

# Appui à la Recherche et au Développement Agricole (AREA) Project

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# Acronyms

AREA	Appui à la Recherche et au Développement Agricole, also known as Support to
	Agricultural Research and Development
AUC	American University of the Caribbean
CHIBAS	A research laboratory associated with Quisqueya University's College of
	Agriculture
CIMMYT	International Maize and Wheat Improvement Center
CRDD	Rural Center for Sustainable Development
FAMV	Faculté d'Agronomie et de Médecine Vétérinaire, also known as the State
	University of Haiti's College of Agriculture
LSU	Louisiana State University
IFAS	Institute of Food and Agricultural Sciences
MS	Master of Science
MARNDR	Ministère de l'Agriculture, des Ressources Naturelles et du Développement,
	also referred to as Haiti's Ministry of Agriculture
M&E	Monitoring and Evaluation
ORE	Organisation pour la réhabilitation de l'environnement, or Organization for
	Rehabilitation of the Environment

SARD	Support to Agricultural Research and Development
UF	University of Florida
UHM	Haiti's Unité Hydrométéorologique, or Haiti's Hydrometeorological Unit
UI	University of Illinois
UNEPH	Université Episcopale d'Haïti
USAID	United States Agency for International Development

# Disclaimer

The authors' views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. Government.

# **Project Background**

In May 2015, the University of Florida's Institute of Food and Agricultural Sciences (IFAS) and two other U.S. land grant institutions (the project consortium\*) entered a five-year cooperative agreement with the U.S. Agency for International Development to support its Feed the Future initiative in Haiti.

The Appui à la Recherche et au Développement Agricole (AREA) project team's approach to address the long-standing challenges of food insecurity and under-nutrition in Haiti is to support public and private institutions that are working to improve agricultural productivity. These institutions include the Ministère de l'Agriculture, des Ressources Naturelles et du Développement Rural (MARNDR), Faculté d'Agronomie et de Médecine Vétérinaire



(FAMV), and other higher education institutions. The project builds on the Haiti's National Agriculture Investment Plan, which outlines dozens of projects designed to revive and modernize its agricultural sector following a devastating earthquake in January 2010.

The project consortium is working to increase the availability of improved production technologies to farmers and the private sector through effective extension and development of an agricultural innovation system. The rapid scaling up of proven technologies is designed to increase adoption rates in the short term and propel the development of new technologies over the longer term. Developing functional and sustainable agricultural systems requires building on successful models and forging linkages to the national and international efforts already in place in Haiti.

# **Executive Summary**

During the second quarter ended March 31, 2020, AREA completed numerous activities that had been postponed from earlier due to widespread civil unrest and limits on the travel of staff, researchers and project stakeholders. In mid-March AREA again postponed or canceled activities because of the coronavirus pandemic.

AREA achieved a number of milestones this quarter:

- An AREA-supported scholar from Haiti successfully defended her Master of Science thesis and is poised to graduate from UF, which would mark the twentieth graduate of the program.
- AREA researchers and master's students completed 26 research and extension publications on topics ranging from a study of Haiti's soil characteristics to a first report of a fungus causing fruit rot in eggplants.
- The project held nine short-term training events attended by 353 participants, and more than half of the attendees were women.
- More than 100 researchers, students and government officials attended AREA's International Conference on Research and Innovation held March 10-11 in Pétionville, Haiti.
- AREA led the field testing of 19 newly introduced technologies and/or management practices designed to improve the agricultural sector.

# A. Climate Smart Solutions

### Background

The goal of AREA's Climate Smart Solutions program is to support Haitian institutions and its agricultural sector in managing risks associated with climate variability by reducing losses during unfavorable years and maximizing harvests in favorable ones. AREA is researching how climate variability affects the livelihood of Haitian farmers and their ability to respond to these challenges. AREA also facilitates access to climate information, develops tools that farmers can use to improve seasonal planning and day-to-day decision-making, and builds capacity for outreach on climate risk management in agriculture.

## Output I: Data analysis and write up

In January, the Climate Smart Solutions team submitted the manuscript "Farmers trained in Participatory Integrated Climate Services for Agriculture (PICSA) report improved farming practices in Haiti" to the peer-reviewed publication *Journal of Rural Studies*. The article was the second submitted to a peer-reviewed journal. The team received and is addressing a second set of comments from reviewers at *Population and Environment* for the first article submitted, "Coping with climatic shocks: Local perspectives from Haiti's rural mountain regions," prior to publishing.

#### Output 2: Presentation of results to partners and participating farmer associations

In January, the Climate Smart Solutions team reported the results of the PICSA training and climate focus group discussions to participating farmers' associations in Kenscoff and a representative of the World Food Program (Figure 1).



Figure 1. AREA presented results from the Climate Smart Solutions program to farmer groups in Kenscoff on Jan. 27, 2020.

On March 10 and 11 the members of the Climate Smart Solutions team reported results of their research to public and private sector partners at AREA's International Conference on Research and Innovation. AREA's

weather station technician also exhibited a working prototype of a station exhibited at the March conference (Figure 2).



Figure 2. AREA's weather station technician showed the features of second-generation station like one AREA has installed at sites in Haiti.

### Output 3: Capacity building for PICSA master trainers

In February, AREA hosted a one-day refresher PICSA course for four farmer leaders to reinforce the expert training they previously received. AREA selected the farmer leaders based on demonstrated leadership, motivation, respect from members of the community, verbal communication and perceived credibility. Following the training, participants reported that they had a more in-depth understanding of PICSA concepts.



Output 4: Supervise a second train-the-trainers led by expert trainers

Figure 3. AREA led a five-day training of trainers with extension agents and field officers in Les Cayes.

In January and February, AREA's Climate Smart Solutions team prepared for a train-the-trainers workshop on the use of the PICSA approach with farmers in Les Cayes. AREA worked closely with Catholic Relief Services (CRS) on the logistics of the workshop, which CRS hosted at its headquarters in Les Cayes Feb. 28-March 5. Twenty-six people participated in the training, including extension agents from the communes of Maniche, Torbeck and Camp Perrin, field officers from Grand Anse, and a supervisor from CRS's Kabos project. The trainees were provided direct contact with UHM though a WhatsApp group to receive regular updates on the weather and seasonal forecasts. CRS plans to provide the training for additional agents in the South in the near future.

### Output 5: Continued support to the Ministry of Agriculture (UHM)

AREA planned a workshop with UHM and the U.K. Meteorological Office to support UHM's efforts to improve its use of weather and climate data to serve the agricultural sector and integrate a data management system called Climsoft. Climsoft is a free and open-source data management system endorsed by the World Meteorological Organization and used throughout Africa to store and analyze climatic data and to assess risks. The workshop, scheduled to take place March 16-27, was postponed due to the coronavirus pandemic.

#### Output 6: Support to weather stations in Haiti

AREA's weather station technician worked to solve issues that disrupted data transmissions and caused weather stations installed by AREA to go offline. He consulted remotely with the UF electrical engineering professor who has been leading this program. In early February, AREA's weather station technician visited four of the AREA-installed weather stations to troubleshoot problems and to train site personnel. The technician also relocated the Damien station to near the Department of Rural Engineering at FAMV to improve its reliability. As of March 31, two of six AREA-installed weather stations were back online (Bas-Boën and Wynne Farm) and the technician continued to work to upgrade and improve the reliability of the others. The UF electrical engineering professor and AREA station technician are exploring cell phone technology that may replace the dependence on Wi-Fi connectivity for accessing data.

Separately, the UF electrical engineering professor completed a manual on how to maintain weather stations, aimed at technicians who will maintain stations after the culmination of the AREA project. AREA staff is translating the manual to French and plans to distribute it starting in the third quarter.

# B. Collaborative Capacity Building in Maize Seed Systems

#### Background

The Maize System activities are designed to finalize the development of the maize variety testing system that connects on-station research activities at CRDDs with other research farms and on-farm evaluations conducted by participating farmer networks.

Output 1: Train researchers and agricultural professionals to compile and analyze maize variety data, and to use phenotyping technology and standard operating procedures to conduct maize experiments



Figure 4. Participants learned how to use a phenotyping meter at the January training.

Seventeen agricultural public and private sector professionals and researchers participated in a training on phenotyping technology held Jan. 15-16 in Pétionville, Haiti. The training was led by AREA's maize specialist and an associate professor/corn breeder from the University of Illinois (UI). The focus of the training was to reinforce and apply the concepts on standard-operating procedures (SOP) introduced at the AREA workshop held in September 2018 at UI. During the January training the participants learned how to use the PhotosynQ phenotyping meter technology for data collection with applications to field plot research (Figure 4), as well as how to visualize the data collected on a website and how to perform statistical analysis using R.

A post-training evaluation was administered to assess the knowledge gain of the participants (see the M&E section).

On Jan. 17, 11 participants attended a workshop on analyzing maize trial data. During the workshop, the data from all the maize trial sites completed in 2019 were compiled into a spreadsheet and the participants learned how to develop a list of codes and units of measurement for the traits measured. Also, the participants learned to perform statistical analyses with R Studio. The group developed a timeline to complete the data analysis and to write a paper for publication in *Crop Science Journal*.

#### Output 2: Finalization of standard operating procedures (SOP) and maize seed system training materials

Nothing to report during this quarter.

#### Output 3: Presentation of results to partners

AREA's maize specialist worked with a graduate of AREA's Master of Science program who now serves as a sorghum breeder at CHIBAS, a research laboratory associated with Quisqueya University's College of Agriculture, to analyze the maize trial data. The sorghum breeder presented the results of the maize trial at AREA's International Research and Innovation Conference held on March 10-11 (Figure 5).



Figure 5. A graduate of AREA's Master of Science program who now serves as a sorghum breeder in Haiti presented the results of the maize trial at AREA's International Research and Innovation Conference.

# C. Legume Research

### Background

AREA's Legume Breeding Research program focuses on genetic improvement of common beans and peanuts. Legume crops such as common beans and peanuts are important for providing protein and nutrients necessary for adequate human nutrition. If managed optimally, legume species also can contribute significant levels of soil nitrogen through their symbiotic relationship with nitrogen-fixing bacteria.

#### Output 1: Field testing of the four bean lines developed by AREA

AREA planted two field trials to test the agronomic performance of the four improved black bean lines selected by AREA to increase seeds. The seeds were planted in Bobin (in the commune of Croix-des Bouquets) under the management of the Bas Boën CRDD and in Cabaret under CHIBAS. The experiment will compare the performance of these lines of beans with two improved local varieties X-RAV and DPC-40 used by farmers.

AREA sowed the bean lines in mid-December on 0.86 hectare (ha) for both the evaluation trial and seed multiplication at Bobin. The evaluation trial used four replicated plots in a randomized complete block design. AREA measured 10 traits for the phenotypic assessment of bean lines, including: number of seeds germinated, days to flowering, physiological maturity, stem length, number of pods per plant, number of seeds per pod, 100-seed weight, leaf area index measurements and total yield. The diseases affecting the plots during the season were identified and severity was rated on a scale from 1 to 9.



Figure 6. The improved seeds developed by AREA yielded a large bean crop at Cabaret.

AREA manually harvested the beans on March 5 and 6 — 85 to 86 days from sowing (Figure 6). The yield for the replicated plots were calculated for the evaluation trials at Bobin in Croix-des-Bouquets. The average yield varied from 1.74 tons/ha to 2.24 tons/ha. There was no statistical significance between the improved lines and the controls. However, there was a significant difference between the yield of the two controls  $X_RAV$  and DPC\_40.

AREA is waiting for the harvest data for the second bean plots managed by CHIBAS at Cabaret, which will be presented in the next quarterly report.

#### Output 2: Advanced peanut lines developed at UF

Nothing to report in the second quarter.

# D. Plant Pathology

#### Background

A key focus of the AREA Plant Pathology program is to improve the capacity of the Bas Boën CRDD and the Ministry of Agriculture to operate and maintain a functional plant diagnosis laboratory. AREA will provide diagnostic-related activities and extension documents in Haitian Creole related to plant disease management. In Year 4, the Ministry of Agriculture requested and received training in risk assessment, which AREA will continue to do in Year 5.

# Output 1: Provide pest and disease identification to farmers and develop management guidelines for dissemination to farmers and agricultural service (extension) providers

During the growing season, AREA team members began to regularly visit bean fields at the Bas Böen CRDD and on farms around the Plaine du Cul-de-Sac. AREA pathologists recommended preventive measures to control pests and diseases, including using disease-free seeds, optimal spacing of plants, eliminating weeds and regularly scouting the fields for diagnostic purposes. AREA supported the Bas Böen CRDD by providing pest and disease identification and management guidelines to farmers and students. Sampling was discontinued in March because of coronavirus restrictions.

Plant	Location	Disease/symptoms	Causal/associated	No. of
			agent	samples
Common bean	Plaine du Cul-de-Sac	Insects	Aphids, mites, thrips	5
Common bean	Plaine du Cul-de-Sac	Physiological damage	Not found	4
Tomato	Kenscoff	Fusarium wilt	Fusarium oxysporum	3
(hydroponic)				
Peanut	Mirbalais	Peanut rust	Puccinia arachidis	1
Peanut	Mirbalais	Early and late leaf	Cercospora arachidicola	2
		spots	-	
Rice	St. Marc	Sheat rot	Fusarium sp./Sarocladium	1
			oryzae	
Rice	St. Marc	Blast	Pyricularia grisea	1
Common bean	Plaine du Cul-de-Sac	Rhizochtonia root rot	Rhizochtonia solani	7

Table 1. Plant diseases diagnosed at the plant pathology laboratory

In March, AREA printed and distributed fact sheets on the two "new" diseases that were characterized in Year 4, toppling disease of banana caused by *Klebsiella variicola* and a fruit rot on eggplant caused by *Lasiodiplodia hormozganensis*.

Output 2: Technical training and outreach activities for personnel at CRDDs, Ministry of Agriculture and universities



Figure 7. AREA's plant pathology staff teamed with an agricultural development organization to hold an open house at the AREA-supported Bas Boën CRDD.

AREA partnered with the Haitian Foundation for Sustainable Agricultural Development (FONHDAD) and participated in a one-day event to promote the programs and services offered at Bas Böen CRDD's plant clinic. AREA's plant pathology technician and agronomist participated in the demonstrations and technical presentations on plant diseases, including an overview of the toppling disease of banana, how to sample for plant diseases and the accomplishments of the plant pathology program. The CRDD produced and demonstrated DryCards, a technology created by UC Davis's Horticulture Innovation Lab, to determine if dried food is dry enough to prevent mold growth during storage. AREA facilitated the contact between the Horticulture Innovation Lab and the Bas Böen CRDD, including assisting with the CRDD's application to become a DryCard distributor in Haiti. AREA also provided more than a dozen fact sheets in French or Creole on plant pathology and soils.

AREA's plant pathology technician supported Quisqueya University students working on their graduation theses to identify causal agents of plant diseases in peanuts and rice. AREA's lab technician at the Bas Boën CRDD also continued to support the students with experiments to sample, diagnose and make recommendations to manage plant diseases.

Feb. 4-5, AREA's plant pathology team and agronomists conducted an IPM and pesticide safety training at the CRDD of Montrouis for 31 members of farmers' associations. The event had been rescheduled from September due to political unrest. AREA provided the participants a Ministry of Agriculture-produced technical manual for pesticide users in Haiti that served as a primary teaching tool, along with other training materials. This included information on integrated pest management, pesticide labelling, pesticide formulations, harmful effects and emergency response, personal protective equipment, transportation and storage, and disposal. No pesticides were used during the training.

Feb. 10-14, the plant pathology team conducted a plant diagnostic training at the American University of the Caribbean in Les Cayes (Figure 8). In lectures and laboratory exercises, 17 attendees learned the principles of mycology, bacteriology, virology and abiotic disorders; good laboratory practices; and how to sterilize media, prepare cultures, visualize fungal spores and identify common plant pathogens. AUC plans to use the materials introduced at the training to supplement its microbiology and plant pathology teaching curriculum.



Figure 8. AREA's plant pathology team conducted a plant diagnostic training at the American University of the Caribbean in Les Cayes.

Output 3: Strategic initiatives with the Ministry of Agriculture to address new plant pathogens

A U.S.-based plant pathology researcher and a graduate of AREA's Master of Science program conducted an expert elicitation Jan. 31 attended by 10 representatives from the Ministry of Agriculture. The purpose of the elicitation was to gather information from experts and help AREA to work with the Ministry to evaluate the role of management practices and regulatory policies in addressing the risk of new and existing pests and diseases in Haiti. The data collected from the study was used to map the risk for banana and mango diseases and help policymakers develop phytosanitary measures to reduce the risk of emerging pests and pathogens. A summary document will be shared with the Ministry of Agriculture and will inform a paper on pest risks in Haiti that AREA is preparing to submit to a peer-review journal.

# E. Soil Science Research

#### Background

The objectives of AREA's soil fertility management program are to:

- Map the spatial distribution of key soil attributes to inform soil fertility management research and extension
- Establish and evaluate multiple approaches for soil restoration and its sustainable conservation
- Make recommendations to farmers and other land managers

# Output 1: Fertilization practices based on different fertilizer formulas that best fit soil deficiencies and plant requirements

As AREA reported last quarter, the project team determined that laboratory tests of the soil at the available Bas Boën CRDD site showed it was inadequate to conduct a fertility experiment.

#### Output 2: Bean response to phosphorus and potassium fertilization on alkaline soil

AREA staff members conducted weekly field visits to monitor the experiment on a site in Cabaret, where beans were planted and fertilized with triple superphosphate (P2O5), muriate of potash (K2O) and urea (N). The experiment was set up in coordination with CHIBAS.

Soil and tissue samples were collected at the flowering stage to evaluate the nutrient status of the soil and plant uptake. On March 19, the beans were harvested, and tissue samples were collected (Figure 9). As of March 31, AREA was processing the soil and tissue samples prior to applying for a permit to ship them to the UF/IFAS Extension Soil Testing Laboratory for analysis.



Figure 9. AREA team members apply fertilizer on bean plants at flowering stage as part of the experiment to determine the optimum level of fertilizer to apply.

#### Output 3: Management of salt affected water irrigation for crop growth and yield improvement

AREA collected 10 samples of groundwater used for crop irrigation to assess salinity levels at the Bas Boën CRDD. The parameters analyzed were: Electrical conductivity (EC), pH, Ca (calcium), K (potassium), Mg (magnesium), Na (sodium). The data collected for both the soil and water analyses informed the salinity management recommendations section of the soil booklet "How to Improve Soil Fertility in Haiti."

#### Output 4: Dissemination of the results in Haiti

The former leader of AREA's Soil Science Research program wrote a booklet, "How to Improve Soil Fertility in Haiti," to help extension agents, farmers and agricultural professionals address soil deficiencies and improve crop yields. AREA distributed printed copies and electronic versions on USB drives of the 24-page, French-language booklet to attendees of the project's March 10-11 Conference. The booklet also is posted on AREA's website.

The AREA team also translated into French or Creole three fact sheets aimed at farmers and extension agents. The subjects of the fact sheets were soil testing, an overview of soils and fertilizers for master gardeners, and the "four Rs" of fertilizer management. The fact sheets were also distributed at AREA's International Conference on Research and Innovation.

# Output 5: Improving the capacity of the soil labs at the Bas Boën CRDD, FAMV and the American University of the Caribbean (AUC)

AREA and a FAMV soil scientist assisted the soil technician at Bas Boën CRDD to set up the flow cytometer that AREA awarded as part of a Pilot Project. The instrument will be set up once coronavirus restrictions are lifted.

# F. Nutrition Interventions

Background

Haiti continuously works to enhance its supply of affordable and nutritious foods. A faculty member of the LSU Ag Center's School of Nutrition and Food Science assessed the nutritional situation in Haiti and developed a nutritional-based extension intervention to encourage the consumption of leafy vegetables.

# Output 1: Follow-up with participants of May 2019 nutrition education training and communication of results

AREA's nutrition team conducted a focus group evaluation using small group discussions and guided interview questions with participants of the YR 4 Asian spinach nutrition training. Sixteen women farmers participated in the focus group evaluation, the purpose of which was to evaluate the farmers' cultivation and eating habits of Asian spinach introduced to them last year, use of PICS bags, and practice of hand and vegetable washing. The LSU Nutrition Assistant Professor developed the survey instrument for the focus group evaluation, which was translated to Haitian Creole and administered by AREA team members in Haiti prior to the training on the use of amaranth greens.

# Output 2: Implement amaranth (greens)-centered nutrition education training program targeting women farmers associated with rural growers/farmers associations

The AREA nutrition team organized training events targeting female farmers in the Montrious and Kenscoff regions on the nutritional benefits of amaranth.



Figure 10. Women attending the nutrition training learned about amaranth.

An AREA team conducted the training in Montrious March 18-19 for 83 women from 10 farmers' associations in the Matheux corridor (Figure. 10). The event centered on teaching the participants about the nutritional value of various food groups, including amaranth, and the nutritional needs of women and children. The women also learned about basic food safety and how to cook amaranth. An AREA agronomist taught participants how to cultivate amaranth, establish a plant nursery and maintain the plants.

AREA cancelled the training at Kenscoff due to restrictions on meeting sizes due to the coronavirus. AREA plans to reschedule the training when the restrictions are lifted.

# Output 3: Follow up with participants of amaranth nutrition education training and communication of results

Nothing to report in the second quarter.

# G. Pilot Projects

## Background

AREA launched the Pilot Projects program to support the development of agricultural research professionals, encourage collaboration among researchers and research institutions, and address agricultural research priorities. AREA issued calls for proposals for three types of awards: acquisition of supplies and other nonexpendable items for research and education (Category 1), support to individual Haitian researchers (Category 2), and support for collaborative research projects (Category 3).

# **Output 1: Continue monitoring Pilot Projects**

AREA staff distributed to partner universities equipment for use in laboratories and for teaching. Staff also compiled information regarding the use of research and education supplies and other nonexpendable items awarded by AREA in Category 1 (Figure 11). The researchers who received Category 2 and 3 funding resumed their field work in the second quarter. AREA anticipates that two of the three projects will be completed by next quarter.



Figure 11. Pilot project awardee receives equipment.

# H. MS and Graduate Certificates

Background

Among AREA's primary goals is to support and inspire Haitian agricultural professionals by offering programs to build their research, education and extension skills. AREA is doing this is through long-term capacity training of Haitian scholars in Master of Science degree programs at UF and LSU. In addition, AREA supports Haitian students in non-degree graduate certificate programs offered via distance learning.

# Output 1: Continued support of AREA-funded Master of Science students enrolled in graduate school at UF

All of the remaining six of 25 AREA-supported graduate students are making adequate progress in their programs at UF.

In February, one student successfully defended her thesis and is on track to graduate in May and become the  $20_{th}$  Haitian student to graduate with support from AREA (Figure 12). Her thesis — "Getting a jump on invasive pathogens: geographic risk assessment for new banana diseases in the Caribbean and a rapid detection method for *Raffaelea lauricola* in environmental samples" — explored new plant diseases that are harming banana crops in Haiti and other Caribbean countries.



Figure 12. After defending her thesis in February, this UF student will become the 20th AREA-supported Master of Science to graduate.

The other students are expected to graduate with master's degrees from UF in December.

# Output 2: Continued support for Haitian students working to earn graduate certificates through UF's online education program

One of the two students in this program was awarded his certificate in January after completing the program in December. The second student was unable to enroll in the spring semester, but she plans to take a course in the summer and in fall semesters to complete the certificate program by December. AREA staff will continue to work closely with the student to help her succeed.

# I. Farmers Associations, CRDDs and Ministry of Agriculture

## Background

AREA identified strategic opportunities to work with Haiti's Ministry of Agriculture and rural centers for sustainable development (or CRDDs) to support their research and extension activities in Haiti. Using a

"bottom up" process, AREA aims to strengthen the capacity of the Ministry and CRDDs to serve Haiti's agricultural sector. AREA is also working closely with farmers' associations to provide capacity-building trainings and to help farm advisers improve their services.

# Output 1: Capacity-building trainings for farmer associations and CRDDs

AREA developed training materials and held a training Feb. 17-20 at the Kenscoff Communal Initiative Center on various business and organizational topics that the associations identified as priorities (Figure 13). The 46 attendees included members of farmer associations, the CRDDs of Robin and Duvier, and the private sector, including operators of shops that cater to farmers. Training modules covered organizational leadership, developing a business plan, developing or revising bylaws, creating an organizational structure compatible with a group's mission, developing a marketing plan, creating a resource development plan, and evaluating the effectiveness of an organization. All the attendees who completed a post-training survey reported an increase in knowledge as a result of the training.



Figure 13. Forty-six people learned about the fundamentals of setting up and running a farmers' organization at an AREA training.

## Output 2: Disseminate findings of nonprofit management capacity building trainings

AREA staff began writing an article about their work to build the capacity of nonprofit organizations.

## Output 3: Collaborative research conference

More than 100 scholars, researchers and Haiti agricultural experts gathered to share knowledge and build relationships at AREA's International Conference on Agricultural Research and Innovation at the Karibe Convention Center in Pétionville on March 10-11 (Figure 14).



Figure 14. International Conference on Research and Innovation attendees are welcomed at the opening ceremony.

The research conference had three main objectives: present the results AREA-sponsored research; facilitate sharing of information between stakeholders in the agricultural sector; and foster networking among researchers.

The International Conference on Research and Innovation focused on the results and accomplishments of research programs carried out in seven priority areas: (1) Agroclimatology and strategies for how farmers can adapt to increasingly variable climate conditions variabilities; (2) Studies and research to tackle the challenges of higher agricultural education in Haiti; (3) Research on plant diseases and pests with emphasis on strategic crops such as beans, plantains, sorghum, rice, corn, sweet potatoes and vegetable crops; (4) Agricultural extension and the gender issues in agriculture; (5) Agronomy and agronomic practices that facilitate better management of soil fertility; (6) Crop improvement, particularly beans, sorghum and corn; (7) Postharvest technologies and food safety with a focus on research to reduce aflatoxins in foods.

## Output 4: Establish the Haitian Forum for Agricultural Extension and Advisory Services (HFAAS)

AREA and FONHDAD worked to organize a meeting of key partners to establish HFAAS, which FONHDAD would lead. The meeting was scheduled for April but has been cancelled due to coronavirus restrictions and will be rescheduled for early June.

# J. Gender Assessments and Interventions

#### Background

AREA's strategic approach includes incorporating women in all project activities and work to achieve gender parity. The project is working to identify gender constraints in Haiti's agricultural sector, making recommendations, and developing gender-responsive interventions to agricultural projects' programming, particularly through extension and advisory services.

#### Output 1: Workshops on integrating gender in agricultural development programs

AREA's gender extension specialist and nutrition program coordinator led a workshop at the Montrouis CRDD on Feb. 28 to train twelve agricultural extension agents about the importance of integrating gender in

their advisory services to farmers and rural communities (Figure 15). The workshop was largely based on a program developed by the USAID-supported Integrating Gender and Nutrition within Agricultural Extension Services (INGENAES) project. AREA staff translated INGENAES materials to Creole prior to the workshop. The goal of the workshop was to build sustainability of AREA's gender extension activities. By inviting extension professionals AREA hopes to reach more people, as the trained agents can subsequently reach many farmers and benefit more rural communities. The results of a survey showed the participants were overall satisfied with what they learned and reported a knowledge gain on most topics for all three modules (see M&E section).



Figure 15. AREA's gender specialist led a workshop on how farm advisers can better integrate women into activities.

## Output 2: Workshop: professional development for women on entrepreneurship and leadership

Originally set for May, AREA will reschedule the event because of coronavirus pandemic restrictions. AREA will work with the administrators of the key agricultural universities to determine the best timing for the workshop.

# K. Extension Experiment

## Background

AREA's extension research team conducted a large-scale research study to compare the effectiveness of the three models of extension used in Haiti: 1) Master farmer, which centers on an expert who teaches farmers in a lecture-style setting; 2) Farmer field school, which primarily relies on the community of farmers to teach each other; and 3) Simple distribution, or input supply-driven, in which farmers come to a central location to receive the technologies and basic information on their use. The primary objectives of the experiment are to:

- 1. Evaluate the differences of three commonly used models of extension in Haiti.
- 2. Assess the interactions between extension models and farmer associations as predictors of farmers' willingness to test innovations on their own farms.
- 3. Determine whether there is a relationship between the gender of the farmer, the traits of the farmer associations and the efficacy of the extension model.

#### Output I: Final analysis of comprehensive extension experiment data

During the second quarter, AREA made three major advances in analyzing the data associated with the Extension Experiment. First, the team completed database entry of information from the group dynamics instrument. Secondly, a UF/IFAS statistician completed the initial data analysis and confirmed all three hypotheses for the experiment.

- Hypothesis 1: There is a significant independent effect of the approach to technical assistance and the willingness of farmers to test innovations on their own farm.
- Hypothesis 2: There is a significant independent effect of the traits and characteristics of a farmer association on the willingness of farmers to test innovations on their own farms.
- Hypothesis 3: There is an interaction between approach to technical assistance and traits of a farmer association on farmers' willingness to test innovations on their farms.

Lastly, the team conducted a test to understand these interactions and learned that three traits of farmers' organizations appear to have the greatest effect on farmers' willingness to try new technologies on their farms: degree of engagement with the association, members' confidence in the association as an organization, and members' perceptions of equity among members of the association.

## **Output 2: Dissemination of findings**



Figure 16. A recent graduate of AREA's Master of Science program presented results of the experiment to determine the most effective extension method to reach Haitian farmers.

AREA's extension experiment team communicated findings to key stakeholder groups, the scientific community and agricultural development professionals at AREA's International Conference on Research and Innovation (Figure 16). At the close of the quarter, the team continued to work on an article they will submit for publication in peer-reviewed journals.

# L. Higher Education Research and Development

#### Background

The objective of the Higher Education program is to strengthen the capacity of Haiti's agricultural higher education institutions and help improve curriculum to better fulfill the needs of the country's agricultural sector.

# Output 1: Data analysis of observational research

The higher education team continued classroom observations with the help of the gender and M&E specialist (Figure 17). They observed 21 classes taught by eight instructors, each of whom participated in the AREA Faculty Development Academy. Due to coronavirus restrictions and increased security in Haiti, the researchers decided to reduce the number of instructors observed and analyze the existing data. The team will continue to conduct observations and collect data in the third quarter if there is an opportunity to safely do so.



Figure 17. AREA staff members observed classroom instruction.

# Output 2: Continued support to improve FAMV's diagnostic course for fourth-year agronomy students

AREA higher education staff met with FAMV's diagnostic course teaching committee to plan for the course and determine what contributions AREA scientists will make in 2020. The FAMV faculty expressed interest in incorporating AREA's recommendations to improve the curriculum changes and AREA planned to support FAMV faculty as they transition to teaching new course content. In response to the coronavirus outbreak, FAMV postponed the diagnostic course set for April to a later date.

Output 3. Supporting research laboratory and better classroom environment for improved learning experience at FAMV

AREA plans to train faculty and students using teaching materials already developed by UF Environmental Health and Safety when FAMV resumes operations and after receiving the necessary PPE (on back order).

# Output 4. Training on access to free peer-reviewed scientific journals, books and databases and scholarly writing skills

At AREA's research conference, a UF librarian conducted a session on how agricultural researchers, students and professionals can access free resources and on scholarly writing for journals, including proper citations, plagiarism, and evaluating sources. She also provided one-on-one sessions to address specific questions and needs (Figure 18).



Figure 18. A UF librarian worked with scholars to address specific questions and needs.

# M. Postharvest Loss Management and Food Safety

AREA's Postharvest Loss Management and Food Safety program aims to reduce postharvest losses, improve food safety and increase food security in the Feed the Future-West corridor.

#### Output I: Produce communication materials on ways to reduce aflatoxin in foods

AREA finalized two fact sheets. The first aims to provide information to the Haitian food industry to develop a food business. The second was how food processing businesses can create a sanitation program to enhance the safety of their operations. In addition, during a meeting held Jan. 16 at the Ministry of Commerce, the aflatoxin working program made significant progress on creating an aflatoxin guide, which the group plans to finalize at a subsequent meeting.

#### Output 2: The mycotoxin research unit at FAMV certified ISO 17025

The mycotoxin research unit at FAMV completed the second of three rounds of a proficiency analysis as part of AREA's work to assist the research unit to become accredited by the International Organization for Standardization (ISO). The testing program is coordinated by the Office of the Texas State Chemist (OTSC). On Feb. 7, the lab began analyzing the samples of ground corn from the OTSC and the results were reported

to OTSC on March 23. If the result is found satisfactory by OTSC, the lab will receive the last round of samples in July.

# Output 3: Produce safety training

As the second quarter closed, AREA postponed a Produce Safety Alliance (PSA) training that was scheduled for April 2-3. This activity will be rescheduled after coronavirus pandemic restrictions are lifted.

## Output 4: Broccoli cultivar evaluation and hydro cooling techniques training

AREA hired a postharvest technician to evaluate the postharvest quality of nine broccoli cultivars. The research is in partnership with the Association des Producteurs Organisés de Kenscoff (APLOK). Broccoli (*Brassica oleracea* L.) is a cool season vegetable that is most appropriate in the highlands of Kenscoff where it is planted during two periods, November to February and March to June. AREA did the preliminary work to set up the evaluation in January (Figure 19) and began the trials in February. AREA will continue to monitor the trial and in May staff plans to train an APLOK technician and farmers to evaluate broccoli quality.



Figure 19. AREA staff transplanted seedlings in the nursery as part of an evaluation of broccoli.

# Hydrocooling

On March 18 and 19, AREA's postharvest technician conducted a hydrocooling technique training as part of AREA's nutrition training (see Nutrition Interventions, Output 2). Hydrocooling is a low-cost technology that can improve the postharvest shelf life of vegetables by cooling them after harvest, thereby reducing postharvest losses and potentially generating more farm income. AREA plans to share this technology with farmers producing broccoli when the COVID-19 restrictions end.

## Output 5: Solar seed dryer training

Early in February, AREA staff members built a solar-powered grain dryer at the Bas Boën CRDD (Figure 20). The prototype was displayed at AREA's research conference. AREA plans to conduct separate trainings to show others how to build the low-cost grain dryers at the Bas Boën CRDD and in Les Cayes.



Figure 20. AREA staff members built a low-cost grain dryer powered by a solar panel that AREA will use to demonstrate to farmers how to build their own.

# Monitoring and Evaluation (M&E)

# Summary of FY2020 Q2 Performance

The M&E section presents a short description of each indicator's performance in FY2020 Q2. Note: The number of participants in the M&E section may differ from the numbers elsewhere in this document. This reflects USAID's requirement to exclude in the final indicator totals those who have participated in prior AREA training activities in the same fiscal year.

No.	Indicator Type (Unit of Measure)	Disaggregation	Annual Target (FY20)	Q1	Q2	Q3	Q4	Annual Performance Achieved to the End of Reporting Period (%)	On Target (Yes/No)	LOP Results1 / LOP Targets
1	Number of individuals who have received USG-supported degree-granting non- nutrition-related sector productivity or food security training (RAA)– EG.3.2-2 (FTF 4.5.2.6)	- Sex - Duration	9	9 9 C 4 F 5 M	6 6 C 4 F 2 M			100% 9 /9 9 C 4 F 5 M	Y	25 /25
2	Number of research and extension publications as a result of project assistance – custom	<ul> <li>Publication type</li> <li>Language</li> <li>Sex of primary author</li> <li>Publication status</li> <li>Partner organization</li> </ul>	20	18	26			220% 44 / 20	Y	115 / 51
3	Number of individuals who have received U.S. government-supported short-term agricultural sector productivity or	- Sex - Corridor, commune - Type of individual	400	1	288 127 F			72% 289 / 400	Y	1,611 / 1,254

Table 2. Reduced Version of the IPT Table demonstrating the FY2020 performance of the 11 indicators

1 LOP results are added across years, and include duplicated individuals.

No.	Indicator Type (Unit of Measure)	Disaggregation	Annual Target (FY20)	Q1	Q2	Q3	Q4	Annual Performance Achieved to the End of Reporting Period (%)	On Target (Yes/No)	LOP Results1 / LOP Targets
	food security training (RAA) (WOG)– EG.3.2-1 (FTF 4.5.2.7)									
4	Number of training events delivered – custom	<ul> <li>Corridor,</li> <li>commune</li> <li>Nationality of</li> <li>primary presenter</li> </ul>	12	0	9			75% 9 / 12	Y	57 / 52
5	Percentage of participants with an increase in knowledge related to research and extension – custom	- Sex - Program type	85%	NA	74%			-	N	86% / 84%
6	Percentage of female participants in U.S. government–assisted programs designed to increase access to productive economic resources– GNDR-2	- Program type	50%	40%	54%			54% (196 / 363)	Y	46% / 50%
7	Number of new technologies or management practices introduced as a result of U.S. government assistance – custom	<ul> <li>Corridor,</li> <li>commune</li> <li>Crop type</li> <li>Technology</li> <li>type</li> </ul>	4	0	3			75% 3 / 4	Y	46 / 48
8	Number of grant- funded projects in	- Sex - Source	4	0	0			0%		27 / 31

No.	Indicator Type (Unit of Measure)	Disaggregation	Annual Target (FY20)	Q1	Q2	Q3	Q4	Annual Performance Achieved to the End of Reporting Period (%)	On Target (Yes/No)	LOP Results1 / LOP Targets
	Haiti as a result of project assistance – custom									
9	Number of curriculum changes at partner educational institutions – custom	- Institution	3	2	0			67% 2/3	Y	25 / 24
10	Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USG assistance - E.G.3.2-7	- Category of research - Phase of development - Corridor	25	4 under field testing	19 under field testing			76% 19 / 25	Y	562 under research 62 under field testing 3 made available for uptake / 200
11	Number of individuals participating in U.S.G food security programs – EG.3.2	- Sex - Age - Type of individual	400	1 0 F 1 M	353 192 F 144 M			89% 354 / 400 192 F 145 M	Y	1,076 / 900

\*Indicators that were dropped during FY2017 are omitted in this table.

## Indicator Performance Narratives

• Indicator No. 1 – Number of individuals who have received U.S. government-supported long-term agricultural sector productivity or food security training – USAID indicator: (RAA) – EG.3.2-2 (FTF 4.5.2.6)

This quarter, six students (four women and two men) remain enrolled in graduate programs. Three students successfully finished their program and graduated from UF in Quarter 1. The life-of-project (LOP) target of 25 is currently being met.

• Indicator No. 2 – Number of research and extension publications as a result of project assistance – *custom* USAID indicator for AREA project

AREA reported 26 publications during the most recent quarter (Table 3). These included two conference presentations and four journal articles submitted or published. One booklet on soil was distributed at the AREA Research Conference. AREA researchers also completed 19 fact sheets, many of which were adapted and translated to French or Creole from English-language publications in UF/IFAS's Electronic Data Information Source (EDIS). The fact sheets are available on the project's website.

No.	Program	Title of presentation/article	Status	Publication/event
Ι.	Climate Smart Solutions	Farmers trained in Participatory Integrated Climate Services for Agriculture (PICSA) report improved farming practices in Haiti.	Submitted	Journal of Rural Studies
2.	Climate Smart Solutions	Final presentation on results from PICSA and Focus Group Discussions	Presented	To 44 farmers in Kenscoff area
3.	Climate Smart Solutions	It takes a village: Developing Climate Services in Haiti's Agricultural Sector	Presented	International Conference on Climate Services
4.	Collaborative Maize Seed Systems	Cheni, Spodoptera Frugiperda (J.E. Smith) (Insecta: Lepidoptera: Noctuidae)	Published	AREA Website International Conference on Research and Innovation
5.	Collaborative Maize Seed Systems	Jesyon Raje Nan Jaden Mayi	Published	AREA Website International Conference on Research and Innovation
6.	Gender	Identifier Et Repondre Aux Besoins Des Publics Cibles De La Vulgarisation Agricole	Published	AREA Website International Conference on Research and Innovation
7.	Gender	Les Femmes Et L'argent: Enjeux Uniques	Published	AREA Website International Conference on Research and Innovation

Table 3. Research and extension publications reported in Q2

8.	Gender	Sélectionner Le Type D'expérience Éducatif Adapté À Votre Opération D'agrotourisme	Published	AREA Website International Conference on Research and Innovation
9.	MS Graduate	Community-driven metadata standards for agricultural microbiome research	Published	The American Phytopathological Society (APS) Publications
10.	Plant Pathology	Alternaria Nan Fèy Ak Gous Pwa An Ayiti	Published	AREA Website
11.	Plant Pathology	Antraknoz Sou Piman Dous	Published	AREA Website
12.	Plant Pathology	First Report of Plantain Soft Rot Caused by Klebsiella variicola in Haiti	Published	Phytopathology Preview
13.	Plant Pathology	Gestion Des Nematodes Dans Un Jardin Potager	Published	AREA Website
14.	Plant Pathology	Gid Pou W Kapab Idantifye Epi Kontwole Pwoblem Maladi Plant Yo : 4em Pati. Kesyon Pou Poze Kliyan Yo	Published	AREA Website
15.	Plant Pathology	Gid Pou W Kapab Idantifye Epi Kontwole Pwoblem Maladi Plant Yo : 3em Pati Kontwole Maladi Plant Yo	Published	AREA Website
١6.	Plant Pathology	K/R: Maladi Ren Kaze Lakay Bannann Ak Fig An Ayiti	Published	AREA Website
17.	Plant Pathology	Kijan Pou Nou Kontwole Mildyou Poud Blanch Nan Pwa An Ayit	Published	AREA Website
18.	Plant Pathology	Lasiodiplodia K Ap Lakoz Pouriti Berejèn An Ayit	Published	AREA Website
19.	Plant Pathology	Nematode Fouisseur, Radopholus Similis (Cobb 1893) Thorne (1949) (Nematoda: Secernentea: Tylenchida: Pratylenchidae: Pratylenchinae)	Published	AREA Website
20.	Plant Pathology	Network analysis of the papaya orchard virome from two agroecological regions of Chiapas Mexico	Published	mSystems
21.	Plant Pathology	Tach Bakteryen (Tach Nwa) Sou Tomat	Published	AREA Website
22.	Postharvest and Food Safety	Éléments De Base D'un Programme D'assainissement Pour La Transformation Et La Manutention Des Aliments	Published	AREA Website International Conference on Research and Innovation
23.	Soil Science Program	Analyse Du Sol	Published	AREA Website International Conference on Research and Innovation
24.	Soil Science Program	Les 4b De La Gestion De Fertilisation	Published	AREA Website

				International Conference on Research and Innovation
25.	Soil Science Program	Soil Booklet	Published	AREA Website International Conference on Research and Innovation
26.	Support to Higher Education	Utilisation De L'apprentissage Coopératif Dans L'éducation Formelle Et Non Formelle	Published	AREA Website International Conference on Research and Innovation

Additional publications AREA completed in Quarter 1 (Table 4) are noted here because they were not captured until now. These include the three master's theses written by AREA-supported graduate students who graduated last quarter. Publications from other AREA programs not previously reported are also noted.

AREA Program	Title of article	Status	Publication/event
Plant Pathology	Effective altruism as an ethical lens on research priorities	Published	The American Phytopathological Society (APS) Publications
MS Graduate	Screening Cowpea (Vigna unguiculata L.Walp) germplasm for root knot nematodes resistance (Meloidogyne sp.) and morphological, physiological, and agronomic Traits	Submitted	Master Thesis at UF
MS Graduate	Development of biotechnology tools to improve precision breeding in vanilla	Submitted	Master Thesis at UF
MS Graduate	Uncovering future aspirations of Haitian-American emerging adults	Submitted	Master Thesis at UF
MS Graduate	Genetic Variation among Cucurb Nutrition and Seed Size	itp. Base Acce	s <b>ମ୍ବରାନ୍ତ୍ରୀନ୍ତ୍ରାମ</b> ଞ୍ଚିଙ୍ଘିମିବାମ Sciences
Postharvest and Food Safety Technology	How to Start an Agribusiness: Introduction	Published	AREA Website

Table 4 Six additional	nublications	ARFA h	as added to	he noted	for OI	results
Table T. JIX addicional	publications		as added to	De noted		results

• Indicator No. 3 – Number of individuals who have received U.S. government-supported short-term agricultural sector productivity or food security training – *custom USAID indicator for AREA project* 

The AREA project trained 288 individuals during this three-month period. Of the 288, 125 were women. See Table 5. One of two students completed the online certificate program in December, and a correction is made in Q1 reporting. Please note that this indicator does not count nutrition-related activities.

• Indicator No. 4 - Number of trainings events delivered - custom USAID indicator for AREA project

AREA held nine training events in the latest quarter. Table 5 provides a list of these training activities.

Workshop/program	Location	Participant	% of Female Participants <sup>2</sup>	% of participants with increase in knowledge3
Phenotyping training	Petionville	17	29%	100%
Pesticide training	Kenscoff, Montrouis	73	59%	36%
Plant disease diagnostic	AUC, les Cayes	17	29%	100%
PICSA ToT – refresher	Petionville	4	50%	-
Nonprofit management	Kenscoff	46	48%	100%
Gender integration	Montrouis	10	50%	100%
PICSA ToT	Les Cayes	27	15%	100%
AREA research conference	Petionville	94	44%	-
Amaranth training	Montrouis	65	100%	71%
Total		353	54% (192 / 353)	74%

#### Table 5. Training events held during Q2

• Indicator No. 5 – Percentage of participants with an increase in knowledge related to research and extension – *custom USAID indicator for AREA project* 

Seventy-four percent of surveyed participants reported an increase in knowledge (see Table 8). This is below AREA's target of 85% and was primarily driven by low performance in the pesticide training. Based on an item-by-item analysis, and a conversation with the team, we determined multiple items in the test instrument were not clear and the allocated time to complete the tests was not sufficient. Both factors likely contributed to the low scores.

• Indicator No. 6 – Number of curriculum changes at partner educational institutions – *custom USAID indicator for AREA project* 

No curriculum changes were recorded this in Quarter 2.

<sup>2</sup> Participants may not fill in the gender question on sign-in forms, which could lead some under-representation of female participants.

<sup>&</sup>lt;sup>3</sup> Percentage is calculated based on the number of test respondents, which may differ from the number of total participants at the training.

• Indicator No. 7 – Number of new technologies or management practices introduced as a result of U.S. government assistance – *custom USAID indicator for AREA project* 

AREA introduced three technologies (Table 6). Two were presented at AREA trainings with various partners. The third technology, grain moisture meters, was awarded to a beneficiary of the Pilot Project program.

No.	Technology Name	Recipient	Purpose
I	Phenotyping meter	FAMV, AUC, UNEPH, UNIQ, CRDDs	Measure photosynthetic activities of maize plants.
2	Grain moisture meter	FAMV	Measure the moisture and temperature of different grains.
3	Amaranth leaves	CRDDM	An excellent source of Vitamin A, Vitamin C, Calcium, and Folate and a good source of Potassium, Amaranth leaves were shared with female farmers to learn how to create balanced meals for their households.

Table 6. Technologies introduced to various AREA partner institutions

• Indicator No. 8 – Number of grant-funded projects in Haiti as a result of project assistance – *custom* USAID indicator for AREA project

Once the documentation has been received and finalized, we will report the final beneficiaries of pilot projects in FY2020. The distribution of supplies previously awarded continued in Quarter 2.

• Indicator No. 9 – Number of technologies, practices and approaches under various phases of research, development, and uptake as a result of USG assistance – USAID Indicator: E.G.3.2-7

AREA was field testing 19 technologies and management practices (Phase II). See Table 7 for more details. Four AREA programs are finishing research projects. The Collaborative Capacity Building in Maize Seed Systems program conducted a training on phenotyping. The Soil Science Research, Legume Breeding program and Postharvest and Food Safety Technology programs are also implementing experiments.

Program	No.	Technology or improved practice	Phase	Objective
Soil Science Research	2	Fertilizers (muriate of potassium and triple superphosphate)	Phase II – Under field testing	This experiment aims to increase black bean yield in the FTFWC through better soil fertility and nutrient management.
Legume Breeding	4	PR 1423-153 PR 1423-117 PR 1423-110 PR 1423- 99	Phase II – Under field testing	Field evaluations seek to produce improved varieties with higher yield, and good resistance to diseases and abiotic stresses (mainly drought).

Table 7. Number of technologies or improved practices under field testing

Collaborative Capacity Building in Maize Seed Systems	4	CIMMYT MPI CIMMYT Hugo Plus ORE Hybrid HP2012 (local variety)	Phase II – Under field testing	In coordination with CIMMYT, on-farm demonstration plots are done in farmers' fields to evaluate best-performing maize genotypes
Postharvest and Food Safety Technology	9	Broccoli varieties: Royal Favor II EMBR 934 Kinsman EMBR 9212 EMBR 972 Royal Max Green Magic FI Marathon FI Imperial FI	Phase II – Under field testing	In partnership with a farmer organization, these trials evaluate the adaptability and postharvest quality of the broccoli varieties in the Kenscoff region

• Indicator No. 10 – Percentage of female participants in U.S. government–assisted programs designed to increase access to productive economic resources – USAID Indicator: GNDR-2

The proportion of female participants in project activities during the second quarter was 54% (See Table 8). Special efforts are made to maintain women's participation and reach the target of 50%. For example, participants at the nutrition training on amaranth leaves were all female.

rable of those of the finale participants by program type					
Program Type	QI	Q2			
Short-term trainings	0%	54%			
Degree-granting trainings	44%	67%			
Internship program	-	-			
Overall	40%	54%			

Table 8. Proportion of female participants by program type

• Indicator 11 - Number of individuals participating in U.S.G. food security programs – USAID Indicator: EG.3.2

Three hundred and fifty-three individuals participated in a U.S. Government food security program in Q2, nearly reaching the FY2020 target of 400. The audience mainly consists of producers (55%), the private sector (19%), the public sector (11%) and members from civil societies (5%). We expect to deliver three more trainings this fiscal year, one of which will target 100 students.