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Sustainability of Water Smart Agricultural Practices in Guatemala's Dry Corridor

Prepared for Catholic Relief Services
by the Keough School of Global Affairs Integration Lab
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Integration Lab

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Acronyms

BHA	Bureau for Humanitarian Assistance
CRS	Catholic Relief Services
CSA	Climate Smart Agriculture
COCODES	Consejo Comunitarios de Desarrollo (Community Development Council)
ECA	Escuela de Campo Agrícola (Farmer Field School)
FGD	Focus Group Discussion
GPE	Global Partner Experience
HHS	Household Survey
if-Lab	Integration Lab (University of Notre Dame)
IPM	Integrated Pest Management
KII	Key Informant Interview
LAC	Latin America and Caribbean
NGO	Non-Governmental Organization
Raíces	Restorative Agriculture in Communities for Economic Sustainability Program (CRS)
RENACER	Restoring Nutrition and Food Security in Communities of the East and North of Guatemala Program (CRS)
USAID	United States Agency for International Development
VSE	Visual Soil Evaluation
WSA	Water Smart Agriculture

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Preface

In 2020 and 2021, Catholic Relief Services (CRS) Guatemala respectively launched Restorative Agriculture in Communities for Economic Sustainability (Raíces) and RENACER: Restaurando la Nutricion y Alimentacion en Comunidades del Oriente y Norte de Guatemala (Restoring Nutrition and Food Security in Communities of the East and North of Guatemala) in the Dry Corridor of Guatemala. Raíces and RENACER were CRS's programmatic emergency responses to extreme weather conditions and food insecurity. These projects were unique because, whereas past CRS Guatemala emergency response projects had focused primarily on nutrition and food assistance, these prioritized building long-term livelihood resilience through agriculture.

One approach used farmer field schools, known as escuelas de campo agrícola (ECAs), to extend water smart agriculture (WSA) practices to smallholder farmers. The technical effectiveness of WSA practices is well documented; however, there is little insight on participant behavior, perspectives, and uptake in the short-run. Therefore, CRS Guatemala collaborated with a team of graduate students from the University of Notre Dame's Keough School of Global Affairs (henceforth referred to as "the research team") to conduct a mixed-methodological study in 2022.

The report is organized as follows: an overview of the study objectives is followed by an overview of key findings and an introduction of the research methodology, then possible barriers/drivers to uptake evidenced from individual and community perceptions, as well as perceptions of ECAs are presented, concluding with associated recommendations to improve future WSA programming, as well as considerations for future research. Instruments used for data collection, code books and protocols for data analysis, as well as supplemental data analyses are included as appendices.

The findings in this report are most relevant for those within CRS and Caritas Guatemala who were involved in the Raíces and RENACER programs or who hope to continue extending WSA practices in the region. The key insights provided here

may be used to improve the design and implementation of future WSA or ECA projects, especially within short-term emergency response windows. Though the context of this study makes it most applicable to future projects in the Guatemalan departments of Chiquimula and Baja Verapaz or other demographically or climatologically similar departments, the findings may also be of interest to CRS's WSA platform in Mesoamerica, which includes Honduras, El Salvador, and Nicaragua. This platform, along with other actors in the region, may find the knowledge useful when considering integrating WSA practices into short-term emergency response projects.

Finally, this report may also be useful to external funders of emergency response and/or WSA projects, including The United States Agency for International Development (USAID) and Bureau for Humanitarian Assistance (BHA). Funders may use the evidence herein to make decisions about future requests for proposals on this topic, especially for short-term emergency response projects.

About the Authors

This document was authored by a team of graduate students enrolled in the Integration Lab (i-Lab) in the Keough School of Global Affairs (KSGA) at the University of Notre Dame. This document assembles data, analyses, recommendations or guidance at the request of Catholic Relief Services (CRS). As the product of an academic experience, any opinions, findings, and conclusions or recommendations expressed herein are those of the student authors and do not necessarily reflect the views of the Keough School of Global Affairs, the University of Notre Dame or CRS.

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Catholic Relief Services

Founded in 1943, CRS assists impoverished and disadvantaged people overseas, working in the spirit of Catholic social teaching to promote the sacredness of human life and the dignity of the human person.

1.0 Executive Summary

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Smallholder farmers in Guatemala's Dry Corridor have experienced both slow-onset and abrupt climate shocks, leading to increased levels of poverty and food insecurity. CRS Guatemala's recent short-term emergency response programs, Raíces and RENACER, in the country's Dry Corridor thus provide a venue to investigate this potential. CRS knows these practices improve crop yields in conditions of water scarcity, but this study aims to understand the effectiveness of the programs from a social perspective.

In summer 2022, the research team from the University of Notre Dame (USA) partnered with CRS Guatemala to perform a mixed-methods study, exploring the following research questions: 1) Which WSA practices are farmers currently applying, which ones are most likely to be sustained after project completion, and why? 2) What are participants' perceptions of CRS's extension through ECAs? The five WSA practices in this study are permanent mulching, 4R responsible nutrients management, visual soil evaluation, integrated armyworm management, and integrated slug management.

A total of 507 household surveys (HHSs), 24 focus groups discussions (FGDs), and 10 key informant interviews (KIIs) were conducted over the summer to provide both individual and collectively negotiated insights. Some findings to be highlighted are that when participants retained knowledge of a practice, they applied it which supports the need for more programs similar to RENACER and Raices in the future. The data also revealed significant findings around the impact of land tenure and gender being a barrier to application of WSA practices. In relation to gender and correlated lower female literacy rates, the study revealed barriers to leadership opportunities in ECAs, as well as disproportionate strain on women participants.

Based on these findings, the research team provides considerations for further investigation, as well as recommendations to improve WSA program implementation. Main areas for further study include (1) departmental differences as drivers/barriers to the practices; (2) other variables that could impact knowledge retention, application and adoption like livelihood and perceived vulnerability; (3) the impact of land tenure to application; (4) and the role of gender in knowledge retention.

With the ECA promoters being pivotal to this type of extension model, the recommendations specifically focus on this role. The research team recommends the following: (1) define the promoter role and responsibilities; (2) create a leadership development pipeline; (3) ensure equitable leadership opportunities; (4) provide community appropriate incentives; (5) develop training resources (especially physical materials) in both Spanish and local languages.

2.0 Overview

2.0 Overview

Motivation

Partly due to the high concentration of the world's poor with agricultural livelihoods, agriculture is 3.2 times more effective than other sectors in reducing the number of citizens in low-income and resource rich countries who live below one dollar a day (Christiaensen et al., 2011). Unfortunately, agricultural livelihoods are under threat from climate change, with the current and projected effects of climate change on crop yields most pronounced in the poorest, hottest regions of the world, where it is estimated to reduce yields by approximately 17% by 2080 (Hallegatte et al., 2016).

"in the poorest, hottest regions of the world...[climate change] is estimated to reduce yields by approximately 17% by 2080."

(HALLEGATTE ET AL., 2016)

The most devastating effects of climate change on agriculture are abrupt shocks, which include time-limited events such as hurricanes/cyclones, droughts, floods, and landslides. Incidences of some of these extreme events have increased since 1950 and are predicted by the Intergovernmental Panel on Climate Change to continue to increase in the 21st century (Banholzer et al., 2014). The recovery periods following such shocks represent periods of intense rebuilding and reinvestment and are a chance for organizations to employ interventions that could strategically address both short-term needs and long-term resilience.

This study explores CRS's use of water-smart agriculture (WSA) extension methods in such periods of recovery. WSA is a set of water use practices inspired by climate smart agriculture (CSA). The concept was introduced to encourage the adoption of improved crop, soil, and water practices by smallholder farmers in order to mitigate the agricultural losses associated with irregular rainfall (II CA, 2020).

There are several identified barriers to the uptake and long-term adoption of CSA and WSA techniques in various contexts across the globe (McCarthy et al., 2011). Even when WSA techniques are adopted by beneficiaries, their impact on the most vulnerable subpopulations of smallholder farmers–such as those with small amounts of land, female-headed households, and Indigenous communities–may be limited.

Context

For 75 years, CRS has focused on creating programs to alleviate poverty and improve living standards for those in need (CRS, 2021a). CRS's transformative and sustainable change is rooted in walking in solidarity with local partners to promote long-term impact. In 2020, CRS implemented 157 agriculture and livelihood projects globally (CRS, 2021b), which seek to build resilience, provide financial education, and promote regenerative farming practices.

In the last two years, the communities located around the Dry Corridor of Central America have been affected by hurricanes, floods, and droughts, which have exacerbated food insecurity and pre-existing economic challenges (FEWS NET, 2020). Additionally, years of soil degradation have worsened conditions and left crops in the region extremely vulnerable to drought and excessive rains, leaving families susceptible to hunger and malnutrition (WFP, 2022). In response, CRS has been working with local partners in many impacted Central American countries. For example, CRS implemented the RENACER and Raíces programs with the financial support of the United States Agency for International Development (USAID) through the Bureau of Humanitarian Assistance (BHA) and implementation support from Caritas Zacapa (Diocese of Zacapa and Chiquimula) in Chiquimula and Caritas Verapaz in Baja Verapaz. WSA interventions were incorporated into these projects to strengthen farmers' and communities' capacities to mitigate risks associated with drought and erratic rainfall (CRS-USCCB, 2021).

CRS has found that while the average farmer in the Dry Corridor has been losing between 60-80% of their staple crops in the recent recurrent droughts, farmers with demonstrated WSA

plots lost less than 40% of their crops, with 70% more yields than control plots and double the national average yield. Despite these impressive results, two main knowledge gaps remain. First, the factors that convince smallholder farmers to apply and maintain these practices are not well understood. Second, the fact that many farmers participating in ECAs (*escuelas de campo agrícola*, or farmer field schools) do not apply WSA practices requires further investigation.

The ECAs CRS used to extend these practices are not simply classes, but rather community organizations. Those participating in the ECA elect a leader to the role of "promoter." Promoters in a given region typically meet monthly in a regional hub to participate in training facilitated by CRS and Caritas agricultural extensionists or technicians. Promoters then return to their communities with training materials and facilitate hands-on training with ECA participants. Promoters remain in contact with CRS and Caritas extensionists, reporting information such as training attendance and field observations.

Study Objectives

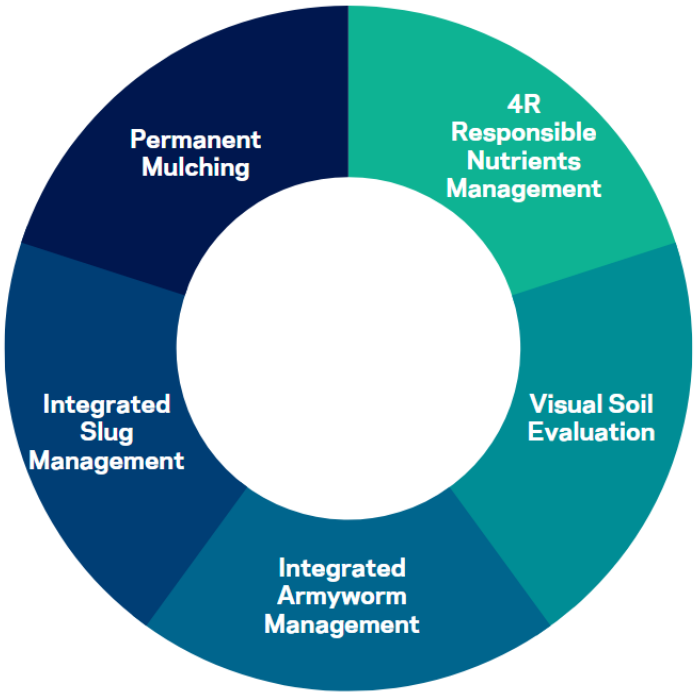
In partnership with CRS Guatemala, the research team conducted a mixed-methods study in two departments of Guatemala's Dry Corridor during the summer of 2022. The study was centered on the voices of smallholder farmers and communities and was intended to address the aforementioned knowledge gaps: though CRS Guatemala has evidence of WSA practices' impacts on yield, they lack knowledge on the barriers and drivers of uptake by program participants.

The research design sought to answer the following questions:

Research Question 1	Which WSA practices are farmers currently applying, which ones are most likely to be sustained after project completion, and why?
Research Question 2	What are participants' perceptions of CRS's extension through ECAs?

In selecting water smart agriculture (WSA) practices to include in ECAs, CRS Guatemala considered participant input, local context, and ability to implement in a short-term project. The following five practices were further selected by CRS for this study, because they were consistently taught across study zone communities:

Five WSA Practices Included in this Study



1. ***Permanent Mulching***: Farmers leave crop residue on their fields, plant nitrogen-rich cover crops, and plant trees amongst their crops.
2. ***4R Responsible Nutrients Management***: Farmers use the right source, right rate, right time, and right place (4Rs) when applying fertilizers.
3. ***Visual Soil Evaluation***: Farmers conduct a soil test to determine the health of their plot.
4. ***Integrated Armyworm Management***: Farmers manage weeds, utilize and monitor traps, and apply insecticides only as a last resort.
5. ***Integrated Slug Management***: Farmers monitor their plots and manually kill slugs early in the season, utilize and monitor traps, and only apply insecticides as a last resort.

3.0 At a Glance: Key Findings

- Almost all HHS respondents who demonstrated knowledge of a practice also applied it.
- Permanent mulching and 4R responsible nutrients management were the best-received practices, and Baja Verapaz had better overall HHS results than Chiquimula.
- Though the variables hypothesized to have the strongest effect on knowledge did show up in the regression analysis, other variables may be more significant.
- Land tenure is an important application barrier for the permanent mulching and visual soil evaluation practices.
- Gender is an important knowledge barrier, especially for permanent mulching and both IPM practices.

AT A GLANCE: KEY FINDINGS & INSIGHTS

- There is a difference in household bargaining power and cultural roles between men and women.
- There is a lack of confidence when integrating information taught in Spanish, versus the local language (such as Achi in Baja Verapaz).
- The lack of confidence with Spanish paired with lower female literacy rates affects women's abilities to take-on leadership roles like being a promoter.
- The promoter role requires a significant amount of resources, which may disproportionately strain women.
- There is a lack of transparency upfront on the roles/responsibilities of promoters, as well as a lack of agency in opting in or out of the promoter role once chosen.

4.0 Research Methodology

4.0 Research Methodology

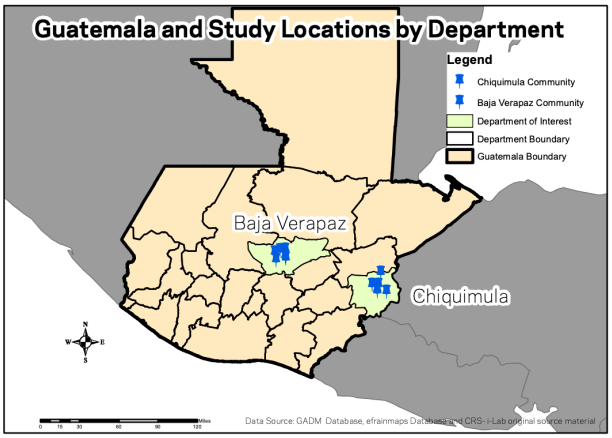
The following section details the use of Household Surveys (HHSs), Focus Group Discussions (FGDs), and Key Informant Interviews (KIIs) to explore the study's research questions in 12 communities, divided equally across the departments of Chiquimula and Baja Verapaz in Guatemala's Dry Corridor region. All study participants consented to participate in activities via an oral consent process with the understanding that they could choose to withdraw from the study at any time. No monetary compensation was given for participation.

Study Zone

The Chiquimula Department is located on the southeastern edge of Guatemala, along the Honduras border. Community selection and data collection were influenced by safety concerns. The Baja Verapaz department is located northeast of Guatemala City, near the center of the country. The communities in this department are home to a large population of Achi people, one of the major Indigenous groups in Guatemala. Also to note, there was a higher concentration of female participants in Raíces and RENACER compared to Chiquimula.

Based on guidance from the CRS Guatemala and local Caritas teams, the research team identified 12 ECA participant communities that would be analyzed in the study. Community selection was informed by existing data on:

1) gender breakdown of ECA participants,
2) size of plots cultivated by farmers, and
3) initiation date of ECAs.



The selected communities underwent several iterations of review from Caritas and CRS Guatemala staff to ensure they equally represented participants of the Raíces and RENACER programs. Community selection was thus not randomized and also sought gender balance by selecting sites with no fewer than four male participants in each community. Figure 1 below shows the 12 communities visited across Chiquimula and Baja Verapaz departments (see Appendix G for enlargement). Only those who were previous or current participants in CRS's RENACER or Raíces projects completed HHSs; a subset of these then opted into follow-up FGDs.

CHIQUIMULA	BAJA VERAPAZ
Quequezque	Rincon De Jesus
El Guayabo	San Francisco
Tunuco Abajo	Las Minas
Buena Vista	Dolores
El Volcán	Nimacabaj
La Cumbre	Xesiguan

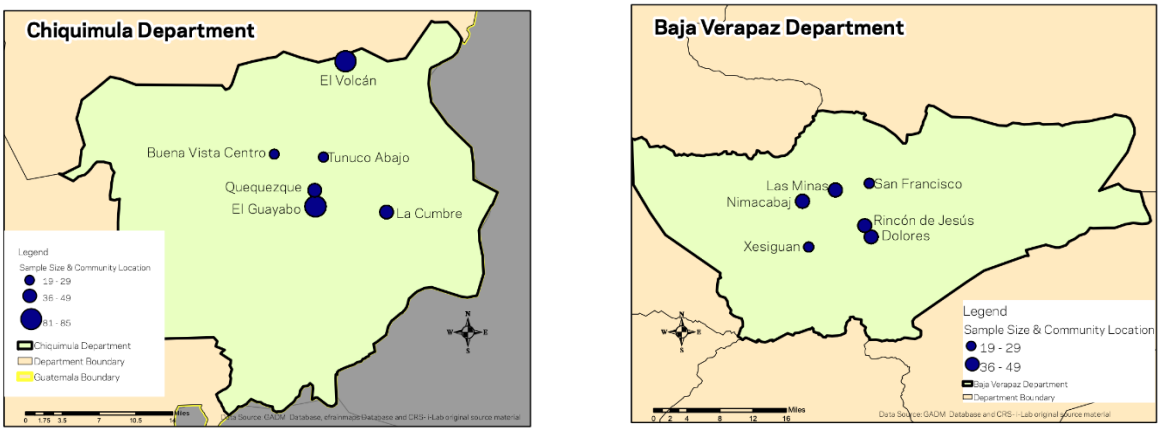


Figure 1: *List of 12 communities in this study, 6 in each department in Guatemala.*

Data Collection Overview

The Research Team

The research team worked with five local enumerators in the Chiquimula department, and six local enumerators plus two moderators in Baja Verapaz (moderators were hired in this region due to the need for both Spanish and Achi language skills). Enumerators conducted the HHSs, while moderators conducted the FGDs. The research team, which is fluent in Spanish, served as moderators in Chiquimula, while the pair of contracted moderators were used in Baja Verapaz. The research team also conducted all KIIs.

Training

With the support of CRS and local partners, the research team facilitated three two-day training workshops on June 6-7, 2022 for the Chiquimula enumerators and June 10-11 for the Baja Verapaz enumerators and facilitators. The training workshops ensured that enumerators were ready to launch and execute the data collection independent of the research team. Training programs included a field pilot of the HHS for cognitive testing.

Timeline

The data collection model in both departments involved administering HHSs prior to FGDs, in order to use HHSs opt-ins to select FGD participants. This created a waterfall schedule. The research team (and any contracted moderators) then visited each of the 12 communities a few days after the HHS had been conducted there by the enumerators. Figure 2 provides a summary of the exact dates of activities in each department.

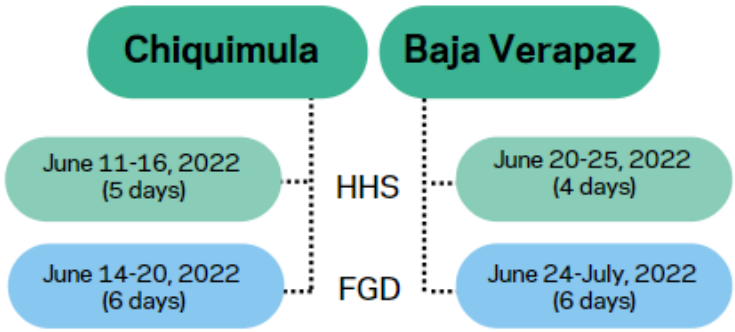


Figure 2: *Outline of data collection timeline for both departments for HHSs and FGDs.*

Data Collection

Household Survey (HHSs)

The household survey (HHS) included a total of 39 closed-form questions encoded into a Fulcrum mobile application on enumerator smartphones (see Appendix A) revealing individually-reported barriers and drivers. Conditional logic was used to serve up a series of follow up questions for each WSA practice that was being applied, in order to document intentions to sustain that practice and drivers of that decision. Being a participant in the RENACER or Raíces programs was a prerequisite for being included in this study. The target number of HHS participants was chosen based upon a percentage of the total number of RENACER/Raíces ECA participants in that community (see Appendix B). To ensure the target sample size was reached, additional participants were invited beyond the target percentage for some communities. When the community's total number of participants was small, all RENACER/Raíces participants in that community were invited. Additionally, the total numbers of male participants were small due to the nature of the program; in such cases, all male

participants were invited to participate. With coordination between Caritas ECA program managers and promoters in both departments, selected ECA participants were invited to participate in the HHS. Figure 3 reports the total number of HHSs in each department, for a total of 507 HHSs for the study.

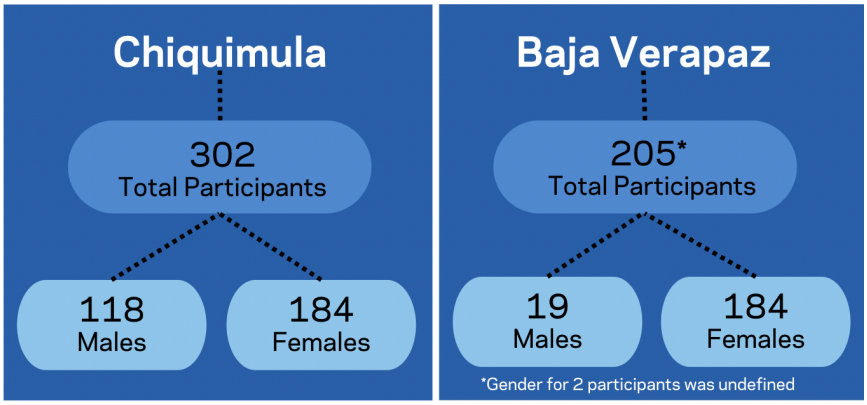


Figure 3: *Household survey breakdown by department and gender.*

Focus Group Discussions (FGDs)

The research team conducted two FGDs, one for women and one for men, in each of the 12 communities where the HHS was administered, engaging a total of 148 participants. The breakdown by gender was 53 male participants and 95 female participants. The 60-minute FGDs were facilitated in person at a central community location identified by the ECA promoter and Caritas staff. Participants opted into the FGD during their HHS. If the number of opt-ins exceeded eight, participants were selected using a **vulnerability index ratio** (VIR) calculated by dividing the land size cultivated by the number of household members, as self-reported in the HHS. The opt-ins with the min, max, and median VIRs were selected to participate in the FGD. The remaining quota was filled utilizing a random name generator until at minimum of four and maximum of eight participants were selected. See full protocol in Appendix C.

These FGDs were formatted as a semi-structured guided discussion of WSA practices, including (i) workshop curriculum, (ii) barriers, drivers, utilization, and relationship with current extension methods, and (iii) establishment of the ECA.

Key Informant Interviews (KIIs)

Based on early insights during FGDs on the role of promoters and Caritas technicians in effective extension, development of ECAs, and beneficiary participation, promoters and Caritas Technicians were prioritized for KIIs. This resulted in the research team conducting ten semi-structured conversations with a total of 10 key informants either in-person during community visits or virtually over Zoom or WhatsApp, depending on the interviewee's preference and internet connectivity.

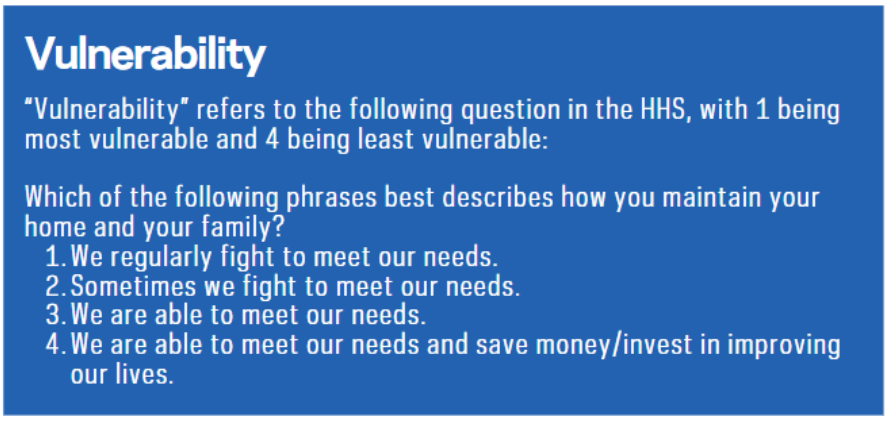
Data Analysis

Household Survey (HHS)

All identifiable information from HHS respondents opting into the FGD activity was stripped by a third party before transfer to the research team for analysis. The anonymous HHS database was cleaned and processed for completeness. The data was partitioned by department and community. Descriptive statistics were then generated for topics related to each WSA practice, such as knowledge, application, intention to continue applying, and perceptions, as well as underlying factors/rationale.

Using Stata, the research team executed simple and multivariate logistic regressions to distill potential associations between various factors and the knowledge of the five WSA practices included in this study. Logistic regressions, as opposed to linear regressions, were run because the dependent variable was binary (respondent did or did not demonstrate knowledge of the practice). Details of the logistic regressions are as follows:

- *Dependent Variable:* (knowledge$Y$) Demonstrated **knowledge** retention of each practice was treated as the dependent or output variable of these regression models.
- *Independent variables:* Two variables were treated as independent or explanatory variables "land amount/household size ratio" and "gender." These variables were selected based on CRS hypotheses that these factors have the largest effect on knowledge outcomes.
    - **Land amount/household size ratio** (landamt/HHsizeX_1): This variable is adopted as a proxy for vulnerability, as land is perhaps the most important asset of smallholder farmers and, for those who consume their own production, yields must be divided amongst household members. The relationship between land amount/household size and knowledge retention is hypothesized to be positive (the more land owned per household member, the more likely an individual is to remember the practices).
    - **Gender** (genderX_2): Being female is hypothesized to have a negative relationship with knowledge retention. Reasons include: (i) the fact that it is usually men who work in the fields and would therefore apply the practices; (ii) women in Baja Verapaz tend to speak less Spanish than men; and (iii) women in both departments tend to complete less formal schooling. Less tangible factors are also at play, like confidence and role expectations.
- *Universal Control Variables:* The following key demographic variables were used as controls:
    - **Education level** (educationX_3): Collected responses were coded from 0-5, where 0 = I never attended any form of school and 5 = I completed middle education.
    - **Vulnerability** (vulnerabilityX_4) is explained in the call out box below. As this question asked respondents to self-select their vulnerability level, it cannot be taken as an objective measure of vulnerability but rather the respondent's perceived vulnerability.
    - **Number of years farming** (years_farmingX_5): Respondents provided a numeric value (minimum of 1 and maximum of 75).
    - **Livelihoods** (livelihood_3X_6, livelihood_4X_7, livelihood_6X_8): Three livelihood sources were respectively included in the model: (i) working for the farm or business of someone outside the community, (ii) working for the farm or business of a community member, and (iii) living off of one's own production.



- *Additional Control Variables:* Additional controls were included for the two integrated pest management practices. These controls were added because demonstration of knowledge of the integrated armyworm management and integrated slug management practices could be mainly explained by the presence of the pest farmers are meant to manage, as well as planting the crops affected by these pests. Therefore, the control variables aimed to provide robustness to the estimations of the independent variables. These controls do not apply to the other three practices, as they do not address specific pests.
    - For integrated armyworm management: **being affected by the armyworm pest**, **planting corn in the last "primera" season**, and **planting corn in the current season**.
    - For integrated slug management: **being affected by the slug pest**, **planting beans in the last "segunda" season**, and **planting beans in the current season** were treated as controls.

For each WSA practice, a first round of simple logistic regressions was run between knowledge and each of the independent and control variables individually, then a multivariate regression was run including all variables. The analyses were conducted on subpopulations constructed based on department, as a sufficient sample size could not be assured in each community. See Appendix E for the complete regression output tables with total number of observations, coefficients, and statistical significance levels, holding other variables constant in each model. Barriers and drivers are identified as those passing the minimum thresholds for significance (see call out box). Summary statistics for the included variables are reported in Appendix H.

CAVEAT

Human behavior is complex and influenced by a myriad of unknown variables, which leads to small regression coefficients. For this reason, a coefficient should be considered "significant" when it passes a 95% statistical significance test and "substantive" when its coefficient is large relative to other coefficients in the model. All coefficients mentioned in this report pass a 95% statistical significance test.

Focus Group Discussions (FGDs) & Key Informant Interviews (KIIs)

The research team leveraged FGDs and KIIs conducted in the field to identify individually reported and collectively negotiated perceptions of CRS WSA practices and extension methods, as well as potential barriers and drivers that would potentially predict optimal WSA practices for given community characteristics. The data analysis process was designed to identify community-preference pathways for continued use of WSA practices and replication of CRS interventions in the future.

Recordings for all 24 FGDs and 4 selected KIIs were transcribed verbatim by a local transcription service and entered into Quirkos, a qualitative data analysis platform. A set of codes was developed by the research team and verified by CRS Guatemala to capture common themes in these semi-structured conversations. The themes are organized under five categories: ECAs, culture, transfer of knowledge, stakeholders, and WSA practices (see Appendix D for complete code book).

Code counts for each theme were initially processed individually and then processed to identify the number of co-occurrences between coded drivers/barriers and specific practices. Co-occurrences between the practices and hypothesized drivers and barriers ranged from zero hits (or number of occurrences) to 47 hits across the studied practices. Due to the subjectivity of coding qualitative data, hits are interpreted in a relative sense rather than ranking them based on direct counts. Three tiers were created to stratify the counts by calculating the number of hits to a specific practice driver/barrier relative to the total driver and barrier counts. The highest percentage calculated was ~23%. Thus, Tier one is <5%, Tier two is between 5-15%, and Tier three is >15%. Only those practices with barriers and drivers at Tier 2 or 3 (see Figure 4) are reported as barriers or drivers in Section 5.

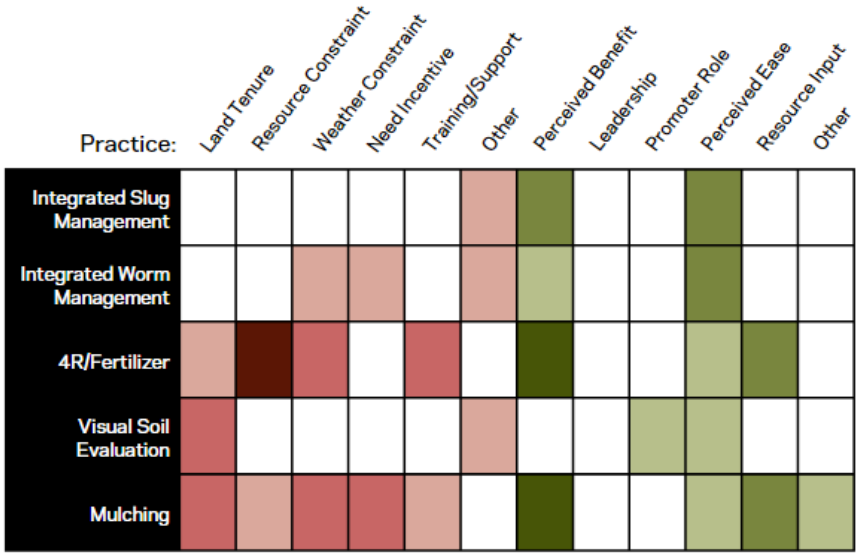


Figure 4: *Drivers and Barriers Practice Matrix (barriers shown in shades of red and drivers in shades of green for Tier 1 (lightest) to Tier 3 (darkest); white squares indicate this combination was not discussed by respondents.*

Limitations

Generalizability

Not only do the departments in this study have climates, geography, cultures, and demographics distinct from other departments in Guatemala, but also the six communities selected in each department have features that are distinct from other communities in the same department. Therefore, though the findings herein may be useful and informative to practitioners in all of Guatemala, and perhaps even in Central America and beyond, they should not be generalized to broader farming populations within or outside of Guatemala. Care should also be taken when generalizing the findings to the total population of Chiquimula and Baja Verapaz.

Timing and Location of Research

Participants' perceptions of WSA practices and ECAs were clearly impacted by the severe drought that took place during the previous growing season. Farmers reported little to no harvest, and when asked whether using WSA practices made a difference, they often gave responses such as: "Nothing can help when there's no rain." The timing of the study also impacted the availability of participants for HHSs and FGDs. Though it was not the busiest time of the season, as most farmers had finished planting, it was still a work-intensive season for weeding, fertilizing, and other field activities. This especially affected the number of men who were able to participate in the study. For women, time was also critical. Women are in charge of providing food to their husbands and hiring laborers. During the FGDs, some women discussed the tradeoff between coming to the discussions and having time to cook.

Further, HHS and FGDs were administered at a central location in the community, due to the distance between individual households, biasing the sample toward those who were willing and able to travel to this location without direct compensation. Community spaces are also less private, which may have affected participants' comfort level and candor, particularly for the HHS.

Self-Reported Data

The research team was unable to independently verify any of the data collected in HHSs, FGDs, or KIIs, e.g., by visiting farm parcels or observing farming practices. Participants' responses may be subject to biases such as attribution, exaggeration, telescoping, and selective memory.

Risk of Response Bias

Given study participants' existing relationships with CRS and/or Caritas, through program participation in Raíces or RENACER, respondents may cautiously or opportunistically respond to questions. HHS questions and FGD topics on land issues (amount, tenure), remittances, and livelihoods were susceptible to such biases, as these parameters have been used in the past to determine project eligibility. There was also likely bias when participants responded to questions about WSA practice application, intention to continue applying, and reasons for applying/continuing, as respondents might have felt the need to shed a positive light on the program in question, to encourage future programming.

Language

In Baja Verapaz, we attempted to reach a consensus in each community on whether to facilitate the FGD in Achi or Spanish, but language barriers were certainly still experienced by some participants. Even in Chiquimula, where the vast majority of participants spoke Spanish, regional differences in the Spanish language may have created barriers.

Additionally, the research team utilized Google Translate to translate FGD and KII transcripts to English for coding, which may have led to some loss of context and nuance. To mitigate this, the research team kept the original Spanish transcripts to reference when directly quoting.

Utilization of Different Coders

Two members of the research team coded FGDs, which may have resulted in some inconsistency. To mitigate these concerns, the two individuals reviewed the codebook and jointly reviewed one FGD together to calibrate their processes. The coders consistently collaborated throughout the coding time frame. Coupling this with the relative (tiered) evaluation of hits helped to mitigate some of the inherent subjectivity of qualitative data analysis.

5.0 Key Findings & Insights

5.0 Key Findings & Insights

This section includes the key findings and insights from this study, as well as recommendations for areas of further research and programmatic/implementation improvements. When there are differences between departments of Chiquimula and Baja Verapaz, it will be explicitly stated.

Descriptive Statistics

Knowledge of Practices

Permanent Mulching showed the strongest knowledge retention across Departments, though overall knowledge retention was stronger in Baja Verapaz.

- Knowledge retention was higher for a larger range of WSA practices in Baja Verapaz (see Figures 5 and 6).
- In Chiquimula, **permanent mulching practice** was best retained (86% of participants).
- Within Baja Verapaz, **responsible nutrients management** and **permanent mulching** both recorded high knowledge retention (97% and 96% of participants, respectively).

Evidence of Application

Visual soil evaluation and permanent mulching practices had the highest application rates in both departments.

- In Chiquimula (see Figure 7), **visual soil evaluation** had the highest rate of first-time use (39%), while **permanent mulching** had the highest rate of past use (87%).
- In Baja Verapaz (see Figure 8), **visual soil evaluation** and **permanent mulching** had the highest rates of first-time use (46% and 45%, respectively), while integrated pest management (**IPM) - Armyworm practice** had the highest rate of past use (76%).

Intended Continued Use

Permanent mulching has the strongest rates of intended continued use in both departments, although all practices in the Baja Verapaz were reported with high intended continued use.

- The intention to continue use of practices was reported as high in both departments, though intentions may reflect desire for continued support from Caritas/CRS (see Figures 9 and 10).
- In Chiquimula, **Permanent Mulching** and **IPM - Slug** practices reported the highest intended continued use (92% and 91%, respectively).
- In Baja Verapaz, **all practices** reported over 90% intended continued use.

Descriptive Statistics on Knowledge, Application, and Intention to Use Practices

**Note: The Baja Verapaz department did not need IPM - Slug practice as slugs were not a problem in this area.*

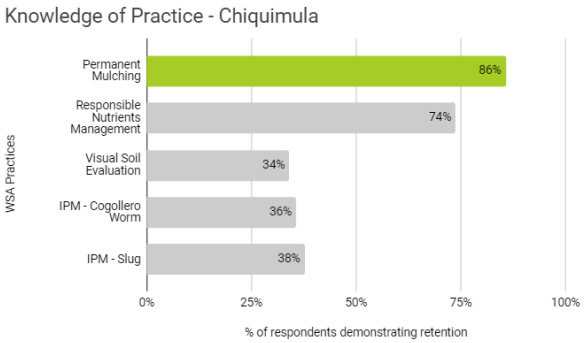


Figure 5: *% of respondents displaying knowledge retention on each practice in Chiquimula.*

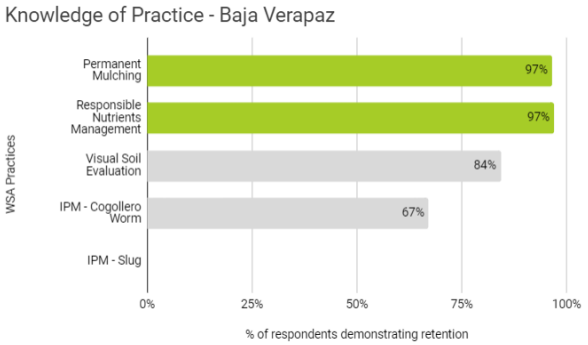


Figure 6: *% of respondents displaying knowledge retention on each practice in Baja Verapaz.*

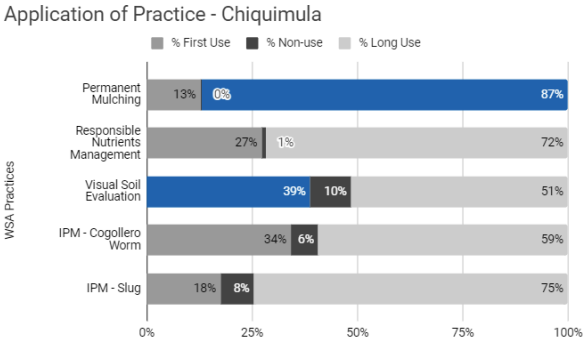


Figure 7*: % of respondents in Chiquimula who applied each practice after attending an ECA workshop either: 1) for the first time, 2) did not use it at all, or 3) had already been using the practice.*

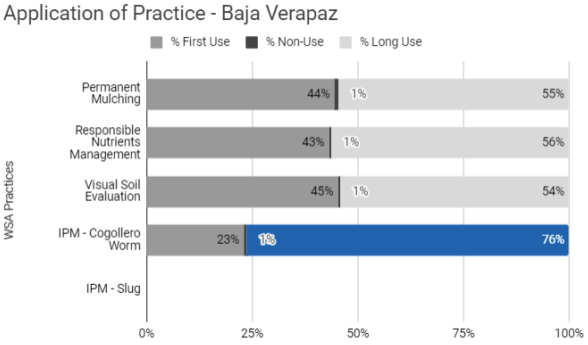


Figure 8: *% of respondents in Baja Verapaz who applied each practice after attending an ECA workshop either: 1) for the first time, 2) did not use it at all, or 3) had already been using the practice.*

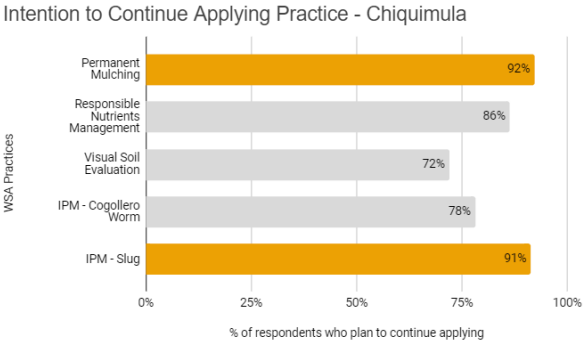


Figure 9: *% breakdown of respondents in Chiquimula who intend to continue to use each WSA practice.*

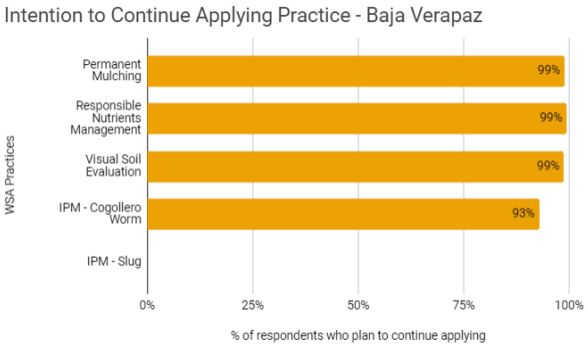


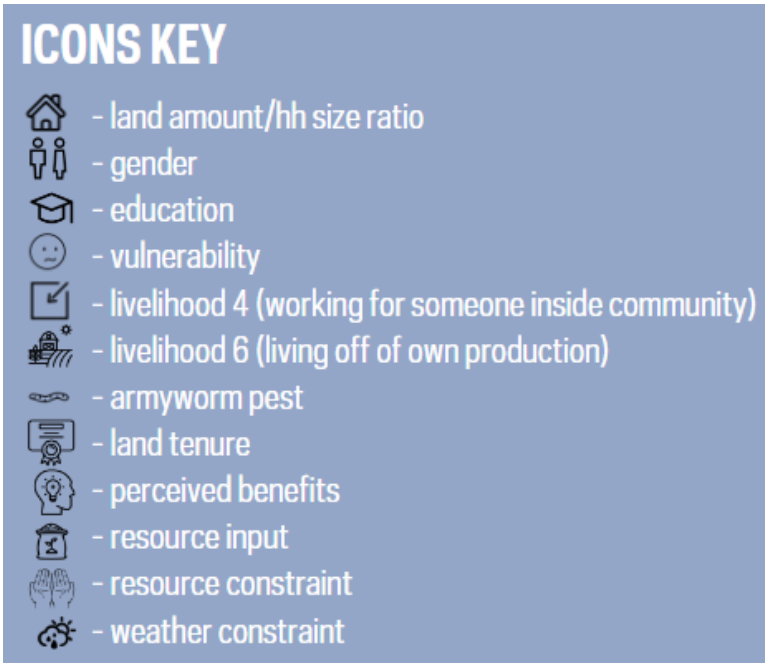
Figure 10: *% breakdown of respondents in Baja Verapaz who intend to continue to use each WSA practice.*

Drivers/Barriers of Five Practices

The following pages are summary cards for each WSA practice that present; both individually reported (based on HHS) and collectively negotiated (based on FGD) drivers and barriers of WSA knowledge; as well as, drivers and barriers of application collectively negotiated (based on FGD), by department. Since **almost all HHS respondents who demonstrated knowledge also applied the practice** (see Figures 5 - 8), only knowledge (not application) barriers and drivers identified in the regression analysis are presented. The asterisks found next to the driver/barrier icons denote the statistical significance of the variable (** for 95% significance; *** for 99% significance). Asterisks colored in red represent variables with a substantive effect. Refer to the regression output tables in Appendix E for details.

Each summary card includes commentary on a few key selected drivers and barriers. These drivers/barriers were so selected for one or both of the following reasons:

1) The evidence was significant, meaning the regression coefficient was substantive and/or it was mentioned frequently in FGDs.
2) The research team felt qualified to comment on the driver/barrier and its implications for CRS's future program implementation. CRS should consider the drivers and barriers without commentary, as some of them may be equally important.



PERMANENT MULCHING

HHS Knowledge

Chiquimula

Drivers

- livelihood 6 (living off of own production) **
- livelihood 4 (working for community member) **

Barriers

- gender **

Baja Verapaz

Drivers

NONE IDENTIFIED

Barriers

NONE IDENTIFIED

FGD Application

Both Departments

Drivers

- perceived benefits
- resource input

Barriers

- land tenure
- weather constraint
- resource constraints

86% in Chiquimula & 97% in Baja Verapaz demonstrated knowledge

In Chiquimula **58%**

In Baja Verapaz **22%**

...say that all of the land they cultivate is rented.

Livelihood Contradictions?

Both "working for the farm or business of a community member" and "living off of own production" emerged as drivers of this practice in the regression analysis of the HHS. It may appear contradictory that these two distinct livelihoods would both be drivers. However, 36% of participants responded that they engage in both of these livelihoods.

Land Tenure & Intertemporal Choice

In FGDs, land tenure emerged as a key barrier to the permanent mulching practice. Participants shared that landowners may let their livestock eat the remnants of past crops, counteracting the benefits of the mulch. This barrier is especially significant given the percentage of HHS participants, over half in Chiquimula, who said all of the land they cultivate is rented. Another interesting finding was the role of intertemporal choice. For example, participants understood the benefits of using canavalia as a cover-crop; however, canavalia is not edible. Therefore, there is a choice between soil health and economic benefit, or food for their family.

ECAS OR FAMILY CUSTOM?

As demonstrated in Figures 5 and 6, 87% of respondents in Chiquimula and 55% in Baja Verapaz said they are using the practice and have done so for multiple seasons. Though some respondents indicated in the HHS that they had learned this practice through family custom, 75% in Chiquimula and 81% in Baja Verapaz of individuals who had used the practice for multiple seasons reported having learned it at an ECA or from someone who attended an ECA. These results suggest that, although the permanent mulching practice is a tradition in some families, CRS's ECAs have been key to its sustained use.

4R RESPONSIBLE NUTRIENTS MANAGEMENT

HHS Knowledge

Chiquimula

Drivers

- land amount/hh size ratio **
- vulnerability ***
- livelihood 4 (working for community member) **

Barriers

- livelihood 6 (living off of own production) **

Baja Verapaz

Drivers

- livelihood 6 (living off of own production) **

Barriers

NONE IDENTIFIED

FGD Application

Both Departments

Drivers

- resource input
- perceived benefits

Barriers

- resource constraints
- weather constraints
- education

74% in Chiquimula & 97% in Baja Verapaz demonstrated knowledge

"When the rainy season is beautiful like it is[now]..all the practices work...but with a dry spell nothing, not even the best fertilizer, works...last year, the fertilizer [Caritas] gifted us, I applied a part of it...and from there, well, the dry season was too intense. I didn't see a result. But what I think is that it wasn't the fertilizer, it was the dry season, because a spot here...I applied the same fertilizer, and...it did work."

Male ECA Participant; Quequezque, Chiquimula

Vulnerability & Inputs

The finding that those who were more vulnerable were more likely to know this practice in Chiquimula could be partially explained by the FGD finding that the distribution of fertilizer through RENACER and Raíces was a driver to utilization of the 4R practice. However, across both departments, only 5% of HHS respondents said that resource inputs convinced them to try the practice, with most (51%) responding that the ECA, technician, or promoter convinced them (Appendix F). This contradiction could be due to response bias, as respondents may have felt different pressures during HHSs and FGDs.

Resource Constraints

FGD participants cited resource constraints as a major barrier to the utilization of the 4R practice. Participants framed resource constraints in two ways: (1) economic constraints and (2) time constraints. The majority of FGD participants noted that they would not have the financial ability to continue this practice without receiving the fertilizer. Time constraints kept participants from following the recommendation to bury fertilizer–this felt as if they were "double planting". Additionally, respondents were skeptical about the effectiveness of the 4R practice in long periods of unfavorable weather conditions.

VULNERABILTY MATTERS MORE FOR 4R RESPONSIBLE NUTRIENTS MANAGEMENT

Of the four levels of vulnerability in the HHS, in Chiquimula 85% of those who identified as most vulnerable demonstrated knowledge of this practice, whereas only 18% of those in other vulnerability levels demonstrated knowledge. In Baja Verapaz, though knowledge was consistent across vulnerability levels, 61% of those who identified in the two most vulnerable levels had applied the 4R practice for multiple seasons, whereas only 47% of those in the two least vulnerable levels had done so. This difference by vulnerability level was not seen for the permanent mulching practice.

VISUAL SOIL EVALUATION (VSE)

HHS Knowledge

Chiquimula

Drivers

livelihood 6 (living off of own production)

Barriers

NONE IDENTIFIED

Baja Verapaz

Drivers

NONE IDENTIFIED

Barriers

vulnerability

FGD Application

Both Departments

Drivers

NONE IDENTIFIED

Barriers

land tenure

34% in Chiquimula & 84% in Baja Verapaz demonstrated knowledge

"Because before, we didn't receive talks, so we didn't properly work the land and the crops. It is an asset for us, because previously, we only bought corn [from stores] instead of growing the crops. Because before, we did not know about the talks, and the harvests were not good."

Female ECA Participant; Dolores, Chiquimula

Living Off of One's Own Production

Especially in Chiquimula, rates of knowledge retention for this practice are relatively low. Additionally, the percentage of those who have not tried the VSE practice in Chiquimula is relatively high, at 8% (see Figures 5). In order to understand why there was less uptake of this practice, the research team recommends that CRS investigate its relationship to livelihood. If those who live off of their own production are more likely to own land (further investigation would be required to establish this), the finding that this livelihood is a driver of knowledge retention complements the FGD findings on land tenure, discussed below.

Land Tenure

The main barrier to this practice discussed in FGDs across both departments was land tenure. Community members spoke about how landowners did not want holes dug up around their property. In addition, they mentioned that there is little incentive to invest in the plot when one rents different land each season.

LIVING OFF OF OWN PRODUCTION

FGD participants across departments shared the importance of WSA training. This was the first time accessing this knowledge for many of these communities. Moreover, most participants shared that the production of their crops was mainly for home consumption. Therefore, access to knowledge is helping farmers increase food security and decrease their dependence on buying corn or beans from stores. By learning and using the VSE practice, farmers have gained knowledge on identifying the type of land they own and making decisions to improve harvests.

INTEGRATED PEST MANAGEMENT (IPM): ARMYWORM & SLUG

HHS Knowledge

Chiquimula

Drivers

armyworm only

livelihood 6 (living off of own production)

Barriers

both practices

gender

armyworm: ***
slug: **

armyworm only ***

vulnerability

Baja Verapaz (armyworm only)

Drivers

armyworm only ***

armyworm pest

Barriers

NONE IDENTIFIED

FGD Application

Both Departments

Drivers

perceived benefits

education: perceived ease

Barriers

weather constraints

37% in Chiquimula & 67% in Baja Verapaz demonstrated knowledge

Gender

The HHS in both departments showed significantly less knowledge retention of these practices than of the permanent mulching and 4R responsible nutrients management practices, with females being less likely to demonstrate knowledge in Chiquimula. This is likely due to the distinct experience of women–their household roles and participation in ECAs–for which the FGDs and KIIs provided additional context. These findings are discussed further in the Perceptions of ECAs section.

FGD Insights

Participants shared that they are unsure when these pests will emerge each year and by the time they do, the damage is typically already done. In Baja Verapaz, women especially expressed an urgency to treat the armyworm pest. This led to the use of the pesticide, Volaton, as opposed to waiting for the results of the IPM practice. A driver identified in Chiquimula FGDs was perceived ease and benefit of applying these practices. They appreciated their simplicity and cost-effectiveness, mentioning that beer or juice is a lot less expensive than typical pesticides. Additionally, when practiced, community members believed the practices were effective.

PRESENCE OF THE ARMYWORM PEST

The regression analysis revealed that, in Baja Verapaz, having the armyworm pest had an effect on knowledge retention of the integrated armyworm management practice that was both statistically significant and substantive. This finding seems obvious --of course those who have the pest are more likely to remember a practice to manage it. What is surprising, however, is that in Chiquimula, the armyworm pest variable did not surface in the multivariate regression as having an effect on knowledge retention of the armyworm practice; the same was observed for the slug practice. This, coupled with the fact that 66% of respondents in Chiquimula reported being affected by the armyworm and 69% by the slug, would suggest that the low rates of retention in Chiquimula are not entirely due to the absence of the armyworm pest.

Community Perceptions of ECA Effectiveness

Language Choice and Household Bargaining Power for Women

Another key finding from the research is that there is a difference in household bargaining power and cultural roles between men and women. The two CRS projects included in this study, Raíces and RENACER, required that only one member of the household is eligible for the program. As the projects are training-based with the benefit of agricultural inputs such as fertilizer, even when the primary household agricultural decision maker was male, being unable to take time away from working on the land, a larger percentage of women were enrolled in the programs. Therefore, while women are often the ones learning the practices through the ECAs, in a majority of cases, it is ultimately the men who make implementation decisions. This often requires a transfer of knowledge from women to men in the household, which carries the potential for loss of knowledge through transfer or power dynamics.

> "Right now there is more participation [in WSA practice workshops] by women because it is a little bit more complicated for men because they don't want to lose a day of work in their field. If they attend a meeting, they already lose a day of work, so th
> by attending the workshops and transferring t
> [men] after. There already exists this type of co
> the household so that [men] are able to do the
> FEMALE ECA PARTICIPANT; XESIGUAN, BAJA VERAPAZ

> "women smallholders uptake is affected by limited access to… extension, restricted membership in cooperatives and water user associations, lack of access or user rights to land, skill training, information, and restricted mobility."
> (TSIGE, SYNNEVÅG, & AUNE, 2020)

Additionally, there is a lack of confidence when integrating information taught in Spanish, so the workshops taught in Spanish either need to be translated to Achi or there needs to be an increase in the non-verbal teaching aids, e.g., physical training materials with graphics or hands-on learning to transmit the content of the workshops**.** This aligns with gendered limitations in agricultural contexts around the globe, e.g., an Ethiopian study found that "women smallholders' uptake is affected by limited access to…extension, restricted membership in cooperatives and water user associations, lack of access or user rights to land, skill training, information, and restricted mobility" (Tsige, Synnevåg, & Aune, 2020).

This was especially common for women and the elderly where Indigenous languages predominate, such as the Baja Verapaz department. Through observation and discussion with community members, it became apparent that despite local Caritas staff members assuring that Spanish is sufficient for implementation of CRS's projects in local communities, there is

often a burden on the promoters and/or the children of the community to translate the knowledge into Achi in Baja Verapaz.

Lastly, this lack of confidence with Spanish paired with lower female literacy rates affects women's abilities to take-on leadership roles like being a promoter. The study asked several women's FGD groups whether they would be interested in taking on the role of a promoter in the future, as well as what they believed were minimum requirements for a promoter. Many mentioned the ability to speak, read, and write in Spanish as a limitation:

Promoters Feel Obligated to Enter into Leadership Roles

Promoters are leaders chosen by the community to receive the initial WSA training from Caritas/CRS and disseminate that knowledge to program participants. This role is vital to the success of the ECAs, demonstrated by the fact that across the 5 practices, 49% of total responses stated they were convinced to try the practice by an ECA, technician, or promoter (Appendix F). The majority of communities interviewed identified common challenges in assuming this role, suggesting a need for further investigation into the role and responsibilities of ECA promoters, who serve as a vital bridge between Caritas/CRS and the smallholder farmers in their communities.

First, the research revealed that the **promoter role requires a significant amount of resources, which may disproportionately strain women**. In many instances, promoters described the inconvenient timing of regional training events held in the main city centers, where the research team would gather with the Caritas technicians (agricultural specialists responsible for training promoters). For female promoters, these trainings often conflict with care work such as preparing meals or taking care of their children, which is especially inconvenient when short notice is given for regional ECA trainings. For example, one female promoter shared about the chaos that often ensued when a ECA promoter meeting was scheduled out in the center of town, which usually was an all-day ordeal between traveling there, attending the workshop, and getting back in time to cook dinner and complete other household chores. When there was short

notice, this caused an extra level of strain on her because it conflicted with her daily care responsibilities that required extra coordination and uncertainty.

> **"I had to run, call my daughter and my other daughter-in-law who were at home, and I told them they had to prepare lunch. Then, I had to call my other daughter-in-law and told her that the other two were going to leave lunch with her. I didn't know who was going to take the lunch [to the workers on the farm] but they were going to have to figure it out. What else could I do - I was already committed [as an ECA promoter] so I had no choice, and that is what I'm left with [having to deal with] in this group."**
>
> FEMALE ECA PROMOTER; DOLORES, BAJA VERAPAZ

Second, **there is a lack of transparency upfront on the roles/responsibilities of promoters, as well as a lack of agency in opting in (or out) of the promoter role once chosen.** One women promoter mentioned she was nominated to be the ECA promoter when CRS/Caritas came to their community, but she told the COCODES president (who serves as the main community leader) that she did not have the bandwidth to do so. Instead of relieving her of the responsibility, the COCODES president insisted the role would simply be serving as a "representative," so she didn't have much of a choice but to fill the role for the good of her community.

> **"When I found out how much work it actually was, it was too late. I was already committed."**
>
> FEMALE ECA PROMOTER; DOLORES, BAJA VERAPAZ

Communities and community leaders are familiar with the need to select a leader to be the point person for Caritas projects. While there is a norm set in place for voting in leaders collectively as a community, it was pretty common that the COCODES President (who were generally the point of contacts for new projects) were also unaware of the actual responsibilities for a new leadership role like serving as an ECA promoter. Though there were some promoters who mentioned that they volunteered for the leadership position as ECA promoter, the majority mentioned that they were elected through a community voting process for which they had no say in being nominated. This often led to current community leaders being voted in for an additional leadership position that required time they often did not have.

6.0 Recommendations

6.0 Recommendations

Recommendations: WSA Topics to Further Investigate

Based on the key findings that…

1. almost all HHS respondents who demonstrated knowledge of a practice also applied it;
2. permanent mulching and 4R responsible nutrients management were the best-received practices, and Baja Verapaz had better overall HHS results than Chiquimula;
3. though the variables hypothesized to have the strongest effect on knowledge did show up in the regression analysis, other variables may be more significant;
4. land tenure is an important application barrier for permanent mulching and visual soil evaluation practices;
5. and gender is an important knowledge barrier, especially for permanent mulching and both integrated pest management (IPM) practices

…the research team suggests the following:

1. Access to Knowledge is Key to Application

The finding that the vast majority of those who demonstrated knowledge of the practices also *applied* them–with those who never applied or who used to apply and stopped under 10%–has important implications for the relationship between knowledge and application, as well as the overall success of CRS Guatemala's ECAs. As this is self-reported, the research team recommends **CRS independently verify these results** by visiting a randomized sample of farm parcels.

2. Not All Practices and Departments Are Equal

Permanent mulching and 4R responsible nutrients management had the highest rates of knowledge retention in both departments. As discussed above, this also has implications for application. The flip side of this finding is that the other three practices were less well-received. FGD conversations support these findings. The research team recommends that, if CRS selects the visual soil evaluation and two IPM practices for future ECAs, they **carefully consider the barriers (presented herein) to these practices, as well as the drivers of the two better-received practices**. CRS may use this information to modify the practices, the way they are taught, and/or the participant populations.

Baja Verapaz had better survey results than Chiquimula in all three output categories: knowledge, application, and intention to continue applying. The research team hypothesized this was largely due to the fact that half of the Chiquimula communities (59% of Chiquimula participants) in the study participated in the RENACER program, which started one year later than Raíces, in 2021; whereas all of the Baja Verapaz communities participated in Raíces. This

means three of the Chiquimula communities were exposed the WSA practices (via ECAs) for less time. To test this hypothesis, the research team compared outputs from the three Raíces communities and the three RENACER communities in Chiquimula. Though Raíces communities generally had higher rates of knowledge, application, and intention to continue use compared to RENACER communities, they were still not as high as for Baja Verapaz. For details, see knowledge, application, and intention to use tables in Appendix H. These findings suggest that a later ECA start date may be responsible for some, but not all, of the differences in outcomes between departments. Therefore, **the research team recommends CRS consider the practice drivers in Baja Verapaz and barriers in Chiquimula**, in an effort to understand and replicate Baja Verapaz's better outcomes.

3. Unexpected Variables at Play

The research team hypothesized that "gender" and "land amount divided by household size" (as a proxy for vulnerability) have the greatest effect on knowledge retention of practices (see the Methodology: Data Analysis section for more details). As discussed below in recommendation 5, gender did surface as a barrier three times in the regression analysis, and its importance was validated by FGD and KII findings. Land amount/household size, however, only surfaced once, as a driver of the 4R responsible nutrients management practice in Chiquimula, and its coefficient was not substantive.

Other variables had a larger effect and may warrant more attention in future research. For example, the livelihood variables "working for the farm or business of a community member" and "living off of one's own production" surfaced a total of seven times, with the latter sometimes having a substantive effect (relatively large coefficient).

Likewise, perceived vulnerability (learn more about this variable in the Data Analysis section) surfaced three times in the regression analysis. In Chiquimula, vulnerability was a substantive driver of the 4R responsible nutrients management practice (those who were more vulnerable were more likely to remember the practice), while it was a substantive barrier to the integrated armyworm management practice. The perception of vulnerability should be considered in future programming (e.g., implementing exercises that increase positivity by creating spaces to share and build relationships or developing a framework that clearly connects the benefits of the practices to reduce vulnerability).

The research team recommends CRS further investigate the relationship between farmers' livelihoods and perceived vulnerability on the one hand, and their knowledge retention, application, and adoption of WSA practices on the other.

4. Land Tenure is a Barrier to Application

In FGDs, land tenure consistently surfaced as a barrier to application, especially for the permanent mulching and visual soil evaluation practices. With regards to permanent mulching, farmers' efforts to leave crop residue on fields were often negated when landowners allowed their livestock to enter the field and eat the residue. For visual soil evaluation, farmers said landowners did not want them to dig holes on their property. Regarding both practices, the lack of permanence (farmers may not have access to the same land in future seasons) decreased the incentive to apply the practices and improve soil quality.

These are especially important findings given that 58% of HHS participants in Chiquimula and 22% in Baja Verapaz said they rent all of the land they cultivate. High percentages of participants renting land in Chiquimula may be partially responsible for the department's lower percentages of demonstration of knowledge, application, and intention to continue use for the visual soil evaluation practice. **The research team recommends that CRS gather data on land tenure of the participant population before implementing future ECAs.** If a large segment of the population rents land, CRS may **consider selecting practices to which land tenure is not a significant barrier**. For instance, our research found that although land tenure is an identified barrier for the permanent mulching practice based on the FGD analyses conducted, across both departments, this practice had the highest percentages of demonstration of knowledge, application, and intention to continue applying in the future. Alternatively, CRS could **include landowners in the conversation from the start of the programs**, educating them on the practices that may be perceived as problematic.

5. Gender is a Barrier to Knowledge Retention

In Chiquimula, being female surfaced as a barrier to knowledge retention of the permanent mulching practice and both IPM practices. In one of the FGDs in Chiquimula, women stated that killing slugs manually would cause the pest to multiply. Perhaps, in addition to the other factors that make men and women different (roles, education, etc.), women hold beliefs about some practices that would discourage them from applying.

In Baja Verapaz, women also expressed the need to use products that provide results in a reasonably short window. This urgency is because when a pest has reached its crops, the time for action has to be quick. Perhaps there is a need to further emphasize the timeline of the WSA pest management tools.

> **"They have taught us several preparations, but each has its processes, and we must wait several days. So, it is easier to buy chemical poison and throw it into the cornfields. Because if we don't hurry, the worm will finish our crops."**
>
> FEMALE ECA PARTICIPANT; BAJA VERAPAZ

The research team recommends CRS further investigate why women were less likely to demonstrate knowledge of these three practices in particular. If the reasons are deeply-entrenched in culture and beliefs versus understanding of the timeline, this could influence CRS's future practice selections and communication strategies through ECA training.

Recommendations: ECA Program Implementation Adjustments

Based on the key findings herein, the research team recommends the following considerations to improve the programmatic extension approach through ECAs. With the ECA promoters being pivotal to this type of extension model of information, the recommendations specifically focus on improvements to this role.

1. Define the Promoter Role and Responsibilities

Create clarity from the start around the roles and responsibilities for an ECA promoter, and ensure a systematic approach to securing a leader who is willing and has the bandwidth to serve. It's understandable that culturally there may be a hesitancy to be too transparent because then no one will step into the role, but transparency is key to ensuring ECA promoters to act for the good of the community.

2. Create a Leadership Development Pipeline to Cultivate Future Promoters

Develop a leadership development program to cultivate a pool of leaders with skills relevant to being a future promoter, so that the burden to lead does not fall on one (possibly unprepared) person in the community. This would ideally enable leadership rotation, setting term limits for the ECA promoter, which would prevent burnout.

> **"It could help us a lot if someone said 'ok lets start developing people so they can be a part of leadership'. Because, imagine that you are choosing a representative, and you choose him, he is going to doubt it, because, as you say, it is not easy to come to the community and explain what capacities one would learn. I tell people that it is important that everyone goes there and brings information, so we can share it and see what could help us a lot. And it would be great if there were institutions that could support us in that, to start developing people for them to be better leaders with time."**
>
> MALE ECA PARTICIPANT; LA CUMBRE, CHIQUIMULA

3. Ensure Equitable Leadership Opportunities

Consider the importance of gender balance within ECAs in each community, given the data revealed differences in household bargaining power and cultural roles between genders can impact successful implementation of WSA practices.

This would also ideally highlight the need for more investment into leadership training for women, so that there would be improved gender parity amongst leadership positions that allows for more female ECA participants to feel empowered to speak up as well.

4. Provide Community Appropriate Incentives to Serve as a Promoter

Create community-relevant incentives to serve as a promoter, based on different metrics of success and/or community engagement (i.e., providing an irrigation kit for the promoter's land, recognition/appreciation of their work intermittently throughout the year, etc.).

5. Develop Training Resources for Local Community Promoters in the Local Languages, such as Achi in Baja Verapaz

The understanding is that community members rarely read or write in their local language, but having Caritas technicians teach workshops or create resources, such as facilitation guides for promoters, in the local language would be beneficial. Creating such resources for promoters would support community members as well as promoters who may have lower levels of Spanish literacy, which the research team found in this study. Ultimately, this would lessen the burden on promoters to be directly responsible for translating the information gained from Caritas technicians on various WSA practices.

7.0 Conclusion

7.0 Conclusion

Rural smallholder farmers in Guatemala's Dry Corridor region face the negative impacts of climate change-induced shocks, which increase vulnerability to poverty and food insecurity. In partnership with local organizations such as Caritas, CRS Guatemala implemented the farmer field school (ECA) model in local communities to extend water smart agriculture (WSA) practices. ECAs are traditionally used in long-term projects, but CRS Guatemala has implemented them as short-term emergency responses, in the hopes that they will have a sustained impact on the climate change resilience of smallholder farmers.

The twelve smallholder farming communities selected for this study are located in the Chiquimula and Baja Verapaz departments in Guatemala's Dry Corridor and participated in CRS Guatemala's RENACER and Raíces programs. This study investigated five WSA practices (permanent mulching, 4R responsible nutrients management, visual soil evaluation, integrated armyworm management, and integrated slug management) to better understand which were being applied by farmers, which were most likely to be sustained after project completion, and why. Additionally, the study sought to further understand participants' perceptions of CRS Guatemala's extension methods via ECAs.

Utilizing a mixed-methods approach, the study conducted 507 household surveys, 24 focus group discussions, and 10 key informant interviews. The study revealed several key findings and insights, one of which is that when participants retained knowledge of a practice, they almost always applied it, which highlights the importance of interventions, like ECAs, that disseminate knowledge. The study also revealed that land tenure and gender are significant barriers to application of certain WSA practices. Focus group discussions revealed barriers to leadership opportunities for women in ECAs, as well as disproportionate strain on women participants, partly due to lower literacy rates among females.

The research team hopes that CRS and other international organizations will leverage the findings in this study and their associated recommendations to improve future programs–especially those in short-term emergency response contexts–meant to increase the resilience of smallholder farmers. The research team greatly appreciates the time, effort, and support from all individuals and partner organizations who made this study possible.

8.0 References

8.0 References

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9.0 Appendices

Appendix A: Data Collection Instruments

Household Survey Instrument

INFORMACIÓN DE LA ENCUESTA
P#. [PARA ENCUESTADOR] ¿Cómo te llamas? 1 [Nombre del encuestador 1] 2 [Nombre del encuestador 2] 3 [Nombre del encuestador 3] 4 [Nombre del encuestador 4] 5 [Nombre del encuestador 5]
P1. [PARA ENCUESTADOR] ¿En cúal comunidad estás? 1 Quequezque, Chiquimula 2 El Guayabo, Chiquimula 3 Tunuco Abajo, Chiquimula 4 Buena Vista, Chiquimula 5 El Volcán, Chiquimula 6 La Cumbre, Chiquimula 7 Las Minas, Baja Verapaz 8 Xesiguan, Baja Verapaz 9 Nimacabaj, Baja Verapaz 10 Rincon de Jesus, Baja Verapaz 11 San Francisco, Baja Verapaz 12 Dolores, Baja Verapaz
BIENVENIDO
DIGA "Hola. Gracias por hablar conmigo hoy. Esta encuesta es para un estudio universitario. Estamos en su comunidad porque CRS y Cáritas han implementado programas agrícolas aquí. Estos han incluido escuelas de campo agrícolas, que también se conocen como ECAs, que capacitaron a los agricultores en prácticas de agua y suelo para la agricultura, o prácticas ASA. Estos talleres hablaron sobre temas tales cómo ver como la salud del suelo, usar abonos o fertilizantes, usar basura para cubrir el suelo y controlar plagas."
P2. ¿Participó usted o alguien de su hogar en una de estas escuelas de campo agrícolas, o ECAs? (Si no está seguro, seleccione No) 5 Sí, he asistido a una escuela de campo para agricultores 4 Sí, mi cónyuge y yo hemos asistido a una escuela de campo para agricultores 3 Sí, mi cónyuge asistió a una escuela de campo para agricultores 2 Sí, otra persona de mi hogar asistió a una escuela de campo para agricultores 1 No SI P2=5,4 P3. ¿Qué temas de capacitación ha recibido en la Escuela de Campo? (Lee opciones en voz alta) 5 Evaluación visual del suelo

4 Manejo Responsable de Nutrientes 4 R
3 Cobertura permanente del suelo
2 Manejo Integrado del Gusano Cogollero
1 Manejo Integrado de la Babosa (Chimilca)
95 No sé
99 Sin respuesta

SI P2=4,3,2

P4. ¿En cuál de las siguientes escuelas de campo agrícolas, o ECAs, participó su cónyuge o otra persona de su hogar, aparte de usted? (lee opciones en voz alta)

5 Evaluación visual del suelo
4 Manejo Responsable de Nutrientes 4 R
3 Cobertura permanente del suelo
2 Manejo Integrado del Gusano Cogollero
1 Manejo Integrado de la Babosa (Chimilca)
95 No sé
99 Sin respuesta

SI P2=No

DIGA: "Gracias por su disposición a hablar conmigo, pero desafortunadamente estamos buscando hogares que formaron parte de estas ECAs.

[GUARDAR Y SALIR DE LA ENCUESTA]

PREGUNTAS DE EVALUACIÓN[1]

P5. ¿Contribuye usted a la toma de decisiones relacionadas con las prácticas agrícolas en su hogar?

2 Sí
1 No

CONSENTIMIENTO

Quiero asegurar que usted sepa que no tiene que hablar conmigo hoy y puede dejar de hablar conmigo en cualquier momento. Alguien puede escuchar nuestra conversación, así que si hay alguna pregunta que le incomode, no tienes que responder.

Si decide no hablar conmigo, no le afectará de ninguna manera.

Le pedimos participar en esta encuesta porque tenemos entendido que usted es parte de una ECA. No habrá compensación por hablar conmigo, aunque los comentarios de usted nos

[1] Q3 [pregunta 3] eliminada cuando se cambió la encuesta solo para participantes; La pregunta de detección permite encuestar a los no participantes solo si queda tiempo adicional en el día y se ha llegado a todos los participantes objetivo.

ayudarán entender que piensa la gente sobre las prácticas de agua y suelo para la agricultura, o las prácticas ASA.

Esta encuesta es para un censo, y no está asociada con ningún proyecto nuevo.

Existe el riesgo de contraer COVID-19, pero nos mantendremos alejados para mantenerlo a salvo.

Su nombre u otra información personal no se registrará a menos que esté de acuerdo con compartirlo al final de la encuesta.

¿Tiene alguna pregunta o inquietud?

P6. Para asegurarnos de que nos entendemos, si decide no hablar conmigo hoy, ¿afectará a su inscripción en programas de CRS o Caritas?
2 Sí
1 No

SI P6=No
DIGA: "Sí, eso es correcto".

SI P6=Sí
DIGA: "Perdón por cualquier confusión. Para mayor claridad, esta encuesta no afectará a su inscripción en programas de CRS o Cáritas incluso si no habla conmigo hoy. ¿Esto es más claro?"

P7. ¿Puede confirmar que usted es mayor de 18 años de edad?
2 Sí
1 No

P8. ¿Está usted de acuerdo en participar?
2 Sí
1 No

SI P7 + P8 = Sí
DIGA: "Si tiene alguna pregunta o inquietud sobre nuestra conversación, aquí hay una tarjeta donde encuentra información de la persona que puede responder sus preguntas de este estudio.

[DAR LA TARJETA DE CONTACTO]

SI P7 O P8 = No
DIGA: "No hay problema. Gracias por tu tiempo."

[GUARDAR Y SALIR DE LA ENCUESTA]
HISTORIA AGRÍCOLA
P9. ¿Cuántos años usted lleva cultivando? [Entrada numérica] [PARA EL ENCUESTADOR] Ingrese 95 para No sé; Ingrese 99 para Sin respuesta
P10 ¿Cuánta tierra cultiva su hogar, en tareas/cuerdas o manzanas? Si no sabe la cantidad de tierra, ¿cuántas libras/quintales debería producir su tierra? (Si no usa tareas/cuerdas, seleccione "Otro" y ponga el número y unidad que usa la persona.) 1 Menos de 2 2 2-7 3 8-12 4 13-17 5 Más de 17 Otro (Complete en el espacio en blanco) 99 Sin respuesta CUADRO DE INFORMACIÓN: [PARA EL ENCUESTADOR] Hay 16 tareas en una manzana o 8 tareas en ½ manzana. Cuerdas son igual que tareas.
P11. ¿Cuánto de esta tierra es propiedad suya o de su familia? 4 Toda la tierra es nuestra 3 La mitad o más de la tierra es nuestra 2 Menos de la mitad de la tierra es nuestra 1 Toda la tierra es alquilada 99 Sin respuesta
P12. ¿Qué cultivos usted sembró durante la primera temporada del año pasado? 1 Maíz 2 Frijoles 3 Café 4 Cardamomo 5 Frutas (Árboles) 6 Canavalia (53 count) 7 Ayote (25 count) 8 Mani (14 count) ~~9 No sembro (5 count)~~ ~~10 Caupi (9 count)~~ ~~11 jamaica (4 count)~~ 95 No sé Otro (Complete en el espacio en blanco) 99 Sin respuesta
P13. ¿Qué cultivos su hogar sembró durante la segunda temporada el año pasado?

1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)
6 Canavalia
~~7 Ayote~~
7 No sembro
~~9 Caupi~~
~~10 Mani~~
95 No sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P14. ¿Qué cultivos su hogar está sembrando en esta tierra ahorita?
1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)
6 Canavalia
7 Ayote
~~8 No sembro~~
8 Mani
9 Jamaica
95 No sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

SI P12 O P13=1,
P16. ¿Cuál fue el rendimiento en quintales/libras de maíz de su hogar el año pasado?
Campo numérico

CUADRO DE INFORMACIÓN: [PARA EL ENCUESTADOR] Inserta el número total de su rendimiento, la unidad usada, y la cantidad total de tierra. Por ejemplo: 20 libras por 5 tareas o 2 quintales por 1 manzana. Cuerda es igual que tarea.

SI P12 O P13=2,
P17. ¿Cuál fue el rendimiento en quintales/libras de frijoles de su hogar el año pasado?
Campo numérico

CUADRO DE INFORMACIÓN: [PARA EL ENCUESTADOR] Inserta el número total de su rendimiento, la unidad usada, y la cantidad total de tierra. Por ejemplo: 20 libras por 5 tareas o 2 quintales por 1 manzana. Cuerda es igual que tarea.

P18. ¿Qué tipos de plagas han afectado los cultivos en esta comunidad? (MARQUE TODO LO QUE CORRESPONDA) (CFO)

~~11 Sompopo~~
7 Mosca blanca
6 Mosaico
5 Gusano alambre
4 Gallina ciega
~~6 No hay plaga~~
~~5 Hielo~~
~~4 Tortugilla~~
3 Café Broca
2 Babosas
1 Gusanos Cogollero
Otro (Complete en blanco)
95 No sé
99 Sin respuesta

CONOCIMIENTO Y USO DE PRÁCTICAS[2]

DIGA: "Ahora hablaremos de las diferentes prácticas que usted podría usar en su cultivo ."

EVALUACIÓN DEL SUELO (1)

INSTRUCCIONES: Sostenga el vaso asignado para evaluación visual del suelo.

P19. ¿Cómo hace o cómo hará usted para saber cómo está la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA–SOLO MARQUE "Cualquiera otra práctica" SI NO MARCA NINGUNA DE LAS OPCIONES ASA) [NO LEA LAS OPCIONES]

7 Hago una prueba de fragmentos–saco un bloque de suelo y lo dejo caer sobre una superficie plana.
6 Ordeno los terrones (o agregados) por tamaño.
5 Califico visualmente unas 8 propiedades del suelo.
4 Utilizo la guía de evaluación visual del suelo.
3 Hago una de estas evaluaciones en cada área distinta de mi parcela.
2 Cualquiera otra práctica
1 No hago nada
0 No sé
99 Sin respuesta

SI P19=3-7 (Cualquiera),

INSTRUCCIONES: Coloque la vaso del suelo en el piso para que sea visible para la persona

P19a ¿Cómo usted aprendió a ver la salud de su suelo?
6 Asistí a una escuela de campo para agricultores
5 Me enseñó alguien que asistió a una escuela de campo para agricultores

[2] Tarjeta de referencia rápida con descripciones de los módulos

4 Alguien me enseñó, pero no asistieron a una escuela de campo para agricultores
3 Una institución, fuera de Cáritas o CRS, me enseñó (p.ej. MAGA)
2 Lo aprendí por mis propios medios
1 Solo lo sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P19b ¿Ha utilizado esta práctica en su área de cultivo/ parcela?
4 Sí, estoy usando esta práctica y lo he hecho durante varias temporadas
3 Sí, estoy usando esta práctica esta temporada por primera vez
2 Sí, usé la práctica en el pasado pero ahora la he dejado
1 No
99 Sin respuesta

SI P19b=1

19c. ¿Por qué no ha probado esta práctica de ver la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Mi suelo no tiene problemas/la práctica no es relevante para mi;8
No he tenido el tiempo para utilizarla todavía, pero quiero;7
No tengo el tiempo o los recursos para utilizarla;6
La ECA o el técnico/promotor no me convenció;5
No vi un buen resultado en la parcela de demostración;4
No estaba convencido de que la práctica aumentaría el rendimiento de mi tierra;3
Sabía que Cáritas iba a dejar de darnos los insumos;2
El dueño de la tierra que alquilo no quiere que la haga;1
No sé;95
Otro (Complete en el espacio en blanco)
Sin respuesta;99

SI P19b=4, 3, 2

P19d. ¿Para qué cultivos utilizó esta práctica de ver la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA)
1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)
95 No sabe
Otro (Complete en blanco)
99 Sin respuesta

P19e. ¿Qué le convenció de intentar esta práctica de ver la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]

7 Costumbre familiar
6 La ECA o el técnico/promotor me convenció
5 Vi un buen resultado en la parcela de demostración
4 Estaba convencido de que la práctica aumentaría el rendimiento de mi tierra
3 Quería ahorrar dinero al usar menos insumos/fertilizantes
2 Cáritas me dio los insumos para intentarlo
1 El dueño de la tierra que alquilo quiere que lo haga
95 No sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P19f. ¿Cambió el rendimiento de su cultivo al usar esta práctica de ver la salud de su suelo y cómo?
5 Mejora significativa
4 Alguna mejora
3 Sin diferencia
2 Ligeramente peor
1 Significativamente peor
95 No sé
99 Sin respuesta

SI P19b=4, 3
P19g. ¿Planeas seguir usando la práctica de ver la salud de su suelo en el futuro?
2 Sí
1 No
95 No sabe/no está seguro
99 Sin respuesta

SI P19f=Sí,
P19h.¿Por qué planeas seguir usando la práctica de ver la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Ví un buen resultado en la parcela de demostración;6
La práctica ha mejorado el rendimiento de mis cultivos;5
Ahorro mi dinero en fertilizantes, porque uso menos;4
Ahorro mi dinero en fertilizantes, porque Cáritas me las da;3
Estoy anticipando más insumos de Cáritas;2
Estoy anticipando más apoyo de los técnicos o promotores;1
Otro (Complete en el espacio en blanco)
7 It is good practice to do/ it is a good learning
No sé;95
Sin respuesta;99

SI P19b=2 O P19f=No,

P19i. ¿Por qué dejó de utilizar o planea dejar de utilizar la práctica de ver la salud de su suelo? (MARQUE TODO LO QUE CORRESPONDA)

No tengo el tiempo o los recursos para seguir haciéndola;5
No ví un buen resultado en mi parcela;4
Cáritas no va a continuar entregando insumos;3
El técnico no viene a ayudar o ofrecer materiales;2
Utilicé la práctica y la salud de mi suelo ya está mejor;1
Otro (Complete en el espacio en blanco)
No sé;95
Sin respuesta;99

SI P19 ≠ 3,

INSTRUCCIONES: No use más el vaso que identifica el práctica evaluación del suelo

MANEJO DE NUTRIENTES (2)

INSTRUCCIONES: Levante el vaso para la práctica de nutrientes.

P20. ¿Cómo hace o cómo hará usted para fertilizar su cultivo? (MARQUE TODO LO QUE CORRESPONDA–SOLO MARQUE "Cualquiera otra práctica" SI NO MARCA NINGUNA DE LAS OPCIONES ASA) [NO LEA LAS OPCIONES]

6 Utilizo la fuente localmente disponible más adecuada para el cultivo.
5 Establezco la dosis adecuada para no desperdiciar y para no aplicar menos de lo que necesita.
4 Aplico el fertilizante en el momento de la siembra y antes de la floración.
3 Trato siempre de enterrar el fertilizante o aplicarlo lo más localizadamente posible.
2 Cualquiera otra práctica
1 No hago nada
0 No sé
99 Sin respuesta

SI P20=Sí,

INSTRUCCIONES: Coloque la vaso de nutrientes en el piso.

P20a ¿Cómo aprendió a poner el fertilizante o el abono?

6 Asistí a una escuela de campo para agricultores
5 Me enseñó alguien que asistió a una escuela de campo para agricultores
4 Alguien me enseñó, pero no asistieron a una escuela de campo para agricultores
3 Una institución, fuera de Cáritas o CRS, me enseñó (p.ej. MAGA)
2 Me enseñé a mí mismo
1 Solo sé

Otro (Complete en el espacio en blanco)
99 Sin respuesta

P20b ¿Ha utilizado la práctica de cómo aplicar el fertilizante en su área de cultivo?
4 Sí, estoy usando esta práctica y lo he hecho durante varias temporadas
3 Sí, estoy usando esta práctica esta temporada por primera vez
2 Sí, usé la práctica en el pasado pero ahora la he dejado
1 No
99 Sin respuesta

SI P20b=1

¿Por qué no ha probado esta práctica? (MARQUE TODO LO QUE CORRESPONDA)
Mi suelo no tiene problemas con nutrientes/la práctica no es relevante para mi;8
No he tenido el tiempo para utilizarla todavía, pero quiero;7
No tengo el tiempo o los recursos para utilizarla;6
La ECA o el técnico/promotor no me convenció;5
No vi un buen resultado en la parcela de demostración;4
No estaba convencido de que la práctica aumentaría el rendimiento de mi tierra;3
Sabía que Cáritas iba a dejar de darnos los insumos;2
El dueño de la tierra que alquilo no quiere que la haga;1
No sé;95
Otro (Complete en el espacio en blanco)
Sin respuesta;99

SI P20b=4, 3, 2

P20c. ¿Para qué cultivos utilizó la práctica de como aplicar el fertilizante? (MARQUE TODO LO QUE CORRESPONDA)
1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)
95 No sabe
Otro (Complete en blanco)
99 Sin respuesta

P20d. ¿Qué le convenció intentar la práctica de como aplicar el fertilizante? ? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
8 My wife taught me/My husband taught me
7 Costumbre familiar

6 La ECA o el técnico/promotor me convenció
5 Vi un buen resultado en la parcela de demostración
4 Estaba convencido de que la práctica aumentaría el rendimiento de mi tierra
3 Quería ahorrar dinero al usar menos insumos/fertilizantes
2 Cáritas me dio los insumos para intentarlo
1 El dueño de la tierra que alquilo quiere que lo haga
95 No sé
Otro (Complete en el espacio en blanco)

7 Costumbre Familiar

8 Learned this practice from other organizations and in other farming experiences

99 Sin respuesta

P20e. ¿Cambió el rendimiento de su cultivo al usar la práctica de como aplicar el fertilizante y cómo?
5 Mejora significativa
4 Alguna mejora
3 Sin diferencia
2 Ligeramente peor
1 Significativamente peor
95 No sé
99 Sin respuesta

SI P20b=4, 3
P20f. ¿Planeas seguir usando la práctica de como aplicar el fertilizante a sus cultivos en el futuro?
2 Sí
1 No
95 No sabe/no está seguro
99 No responde

SI P20f=Sí,

P20g. ¿Por qué planea seguir usando la práctica sobre cómo aplicar los fertilizantes a sus cultivos? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Ví un buen resultado en la parcela de demostración;6
La práctica ha mejorado el rendimiento de mis cultivos;5
Ahorro mi dinero en fertilizantes, porque uso menos;4
Ahorro mi dinero en fertilizantes, porque Cáritas me las da;3
Estoy anticipando más insumos de Cáritas;2
Estoy anticipando más apoyo de los técnicos o promotores;1
Otro (Complete en el espacio en blanco)

7 I already had this knowledge/ this a historical practice in my family

8 It is good practice to do

No sé;95
Sin respuesta;99

SI P20b=2 O P20f=No,

P20h. ¿Por qué dejó de utilizar o planea dejar de utilizar estas prácticas de aplicar fertilizantes? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
No tengo el tiempo o los recursos para seguir haciéndola;5
No ví un buen resultado en mi parcela;4
Cáritas no va a continuar entregando insumos;3
El técnico no viene a ayudar o ofrecer materiales;2
Utilicé la práctica y mi área de cultivo ya rinde mejor;1
Otro (Complete en el espacio en blanco)
No sé;95
Sin respuesta;99

SI P20 ≠ 3,

INSTRUCCIONES: No use más el vaso de nutrientes.

COBERTURA PERMANENTE (3)

INSTRUCCIONES: Levante el vaso que representa a la práctica de la cobertura permanente.

P21. ¿Cómo hace o cómo hará usted para cubrir su suelo ? (MARQUE TODO LO QUE CORRESPONDA–SOLO MARQUE "Cualquiera otra práctica" SI NO MARCA NINGUNA DE LAS OPCIONES ASA) [NO LEA LAS OPCIONES]

5 Utilizo todos los rastrojos y la basura que queda de los cultivos y las plantas en la parcela.
4 Utilizo cultivos de cobertura (abonos verdes), para dejar los rastrojos.
3 He integrado árboles dentro de la área de cultivo.
2 Cualquiera otra práctica
1 No hago nada
0 No sé
99 Sin respuesta

SI P21=Sí,

INSTRUCCIONES: Coloque la vaso de cobertura permanente en el piso.

Q21a ¿Cómo usted aprendió a cubrir su suelo?
6 Asistí a una escuela de campo para agricultores
5 Me enseñó alguien que asistió a una escuela de campo para agricultores
4 Alguien me enseñó, pero no asistieron a una escuela de campo para agricultores
3 Una institución, fuera de Cáritas o CRS, me enseñó (p.ej. MAGA)

2 Me enseñé a mí mismo
1 Solo sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P21b ¿Ha utilizado esta práctica en su área de cultivo?
4 Sí, estoy usando esta práctica y lo he hecho durante varias temporadas
3 Sí, estoy usando esta práctica esta temporada por primera vez
2 Sí, usé la práctica en el pasado pero ahora la he dejado
1 No
99 Sin respuesta

SI P21b=1

¿Por qué no ha probado esta práctica? (MARQUE TODO LO QUE CORRESPONDA)
Mi suelo no tiene problemas/la práctica no es relevante para mi;8
No he tenido el tiempo para utilizarla todavía, pero quiero;7
No tengo el tiempo o los recursos para utilizarla;6
La ECA o el técnico/promotor no me convenció;5
No vi un buen resultado en la parcela de demostración;4
No estaba convencido de que la práctica aumentaría el rendimiento de mi tierra;3
Sabía que Cáritas iba a dejar de darnos los insumos;2
El dueño de la tierra que alquilo no quiere que la haga;1
No sé;95
Otro (Complete en el espacio en blanco)
Sin respuesta;99

SI P21b=4, 3, 2

P21c. ¿Para qué cultivos usted utilizó esta practica de cubrir su suelo? (MARQUE TODO LO QUE CORRESPONDA)
1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)
95 No sabe
Otro (Complete en blanco)
99 Sin respuesta

P21d. ¿Qué le convenció de intentar esta práctica de cubrir el suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
6 La ECA o el técnico/promotor me convenció

5 Vi un buen resultado en la parcela de demostración
4 Estaba convencido de que la práctica aumentaría el rendimiento de mi tierra
3 Quería ahorrar dinero al usar menos insumos/fertilizantes
2 Cáritas me dio los insumos para intentarlo
1 El dueño de la tierra que alquiló quiere que lo haga
95 No sé
Otro (Complete en el espacio en blanco)
7 Costumbre Familiar
8 Learned this practice from other organizations and in other farming experiences
99 Sin respuesta

P21e. ¿Cambió el rendimiento de su cultivo al usar esta práctica de cubrir el suelo y cómo?
5 Mejora significativa
4 Alguna mejora
3 Sin diferencia
2 Ligeramente peor
1 Significativamente peor
95 No sé
99 Sin respuesta

SI P21b=4, 3
P21f. ¿Planeas seguir usando la práctica de cubrir el suelo con basura en el futuro?
2 Sí
1 No
95 No sé
99 No responde

SI P21f=Sí,
P21g. ¿Por qué planeas seguir usando esta práctica de cubrir el suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Ví un buen resultado en la parcela de demostración;6
La práctica ha mejorado el rendimiento de mis cultivos;5
Ahorro mi dinero en fertilizantes, porque uso menos;4
Ahorro mi dinero en fertilizantes, porque Cáritas me las da;3
Estoy anticipando más insumos de Cáritas;2
Estoy anticipando más apoyo de los técnicos o promotores;1
Otro (Complete en el espacio en blanco)
7 Porque eso es lo que aprendí en la ECA

No sé;95
Sin respuesta;99

SI P21b=2 O P21f=No,

P21h. ¿Por qué dejó de utilizar o planea dejar de utilizar la práctica de cubrir el suelo? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
No tengo el tiempo o los recursos para seguir haciéndola;5
No ví un buen resultado en mi parcela;4
Cáritas no va a continuar entregando insumos;3
El técnico no viene a ayudar o ofrecer materiales;2
Utilicé la práctica y la salud de mi suelo ya está mejor;1
Otro (Complete en el espacio en blanco)
No sé;95
Sin respuesta;99

SI P21 ≠ 3,

INSTRUCCIONES: No use más la vaso de cobertura permanente

MANEJO DE GUSANO [3] ***(4)***

INSTRUCCIONES: Levante el vaso de gusanos.

P22. ¿Cómo hace o cómo hará usted para manejar el gusano cogollero [gusano ataca al cogollo del maíz]? (MARQUE TODO LO QUE CORRESPONDA–SOLO MARQUE "Cualquiera otra práctica" SI NO MARCA NINGUNA DE LAS OPCIONES ASA) [NO LEA LAS OPCIONES]

7 Limpio las malezas de la parcela de mi cultivo.
6 Coloco una trampa de gusano cogollero por tarea a principios del invierno.
5 Monitoreo esa trampa cada 15 días.
4 Monitoreo mi cultivo cada semana–los huevos del gusano están colocados en el cogollo.
3 Si al monitorear mi cultivo veo plantas con gusanos, aplico una insecticida (tabaco, flor de muerte, cola de caballo).
2 Cualquiera otra práctica
1 No hago nada
0 No sé
99 Sin respuesta

SI P22=Sí,

INSTRUCCIONES: Coloque la vaso de gusanos en el piso.

P22a ¿Cómo usted aprendió estas prácticas práctica para manejar la plaga del gusano cogollero?

[3] Agrosilvicultura eliminada: ¿Sabe cómo usar la agrosilvicultura? Y Coffee broca: ¿Sabes cómo manejar las plagas de Coffee broca?

6 Asistí a una escuela de campo para agricultores
5 Me enseñó alguien que asistió a una escuela de campo para agricultores
4 Alguien me enseñó, pero ellos no asistieron a una escuela de campo para agricultores
3 Una institución, fuera de Cáritas o CRS, me enseñó (p.ej. MAGA)
2 Yo me enseñe como hacerlo a mi mismo
1 Solo sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

Q22b ¿Ha utilizado esta prácticas en su área de cultivo?
4 Sí, estoy usando esta práctica y lo he hecho durante varias temporadas
3 Sí, estoy usando esta práctica esta temporada por primera vez
2 Sí, usé la práctica en el pasado pero ahora la he dejado
1 No
99 Sin respuesta

SI P22b=1

¿Por qué no ha probado esta práctica práctica para manejar la plaga del gusano cogollero? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Mi área de cultivo no tiene gusanos/la práctica no es relevante para mi;8
No he tenido el tiempo para utilizarla todavía, pero quiero;7
No tengo el tiempo o los recursos para utilizarla;6
La ECA o el técnico/promotor no me convenció;5
No vi un buen resultado en la parcela de demostración;4
No estaba convencido de que la práctica aumentaría el rendimiento de mi tierra;3
Sabía que Cáritas iba a dejar de darnos los insumos;2
El dueño de la tierra que alquilo no quiere que la haga;1
No sé;95
Otro (Complete en el espacio en blanco)
Sin respuesta;99

SI P22b=4, 3, 2

Q22c. ¿Para qué cultivos utilizó esta práctica para manejar la plaga del gusano cogollero?? (MARQUE TODO LO QUE CORRESPONDA)
1 Maíz
2 Frijoles
3 Café
4 Cardamomo
5 Frutas (Árboles)

95 No sabe
Otro (Complete en blanco)
99 Sin respuesta

P22d. ¿Qué le convenció de intentar práctica para manejar la plaga del gusano cogollero? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
6 La ECA o el técnico/promotor me convenció
5 Vi un buen resultado en la parcela de demostración
4 Estaba convencido de que la práctica aumentaría el rendimiento de mi tierra
3 Quería ahorrar dinero al usar menos insumos/fertilizantes
2 Cáritas me dio los insumos para intentarlo
1 El dueño de la tierra que alquilo quiere que lo haga
95 No sé
Otro (Complete en el espacio en blanco)
7 Costumbre Familiar
99 Sin respuesta

P22e. ¿Cambió el rendimiento de su cultivo al usar esta práctica y cómo?
5 Mejora significativa
4 Alguna mejora
3 Sin diferencia
2 Ligeramente peor
1 Significativamente peor
95 No sé
99 Sin respuesta

SI P22b=4, 3
Q22f. ¿Planeas seguir usando la práctica de manejo integrado de gusanos en el futuro?
2 Sí
1 No
95 No sabe/no está seguro
99 No responde

SI P22f=Sí,

P22g.¿Por qué planea seguir usando la práctica para hacer frente a la plaga del gusano? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
Ví un buen resultado en la parcela de demostración;6
La práctica ha mejorado el rendimiento de mis cultivos;5
Ahorro mi dinero en fertilizantes, porque uso menos;4

Ahorro mi dinero en fertilizantes, porque Cáritas me las da;3
Estoy anticipando más insumos de Cáritas;2
Estoy anticipando más apoyo de los técnicos o promotores;1
Otro (Complete en el espacio en blanco
No sé;95
Sin respuesta;99

SI P22b=2 O P22f=No,

P22h. ¿Por qué dejó de utilizar o planea dejar de utilizar la práctica de manejo de gusano? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
No tengo el tiempo o los recursos para seguir haciéndola;5
No ví un buen resultado en mi parcela;4
Cáritas no va a continuar entregando insumos;3
El técnico no viene a ayudar o ofrecer materiales;2
Utilicé la práctica y ya no hay gusanos;1
Otro (Complete en el espacio en blanco)
6, it is feasible because I see my neighbors do it

No sé;95
Sin respuesta;99

SI P22 ≠ 3,

INSTRUCCIONES: No use más la vaso de gusanos.

MANEJO DE BABOSAS (5)

INSTRUCCIONES: Levante el vaso del modulo de las babosas

Q23. ¿Cómo hace o cómo hará usted para manejar la babosa? (MARQUE TODO LO QUE CORRESPONDA–SOLO MARQUE "Cualquiera otra práctica" SI NO MARCA NINGUNA DE LAS OPCIONES ASA) [NO LEA LAS OPCIONES]

7 Utilizo una estaca de madera para buscar y matar a las babosas durante los meses de verano.
6 Monitoreo mi parcela para determinar la población de babosas desde la primera lluvia.
5 Coloco trampas para babosa, una trampa por tarea, a principios del invierno.
4 Monitoreo esa trampa cada 15 días durante los meses de junio, julio y agosto.
3 Si en el mes de augusto hay babosas en las trampas, aplico un molusquicida (químico).
2 Cualquiera otra práctica
1 No hago nada
0 No sé
99 Sin respuesta

SI P23=Sí,

INSTRUCCIONES: Coloque la vaso de que representa la plaga babosas en el piso.

Q23a ¿Cómo aprendiste las prácticas para controlar la plaga de la babosa?
6 Asistí a una escuela de campo para agricultores
5 Me enseñó alguien que asistió a una escuela de campo para agricultores
4 Alguien me enseñó, pero no asistieron a una escuela de campo para agricultores
3 Una institución, fuera de Cáritas o CRS, me enseñó (p.ej. MAGA)
2 Me enseñé a mí mismo
1 Solo sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P23b ¿Ha utilizado esta práctica en su área de cultivo?
4 Sí, estoy usando esta práctica y lo he hecho durante varias temporadas
3 Sí, estoy usando esta práctica esta temporada por primera vez
2 Sí, usé la práctica en el pasado pero ahora la he dejado
1 No
99 No responde

SI P23b=1

¿Por qué no ha probado esta práctica para controlar la plaga de la babosa? (MARQUE TODO LO QUE CORRESPONDA)
Mi área de cultivo no tiene babosas/la práctica no es relevante para mi;8
No he tenido el tiempo para utilizarla todavía, pero quiero;7
No tengo el tiempo o los recursos para utilizarla;6
La ECA o el técnico/promotor no me convenció;5
No vi un buen resultado en la parcela de demostración;4
No estaba convencido de que la práctica aumentaría el rendimiento de mi tierra;3
Sabía que Cáritas iba a dejar de darnos los insumos;2
El dueño de la tierra que alquilo no quiere que la haga;1
No sé;95
Otro (Complete en el espacio en blanco)
Sin respuesta;99

IF P23b=4, 3, 2

P23c. ¿Para qué cultivos utilizó la práctica para controlar la babosa? (MARQUE TODO LO QUE CORRESPONDA)
1 Maíz
2 Frijoles

3 Café
4 Cardamomo
5 Frutas (Árboles)
95 No sabe
Otro (Complete en blanco)
99 Sin respuesta

P23d. ¿Qué le convenció de intentar esta práctica para controlar la babosa? (MARQUE TODO LO QUE CORRESPONDA) [NO LEA LAS OPCIONES]
6 La ECA o el técnico/promotor me convenció
5 Vi un buen resultado en la parcela de demostración
4 Estaba convencido de que la práctica aumentaría el rendimiento de mi tierra
3 Quería ahorrar dinero al usar menos insumos/fertilizantes
2 Cáritas me dio los insumos para intentarlo
1 El dueño de la tierra que alquilo quiere que lo haga
95 No sé
Otro (Complete en el espacio en blanco)
99 Sin respuesta

P23e. ¿Cambió el rendimiento de su cultivo al usar esta práctica y cómo?
5 Mejora significativa
4 Alguna mejora
3 Sin diferencia
2 Ligeramente peor
1 Significativamente peor
95 No sé
99 Sin respuesta

SI P23b=4, 3
P23f. ¿Planeas seguir usando la práctica de manejo integrado de babosas en el futuro?
2 Sí
1 No
95 No sabe/no está seguro
99 No respuesta

SI P23f=Sí,
P23g. ¿Por qué planeas seguir usando esta práctica para controlar la babosa? (MARQUE TODO LO QUE CORRESPONDA)
Ví un buen resultado en la parcela de demostración;6
La práctica ha mejorado el rendimiento de mis cultivos;5

Ahorro mi dinero en fertilizantes, porque uso menos;4
Ahorro mi dinero en fertilizantes, porque Cáritas me las da;3
Estoy anticipando más insumos de Cáritas;2
Estoy anticipando más apoyo de los técnicos o promotores;1
Otro (Complete en el espacio en blanco)
No sé;95
Sin respuesta;99

SI P23b=2 O P23f=No,

P23h. ¿Por qué dejó de utilizar o planea dejar de utilizar la práctica de manejo de babosa? (MARQUE TODO LO QUE CORRESPONDA)
No tengo el tiempo o los recursos para seguir haciéndola;5
No ví un buen resultado en mi parcela;4
Cáritas no va a continuar entregando insumos;3
El técnico no viene a ayudar o ofrecer materiales;2
Utilicé la práctica y ya no hay babosas;1
Otro (Complete en el espacio en blanco)
I do not have this pest in my area, 6
No sé;95
Sin respuesta;99

SI Q23 ≠ 3,

INSTRUCCIONES: No use más la vaso de plaga la babosa.

CANTIDAD DE VASOS

P24. [PARA EL ENUMADOR] ¿Cuántos vasos pusiste en el suelo?
1 0
2 1
3 2
4 3
5 4
6 5

SI Q24 = 0,

vaya a Datos demográficos.

MINI ACTIVIDAD PARTICIPATIVA

SI P24 = 1,

DIGA: "La siguiente actividad tiene por objeto comprobar si esta práctica es valiosa para los agricultores de esta comunidad. La práctica está representada por el vaso aquí en el suelo. Recibirán 10 clips, que deberán utilizar para mostrarnos cuánto valoran esta práctica, en una

escala de 0 a 10. Puedes poner tantos clips como quieras en el vaso. También puedes optar por no poner ningún clip en el vaso.

SI P24 ≠ 1,
DIGA: "La siguiente actividad vamos a conversar sobre las prácticas aprendidas en las escuelas de campo- ECAs. Estas prácticas están representadas por los vasos que están aquí en el suelo. Le voy a dar 10 clips, que usted deberá utilizar para mostrarnos cuál de estas prácticas es más valiosa para usted. Puede colocar tantos clips como desea en un vaso. También puede decidir no poner ningún clip en un vaso. Por ejemplo, puede poner todos los clips en un vaso, si crees que esa práctica es más valiosa que todas las demás. No está obligado a utilizar todos los clips".

SI P22=ASA practicas
DIGA: "Ahora voy a tomar unos minutos para contar los clips colocados en cada vaso. Cuando termino vamos a continuar con las preguntas."

P25. [PARA EL ENCUESTADOR] ¿ Cuántas clips se colocaron en el vaso asignado a evaluación del suelo ?
[Campo numérico]

SI P25=0, P25a. ¿Por qué no colocó clips en esta vaso? (seleccione todas las que correspondan)
- 4 Impacto más pequeño sobre rendimiento/producción
- 3 No responde a mi mayor necesidad
- 2 Difícil de implementar
- 1 Difícil de entender
- Otro (Complete en el espacio en blanco)
- 99 Sin respuesta

IF P25≠0, P25b. [PARA EL ENCUENTADOR] ¿Recibió esta vaso la mayoría de clips, o esta empatada con otra vaso? Si sólo hay 1 vaso, ¿ha recibido más de 5 clips?
- 2 Sí
- 1 No

SI P25b=Sí,
P25c ¿Por qué colocó la mayoría, o puso la misma cantidad, de sus clips en este vaso sobre la práctica que ayuda a saber la salud de su suelo? (seleccione todas las que correspondan) [NO LEA LAS RESPUESTAS]
- 4 Mayor impacto en el rendimiento/producción
- 3 Atiende mi mayor necesidad
- 2 Fácil de implementar
- 1 Fácil de entender
- Otro (Complete en el espacio en blanco)
- 99 Sin respuesta

IF Q23=Sí

P26. [PARA ENCUESTADOR] ¿ Cuántas clips se colocaron en la vaso de nutrientes?
[Campo numérico]

SI P26=0, Q26a. ¿Por qué no pusiste clips en este vaso sobre la práctica del uso de fertilizantes o abono? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]

4 El menor impacto en el rendimiento/producción
3 No atiende mi mayor necesidad
2 Difícil de implementar
1 Difícil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

SI Q26≠0, Q26b. [PARA EL ENCUESTADOR] ¿Recibió este vaso la mayoría de clips, o esta empatada con otro vaso? Si sólo hay 1 vaso ¿ha recibido más de 5 clips?

2 Sí
1 No

SI P26b=Sí,
P26c. ¿Por qué colocó la mayoría, o puso la misma cantidad, de sus clips en este vaso? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]

4 Mayor impacto en el rendimiento/producción
3 Atiende mi mayor necesidad
2 Fácil de implementar
1 Fácil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

IF Q24=Sí

P27. [PARA EL ENCUESTADOR] ¿ Cuántas clips se colocaron en la vaso de cobertura permanente?
[Campo numérico]

SI P27=0, P27a. ¿Por qué no pusiste clips en este vaso para la practica de cubrir el suelo ? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]

4 El menor impacto en el rendimiento/producción
3 No atiende mi mayor necesidad
2 Difícil de implementar
1 Difícil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

SI P27≠0, P27b. [PARA EL ENCUESTADOR] ¿Recibió esta vaso la mayoría de clips, o esta empatada con otra vaso? Si sólo hay 1 vaso, ¿ha recibido más de 5 clips?

2 Sí
1 No

SI P27b=Sí,
P27c. ¿Por qué colocó la mayoría, o puso la misma cantidad, de sus clips en este vaso? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]
4 Mayor impacto en el rendimiento/producción
3 Atiende mi mayor necesidad
2 Fácil de implementar
1 Fácil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

IF P25=Sí

P28. [PARA ENCUESTADOR] ¿ Cuántas clips se colocaron en la vaso del gusano? [Campo numérico]

SI Q28=0, Q28a. ¿Por qué no pusiste clips en este vaso para la prácticas de control del gusano cogollero? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]
4 El menor impacto en el rendimiento/producción
3 No atiende mi mayor necesidad
2 Difícil de implementar
1 Difícil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

SI P28≠0, P28b. [PARA EL ENCUESTADOR] ¿Recibió esta vaso la mayoría de clips, o esta empatada con otra vaso? Si sólo hay 1 vaso, ¿ha recibido más de 5 clips?
2 Sí
1 No

SI P28b=Sí,
P28c. ¿Por qué colocó la mayoría, o puso la misma cantidad, de sus clips en este vaso? (seleccione todas las que correspondan) [NO LEA LAS OPCIONES]
4 Mayor impacto en el rendimiento/producción
3 Atiende mi mayor necesidad
2 Fácil de implementar
1 Fácil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

IF P26=Sí

P29. [PARA ENCUESTADOR] ¿ Cuántas clips se colocaron en la vaso de la babosa? [Campo numérico]

SI P29=0, P29a. ¿Por qué no pusiste clips en este vaso? (seleccione todas las que correspondan)

4 El menor impacto en el rendimiento/producción
3 No atiende mi mayor necesidad
2 Difícil de implementar
1 Difícil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

SI P29≠0, P29b. [PARA EL ENCUESTADOR] ¿Recibió este vaso la mayoría de clips, o esta empatada con otra vaso? Si sólo hay 1 vaso, ¿ha recibido más de 5 clips?

2 Sí
1 No

SI P29b=Sí,
P29c. ¿Por qué colocó la mayoría, o empató la mayoría, de sus clips en este vaso? (seleccione todas las que correspondan)

4 Mayor impacto en el rendimiento/producción
3 Atiende mi mayor necesidad
2 Fácil de implementar
1 Fácil de entender
Otro (Complete en el espacio en blanco)
99 Sin respuesta

DATOS DEMOGRÁFICOS

P30. [PARA EL ENCUESTADOR] ¿Cuál es el género de esta persona?

1 Masculino
2 Femenino

P31. ¿Tiene cónyuge o pareja? [PARA ENCUESTADOR: haga las preguntas de seguimiento]

4 Sí y vive aquí conmigo
3 Sí pero no siempre vive aquí conmigo
2 No, estoy soltero o separado de mi cónyuge o pareja
1 No, mi cónyuge o pareja ha fallecido
Otro (Complete en el espacio en blanco)
99 No responde

P32. Incluido usted, ¿cuántas personas viven en este hogar?

_____(Ingrese el número)

P33. ¿A qué se dedican los miembros de la familia? (MARQUE TODO LO QUE CORRESPONDA)

6 Vivir de lo que produzco en mi parcelas
5 Vender productos/cosechas de mi parcela/ tierra/ finca
4 Trabajar para la finca o negocio de otra persona en esta comunidad
3 Trabajar para la finca o negocio de otra persona fuera de esta comunidad
2 Mi propio negocio vendiendo productos que yo hago, por ejemplo, artesanías
1 Mi negocio propio que ofrece servicios a otros, por ejemplo, reparación de máquinas
Otro (Complete en el espacio en blanco)
99 Sin respuesta

Q34. ¿Cuál de los siguientes frases describe mejor cómo usted mantiene su hogar y su familia? (lee opciones en voz alta)

1 Regularmente luchamos para cubrir nuestras necesidades
2 A veces luchamos para cubrir nuestras necesidades
3 Alcanzamos a cubrir nuestras necesidades
4 Alcanzamos a cubrir nuestras necesidades y ahorrar dinero/invertir en mejorar nuestras vidas
99 Sin respuesta

P35. ¿Cuál es el nivel más alto de educación que completó? (CFO)

0 Nunca asistí a la escuela
1 Comencé la educación primaria
2 Terminé la educación primaria
4 Terminé la educación media
5 Terminé la educación técnica profesional
6 Terminé la educación superior
99 Sin respuesta

CUADRO DE INFORMACIÓN: [PARA EL ENCUESTADOR] Solo seleccione "educación profesional técnica" si han recibido educación agrícola profesional *fuera* de las ECA.

P36. ¿Con qué frecuencia recibe remesas de familiares que viven en el exterior?

3 Regularmente, al menos una vez al mes
2 Ocasionalmente, al menos una vez al año
1 Rara vez, solo cada pocos años
0 Nunca, no recibo dinero de familiares en el extranjero
99 No respuesta

P37. ¿Usted se considera parte de un grupo étnico?
1 Sí
2 No
99 Sin respuesta

[SI P37=Sí] P38. ¿De qué grupo étnico te consideras parte? (lee opciones en voz alta)
1 Ch'orti' Maya
2 Achi
3 Quiche
4 Cackchiquel
97 Otro (Complete el espacio en blanco)
99 Sin respuesta

DIVULGACIÓN DE INFORMACIÓN

DIGA: "Realmente valoramos sus comentarios y nos gustaría tener la oportunidad de conversar más sobre las ECAS y las prácticas que usted esta aprendiendo durante una actividad de grupo. Habrá un grupo solo hombres y otro solo de mujeres, entre 4 y 8 personas de la comunidad. Esta conversación será aquí en su comunidad, y habrá refacciones".

P39. ¿Está interesado en participar en una actividad de grupo?
2 Sí
1 No

[SI P39=Sí]
P40. ¿Cuál es su nombre completo? [Campo de texto]
P41. ¿Cuál es un número de teléfono donde podemos comunicarnos con usted? [si no tiene número de telefono, pregunte por el nombre del promotor]
[Campo de texto]
DIGA: "Lo llamaremos o enviaremos a alguien a su hogar para notificarle si lo necesitamos para la actividad de grupo. Como solo podemos tener un máximo de 8 personas en la actividad, hay una posibilidad que no lo llamaremos. Gracias por su disposición a participar".

[SI P39=No] P42. No hay problema. ¿Estaría dispuesto a decirnos su nombre de todos modos, para que podamos comparar sus respuestas de hoy con los datos de CRS o Cáritas? No es obligatorio.
2 Sí
1 No

[SI P42=Sí] P43. ¿Cuál es su nombre completo? [Campo libre]
[IF Q42=No] Ir a la conclusión

CONCLUSIÓN

DIGA "Gracias por su participación. Sus respuestas serán de gran ayuda para el estudio sobre la utilidad y las percepciones de las prácticas para agua y suelo y las ECAS".

[GUARDAR Y SALIR DE LA ENCUESTA]

Focus Group Discussion Instrument

FGD #1	*Participants are selected from those who self-indicated interest in the HHS. Two FGDs will be run per community: One for men and one for women. IF the interested participants (for a single FGD) are <4 or >8 the Focus Group Discussion Participant Selection Protocol will be followed.*
Leads	IF the main language is Spanish: 1 facilitator (i-Lab Team Member) IF the main language is Indigenous: 1 local facilitator, 1 local translator (local language→ Spanish)
Participant Criteria	● 8-16 household representatives per community ○ One group of 4-8 men ○ One group of 4-8 women ■ Men and women may have different availability, so FGDs will take place at different times. ● Diversity in ratio of amount of land owned and size of family ● Must be older than 18
Materials/ Supplies	● Consent document (to be read) ● Paper & Pens for the ice breaker ● Oversized paper ● Colored Markers (5 different colors) ● Visual representation of current WSA practices used in community (One for each WSA practice) ● Visual representation of intended sustained WSA practices in the community (One for each WSA practice) ● Drinks/light snacks for participants ● FGD synthesis sheet ● 2 audio recorders ● Visual representations of projected answers
Goals of Activity	● To understand the underlying reasons why or why not farmers are currently applying or not applying WSA practices. ● To identify which WSA practices are most likely to be sustained long term. ● To understand the effectiveness of WSA extension methods. ○ By understanding community/HH perceptions of WSA extension/practices
Room Configuration	● Participants should be seated comfortably, in a configuration conducive to discussion.
Agenda	1. Welcome and introduction

	2. FGD Oral Consent is Read 3. Icebreaker 4. Focus group discussion about: a. Key drivers and barriers of current WSA practices used b. Key drivers and barriers of sustainability of WSA practices c. Perception of WSA extension methods 5. Wrap-up & Closing remarks
Artifacts	Written notes, audio recordings, photo documentation

15 Minutes	**Kick-Off and Instructions**	Copies of informed consent script

- Thank you for joining us today
- Provide a welcome statement and introduce the purpose of the focus group.
- Complete the informed consent for each participant.

INSERT CONSENT SCRIPT

You are being asked to participate in this research study. Studies like this one are used to answer questions and learn new information. Some studies might help change or improve the way we do things in the future. This consent process will give you information about this study to help you decide whether you want to participate.

You may choose not to take part in the study or may choose to leave the study at any time. Deciding not to participate, or deciding to leave the study later, will not result in any penalty loss of current or future benefits from CRS or Caritas nor will it affect your relationship with them or the University of Notre Dame in the United States. If you have any concerns, you may choose not to participate.

If you agree to be in the study, you will be asked to participate in a group discussion:

- The activity will take place here.
- The activity should take approximately 60 minutes.
- If you agree, our team will audio record the activity so we can prepare transcriptions afterward. We will delete the recording as soon as we complete our transcription;
- If you agree, our team will take photographs during the activity, but we will not capture your face in those photographs
- This study is not associated with any project or future project.

The research team will be careful to keep your personal information confidential. We cannot guarantee absolute confidentiality.

- Do you agree to participate? [Pause for a verbal response]
- Do you agree to have our activity audio recorded? [Pause for a verbal response]
- [IF PHOTOGRAPHING] Do you agree to have photographs, that do not include your face, taken during our activity? [Pause for a verbal response]
- Do you have any questions? Answer any questions. If you have any concerns, please feel free to contact me at the end of the conversation.

Review Rules:

- Now that you have confirmed your participation...let's review the rules for the activity.
- This is a safe space to speak your opinions, so we ask that you do not repeat this conversation outside of this group.
- We would like to hear everyone's ideas and opinions.
- When you would like to speak, please hold up your number.
- I will call on you by your number when it is your turn to speak.
- Remember you don't have to answer any question you don't feel comfortable with.
- If you would like to discuss something privately, please let us know.

10 Minutes	**Icebreaker**	10 sheets of paper & 10 pens
● Pick your bird activity w/ drawing.		
45 Minutes	**Discussion**	Audio Recording, Synthesis Sheet, oversized paper, Colored Markers

- *If the majority agree to be recorded, turn on the recorder. (Supporting team member starts recording and timer on their phone).*
  - *Any persons who do not agree to recording should be invited to a private conversation after the focus group.*
  - *If the majority do not agree to be recorded, do not use audio recording.*
- *Facilitator should hold up their pen each time they hear a particularly interesting insight or story; supporting team members will record time.*
- *Facilitator makes a mark each time a topic is discussed in the synthesis sheet; write other notes in the space below topics.*
- *Brief the participants: We are going to talk about community experience with ASA practices.*

Questions Prompts to Participants:

1. How did you become aware of the ECA and/or ASA practices?
2. How was the process getting involved in the/an ECA?
3. Which ASA techniques were taught in your community?

Following Question Are to be Repeated for each ASA practice mentioned (in #3):

1. Did you implement ASA practice?
2. How familiar were you with ____ practice before attending the ECA session?
3. For the ASA practices you implemented, what specifically made you decide to implement it?
4. For the ASA practices you did not implement, what specifically made you not implement it? What reservations did you have?
5. Did you feel prepared to execute _____ practice based on the training you received in the ECA?
   - If yes-please elaborate what aspects, you found the most helpful
   - If no-please elaborate what further training/knowledge you would need to be more confident

- Did you receive support following the completion of the ECA (follow-up visit, call, etc…)? If so, did the promoter help you address any issues?
- Was the kit sufficient in helping execute the _____ practice?
  * If yes- what specifically in the kit helped
  * If no-what further support is necessary for the community to execute ___ practice?

Wrap up Questions:

1. Which topics would you like to see more emphasis on?
2. Did you make changes in your farming behavior because of the ECA and ASA practices?
   - If yes, please elaborate.
   - If no, please elaborate why you decided not to apply any ASA practices.
3. Would you recommend attending an ECA to another community member?

5 Minutes	**Close & Wrap-Up**	

This was a very interesting discussion

- You have really helped us understand the situation in this community.
- Thank you for sharing your opinions.
- We will now enjoy some snacks.
- *Stop timer and recordings.*

15 Minutes	**Refreshment Time**	Snacks & Drinks

Distribute snacks, handi-wipes, drinks.

Focus Group Discussion Synthesis Sheet

Date:					**Community:**			
	Female FGD				**Male FGD**			
How did you learn about ECA/ASA	Caritas	COCODES	Neighbor told me about it	Other	Caritas	COCODES	Neighbor	Other
	Notes/Times:				Notes/Times:			
Process of getting involved in an ECA	Easy	Kind-of Easy	Kind-of Hard	Hard	Easy	Kind-of Easy	Kind-of Hard	Hard
	Notes/Times:				Notes/Times:			
ASA Practice #1:								
Factors <u>supporting</u> ASA uptake	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield
	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training
Factors <u>preventing</u> ASA uptake	Expensive	Time	Other practice used	impact on yield	Expensive	Time	Other practice used	impact on yield

	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training
Notes/Times:								
ASA Practice #2								
Factors <u>supporting</u> ASA uptake	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield
	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training
Factors <u>preventing</u> ASA uptake	Expensive	Time	Other practice used	impact on yield	Expensive	Time	Other practice used	impact on yield
	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training
Notes/Times:								

ASA Practice #3								
Factors <u>supporting</u> ASA uptake	Potential benefit in the future	Referred practice	Inexpensive	impact on yield	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield
	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training
Factors <u>preventing</u> ASA uptake	Expensive	Time	Other practice used	impact on yield	Expensive	Time	Other practice used	impact on yield
	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training
Notes/Times:								
ASA Practice #4								
Factors <u>supporting</u> ASA uptake	Potential benefit in the future	Referred practice	Inexpensive	impact on yield	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield
	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training

Factors <u>preventing</u> ASA uptake	Expensive	Time	Other practice used	impact on yield	Expensive	Time	Other practice used	impact on yield
	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training
Notes/Times:								
ASA Practice #5								
Factors <u>supporting</u> ASA uptake	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield	Potential benefit in the future	Referred practice	Inexpensive	Convinced of impact on yield
	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training	Easy to understand	Easy to implement	Addresses my greatest need	ECA relationship/ training
Factors <u>Preventing</u> ASA uptake	Expensive	Time	Other practice used	impact on yield	Expensive	Time	Other practice used	impact on yield
	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training	Difficult to understand	Difficult to implement	Doesn't address my greatest need	ECA relationship/ training

Notes/Times:								
Topics they would like to explore more Times:	Permanent Mulching	4R Nutrients	slug management	“cogollero” worm	Permanent Mulching	4R Nutrients	slug management	“cogollero” worm
	Visual Soil Evaluation				Visual Soil Evaluation			
	Notes/Times:				Notes/Times:			

Key Informant Interview Instrument

Format: Semi-structured conversation; these question prompts will be used to guide the conversation.

Types of Key Informants:

- Chiquimula/Baja Verapaz - Caritas leader
    - ECA leader or COCODES president
    - Local authority (i.e. local councilman)
    - Regional agricultural representative
    - Are there any other people they recommend we talk to?
- Overarching KIIs - 2 KII total
    - Country-level Representative from agricultural government org (MAGA, FEDECOCAGUA, ANACAFE, etc.)
    - WSA-related internal CRS supervisor-level staff over LAC/Guate

Demographic information

1. What community (or communities)/region are you representing today?
2. What organization are you affiliated with?
3. What is your position or role in this community/region?
4. How long have you held this role?

CRS-Related Questions:

1. Describe your experience with CRS.
    a. What does partnership with CRS and your organization look like?
    b. How are external organizations generally received in the community/region?

2. What farming practice norms existed in these communities before organizations like CRS intervened? Pre and/or post- hurricane Iota/Eta? What was being done that wasn't working?
    a. Can you think of specific examples/stories (anecdotes)? Is there anyone you can think of that could be an important person to include in a FGD or talk to?

WSA-Related Questions:

Establish baseline of understanding: "We are about to talk about specific WSA/CRS extension methods. To clarify some key terms in the next set of questions, when we mention: WSA methods, we are referring to x,y,z; extension methods are x, y, z; (etc.)"

1. Which WSA practices have CRS (in partnership with your organization) introduced to the community/region?
    a. Can you name which WSA practices are currently being applied in the community/region?
    b. In your opinion, did the CRS Water Smart Agriculture (WSA) practices (or other similar strategies) introduce any new practices, ideas or norms in the community(s)/region? If so, what specifically?
    c. Do you anticipate WSA practices will continue to be sustained over time? Why or why not?

2. What WSA extension methods were used in your community/region? (Training(s), brochures, etc…)
    a. ***Perception of the inclusion of local voices in the development of agricultural extension practice methodology? -to ask CRS
    b. Question getting at their perceptions of the effectiveness of the extension methods—decide wording

3. Have you seen a transfer of knowledge with these WSA practices happening? If so, please elaborate.
    a. If yes, have you seen modifications to the practices that are relevant to specific contexts in the community/region? If so, please elaborate.

<u>Moderator Assessment:</u>

a) How did the interviewee appear/present themselves?
b) Description of location/atmosphere
c) Interviewee's disposition to engage in interview
d) Body language/non-verbal cues (i.e. gestures, eye contact)
e) Main takeaways

***Based on interviewee's experience with CRS, what are their perceptions on how WSA interventions can be shifted? Provide more contextual knowledge-could reform CRS practices.

Appendix B: HHS Sampling Strategy

HHS Sampling Strategy

The following protocol outlines the sampling procedure based upon the number of WSA ECA participants in a given community.

Assumptions:
- Enumerator can do 10 surveys/day
- All participants are available

*at least 3 always shoot for n=30→ so we can do something with the data.
*Should have tightly clustered, easy access communities first→ enumerators build confidence

Participant n	Target %	Target n	Community Lay out	Enumerator #	Notes
>100	≥50%	n≥50	Closely Clustered	5	IMPORTANT because it is the greatest opportunity to learn from data due to high n. We don't leave the community until the 50% minimum hit. Build a buffer in case we need a second day: • could get a bigger n with more days (could be a different # of enumerators in day 2) • Doesn't have to be back to back. • Can recycle enumerators.
			Easy Access	5	
			Foot Access Only	5	
50-100	≥50%	n≥50	Closely Clustered	5	
			Easy Access	5	
			Foot Access-Only	5	
30-50	≥80%	n≥40	Closely Clustered	4	
			Easy Access	4	
			Foot Access Only	5	
<30	100%	n=30	Closely Clustered	3	
			Easy Access	3	
			Foot Access Only	5	

Target Sample Numbers by Department

Chiquimula: Target Sample

Project	Community	ECA Participants		Men Sampling Strategy		Women Sampling Strategy	Sampling Strategy	Adjusted values based on targeted sample			Collected Data		
		Total	Men	% (55%)	Women	% (55%)	Total	Men	Women	Total	Men	Women	Total
RENACER	Quequezque	64	9	5	55	30	35	9	35	44	20	23	43
RAICES	Guayabo	133	57	31	76	42	73	35	45	80	33	48	81
RAICES	Tunuco abajo	25	13	7	12	7	14	13	12	25	9	13	22
RAICES	Buena vista	21	8	4	13	7	12	8	13	21	6	16	22
RENACER	El Volcan	136	12	7	124	68	75	12	75	87	39	46	85
RENACER	Cumbre	73	9	5	64	35	40	9	40	49	11	38	49
		452	108	54	344	189	249	86	220	306	118	184	302

Baja Verapaz: Target Sample

Project	ECA Participants			Men Sampling Strategy		Women Sampling Strategy	Sampling Strategy	Adjusted values based on target sample			Collected Data		
	Community	Total	Men	% (55%)	Women	% (55%)	Total	Men	Women	Total	Men	Women	Total
RAICES	Rincon De Jesus	52	6	3	46	25	29	6	30	36	1	34	35
	San Francisco	50	12	7	38	21	28	12	25	37	2	27	29
	Las Minas	75	6	3	69	38	41	6	40	46	3	43	46
	Dolores	82	6	3	76	42	45	9	45	54	3	33	36
	Nimacabaj	38	9	7	29	23	30	9	25	34	10	28	38
	Xesiguan	63	5	3	58	32	35	5	35	40	0	19	19
		360	44	26	316	181	208	47	200	247	19	184	203

Appendix C: FGD Participant Selection Protocol

FGD Participant Selection Protocol

This protocol outlines the flow of operations depending upon the initial analysis of HHS data.

Only WSA Direct Participants will be selected for FGDs. Two FGDs will be held per community based on the contingency that there are enough HHS participants who show interest (broken down by gender). FGD participation is voluntary.

Chiquimula: • 6 male FGDs • 6 female FGDs +_____ 12 FGDs	Baja Verapaz: • 6 male FGDs • 6 female FGD +_____ 12 FGDs	Total (Chiqui & Baja): • 12 female FGDs • 12 male FGDs +_____ 24 FGDs

Note:
- The smallest FGD that will be run is 4 participants.
- The largest FGD that will be run is 8 participants.
- Decreases chances of FGD running

	Female	Male	Feasibility of FGD (Yes or No)	Notes
# of interested participants	0	0	No	
	1	1	No	
	2	2	No	
	3	3	No	
	4	4	No	= FGD of 4
	5	5	Yes	= FGD of 5
	6	6	Yes	= FGD of 6
	7	7	Yes	= FGD of 7
	8	8	Yes	= FGD of 8
>8	IF # of interested participants exceed 8, we will prioritize based on the diversity of ratio of land size/household size.			

IF only one gender does not have enough interested participants (<4).

Isolated Event: ≤2 communities in each department	1-2 participants of the gender with not enough interested participants will be Interviewed as a Key Informant(s)
Common Event: >2 in a department	No FGDs are run and the total number of FGDs conducted decreases (becoming <12).
	Non-participants that have learned WSA practices through ECA participants will be included in FGD.

IF the # of interested participants is <4 for both male and female.

IF there is a community with similar criteria and interested participants # is ≥8	The FGD(s) in communities with <4 interested participants will be replaced with FGD(s) in a community with similar characteristics.
IF there is NO community with similar criteria and/or enough interested participation for multiple FGDs of the same gender to be run	No FGDs are run and the total number of FGDs conducted decreases (becoming <12).
	An alternative community will be used for FGD. *Notes: • The community was not part of the HHS. • Different strategy for ID-ing participants

Appendix D: Code Books

Code Name	Definition
ECA CODES	Reference to ECA(s)
Establishment of ECAs	Reference to the establishment and/or creation of ECA(s)
Enrollment	Reference to the process of enrollment in ECA(s)
Knowledge of ECAs	Reference to knowledge of ECA(s)
Workshop Materials/Training	Reference to materials, trainings/workshops presented in ECA(s)
Perception of ECAs	Reference to preceived perception of ECA(s)
CULTURAL CODES	Reference to cultural context
Literacy Rates	Reference to literacy rate or ability to read
Language Confidence	Reference to language ability or comfort level regarding trainings/materials
Decision Making Power	Reference to who has final decision surrounding uptake of WSA practice(s)
Gender Norms	Reference to gender and cultural gender norms
TRANSFER OF KNOWLEDGE	Reference to the dissemination of knowledge
ACTOR CODES	References key actors
Promoter	References to promoter role
Relationship with Promoter	References to participant's perception and/or relationship with promoter(s)
Outside Organizations	Reference to external organizations (i.e. Caritas, CRS, etc...)
GAAP/Savings Program	Reference to GAAP/Savings Program
COCODES	Reference to COCODES
Technicos	Reference to Technico role
WSA PRACTICES CODES	Reference to WSA Practices
Barriers	References to barriers to uptake of WSA practices
Land Tenure	References to land tenure (ownership) of land utilized (or not utilized) for WSA practices
Weather Constraints	References to weather hardships in regards to farming production
Need incentive	References to a lack of short term incentives needed to drive uptake of WSA practice. Includes references to a need for cash, resources (inputs), other short term incentives, etc…
Training/Support	References to an expressed need for more training/support to maintain and/or uptake WSA practice(s)
Resource Constraints	References to a lack of farm inputs such as seeds, fertilizer, necessary tools, etc… Also references examples of a lack of funds needed to puchase shese inputs and/or tools.

Perception of Practices	Reference to perceptions of practices. Including usefulness, benefits, etc…
Value of Learning	Reference to the value of learning and/or importance of knowledge
Retention of Practices	Reference to demonstrated knowledge of a practice. Including detailed description of practice.
Other Practices	Reference to non-WSA techniques utilized
Usage	Reference to actual usage of WSA practice(s)
Relevance of Practices	Reference to need of WSA practice(s)
Community Needs	Reference to other stated needs of the community
Production Usage	Reference to the use of famer production (crops)
Drivers	References to drivers to uptake of WSA practices
Promoter Role	References to Promoters driving behavior change related to uptake/usage of WSA practices
Leadership	References to the importance of strong leadership
Perceived Benefit	References to the perception that by practicing WSA techniques one will gain a benefit
Perceived Ease	Reference to ease of implementing: easy to understand, easy to implement, low cost

INTEGRATED SLUG MANAGEMENT CODES	cross-coded with *WSA PRACTICES CODES*
GUSANO COGOLLERO WORM MANAGEMENT CODES	cross-coded with *WSA PRACTICES CODES*
RESPONSIBLE MANAGEMENT OF 4R NUTRIENTS CODES	cross-coded with *WSA PRACTICES CODES*
PERMANENT MULCHING CODES	cross-coded with *WSA PRACTICES CODES*
VISUAL SOIL EVALUATION CODES	cross-coded with *WSA PRACTICES CODES*

QUOTE CODE	References participant quotes which provide unique insights. Co-tagged

Appendix E: Supplemental Data Analysis

Table E1: Chiquimula: Simple and Multivariate Logistic Models for Visual Soil Evaluation (VSE)

	Dependent Variable VSE Knowledge (1= yes)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	0.0484								0.0233
	(0.097)								(0.113)
Gender		-0.367							-0.319
		(0.247)							(0.271)
Education Level			0.333***						0.257*
			(0.121)						(0.131)
Vulnerability				0.554*					0.547*
				(0.297)					(0.326)
Years of farming					-0.00623				-0.00897
					(0.009)				(0.010)
livelihood 3						-0.653**			-0.462
						(0.297)			(0.327)
livelihood 4							0.412		0.322
							(0.259)		(0.289)
Livelihood 6								1.335***	1.201***
								(0.404)	(0.416)
Constant	-0.748***	-0.0669	-1.005***	-1.304***	-0.560***	-0.496***	-0.923***	-1.792***	-2.093**
	(0.227)	(0.411)	(0.181)	(0.374)	(0.180)	(0.138)	(0.212)	(0.382)	(0.828)
N	301	301	301	300	301	301	301	301	300
R^2									
adj. R^2									

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E2: Chiquimula: Simple and Multivariate Logistic Models for 4Responsible Nutrients Management

	Dependent Variable Nutrient Management Knowledge (1= yes)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	0.251**								0.381**
	(0.128)								(0.162)
Gender		-0.243							-0.264
		(0.278)							(0.378)
Education Level			-0.0575						0.170
			(0.133)						(0.177)
Vulnerability				-3.088***					-3.362***
				(0.398)					(0.468)
Years of farming					0.0328***				0.0241
					(0.012)				(0.016)
Livelihood 3						-0.497*			-0.253
						(0.292)			(0.409)
Livelihood 4							0.979***		0.824**
							(0.274)		(0.358)
Livelihood 6								-0.551	-1.108**
								(0.377)	(0.492)
Constant	0.626**	1.485***	1.149***	4.862***	0.644***	1.230***	0.516***	1.548***	4.906***
	(0.261)	(0.476)	(0.192)	(0.505)	(0.198)	(0.161)	(0.200)	(0.348)	(1.128)
N	298	298	298	297	298	298	298	298	297
R^2									
adj. R^2									

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E3: Chiquimula: Simple and Multivariate Logistic Models for Permanent Mulching

Dependent Variable Mulching Knowledge (Yes=1)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	0.128								0.128
	(0.158)								(0.165)
Gender		-0.886**							-0.844**
		(0.399)							(0.422)
Education Level			0.372*						0.291
			(0.193)						(0.208)
Vulnerability				0.649					0.659
				(0.538)					(0.562)
Years of farming					-0.000718				-0.00938
					(0.013)				(0.014)
Livelihood 3						-0.383			0.217
						(0.367)			(0.452)
Livelihood 4							0.917***		0.949**
							(0.344)		(0.390)
Livelihood 6								0.883**	0.876**
								(0.377)	(0.428)
Constant	1.628***	3.361***	1.539***	1.126*	1.879***	1.977***	1.352***	1.196***	0.923
	(0.333)	(0.722)	(0.225)	(0.619)	(0.254)	(0.205)	(0.239)	(0.317)	(1.186)
N	299	299	299	298	299	299	299	299	298
R^2									
adj. R^2									
Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$									

Table E4: Chiquimula: Simple and Multivariate Logistic Model Integrated Armyworm Management (IAM)

	Dependent Variable IAM Knowledge (Yes=1)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	-0.0156								-0.0368
	(0.098)								(0.127)
Gender		-0.709***							-0.861***
		(0.246)							(0.302)
Education Level			0.161						-0.0359
			(0.121)						(0.153)
Vulnerability				1.341***					1.470***
				(0.322)					(0.359)
Years of farming					-0.00866				-0.0128
					(0.009)				(0.012)
Livelihood 3						-0.0131			0.210
						(0.274)			(0.359)
Livelihood 4							0.000630		0.130
							(0.251)		(0.324)
Livelihood 6								0.783**	0.767**
								(0.342)	(0.386)
Cogollero_pest									0.645*
									(0.367)
Corn_primera_crop									0.0307
									(0.654)
Corn_current									0
									(.)
Constant	-0.540**	0.555	-0.734***	-2.147***	-0.440**	-0.567***	-0.571***	-1.219***	-2.047**
	(0.224)	(0.405)	(0.174)	(0.399)	(0.179)	(0.140)	(0.200)	(0.316)	(1.020)
N	299	299	299	298	299	299	299	299	260
R^2									
adj. R^2									

Dependent Variable IAM Knowledge (Yes=1)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	-0.0156								-0.0368
	(0.098)								(0.127)
Gender		-0.709***							-0.861***
		(0.246)							(0.302)
Education Level			0.161						-0.0359
			(0.121)						(0.153)
Vulnerability				1.341***					1.470***
				(0.322)					(0.359)

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E5: Chiquimula: Simple and Multivariate Logistic Model Integrated Slug Management (ISM)

Dependent Variable ISM Knowledge (Yes=1)												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Landamt/HHsize	-0.0157											-0.0327
	(0.097)											(0.120)
Gender		-0.785***										-0.680**
		(0.244)										(0.276)
Education Level			0.164									0.115
			(0.119)									(0.139)
Vulnerability				0.355								0.252
				(0.304)								(0.332)
Years of farming					-0.00319							-0.00183
					(0.009)							(0.011)
Livelihood 3						0.222						0.345
						(0.267)						(0.331)
Livelihood 4							0.140					0.359
							(0.249)					(0.304)
Livelihood 6								-0.219				0.0214
								(0.299)				(0.334)
Babosa_pest									0.710**			0.579
									(0.334)			(0.361)
Beans_segunda_crop										0.346		0.288
										(0.613)		(0.760)
Beans_current_crop											0.258	0.148
											(0.519)	(0.583)
Constant	-0.464**	0.751*	-0.662***	-0.921**	-0.446**	-0.554***	-0.585***	-0.318	-0.981***	-0.811	-0.509***	-0.765
	(0.222)	(0.402)	(0.171)	(0.378)	(0.177)	(0.139)	(0.200)	(0.268)	(0.303)	(0.601)	(0.122)	(1.087)
N	301	301	301	300	301	301	301	301	263	293	301	257
R^2												
adj. R^2												

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E6: Baja Verapaz: Simple and Multivariate Logistic Models for Visual Soil Evaluation (VSE)

	Dependent Variable VSE Knowledge (1= yes)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Landamt/HHsize	-0.141								-0.217
	(0.133)								(0.148)
Gender		-1.307							-1.234
		(1.046)							(1.104)
Education Level			0.311*						0.340*
			(0.177)						(0.196)
Vulnerability				0.250*					0.389**
				(0.150)					(0.176)
Years of farming					0.00738				0.0145
					(0.014)				(0.017)
Livelihood 3						-0.222			0.0369
						(0.595)			(0.640)
Livelihood 4							0.364		1.045*
							(0.491)		(0.602)
Livelihood 6								0.277	0.834
								(0.440)	(0.560)
Constant	1.924***	4.197**	1.249***	1.139***	1.554***	1.669***	1.558***	1.440***	2.085
	(0.320)	(2.064)	(0.289)	(0.353)	(0.280)	(0.214)	(0.225)	(0.371)	(2.348)
N	201	201	202	202	201	185	185	185	182
R^2									
adj. R^2									

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E7: Baja Verapaz: Simple and Multivariate Logistic Models for Responsible Nutrients Management (4R)								
Dependent Variable Nutrient Management Knowledge (1= yes)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Landamt/HHsize	0.278							0.268
	(0.416)							(0.510)
Education Level		0.127						0.250
		(0.356)						(0.468)
Vulnerability			0.0676					0.341
			(0.307)					(0.449)
Years of farming				0.0375				0.0452
				(0.042)				(0.050)
Livelihood 3					-1.738*			-1.076
					(0.945)			(1.030)
Livelihood 4						0.310		1.357
						(1.131)		(1.339)
Livelihood 6							1.511	2.260**
							(0.929)	(1.126)
Constant	3.059***	3.322***	3.351***	3.031***	3.989***	3.519***	2.708***	0.153
	(0.722)	(0.632)	(0.785)	(0.592)	(0.583)	(0.507)	(0.596)	(1.936)
N	204	205	205	204	186	186	186	167
R^2								
adj. R^2								
Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$								

Table E8: Baja Verapaz: Simple and Multivariate Logistic Models for 4Responsible Nutrients Management

	Dependent Variable Mulching Knowledge (Yes=1)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Landamt/HHsize	-0.0928						-0.160
	(0.261)						(0.314)
Education Level		0.164					0.173
		(0.335)					(0.378)
Vulnerability			0.818*				1.028*
			(0.492)				(0.600)
Years of farming				0.0458			0.0365
				(0.042)			(0.037)
Livelihood 4					-0.175		1.171
					(0.854)		(1.124)
Livelihood 6						0.803	1.908*
						(0.783)	(1.073)
Constant	3.508***	3.113***	1.944***	2.791***	3.288***	2.708***	-0.699
	(0.633)	(0.580)	(0.748)	(0.551)	(0.455)	(0.596)	(1.713)
N	204	205	205	204	186	186	147
R^2							
adj. R^2							

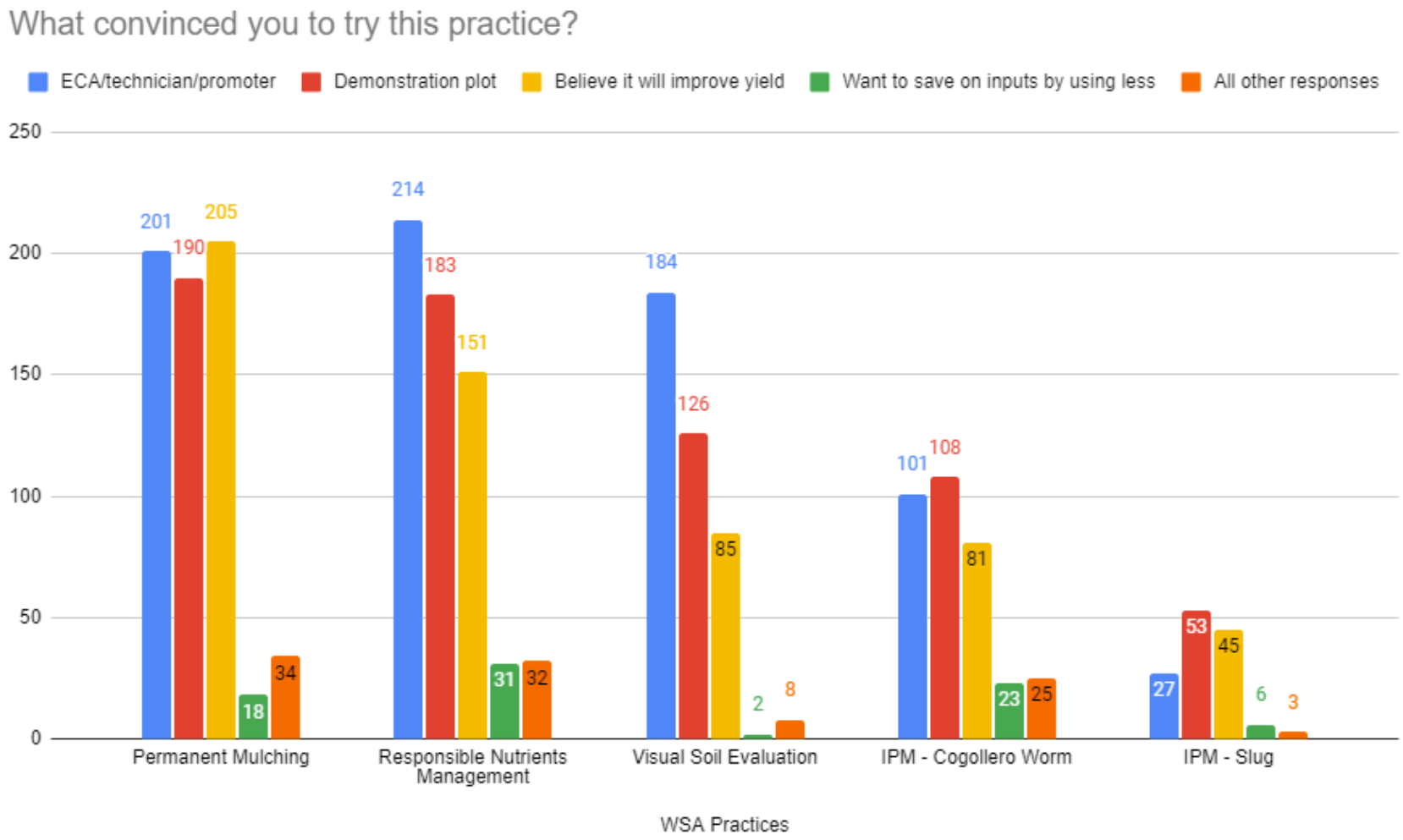
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E9: Baja Verapaz: Simple and Multivariate Logistic Model Integrated Armyworm Management (IAM)

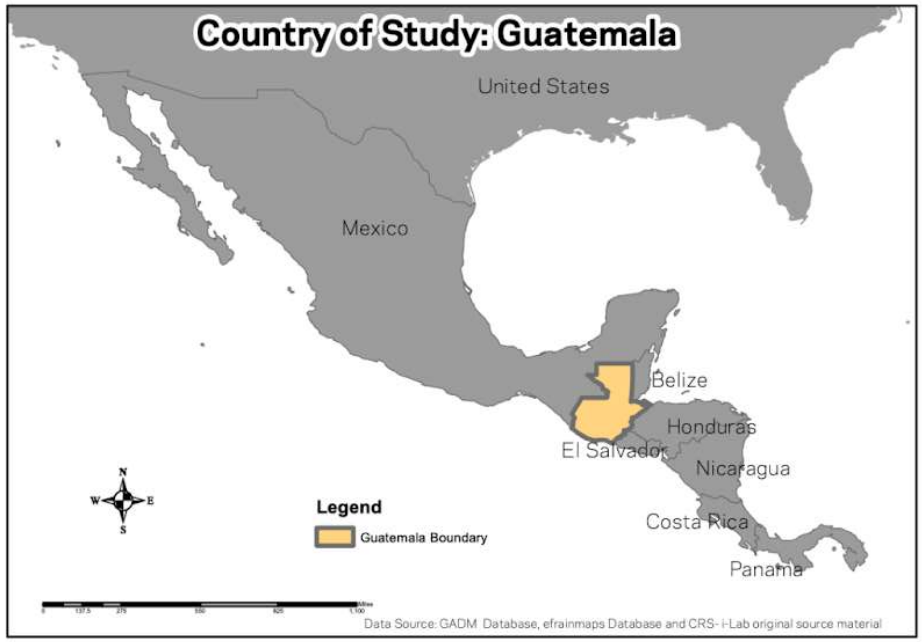
Dependent Variable IAM Knowledge (Yes=1)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Landamt/HHsize	0.166									0.293*
	(0.127)									(0.159)
Gender		-1.049								-0.607
		(0.649)								(0.771)
Education Level			0.178							0.112
			(0.135)							(0.158)
Vulnerability				0.0561						0.0896
				(0.113)						(0.147)
Years of farming					0.0138					0.0194
					(0.011)					(0.016)
Livelihood 3						-0.266				-0.218
						(0.481)				(0.545)
Livelihood 4							0.427			0.738
							(0.382)			(0.506)
Livelihood 6								-0.366		-0.0244
								(0.374)		(0.474)
Cogollero_pest									2.000***	2.676***
									(0.548)	(0.681)
Constant	0.424	2.723**	0.460*	0.592**	0.502**	0.751***	0.614***	0.990***	-1.030**	-1.734
	(0.261)	(1.268)	(0.243)	(0.292)	(0.222)	(0.172)	(0.183)	(0.325)	(0.521)	(1.825)

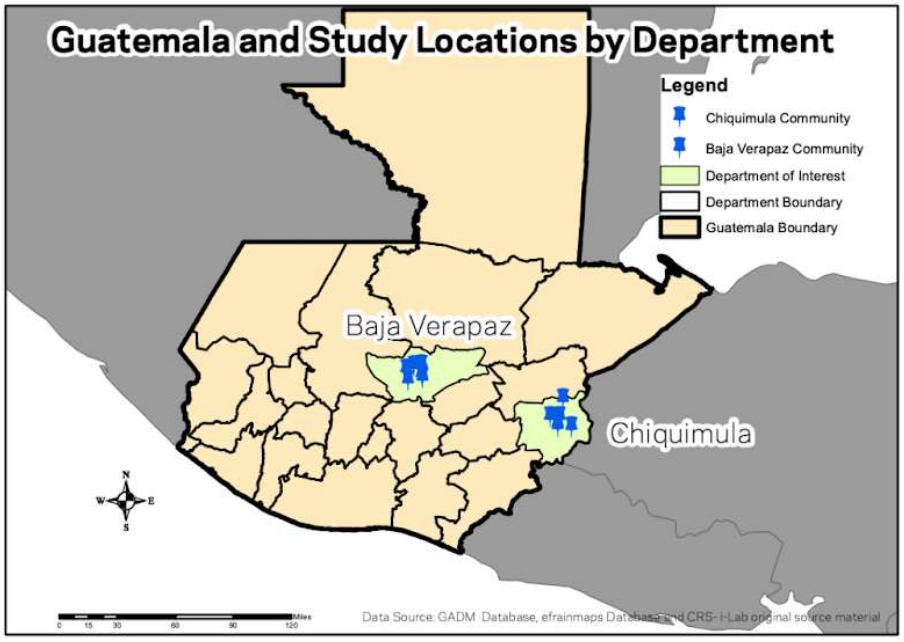
N	194	194	195	195	194	177	177	177	190	167
R^2										
adj. R^2										
Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$										

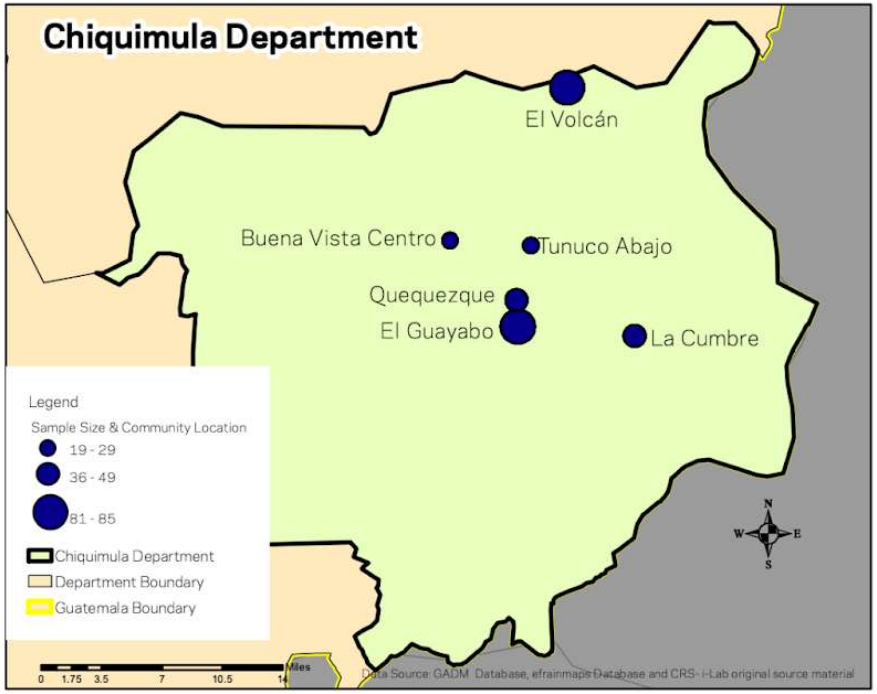
Appendix F: Descriptive Statistics for Motivation to Try Practice

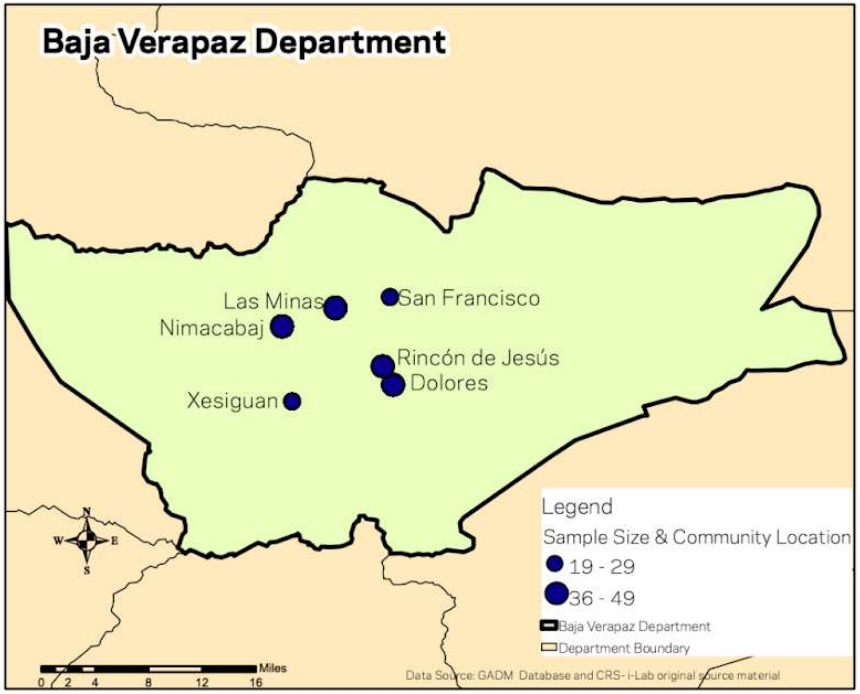


Appendix G: Geographic Locations of Communities and Sample Size






Chiquimula Department
El Volcán
Buena Vista Centro
Tunuco Abajo
Quequezque
El Guayabo
La Cumbre
Legend
Sample Size & Community Location
19 - 29
36 - 49
81 - 85
Chiquimula Department
Department Boundary
Guatemala Boundary
0 1.75 3.5 7 10.5 14
Miles
Data Source: GADM Database, efrainmaps Database and CRS- i-Lab original source material


Baja Verapaz Department
Las Minas
San Francisco
Nimacabaj
Rincón de Jesús
Dolores
Xesiguan
Legend
Sample Size & Community Location
19 - 29
36 - 49
Baja Verapaz Department
Department Boundary
0 2 4 8 12 16
Miles
Data Source: GADM Database and CRS- i-Lab original source material

Appendix H: Summary Statistics of Variables included in Research

Demonstrated Knowledge of WSA Practices

Chiquimula: Demonstrated Knowledge of Permanent Mulching Practice

Demonstrated Mulch Knowledge	Freq.	Percent
0 No	40	13.38
1 Yes	259	86.62
Total	299	100.00

Chiquimula: Demonstrated Knowledge of 4R Responsible Nutrients Management Practice

Demonstrated 4R Knowledge	Freq.	Percent
0 No	75	25.17
1 Yes	223	74.83
Total	298	100.00

Chiquimula: Demonstrated Knowledge of Visual Soil Evaluation Practice

Demonstrated Soil Knowledge	Freq.	Percent
0 No	198	65.78
1 Yes	103	34.22
Total	301	100.00

Chiquimula: Demonstrated Knowledge of Integrated Armyworm Management Practice

Demonstrated Worm Knowledge	Freq.	Percent
0 No	191	63.88
1 Yes	108	36.12
Total	299	100.00

Chiquimula: Demonstrated Knowledge of Integrated Slug Management Practice

Demonstrated Slug Knowledge	Freq.	Percent
0 No	187	62.13
1 Yes	114	37.87
Total	301	100.00

Baja Verapaz: Demonstrated Knowledge of Permanent Mulching Practice

Demonstrated Mulch Knowledge	Freq.	Percent
0 No	7	3.41
1 Yes	198	96.59
Total	205	100.00

Baja Verapaz: Demonstrated Knowledge of 4R Responsible Nutrients Management Practice

Demonstrated 4R Knowledge	Freq.	Percent
0 No	6	2.93
1 Yes	199	97.07
Total	205	100.00

Baja Verapaz: Demonstrated Knowledge of Visual Soil Evaluation Practice

Demonstrated Soil Knowledge	Freq.	Percent
0 No	32	15.84
1 Yes	170	84.16
Total	202	100.00

Baja Verapaz: Demonstrated Knowledge of Integrated Armyworm Management Practice

Demonstrated Worm Knowledge	Freq.	Percent
0 No	64	32.82
1 Yes	131	67.18
Total	195	100.00

Application of WSA Practices

Chiquimula: Application of Permanent Mulching Practice

Mulch Application	Freq.	Percent
2 Used in the past, stopped	1	0.39
3 Using for the first time	33	12.74
4 Using for a long time	225	86.87
Total	259	100.00

Chiquimula: Application of 4R Responsible Nutrients Management Practice

4R Application	Freq.	Percent
2 Used in the past, stopped	1	0.45
3 Using for the first time	61	27.35
4 Using for a long time	160	71.75
99 No response	1	0.45
Total	223	100.00

Chiquimula: Application of Visual Soil Evaluation Practice

Soil Application	Freq.	Percent
1 Not using practice	8	7.77
2 Used in the past, stopped	2	1.94
3 Using for the first time	40	38.83
4 Using for a long time	53	51.46
Total	103	100.00

Chiquimula: Application of Integrated Armyworm Management Practice

Armyworm Application	Freq.	Percent
1 Not using practice	7	6.48
3 Using for the first time	37	34.26
4 Using for a long time	64	59.26
Total	108	100.00

Chiquimula: Application of Integrated Slug Management Practice

Slug Application	Freq.	Percent
1 Not using practice	7	6.14
2 Used in the past, stopped	1	0.88
3 Using for the first time	20	17.54
4 Using for a long time	85	74.56
99 No response	1	0.88
Total	114	100.00

Baja Verapaz: Application of Permanent Mulching Practice

Mulch Application	Freq.	Percent
2 Used in the past, stopped	2	1.01
3 Using for the first time	88	44.44
4 Using for a long time	108	54.55
Total	198	100.00

Baja Verapaz: Application of 4R Responsible Nutrients Management Practice

4R Application	Freq.	Percent
2 Used in the past, stopped	1	0.50
3 Using for the first time	86	43.22
4 Using for a long time	112	56.28
Total	199	100.00

Baja Verapaz: Application of Visual Soil Evaluation Practice

Soil Application	Freq.	Percent
1 Not using practice	1	0.59
3 Using for the first time	77	45.29
4 Using for a long time	92	54.12
Total	170	100.00

Baja Verapaz: Application of Integrated Armyworm Management Practice

Armyworm Application	Freq.	Percent
2 Used in the past, stopped	1	0.77
3 Using for the first time	30	23.08
4 Using for a long time	99	76.15
Total	130	100.00

Intention to Continue Using WSA Practices

Chiquimula: Intention to Continue Using Permanent Mulching Practice

	Freq.	Percent
2 Yes	238	92.25
95 I don't know/I'm not sure	20	7.75
Total	258	100.00

Chiquimula: Intention to Continue Using 4R Responsible Nutrients Management Practice

	Freq.	Percent
2 Yes	191	86.43
95 I don't know/I'm not sure	30	13.57
Total	221	100.00

Chiquimula: Intention to Continue Using Visual Soil Evaluation Practice

	Freq.	Percent
2 Yes	67	72.04
95 I don't know/I'm not sure	26	27.96
Total	93	100.00

Chiquimula: Intention to Continue Using Integrated Armyworm Management Practice

	Freq.	Percent
1 No	2	1.98
2 Yes	79	78.22
95 I don't know/I'm not sure	20	19.80
Total	101	100.00

Chiquimula: Intention to Continue Using Integrated Slug Management Practice

	Freq.	Percent
1 No	2	1.90
2 Yes	96	91.43
95 I don't know/I'm not sure	7	6.67
Total	105	100.00

Baja Verapaz: Intention to Continue Using Permanent Mulching Practice

	Freq.	Percent
2 Yes	194	98.98
95 I don't know/I'm not sure	2	1.02
Total	196	100.00

Baja Verapaz: Intention to Continue Using 4R Responsible Nutrients Management Practice

	Freq.	Percent
1 No	1	0.51
2 Yes	197	99.49
Total	198	100.00

Baja Verapaz: Intention to Continue Using Visual Soil Evaluation Practice

	Freq.	Percent
1 No	1	0.59
2 Yes	167	98.82
95 I don't know/I'm not sure	1	0.59
Total	169	100.00

Baja Verapaz: Intention to Continue Using Integrated Armyworm Management Practice

	Freq.	Percent
1 No	5	3.91
2 Yes	119	92.97
95 I don't know/I'm not sure	4	3.13
Total	128	100.00

Chiquimula Gender

Gender	Freq.	Percent
1 Men	118	39.07
2 Women	184	60.93
Total	302	100.00

Chiquimula Education Level

Education Level	Freq.	Percent
0 Never attended school	117	38.74
1 Started primary education	94	31.13
2 Completed primary education	66	21.85
3 Completed middle education	21	6.95
4 Completed professional technical education	4	1.32
Total	302	100.00

Chiquimula: Work for someone else farm or business outside the community

Livelihood 3	Freq.	Percent
0 No	223	73.84
1 Yes	79	26.16
Total	302	100.00

Chiquimula: Work for someone else farm or business inside the community

Livelihood 4	Freq.	Percent
0 No	109	36.09
1 Yes	193	63.91
Total	302	100.00

Chiquimula Live off my own production

Livelihood 6	Freq.	Percent
0 No	57	18.87
1 Yes	245	81.13
Total	302	100.00

Baja Verapaz Gender

Gender	Freq.	Percent
1 Men	19	9.36
2 Women	184	90.64
Total	203	100.00

Baja Verapaz Education Level

Education Level	Freq.	Percent
0 Never attended school	52	25.37
1 Started primary education	50	24.39
2 Completed primary education	66	32.20
3 Completed middle education	26	12.68
4 Completed professional technical education	6	2.93
5 Completed superior Education	5	2.44
Total	205	100.00

Baja Verapaz: Work for someone else farm or business outside the community

Livelihood 3	Freq.	Percent
0 No	165	88.71
1 Yes	21	11.29
Total	186	100.00

Baja Verapaz : Work for someone else farm or business inside the community

Livelihood 4	Freq.	Percent
0 No	139	74.73
1 Yes	47	25.27
Total	186	100.00

Baja Verapaz Live off my production

Livelihood 6	Freq.	Percent
0 No	48	25.81
1 Yes	138	74.19
Total	186	100.00

Chiquimula Land Amount/ Household size*

Landamt/HHsize	Freq.	Percent
0	2	0.66
.45	2	0.66
.5	5	1.66
.5625	6	1.99
.64	1	0.33
.6428571	14	4.64
.6666667	1	0.33
.75	15	4.97
.9	15	4.97
1	1	0.33
1.111111	3	0.99
1.125	25	8.28
1.13	1	0.33
1.25	11	3.64
1.428571	11	3.64
1.43	3	0.99
1.5	33	10.93
1.666667	17	5.63
1.875	3	0.99
2	35	11.59
2.142857	2	0.66
2.25	10	3.31
2.5	33	10.93
3	1	0.33
3.333333	27	8.94
3.75	4	1.32
4	1	0.33
4.5	3	0.99
5	15	4.97
6.666667	1	0.33
10	1	0.33
Total	302	100.00

* Land amount values are in tareas and are not exact. Land amount was recorded in five ranges (<2, 2-7, 8-12, 13-17, >17), and the average number in each range was used for this calculation (e.g., If the range was 8-12 tareas, 10 tareas was used.)

Baja Verapaz Land Amount/ Household size*

Landamt/HHsize	Freq.	Percent
0	8	3.92
.2	2	0.98
.25	3	1.47
.3333333	2	0.98
.45	1	0.49
.5625	2	0.98
.6428571	7	3.43
.75	15	7.35
.9	28	13.73
1	2	0.98
1.111111	3	1.47
1.125	12	5.88
1.13	1	0.49
1.25	4	1.96
1.428571	9	4.41
1.5	15	7.35
1.666667	8	3.92
1.67	2	0.98
2	20	9.80
2.142857	2	0.98
2.25	7	3.43
2.5	21	10.29
3	6	2.94
3.333333	9	4.41
3.75	2	0.98
5	12	5.88
10	1	0.49
Total	204	100.00

* Land amount values are in tareas and are not exact. Land amount was recorded in five ranges (<2, 2-7, 8-12, 13-17, >17), and the average number in each range was used for this calculation (e.g., If the range was 8-12 tareas, 10 tareas was used.)

Chiquimula: How did you learn about Permanent Mulch Practice?

Categories	Freq.	Percent
1 I just know	2	0.77
2 I taught myself	10	3.86
3 Another institution, outside of Caritas or CRS, taught me	4	1.54
4 I was taught by someone, but they did not attend a farmer field school	45	17.37
5 I was taught by someone who attend a farmer field school	11	4.25
6 I attended a Farmer field school	184	71.04
Other	3	1.16
Total	259	100

Chiquimula: Mulch and Other Learn

Other	Freq.	Percent
Mi padre me enseño	3	100
Total	3	100

Baja Verapaz: How did you learn about Permanent Mulch Practice?

Categories	Freq.	Percent
1 I just know	1	0.51
2 I taught myself	15	7.58
3 Another institution, outside of Caritas or CRS, taught me	4	2.02
4 I was taught by someone, but they did not attend a farmer field school	2	1.01
5 I was taught by someone who attend a farmer field school	159	80.30
Other	17	8.59
Total	198	100

Baja Verapaz Mulch and Other Learn

Other	Freq.	Percent
costumbre familiar	13	76.47
lo aprendí de sus abuelos	1	5.88
lo sabe desde antes como agricultora	1	5.88
su papa le enseño	2	11.76
Total	17	100

Chiquimula: How much of the land is owned by you or your family's?

Land Tenure	Freq.	Percent
1 All the land is rent	175	57.95
2 Less than the half is rent	3	0.99
3 At least half or more is our land	15	4.97
4 All the land is ours	106	35.10
91 Missing	1	0.33
99 No response	2	0.66
Total	302	100.00

Baja Verapaz: How much of the land is owned by you or your family's?

Land Tenure	Freq.	Percent
1 All the land is rent	44	21.46
2 Less than the half is rent	5	2.44
3 At least half or more is our land	15	7.32
4 All the land is ours	140	68.29
91 Missing	1	0.49
Total	205	100.00

Chiquimula: Corn Crop, prime season last year

Corn Crop	Freq.	Percent
0 No	18	5.98
1 Yes	283	
Total	301	100.00

Chiquimula: Corn Crop current year

Corn Crop	Freq.	Percent
1Yes	302	100.00
Total	302	100.00

Chiquimula: Beans Crop, second season last year

Beans Crop	Freq.	Percent
0 No	13	4.42
1 Yes	281	95.58
Total	294	100.00

Chiquimula: Beans Crop current year

Beans Crop	Freq.	Percent
0 No	286	94.70
1 Yes	16	5.30
Total	302	100.00

Chiquimula: Presence of Armyworm Pest

Armyworm Pest	Freq.	Percent
0 No	64	24.24
1 Yes	200	75.76
Total	264	100.00

Chiquimula: Presence of Slug Pest

Slug Pest	Freq.	Percent
0 No	56	21.21
1 Yes	208	78.79
Total	264	100.00

Chiquimula: Perceived Vulnerability

Vulnerability	Freq.	Percent
1We struggle to meet our needs	250	83.06
2 We sometimes struggle to meet our needs	49	16.28
3 We can meet our needs	2	0.66
Total	301	100.00

Baja Verapaz: Corn Crop, prime season last year

Corn Crop	Freq.	Percent
0 No	1	0.49
1 Yes	204	99.51
Total	205	100.00

Baja Verapaz: Corn Crop current year

Corn Crop	Freq.	Percent
0 No	2	0.98
1 Yes	202	99.02
Total	204	100.00

Baja Verapaz: Beans Crop, second season last year

Beans Crop	Freq.	Percent
0 No	64	35.36
1Yes	117	64.64
Total	181	100.00

Baja Verapaz: Beans Crop current year

Beans Crop	Freq.	Percent
0 No	137	67.16
1 Yes	67	32.84
Total	204	100.00

Baja Verapaz: Presence of Armyworm Pest

18_cogollero	Freq.	Percent
0 No	22	11.22
1 Yes	174	88.78
Total	196	100.00

Baja Verapaz: Presence of Slug Pest

Slug Pest	Freq.	Percent
0 No	179	91.33
1 Yes	17	8.67
Total	196	100.00

Baja Verapaz: Perceived Vulnerability

Vulnerability	Freq.	Percent
1 We struggle to meet our needs	101	49.27
2 We sometimes struggle to meet our needs	14	6.83
3 We can meet our needs	20	9.76
4 We can meet our needs and save money/ invest in improving our lives	70	34.15
Total	205	100.00

Chiquimula Vulnerability and Demonstrated Knowledge of Nutrient Management

Vulnerability	Nutrient Management		
	0 No	1Yes	Total
1 We struggle to meet our needs	35	213	248
2 We sometimes struggle to meet our needs	39	8	47
3 We can meet our needs	1	1	2
Total Observations	75	222	297

Baja Verapaz Vulnerability and Demonstrated Knowledge of Nutrient Management

Vulnerability	Nutrient Management		
	0 No	1 Yes	Total
1 We struggle to meet our needs	2	99	101
2 We sometimes struggle to meet our needs	2	12	14
3 We can meet our needs	1	19	20
4 4 We can meet our needs and save money/ invest in improving our lives	1	69	70
Total Observations	6	199	205

Chiquimula Communities: Raíces and RENACER Projects
Knowledge of Practice

Raíces Communities: Quequezque, El Volcan and La Cumbre

Demonstrated Mulch knowledge	Freq.	Percent
0 No	9	7.20
1 Yes	116	92.80
Total	125	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Demonstrated 4R knowledge	Freq.	Percent
0 No	22	17.89
1 Yes	101	82.11
Total	123	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Demonstrated Soil knowledge	Freq.	Percent
0 No	79	63.20
1 Yes	46	36.80
Total	125	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Demonstrated Worm knowledge	Freq.	Percent
0 No	92	74.80
1 Yes	31	25.20
Total	123	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Demonstrated Slug knowledge	Freq.	Percent
0 No	77	62.10
1Yes	47	37.90
Total	124	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Demonstrated Mulch knowledge	Freq.	Percent
0 No	31	17.82
1 Yes	143	82.18
Total	174	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Demonstrated 4R knowledge	Freq.	Percent
0 No	53	30.29
1 Yes	122	69.71
Total	175	100.00

RENACER Quequezque, El Volcan and La Cumbre

Demonstrated Soil knowledge	Freq.	Percent
0 No	119	67.61
1 Yes	57	32.39
Total	176	100.00

RENACER Quequezque, El Volcan and La Cumbre

Demonstrated Slug knowledge	Freq.	Percent
0 No	110	62.15
1 Yes	67	37.85
Total	177	100.00

RENACER Quequezque, El Volcan and La Cumbre

Demonstrated Worm knowledge	Freq.	Percent
0 No	99	56.25
1 Yes	77	43.75
Total	176	100.00

Chiquimula Communities: Raíces and RENACER Projects
Application of Practice

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Permanent Mulching	Freq.	Percent
2 Plans to continue	110	94.83
95 Doesn't know	6	5.17
Total	116	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Responsible Nutrients Management	Freq.	Percent
2 Plans to continue	93	92.08
95 Doesn't know	8	7.92
Total	101	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Visual Soil Evaluation	Freq.	Percent
2 Plans to continue	37	86.05
95 Doesn't know	6	13.95
Total	43	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

IPM- Worm	Freq.	Percent
1 Doesn't plan to continue	1	3.33
2 Plans to continue	25	83.33
95 Doesn't know	4	13.33
Total	30	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

IMP- Slug	Freq.	Percent
1 Doesn't plan to continue	1	2.17
2 Plans to continue	43	93.48
95 Doesn't know	2	4.35
Total	46	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Permanent Mulching	Freq.	Percent
2 Plans to continue	128	90.14
95 Doesn't know	14	9.86
Total	142	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Responsible Nutrients Management	Freq.	Percent
2 Plans to continue	98	81.67
95 Doesn't know	22	18.33
Total	120	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Visual Soil Evaluation	Freq.	Percent
2 Plans to continue	30	60.00
95 Doesn't know	20	40.00
Total	50	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

IPM- Worm	Freq.	Percent
1	1	1.41
2 Plans to continue	54	76.06
95 Doesn't know	16	22.54
Total	71	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

IMP- Slug	Freq.	Percent
1 Doesn't plan to continue	1	1.69
2 Plans to continue	53	89.83
95 Doesn't know	5	8.47
Total	59	100.00

Chiquimula Communities: Raíces and RENACER Projects
Intention to Continue to Applying Practice

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Permanent Mulching	Freq.	Percent
3 Using practice for the first time	12	10.34
4 Using practice long time	104	89.66
Total	116	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Responsible Nutrients Management	Freq.	Percent
3 Using practice for the first time	15	14.85
4 Using practice long time	86	85.15
Total	101	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

Visual Soil Evaluation	Freq.	Percent
1 No using practice	1	2.17
2 Use in the past, stopped	2	4.35
3 Using practice for the first time	13	28.26
4 Using practice long time	30	65.22
Total	46	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

IPM- Worm	Freq.	Percent
1 No using practice	1	3.23
3 Using practice for the first time	1	3.23
4 Using practice long time	29	93.55
Total	31	100.00

Raíces Communities: El Guayabo, Tunuco Abajo, Buena Vista

IMP- Slug	Freq.	Percent
2 Use in the past, stopped	1	2.13
3 Using practice for the first time	3	6.38
4 Using practice long time	43	91.49
Total	47	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Permanent Mulching	Freq.	Percent
2 Use in the past, stopped	1	0.70
3 Using practice for the first time	21	14.69
4Using practice long time	121	84.62
Total	143	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Responsible Nutrients Management	Freq.	Percent
2 Use in the past, stopped	1	0.82
3 Using practice for the first time	46	37.70
4 Using practice long time	74	60.66
99 No response	1	0.82
Total	122	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

Visual Soil Evaluation	Freq.	Percent
1 No using practice	7	12.28
3 Using practice for the first time	27	47.37
4 Using practice long time	23	40.35
Total	57	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

IPM- Worm	Freq.	Percent
1 No using practice	6	7.79
3 Using practice for the first time	36	46.75
4 Using practice long time	35	45.45
Total	77	100.00

RENACER Communities: Quequezque, El Volcan and La Cumbre

	Freq.	Percent
1 No using practice	7	10.45
3 Using practice for the first time	17	25.37
4 Using practice long time	42	62.69
99 No response	1	1.49
Total	67	100.00

KEOUGH SCHOOL
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Integration Lab

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The Integration Lab (i-Lab) is part of the University of Notre Dame's new Keough School of Global Affairs. This interdisciplinary ecosystem leverages innovative approaches and deep partnerships to respond to critical global challenges. The i-Lab offers a distinctive curricular sequence, designed to build momentum over the full two-year arc of the Keough School's Master of Global Affairs, preparing students to be effective professionals capable of operating within a global landscape that requires highly integrated mindsets and wide-ranging professional skillsets. The centerpiece of this student journey is the i-Lab's Global Partner Experience (GPE), a year-long engagement where students work with a partner organization both on campus and in the field, through a collaboration designed to not only enrich the student's professional development, but also deliver tangible results to the partner.

Christine Chun

SUSTAINABLE DEVELOPMENT

Christine is currently pursuing an MGA/MBA dual degree. Previously, she worked over ten years in international development and education-focused nonprofits. She intends to pursue social impact consulting and launch a sustainable coffee social enterprise in Ecuador.

UNITED STATES

Aidé Cuenca Narvaez

SUSTAINABLE DEVELOPMENT

Aidé is committed to leveraging the grassroots work of communities that are already working for social transformation through collaborative partnership, empowerment, and mutuality. Her research seeks to understand the effects of education and environmental policies on vulnerable communities.

ECUADOR

Anna Thomas

SUSTAINABLE DEVELOPMENT

Anna is currently pursuing an MGA/MBA dual degree. She previously worked in international development and community building. In the future, she hopes to use cross-sectoral knowledge to help build a stronger global food system.

UNITED STATES

Alixandra Underwood

SUSTAINABLE DEVELOPMENT

Alix is passionate about about interdisciplinary approaches to environmental crises and to disparities in resource access. She hopes to use her experience in ecology, international development, and inclusive governance to create change.

UNITED STATES