Semilla Nueva sales, higher sales from the seed cooperatives working with Semilla Nueva, and the new COVID-19 response project nearly doubled the number of families planting biofortified seed in the first six months of 2020 vs the entirety of 2019 (Fig. 14 and 15). In the past, Semilla Nueva used surveys of agrodealers to determine the amount of seed sold per farmer, and this data was used for these calculations. With our representative surveys of farmers in late 2020, we will have a more accurate way of estimating the number of farmers served.

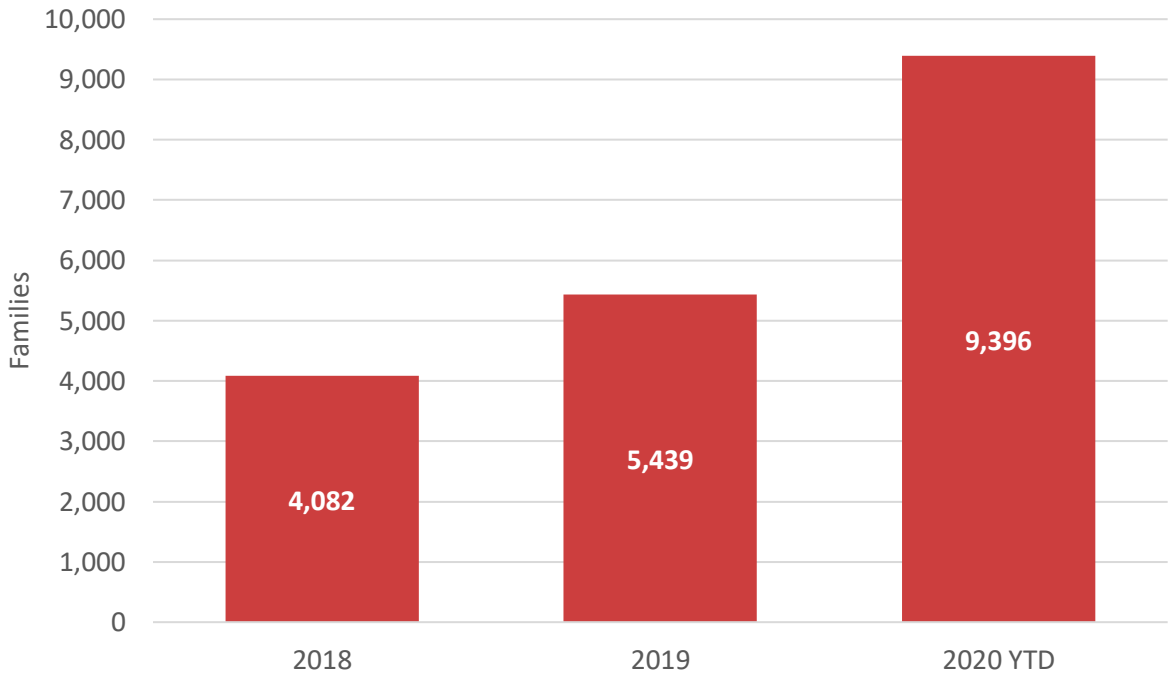


Figure 14: Families planting biofortified seed (2018 - 2020).

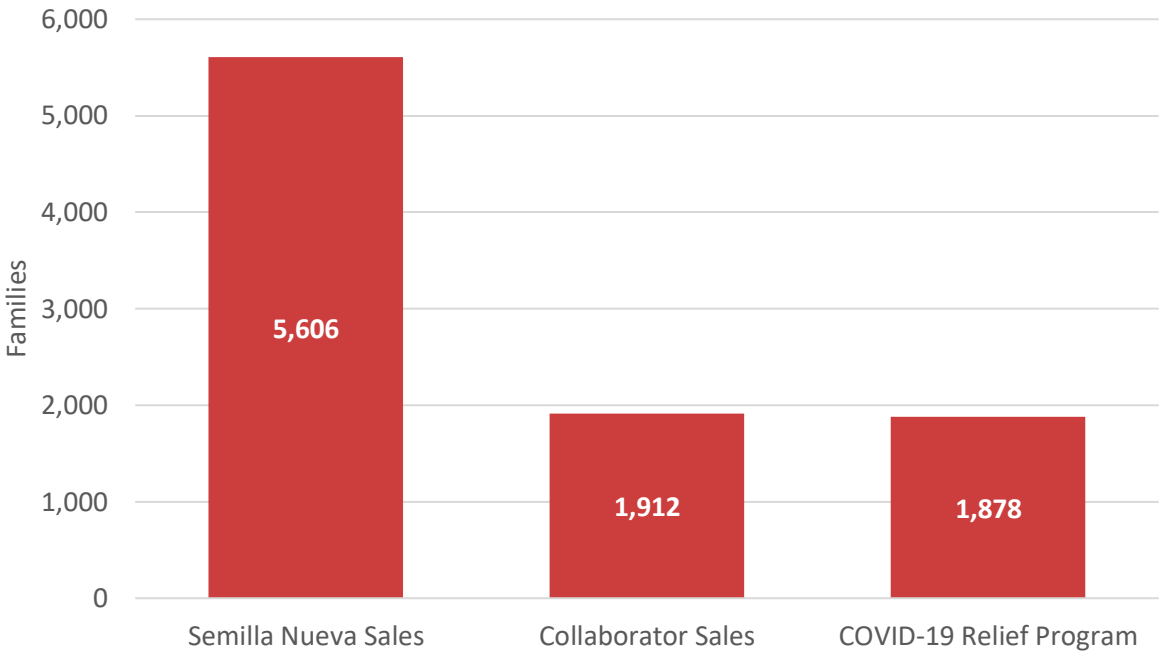


Figure 15: Breakdown of families planting biofortified seed in 2020 YTD by source of seed.

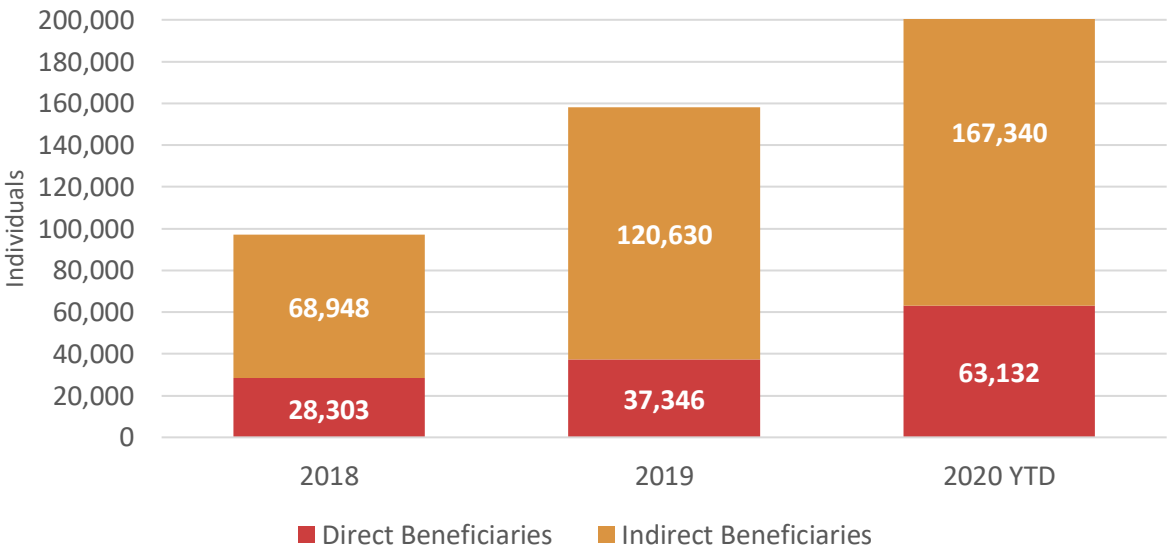


Figure 16: Number of direct beneficiaries (farming family members) vs. indirect beneficiaries (minimum consumers with improved nutrition).

DEVELOPMENT

Summary

- Over $724,000 in funding has been secured in the past six months.
- The team prioritized applying for large prize funding and publishing communications on the importance of reaching farmer families with better nutrition in the face of a pandemic.

We are grateful for all our donors who have risen to the occasion by providing emergency funding and reallocation of existing funds to adapt to the challenges of reaching farmers amidst severe restrictions. Thank you Fintrac, Open Road Alliance, Expo 2020, Mulago, Swiss Re, Light a Single Candle, and Vitol for your new support or flexibility in reallocations. As always, thanks to Cartier Philanthropy and the Mulago foundation for providing flexible, unrestricted funds from the beginning.

Renewals

- **The Mulago Foundation -** The Mulago Foundation has been a critical partner in the strategic design of our programs to maximize impact at scale. Their renewal provided unrestricted funds along with a collaborative review of Semilla Nueva's strategy and three-year goals.

- **The Light a Single Candle Foundation -** The Light a Single Candle Foundation has been a longstanding partner and has previously funded new areas with high potential in Semilla Nueva such as impact modeling. Their 2020 grant supports a professional seed breeding program by funding a crop breeder's salary, the launch of Semilla Nueva's nutrition lab, and seed development costs. LASC is also supporting an experimental program to bring biofortified seeds to subsistence farmers and the launch of our public policy program.

- **The Swiss Re Foundation** - The Swiss Re foundation selected Semilla Nueva as a partner for its annual Global Sports Challenge. The challenge allows Swiss Re employees and Semilla Nueva supporters to log their daily activities - ranging from hiking to cooking - to raise money for Semilla Nueva.

COVID-19 Response Grants

- **The Vitol Foundation -** We entered into a new partnership with the Vitol Foundation. The project supports our pivot to digital marketing to maintain our sales amidst COVID- 19 restrictions. The support also helped us pilot the seed distribution program in Alta Verapaz and Chiquimula to provide seeds to subsistence farmers most affected by the economic impacts of COVID-19.

- **The Swiss Re Foundation** - The Swiss Re Foundation provided an emergency relief grant to expand our marketing response to COVID-19 and R&D efforts. Most of the grant supports Semilla Nueva's purchase of an XRF analyzer, which will allow us to conduct rapid and inexpensive micronutrient analysis of seeds in-house.

Prize Applications

Semilla Nueva applied for three major prizes in the past three months: The Zayed Sustainability Prize, The MIT Solve Prize, and the Elevate Prize. All applications are still under consideration. We'd like to

take a moment to thank all our donors, board members, and supporters who undertook an impressive effort to generate excitement for our Zayed Prize application. We submitted over 50 nomination letters and we appreciate all our supporters that made this possible.

Communications
As the world grapples with how to respond to COVID-19, governments and donors need to prioritize nutrition, given its role in building resilience and immune responses. Semilla Nueva published the following articles to highlight the elevated importance of reaching families with better nutrition during a pandemic:

The Case for Zinc as Part of COVID-19 Response Efforts, published in partnership with social enterprise Sanku and scientists in Guatemala and Tanzania, this op-ed highlights the importance of nutrition, particularly zinc, for building resiliency to the COVID-19 pandemic. Zinc plays a key role in the immune system and has been linked to lower mortality in cases of complicated pneumonia, like those that present in COVID-19. We provided recommendations for donors and policymakers on how to reach vulnerable populations with better nutrition immediately using fortification and biofortification. The article reached over 1,100 readers. You can read it here.

Ensuring Essential Nutrients Amid COVID-19 Through Biofortified Maize, a blog published in partnership with the USAID-funded program Feed the Future Partnering for Innovation, focused on our partnership highlighting our efforts to keep reaching farmers despite the COVID-19 restrictions. Nelson Donis, Semilla Nueva field technician, shared stories from farmers who have lost their second jobs and sources of incomes, increasing the importance of a successful harvest. We are grateful for Partnering for Innovations' continued support at this time! You can read it here.

COVID-19 in Guatemala: Malnutrition Grows with the Case Count, a blog published on the White Flag movement in Guatemala, that highlights the growing food and hunger crisis in Guatemala. Acute malnutrition has tripled since the crisis began. We see the human toll of this as people line highways waving white flags signaling the need for immediate food assistance. You can read it here.

FINANCE / ADMINISTRATION / HUMAN RESOURCES

Summary

- Responding to the COVID-19 crisis, policies were put in place to cover remote work for office staff, rotation of personnel to cover essential duties in the office, and support for field staff with safety materials and paperwork for required travel.
- Cost saving practices were aggressively implemented beginning the first week of the pandemic in Guatemala to save financial resources for 2021 given uncertainty of the economic impacts of COVID-19.
- Semilla Nueva completed its first third party audit of our combined US and Guatemalan 2019 finances with no findings.

Within two weeks of the first COVID-19 case in Guatemala, new systems were put in place across the organization for both the office and field teams:
The field team required extensive support to safely continue operations. Kits of personal protective equipment were built and sent to all field staff (and office staff in smaller proportions) within two weeks of the first case in Guatemala. Improved masks (K95), goggles, and additional supplies were eventually obtained and provided to all field staff. As mentioned in the marketing section, paperwork for each traveling team member had to be recreated weekly and required consultation and relationship management with several government offices on Monday mornings after presidential proclamations on Sunday evenings. The team also regularly intervened over the phone in conversations with local governmental officials or police who stopped team members who had adequate paperwork. New rules, strategies and official interpretations of rules and strategies from the government have sometimes required changes of Semilla Nueva procedures several times in the same week.

The office was able to convert to primarily remote operations within three days of the detection of the first local case. Office staff have taken turns being present physically in the office for required tasks such as physical paperwork, sending supplies, or processing financial reports from the field team. New policies for hygiene and social distancing were established at our experimental farm, with a limit on how many staff could be present at a given time. All team meetings became virtual, and assistance was provided to field staff who did not have reliable computers or internet to ensure their participation. For the admin, finance, and HR teams, new systems such as an error log were launched to involve the whole team in positively finding inefficiencies, mistakes, and opportunities to improve major processes.

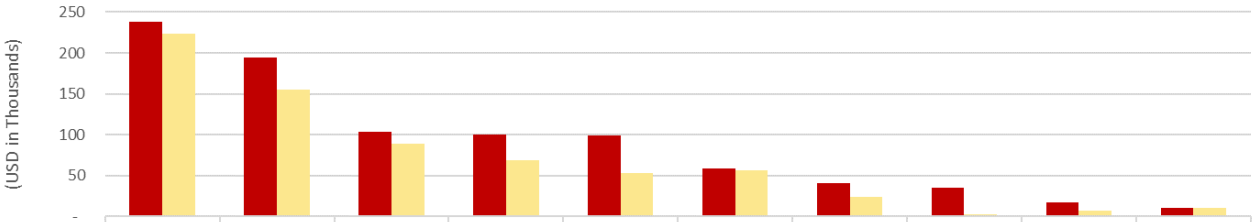
For some rural team members, February may be the last time they saw another Semilla Nueva staff member this year. The human resources team worked to prioritize virtual activities, from games, photo competitions, and informal conversations, to maintain team connection and unity.

Semilla Nueva responded to insecurity in the COVID-19 context by cutting costs where possible and delaying several hires:
Within a week of the first case in Guatemala, a revised budget was created that would maximize our resources for 2021. Working with several of our donors, we delayed the hire of several newly funded positions, reallocated funds to critical expenditures, and then worked to identify savings wherever

possible. As an example, Semilla Nueva canceled all monthly parking at our office. By June, with a better sense of our financial position, several of hiring processes were restarted. Semilla Nueva is currently $200,000 under planned expenditures, as can be noted below (Fig. 17).

Third-party audit of 2019 consolidated financial statements passes without findings:
In February, we held out first third-party consolidated audit of all three SN organizations (US 501(c)3 nonprofit, Guatemalan nonprofit, and our subsidiary company). We received the independent auditor's report in March, concluding: *"the preparation of financial statements was free from material misstatement due to fraud or error".* If you would like to receive a copy of the 2019 audit report, please send an email to mariacruz@semillanueva.org.

2020 budget vs actual
Semilla Nueva's 2020 budget was $1,585,462. As of June, we have executed 43% ($688K) out of 57% ($896K), with below planned spending in all areas. A combination of on-hand cash and donor commitments provides us a runway until early 2021.



	Production	Sales	Finance	R&D	Development	Admin & HR	Marketing	Collaborations	M&E	Experimental Farm
Budget	238	194	103	100	99	59	40	35	17	10
Executed	224	155	89	68	52	56	24	3	7	10

Figure 17: Semilla Nueva's budget vs. execution (Jan – June 2020).