



Improving Rural Livelihoods: A Study of Four Guatemalan Coffee Cooperatives



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GLOSSARY OF TERMS

Cooperative	An organization owned and run jointly by its members; in this report, cooperatives refer specifically to coffee cooperatives composed of smallholder coffee farmers.
SGB	Small and growing business; a commercially viable business with strong potential for growth and thus for creating economic, social, and environmental benefits. A cooperative or producer organization is a type of SGB.
Smallholder	Farmer generally possessing five or fewer hectares of land.

CONTEXT

Poverty in Guatemala is widespread and deeply entrenched, especially in rural areas. Over half of Guatemalans live below the national poverty line, defined by whether a household has sufficient income to purchase a basic basket of goods and services. In rural areas, it is estimated that 39 percent of households live below \$2.50 per person per day, with poverty and marginalization higher in indigenous areas. Over half of children under the age of five are malnourished.

Agriculture plays an important role in Guatemala's economy, comprising 15 percent of GDP and employing about 30 percent of the country's labor force. According to the national coffee association, Anacafé, coffee is grown in over half of the country's municipalities by approximately 90,000 producers. It is one of Guatemala's largest exports, with 98 percent of total production exported.

However, only a fraction of the profits reach individual farmers. Producers earn 10 to 12 cents of every dollar on the retail price of coffee.¹ While producers of specialty coffee (the highest-quality coffee) tend to receive a higher price per pound in absolute terms, they receive a smaller portion of the end price paid by the consumer.²

The overwhelming majority of coffee farmers in Guatemala are independent, that is, unaffiliated with producer organizations. They grow conventional, uncertified coffee and sell to local intermediaries at the market price, and sometimes below it.

A small proportion of coffee farmers are organized into cooperatives,³ which in addition to providing services such as credit and agronomic technical assistance, are generally in a better position than disaggregated farmers to negotiate with coffee buyers for higher prices. Root Capital has provided trade credit to many of these exporting producer organizations in Guatemala — 15 in 2013 and 28 cumulatively since 1999 — and has provided financial management training to 36 producer organizations.

1 Pendergrast, Mark, *Uncommon Grounds: The History of Coffee and How It Transformed the World* (Basic Books, 2010).

2 Prices paid by coffee companies, as well as prices passed on to farmers by cooperatives, vary significantly.

3 In coffee, to our knowledge, there is no definitive data regarding the proportion of coffee farmers organized into cooperatives. However, many in the coffee industry agree that the percentage is low, with some citing that about 10 percent are organized (a figure that we could not link to any specific study).

Box 1: Coffee cooperatives in Guatemala

The cooperative movement in Guatemala emerged in the early twentieth century and peaked in the 1950s and 1960s, following a period of agrarian reform when the government redistributed small plots of land to thousands of rural peasants. During this period, many cooperatives were established with the support of the national government and religious leaders. In coffee-growing areas, newly formed coffee cooperatives sought to commercialize smallholders' coffee and secure higher prices.

During the bloody Guatemalan Civil War from 1960 to 1996, cooperativism, associated with antigovernment guerrilla fighters, withered and many cooperatives disbanded or restricted their activities.

Following the Peace Accords in 1996, and in the wake of a global coffee-price crisis in 2002, many cooperatives resumed their activities to support farmers in accessing markets that paid premium prices, above the market price and the price of production. New cooperatives also emerged, with the same mission as their predecessors: to help connect producers to markets and promote farmers' well-being.

A subset of these cooperatives also embraced principles of sustainability to access fair trade and organic markets, which offered a higher price for compliance with specific environmental and social standards.

Today, Anacafé estimates that approximately 45 percent of the 90,000 farmers in Guatemala farm their own land rather than working on others' estates and that a significant (though unknown) minority are members of cooperatives. The activities of these cooperatives range from only collecting and selling members' coffee to providing more extensive services, including credit, technical assistance, input provision, and community development programs.





Introduction to Four Groups

Below we introduce the four groups that were the focus of Root Capital's study during 2013. We used pseudonyms for the cooperatives to protect their reputations and in order to candidly discuss their achievements, failures, and challenges.

Girasol

The cooperative Girasol was founded in 1964 by American and Italian Catholic groups as a savings and loan cooperative to improve the well-being of its members through access to financial services. In 2009, under the direction of a female leader, the cooperative incorporated a coffee commercialization project to promote income generation and to help recover the ailing savings and loan organization. Since then, the group has exported high-quality specialty coffee to Italy and England under the Slow Food sustainability label. The cooperative has also become involved in the community, furthering access to medical services through the establishment of a medical assistance center (with weekly doctor visits) and selling partially subsidized pharmaceutical and medical supplies. Girasol works with two other cooperatives in areas that speak the Mam indigenous language, located several hours from the cooperative headquarters.

Quick facts:

- ☛ Enterprise type: Savings and loan cooperative with a coffee cooperative offshoot
- ☛ Region in Guatemala and language: Highlands; 1/3 of members speak Mam⁴; remainder are Spanish speakers
- ☛ Year established: 1964, with coffee incorporated in 2009
- ☛ Number of members: 204 members (64 women)
- ☛ Gender inclusiveness: Woman-led; women are 13% of board, 45% of employees, 10% of agronomic extension agents
- ☛ Services offered: Advance payment upon delivery, credit for farm maintenance and renovation, price floor, technical assistance, partially subsidized fertilizer and fungicides, medical assistance center and partially subsidized pharmacy for community members
- ☛ Volume exported in 2013: 5,310 quintales (1 quintal = 100 pounds)
- ☛ Certification: Slow Food independent certification
- ☛ Root Capital lending client since 2011; loan amounts: \$390K (2011), \$500K (2013); financial training client since 2012



⁴ Guatemala has 23 spoken languages.



Idesa

In the 1980s, the communities where Idesa works suffered from what has since been recognized by the international community as government-sponsored genocide and a relentless scorched earth policy. According to a 1999 United Nations Truth Commission report, the government destroyed 70 to 90 percent of the area's villages, killing 7,000 individuals and forcing the majority to escape to the mountains, where thousands more died from starvation, sickness, and aerial bombing.⁵ It was for ordering the deaths of indigenous people in this region that then president Efraín Ríos Montt became the first national leader convicted of genocide in his own country, in 2013.⁶ In 1998, after the worst violence subsided, Idesa was founded by 28 community members to help revitalize livelihoods in the area. Since its inception, the cooperative has sought to improve the quality of life for its members through the commercialization of coffee and the provision of technical assistance and financial services. Beyond commercializing coffee, Idesa, with support from Root Capital, is promoting farmers' diversification into honey production and export.

Quick facts:

- ☛ Enterprise type: Coffee cooperative
- ☛ Region in Guatemala and language: Highlands; predominantly Ixil speakers
- ☛ Year established: 1998
- ☛ Number of members: 176 members (12 women)
- ☛ Services offered: Advance payment upon delivery, credit for farm maintenance, technical assistance, seedlings and inputs for renovation, food security program to promote family gardens, training for honey production
- ☛ Gender inclusiveness: Male-led; women are 0% of board, 50% of employees, 0% of agronomic extension agents
- ☛ Volume exported in 2013: 1,650 quintales (1 quintal = 100 pounds)
- ☛ Certification: Organic and fair trade
- ☛ Root Capital lending client since 2005; loan amounts: started at \$50K; now at \$150K; financial training client since 2012



5 Elisabeth Malken, "In Effort to Try Dictator, Guatemala Shows New Judicial Might," *The New York Times*, March 16, 2013, accessed April 12, 2014, <http://www.nytimes.com/2013/03/17/world/americas/victims-of-guatemala-civil-war-eagerly-await-dictators-trial.html>; Mireya Navarro, "Guatemalan Army Waged 'Genocide,' New Report Finds," *The New York Times*, February 26, 1999, accessed April 12, 2014, <http://www.nytimes.com/1999/02/26/world/guatemalan-army-waged-genocide-new-report-finds.html>.

6 The conviction was overturned shortly thereafter.



Catalina

Founded in 1965, Catalina has become a primary agent of community development in a majority K'iche-speaking area with minimal government services. Beyond aggregating, processing, and commercializing coffee, Catalina has helped to bring water services, road access, and electricity to the local community. In 2004, the cooperative began selling coffee certified by Café Femenino, a foundation created by and affiliated with the U.S.-based coffee importer Organic Products Trading Company (OPTCO), which pays premium prices for coffee produced by women. The cooperative has also prioritized local literacy by founding and maintaining a community library and reading programs for children.

Quick facts:

- ☛ Enterprise type: Coffee cooperative
- ☛ Region in Guatemala and language: Pacific; predominantly K'iche speakers
- ☛ Year established: 1965
- ☛ Number of members: 127 members (68 women)
- ☛ Gender inclusiveness: Male-led; women are 33% of board, 40% of employees, 0% of agronomic extension agents
- ☛ Services offered: Advance payment upon delivery, credit for farm maintenance, wet mill processing, technical assistance, partially subsidized inputs, community library
- ☛ Volume exported in 2013: 1,125 quintales (1 quintal = 100 pounds)
- ☛ Certification: Organic, fair trade, Café Femenino
- ☛ Root Capital lending client since 2008; loan amounts: started at \$78K; now at \$250K; financial training participant since 2012





Lirio

In 2010, Catholic and community leaders founded Lirio to link smallholder farmers to international markets and provide them with an alternative to selling to local intermediaries. Lirio is located in Guatemala's eastern "dry corridor," which suffers from frequent drought — a 2012 drought destroyed over 50 percent of the maize and bean crops. The region also experiences more extreme poverty and malnutrition than the national average. Since its foundation, the cooperative has received significant external donations; the challenge for Lirio in the coming years is to begin operating as a sustainable business (see callout in Chapter 1).

Quick facts:

- ☛ Enterprise type: Coffee cooperative
- ☛ Region in Guatemala and language: Eastern Guatemala; Spanish
- ☛ Year established: 2010
- ☛ Number of members: 236 members (61 women)
- ☛ Gender inclusiveness: Male-led; women are 0% of board, 14% of employees, 44% of agronomic extension agents
- ☛ Services offered: Dry milling, technical assistance (through international NGO)
- ☛ Volume exported in 2013: 2,750 quintales (1 quintal = 100 pounds)
- ☛ Certification: Fair trade
- ☛ Root Capital lending client in 2013; loan amount: one loan for \$250K



Who Are the Farmers?

Most of the farmers associated with these four groups are smallholders, owning one to four total hectares, of which they dedicate 40 to 60 percent to coffee. Typically they devote the rest of the land to producing food crops (corn and beans), as well as maintaining some forest or undeveloped land (see Figure 1 below).

Households tend to be headed by farmers in their mid- to late 40s and to consist of five to seven members. Men and women both participate in production and processing, but generally subscribe to a gendered division of labor. Men plant, fertilize, and prune coffee trees while women are responsible for harvesting, depulping and washing coffee beans, preparing food for workers, and other household tasks. (See Chapter 2 for more details on the division of labor.) The majority of members are male, though participation of women varies from 7 percent in Idesa to 54 percent in Catalina.

Among members of Girasol, Idesa, and Lirio, coffee is the primary source of cash income, accounting for 75 to 82 percent of total income. Meanwhile, among members of Catalina, coffee accounts for only 23 percent of cash income because members produce and sell other crops, including bananas and *maxán* (used for tamales), and also work on others' farms to supplement earnings from particularly small land plots (see Figures 1 and 2).

Figure 1: Landholdings in hectares

Cooperative	Total area	Coffee area	Other production	Uncultivated
Girasol	3.5	1.6	.6	1.2
Idesa	3.8	1.0	.9	1.8
Catalina	1	.6	.3	.1
Lirio	2.2	1.1	.5	.7

Figure 2: Average composition of household income

Cooperative	Total gross income (U.S. dollars)	Coffee income	Other farm sales	Employment	Other (e.g., remittances)
Girasol	\$9,504	75%	4%	9%	12%
Idesa	\$2,175	82%	6%	12%	0%
Catalina	\$4,649	22%	19%	54%	5%
Lirio	\$2,425	80%	6%	10%	4%



In all groups, coffee is regarded as a critical source of income and the surest way to put food on the table. According to one farmer:

"Coffee provides a means to pay for our children and ourselves and to pay for any other needs we have. Coffee is what supports it all."

Many coffee farmers consider coffee to be a basic livelihood yet not a source of prosperity. As another farmer explains:

"The advantage of being a coffee farmer is that it supports you. If you have 10 to 12 cuerdas [half a hectare], it's enough. When I say 'it's enough,' it's not that you can eat and buy everything you want, but at least you have your daily corn. You survive."

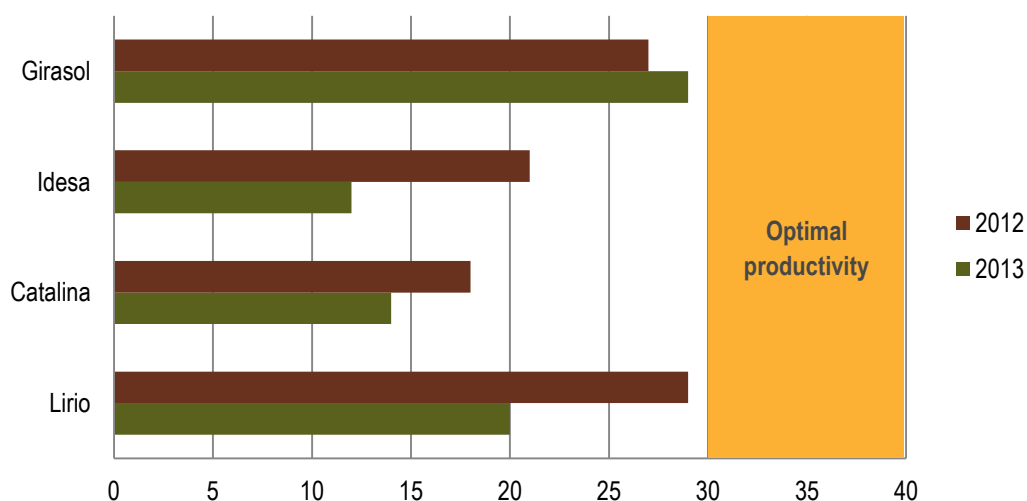
An important factor limiting coffee earnings — though certainly not the only one — is the productivity gap between what farmers currently produce and what they could produce if they had optimal resources and production knowledge. Among members of the four cooperatives, productivity varies but, as is common for smallholders, tends to fall short of what is attainable. According to local agronomists, optimal productivity in this region is between 30 and 40 quintales (1 quintal = 100 pounds) per hectare.⁷

However, the average cooperative member in three of the groups does not achieve this level of output. In 2013:

- ☛ Idesa members achieved yields of 10 quintales per hectare
- ☛ Catalina and Lirio members realized yields of 15 to 20 quintales per hectare
- ☛ Girasol members reached the lower end of optimal production range, at 30 quintales per hectare

⁷ Globally, average coffee productivity is about 20 quintales per hectare. However, farmers in some countries, notably Vietnam and China, produce more than 50 quintales per hectare on average (according to the Food and Agriculture Organization of the UN). While these yields may not be attainable in all contexts due to variations in local climatic conditions and other factors, the significant range in productivity across coffee-producing countries suggests that many farmers are not maximizing their yields.

Figure 3: Productivity 2013 and 2012 (quintales per hectare)



Coffee farm households among the four groups are income-poor, although the self-reported cash income ranges significantly between groups, from \$1 to about \$5.50 per person per day. Survey results show that farmers in Idesa are the poorest, followed by Lirio, Catalina, and Girasol. The chart below summarizes the percent likelihood that members live below \$2.50 per day, as estimated by the Progress Out of Poverty Index® (PPI®), and the income and number of months of food security based on self-reporting in the producer surveys. (See Appendix IV, on the PPI, for more details.)



Figure 4: Income and socioeconomic indicators

Cooperative	Members (<\$2.50/day), estimated income/day, months of food insecurity	Nonmembers (<\$2.50/day), estimated income/day, months of food insecurity
Girasol	17.5% \$5.52 0.28 months	21.8% \$4.32 0.25 months
Idesa	52.8% \$.98* 0.22 months	57.9% \$.26* 0.3 months
Catalina	30.8% \$2.81* 1.4 months*	28.4% \$2.08* 2.4 months*
Lirio	37.7%* \$1.55 2 months	48.1%* \$1.06 2.1 months

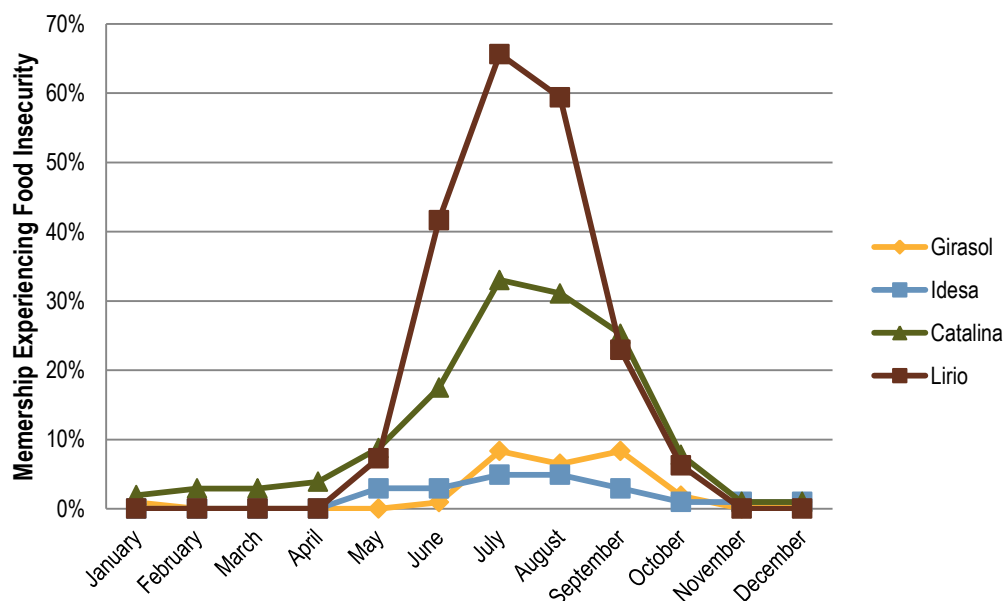
*All statistical means tests are between members and nonmembers. Throughout the document, * indicates that the difference is statistically significant.

Moderate to acute food insecurity is prevalent during the months leading up to the harvest, before farmers receive payment. Cooperative members reported experiencing on average 0.2 to 2 months of food insecurity each year, during which they and their households were unable to maintain their typical diet. Food insecurity is most pronounced during the “lean months” of June through September, peaking in July between the maize and bean harvests, when there is no income from coffee and expenses run high (see Figure 2).⁸

Among Idesa members, food insecurity is less grave than for farmers in the other communities, even though incomes are lower, because households grow subsistence crops and rely on a strong social network for mutual support.

⁸ We believe that the pronounced jump in food insecurity during these months is a product of several factors. First, producer households rely heavily on the cultivation of maize and beans for their subsistence, yet generally cannot produce enough of either crop to last throughout the year. Second, households generally lack enough disposable income throughout the year to purchase supplemental food or meet other household needs. This is particularly true between May and September, when producers have depleted the coffee payments received during the spring coffee harvest, which ends in April, and food is at its most expensive due to high demand. These months are also a difficult time for households more reliant on off-farm labor, such as those belonging to Catalina, as the rainy season limits local employment opportunities.

Figure 5: Incidence of food insecurity among cooperative members



As in other parts of Guatemala, education levels are low. Most farmers report having completed between two and five years of primary education. Although there are signs of progress — almost all children of members attend school, though sometimes not in years when coffee prices fall — about half are below grade level for their age, according to our data (see Figure 6).

Figure 6: Proportion of households with all children at grade level

Cooperative	Members with all children at grade level	Nonmembers with all children at grade level
Girasol	41%	37%
Idesa	48%	44%
Catalina	49%	43%
Lirio	53%	47%

In interviews, members and nonmembers spoke emphatically about the importance of education for their children and their desire to fund their children's schooling; some also lamented removing children from school in years when money was scarce.⁹ As one producer from Catalina explained:

"The most important thing for the community here and now is education for the kids. If you have the resources, the kids should go to school. That's our decision, as long as there's money."

⁹ We did not ask whether the main barrier was school fees, costs associated with schooling such as uniforms and transportation, or the opportunity cost of having children attend school rather than participating in production.

Box 2: Coffee leaf rust

At the time of this study, farmers across Guatemala had just suffered an outbreak of coffee leaf rust, or *la roya* in Spanish, a fungus that kills or weakens coffee trees by affecting the ability of coffee leaves to photosynthesize.

Although coffee rust has been present at low levels in Central America for decades, the current coffee leaf rust epidemic is considered to be the most severe in 40 years, with more than half of Central America's coffee farms affected. Losses were estimated at \$1 billion for the 2012-2013 harvest, and several countries, including Guatemala, declared national emergencies in response. Many farmers lost all or a majority of their production, with food insecurity rising as a result.¹⁰

In areas affected by coffee leaf rust, farmers technically can salvage production by renovating their farms, that is, planting new coffee trees. However, the seedlings and inputs required for renovation are costly, and the process takes two to three years before production resumes and farmers can pay back any loans, rendering renovation a large financial sacrifice in the short term.

In many coffee communities, farmers are disillusioned and looking to outside institutions for assistance while hoping that their fortunes will improve. As one farmer told us, "God willing, if roya doesn't continue, I'll keep cultivating coffee, but if roya continues, we will be in a crisis."

To address the coffee rust crisis, Root Capital in 2014 launched the Coffee Farmer Resilience Initiative, an integrated multi-stakeholder program that includes credit, training, and agronomic partnerships to support farm renovation and rehabilitation,¹¹ income diversification, and other resilience investments.



10 Sheridan, Michael, "The Coming Crisis in the Coffeelands," June 5, 2014, accessed August 29, 2014, <http://coffeelands.crs.org/2014/06/409-the-coming-crisis-in-the-coffeelands/>

11 Renovation refers to replacing old coffee trees with new ones, while rehabilitation is a type of pruning in which coffee trees are stumped to their roots to regrow. Each practice has its advantages. Renovation leads to maximum productivity, assuming proper care of the coffee trees, but requires higher investment and a longer lag time (up to three years) before coffee trees produce. Rehabilitation, on the other hand, is less costly, but does not boost productivity as much; furthermore, some trees may be so affected by coffee rust that rehabilitation ceases to be an option.

CHAPTER 1: IMPACT OF COOPERATIVES AND ROOT CAPITAL

Introduction

“Coffee, it’s more than a crop . . . it’s the way of life for my family.”
— *Producer in Girasol*

In many of the coffee communities in which Root Capital works, coffee is both a source of income and a way of life. The rhythm of the year is set by the coffee season: when it is time to plant, to fertilize, to harvest and dry, and then to restart the cycle. During the harvest, coffee communities are jubilant. As one producer explained, “Coffee brings us happiness, especially during the harvest.” The entire family heads to the coffee plots to pick ripe coffee cherries, and with the first coffee sales, money flows into the household for the first time after several months of hardship.

Though the harvest brings joy, coffee is a hard life. Production is physically demanding and costly. With productivity low in many areas due to inadequate capital, insufficient agronomic knowledge, and depleted soils, profit margins for smallholder coffee farmers are slim. Volatile prices, erratic rainfall and temperature patterns, and uncertain market dynamics are also constant threats.

In Guatemala, coffee farmers are particularly vulnerable because of their small landholdings (generally one to four hectares), most of which they dedicate to coffee, with little land available for supplemental crops that can be eaten or sold. Many coffee growing areas in Guatemala are also remote and lack access to government support programs. In the past few years, coffee leaf rust, a fungus that has killed many coffee trees, has worsened coffee growers’ precarious situation.

Agricultural small and growing businesses (SGBs) provide a glimmer of hope for coffee communities. While only a small minority of coffee farmers are formal members of SGBs¹² — cooperatives in this case — the effect of these groups on members and their households can be substantial.¹³

Impact Studies

From our ongoing engagement as a lender and financial trainer to these producer organizations, we have observed firsthand the impacts that result from their higher pricing and provision of income-boosting services like credit and technical assistance. However, in Root Capital’s initial years as an agricultural lender,¹⁴ we had limited data to corroborate our loan officers’ and financial trainers’

12 To our knowledge, there are no reliable statistics on the proportion or absolute number of farmers commercializing through cooperatives.

13 Since Root Capital started lending in Guatemala in 1999, we have made loans to 28 SGBs, representing about 12,800 farmers. We have also provided financial training to 36 SGBs, 17 of which also received credit from Root Capital. Most of these businesses have now been Root Capital clients for three to four years.

14 Root Capital is an impact-first social lender that provides loans and financial management training to agricultural businesses in the “missing middle” of finance — agricultural businesses that are too large and remote for microfinance and too small for commercial banks to serve. Our clients are farmer cooperative and inclusive private businesses that help build sustainable livelihoods by aggregating hundreds,

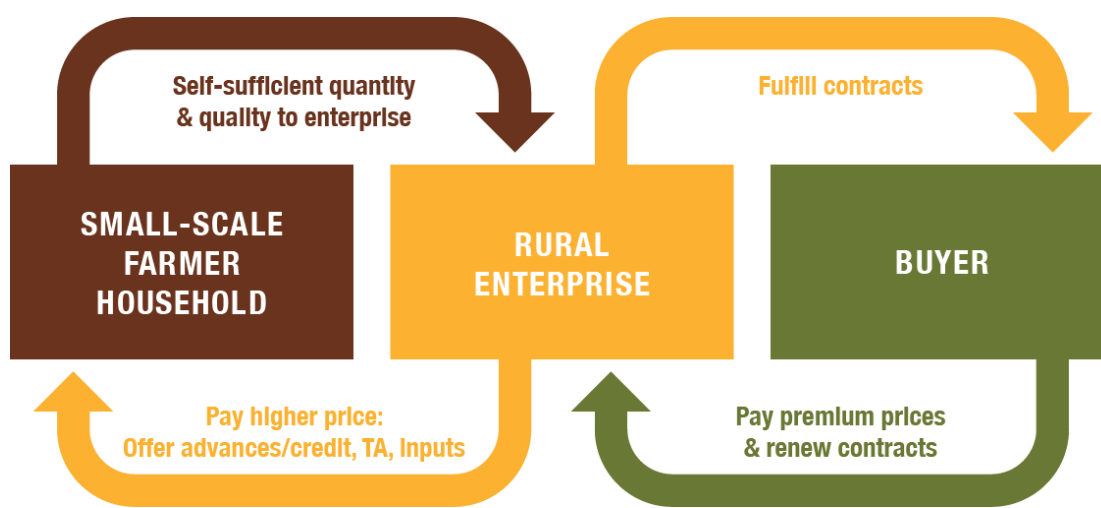
impressions of producer-level impact. In 2011, as a complement to the enterprise-level social and environmental metrics we collect during loan underwriting, we began conducting client-centric impact studies to verify our theory of change while generating actionable data for the enterprises.

Our impact studies have been guided by two fundamental questions:

1. What are the impacts of our clients (SGBs) on small-scale farmers and their families and communities?
2. To what extent does Root Capital's support help our clients to increase those impacts?

From these studies and our engagement with clients, we developed a model to describe the cyclical and mutually beneficial relationship between an enterprise and its farmer suppliers. In the cycle, pictured below, the farmer earns a higher income over multiple harvest seasons when he¹⁵ minimizes side-selling (see Box 6: Side-Selling) and sells all of his eligible product¹⁶ to the enterprise.

Mutually Beneficial Cycle



sometimes thousands, of rural producers. Since 1999, Root Capital has disbursed more than \$600 million in credit to 500 businesses in Africa and Latin America.

¹⁵ We use one gender pronoun, rather than switching between the masculine and feminine pronouns, throughout the report for ease of reading; we opted to use the masculine pronoun specifically because most coffee farmers, including the ones in the four profiled groups, are men. Please see Chapter 2 for more details on the gender breakdown of cooperative members.

¹⁶ Producers generally need to deliver first-grade coffee that meets quality requirements for export. Quality is often measured by counting the number of defects. Defects such as a coffee bean that is black on the inside from fungus, mold, or pests are considered primary, or "Category 1" defects because of their significant negative impact on coffee taste characteristics. Samples with "Category 2," or secondary defects, such as broken beans or water damage, have a lesser impact and are acceptable in limited quantities. According to the Specialty Coffee Association of America (SCAA) standards, "Specialty Grade samples must have zero Category 1 defects and no more than five Category 2 defects," per 350 grams of coffee (<http://www.scaa.org/?page=resources&d=green-coffee-protocols>). A more sophisticated way to measure quality is by cupping the coffee. Some cooperatives have invested in tasting labs and training to enable cupping of each farmer's lot.

This allows the business, at the center of two cycles, to fulfill its contracts and to receive a reliable price, the majority of which it passes to the farmer while also offering services such as agronomic training and credit.

Of course, the impacts of this mutually beneficial cycle can increase or decrease depending on external factors such as market prices and weather shocks, and internal factors such as the strength of financial management.

A well-functioning enterprise with sufficient liquidity pays farmers a first payment upon product delivery and may offer credit before the harvest, when the farmer incurs the majority of production expenses. This gives the farmer an incentive to deliver the promised quantity to the cooperative, and allows him to receive an associated premium¹⁷ above the prevailing local market price at the end of the season.

Guatemala Study

In 2013, we launched studies of four coffee cooperatives in Guatemala¹⁸ in collaboration with the Multilateral Investment Fund of the Inter-American Development Bank and the Committee on Sustainability Assessment (COSA). In this comparative mixed-method study, we surveyed 640 farmers, including 407 cooperative members and 233 nonmembers who served as a comparison group.¹⁹

Of our 12 current coffee clients in Guatemala, we invited these four to participate because they reflected the range of our Guatemalan coffee portfolio²⁰ in terms of geography, ethnicity, length of relationship with Root Capital (ranging from one to 10 years), and range of certifications and buyer relationships. Common findings that emerged from these different groups might indicate trends within our Latin American coffee portfolio and among similar clients.

17 Enterprises can provide a price premium to farmer members assuming that they negotiate a price above the local market price with their buyer(s). This premium typically comes from certifications (e.g., fair trade, organic) and/or differentials for higher-quality coffee, as judged based on the coffee's cupping score and taste profile.

18 We decided to work in coffee because it represents over half of our portfolio.

19 To build the comparison sample, we worked in tandem with participating cooperatives to identify potential respondents unaffiliated with the enterprise. The comparison sample was a combination of incoming cooperative members for the subsequent harvest (strongest comparability), members of neighboring coffee cooperatives that were not Root Capital clients (moderate comparability), and producers who decided not to affiliate but were from the same communities as members (moderate to weak comparability).

20 These groups, like other groups in our Guatemalan loan portfolio, operate in low-income areas and had minimal access to finance prior to Root Capital. Similar to our other clients, the study groups also generally pay above local market rates for coffee and most offer some form of microcredit and agronomic training to members. However, the study groups have lower average membership — 200 members — compared with our other Guatemalan clients, which tend to have about 300 members on average.

Summary of Main Findings

Of the four businesses profiled, we found that three were “well functioning,” defined in this study as businesses that reliably provide producers with higher or more stable prices, internal credit for on-farm expenses, and/or agronomic assistance.

In these three well-functioning groups, members were better off than nonmember unaffiliated farmers. Within the well-functioning groups, cooperative membership correlated with higher incomes, higher levels of self-reported well-being, greater access to credit and agronomic training, and more widespread application of sustainable practices linked to conservation of soil health and water quality.

Female members, a minority in three of the four groups, accessed cooperative services at the same rates and benefited proportionately from those services, but earned lower incomes relative to men because of disparities in land ownership, which meant that they produced and sold less coffee.

The injection of Root Capital credit reinforced and enhanced the mutually beneficial relationship between farmers and enterprise for the three well-functioning groups. Root Capital’s loans gave the groups the cash liquidity to pay their members most of the coffee price upon delivery, decreasing the likelihood that farmers would sell their crops at a fraction of its value to intermediaries to meet immediate cash needs.

Notably, the fourth, less well-functioning group, Lirio, achieved the least impact on producers, and Root Capital’s lending had little incremental impact on this group. In retrospect, we believe that, while Lirio fit the profile of Root Capital’s clients as a group linking smallholder farmers to premium export markets, the cooperative was at too early a commercial stage to benefit from Root Capital’s financial services. (See Box 3 for more details.)

Together, the four studies point to the ingredients for a high-impact relationship between an agricultural enterprise and its farmer suppliers, and how Root Capital and others can reinforce and strengthen this relationship. The main findings are as follows:

1. Members report higher quality of life than nonmembers
2. Members’ total income is higher, in part because coffee cooperatives pay higher prices
3. Enterprises increase access to high-value services: credit, technical assistance, and input provision
4. Enterprises with a stronger relationship with members experience lower side-selling
5. Root Capital services correlate with a stronger relationship between the enterprise and its members, and lower side-selling
6. Enterprise services have influenced members’ adoption of conservation practices
7. Evidence is mixed on whether enterprises have improved farmer yields and resilience to coffee rust
8. Enterprises have likely contributed to improving members’ coffee quality
9. Enterprises’ higher prices and credit may have facilitated members’ land acquisition
10. Coffee farmers express both hope and apprehension about the future

The findings under our two main study lenses — gender and environment — are further developed in separate chapters.

Impact Framework

The Guatemala study, beyond testing and validating Root Capital's impact framework, also became a springboard for refining it.

In this study, we asked farmers to describe the principal benefits of cooperative membership for their households. By analyzing responses to this version of the Most Significant Change question,²¹ we found that among the three well-functioning groups, **higher prices, credit and advances**, and **agronomic assistance** were the most frequently mentioned for each group, albeit in varying order.

Though advances and credit both refer to loans, the two are generally offered at different times, with advances paid upon delivery of coffee and loans offered prior to or during the harvest to front production expenses.

In the case of Lirio and Catalina, "links to other organizations" refers to the agronomic assistance provided by external partner organizations.

Figure 7: For your household, what have been the most important benefits of being a cooperative member?

Cooperative	#1 mentioned	#2	#3	#4
Girasol	Credit	Agronomic assistance	Advances	Price
Idesa	Price	Credit	Inputs	Agronomic assistance
Catalina	Credit	Agronomic assistance	Price	Links to other organizations
Lirio	Links to other organizations	Agronomic assistance	Inputs	Price

The responses to the Most Significant Change question do not minimize the other public goods and services that the cooperatives provide; however, they do single out the services that members and their households deem to be of highest value.²²

²¹ The Most Significant Change question was asked as part of producer-level surveys. Farmers were asked: "For your household, what have been the most important benefits of being a cooperative member?" The response was recorded and then coded for all responses mentioned by the producer. Producers typically identified one to three benefits. Coded responses were aggregated and then the most-mentioned responses were ranked based on the number of times each had been mentioned. The Most Significant Change Methodology was developed by Rick Davies in 1996 and has since been adopted by many researchers and organizations as a means of participatory monitoring and evaluation. For more information, refer to: Rick Davies and Jess Dart, "The 'Most Significant Change' (MSC) Technique: A Guide to Its Use," Version 1, April 2005. Accessed online at <http://www.mande.co.uk/docs/MSCGuide.pdf>.

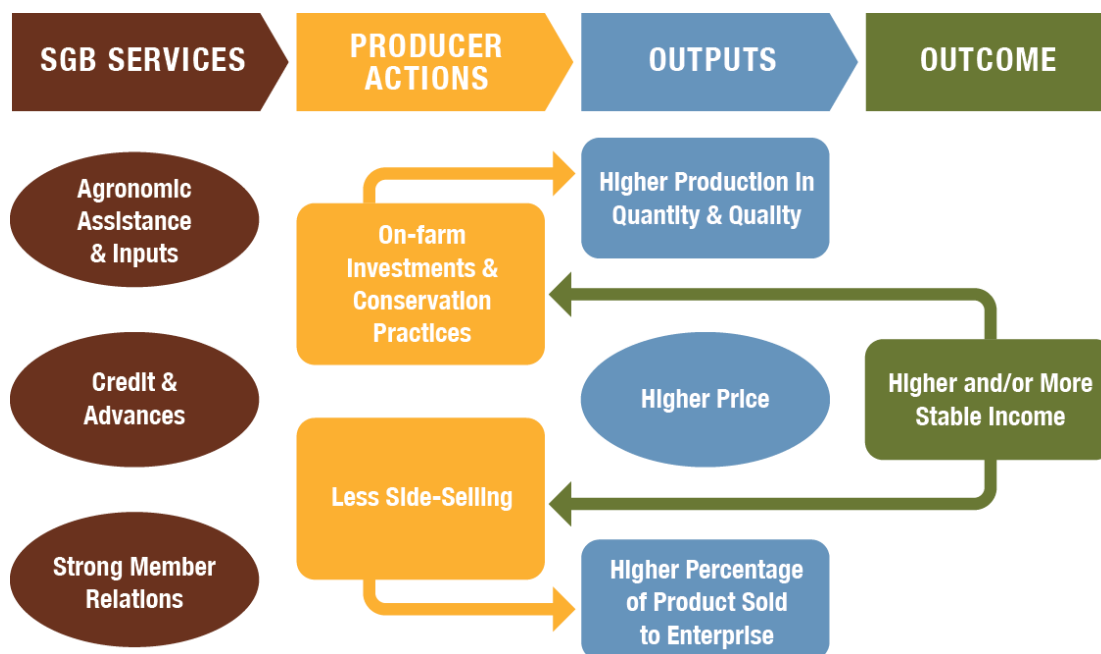
²² These services are not the only ones offered by the cooperatives. Girasol, for instance, organized and partially funded weekly doctor visits for the community and the sale of subsidized medicines. Catalina has acted as a community development agent for over 40 years, bringing electricity and water to the area, and most recently establishing a community library.

The services that appear most often — higher price, credit and advances, and agronomic assistance²³ — all have direct links to higher, more stable incomes, either directly or through increased yields. Based on extensive secondary research linking income to self-reported well-being,²⁴ we hypothesize that it is the relatively greater access to these income-boosting services that contributes to members reporting higher quality of life than nonmembers.

The Agricultural SGB Impact Framework (below), a new framework inspired and largely informed by the Guatemala study, synthesizes how the services provided by the enterprise promote farmer livelihoods. The framework complements the universal theory of change developed by the Initiative for Smallholder Finance (see Appendix III for more details).

In the SGB Impact Framework, the brown circles represent the high-value services provided by well-functioning producer organizations. These lead to the yellow boxes, or the behaviors promoted by the high-value services: less side-selling and more on-farm investment and use of sustainable practices.

Agricultural SGB Impact Framework



23 These findings reinforce those of recent impact studies in [Mexico](#) and in [Nicaragua](#). In both studies, higher price was the most frequently mentioned benefit, followed by a combination of technical assistance, credit, and in Nicaragua, the personal relationship with cooperative management.

24 For example, Daniel W. Sacks, Betsey Stevenson, and Justin Wolfers, "Subjective Well-Being, Income, Economic Development and Growth," NBER Working Paper No. 16441 (NBER), October 2010.

Higher price refers to the higher price generally paid by the enterprise, enabled by its commercialization in higher-value export markets, often with premiums for certifications and quality. Higher price is a primary incentive for members to join and remain in the enterprise.

Credit & advances encompass the loans and the payment upon delivery that well-functioning enterprises offer to farmers. Advances upon product delivery and pre-harvest production credit are essential to enable farmers to afford on-farm investments, such as fertilizers and labor, to maximize quality production. These payments also reduce side-selling by putting cash in the hands of farmers, preventing them from having to sell coffee at lower spot prices to intermediaries.

Technical assistance & inputs give farmers the knowledge and tools, respectively, needed to adopt best management practices to increase productivity and coffee quality in accordance with the enterprise's certification and quality standards, while in many cases also improving the environmental health of their farms.

Member relations refers not to a single service, but rather to the sum of interactions between the enterprise and members that builds farmer identification and loyalty to the enterprise. The relationship includes management, governance and decision-making, and communication with members, as well as preexisting contextual factors such as community cohesion and the organization's history. When the relationship between the enterprise and producers is strong, producers are less likely to side-sell.

The relationship between the enterprise and producers is strengthened when cooperatives reliably provide these services to members at critical moments: financing and training before the harvest when farmers pay for inputs and labor, partial payments upon delivery during the harvest, and premium payments several months after the harvest when the enterprise receives payment from its international buyers. Each of these activities reinforces the value of enterprise membership.

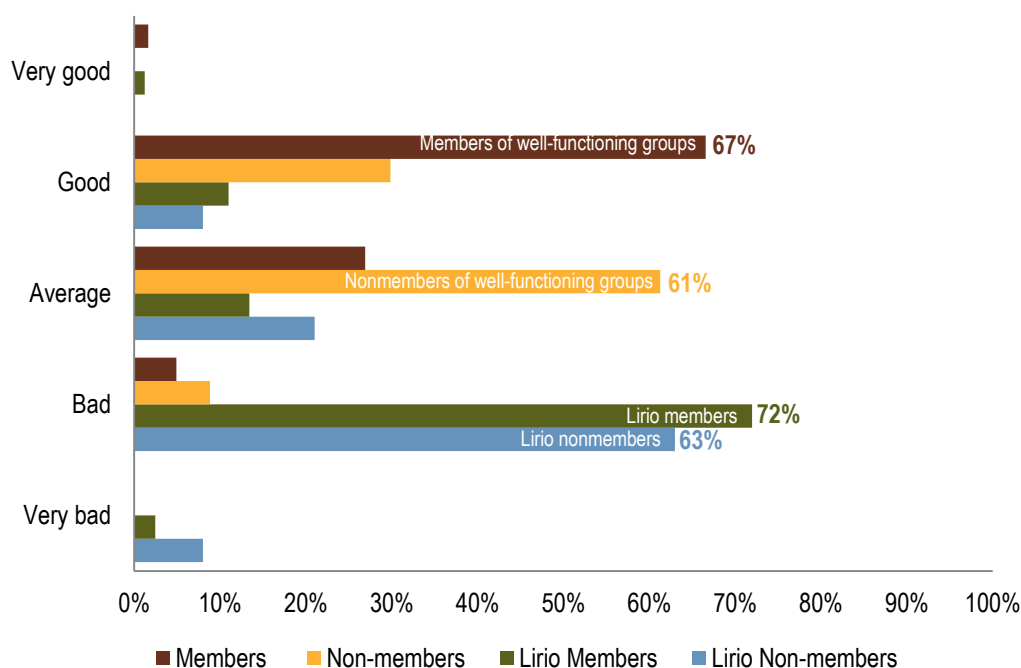
The green box, Higher and/or More Stable Income, represents the end goal of the chain in one production season and the beginning of the next one. Higher income improves the economic situation and quality of life for farmer households. Higher income also is the bridge for the process to continue into the successive harvest, giving farmers the resources and incentive to make on-farm investments like adequate fertilization, improved processing infrastructure, and farm renovation and rehabilitation. Finally, higher and more stable income reinforces the producer's trust, thereby encouraging him to deliver a higher proportion of his harvest to the cooperative and discouraging side-selling in the subsequent season.

Main Findings

Finding 1: Members report higher quality of life than nonmembers

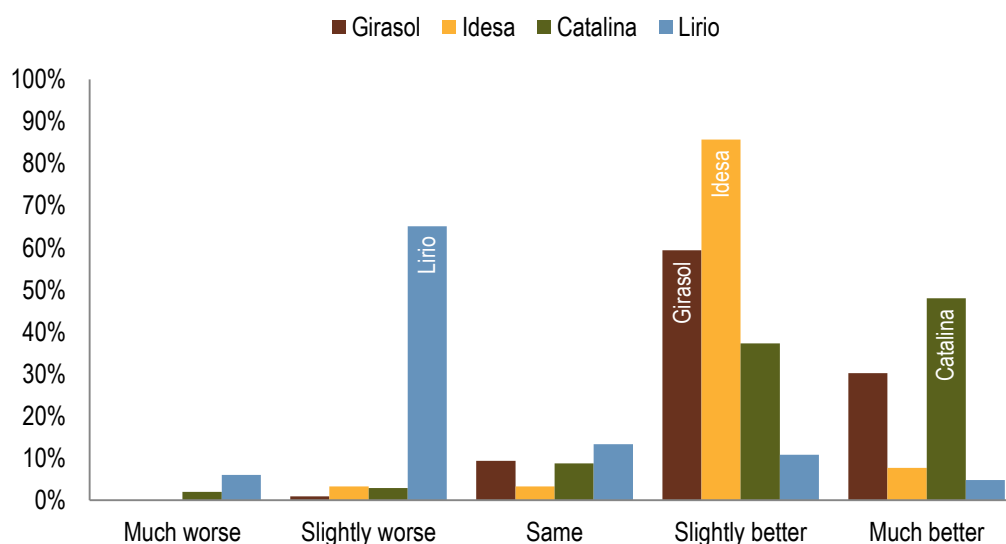
In the producer survey, farmers rated their quality of life in the last production year. Members of the three well-functioning cooperatives were most likely to rate their quality of life as “good,” while independent farmers most often responded “average.” Very few members said their quality of life was “bad.” This is in contrast to the less well-functioning group, Lirio, in which members responded similarly to nonmembers, reporting that their life was “bad,” followed by “average.”

Figure 8: Self-reported quality of life



When asked how their lives had changed since joining the cooperatives, most farmers said that the quality of life of their households was “slightly better” or “much better” since joining.

Figure 9: Members' quality of life now vs. pre-cooperative



Although the perceived quality of life depends on various factors, with varying degrees of influence for different individuals, researchers have established a strong correlation between perceived well-being and absolute income.²⁵ That is, all else being equal, a producer would rate his quality of life more positively if he were satisfied with his household's economic situation.

In qualitative interviews, members explicitly linked their higher quality of life to their cooperative membership. As one farmer in Girasol explained:

The quality of life is better than before because if you need something and you're a good member, the doors of the cooperative are open to you. You can say, "I need this favor, I need a loan, an advance for coffee," and the guys, since they know you've been loyal to the cooperative, they'll give you a hand.

In Lirio, we suspect that the baseline quality of life is lower because of extreme marginalization, frequent droughts and loss of crops, and, in contrast to Catalina and Idesa, a fragile social fabric exacerbated by activities related to drug trafficking.

²⁵ Daniel W. Sacks, Betsey Stevenson, and Justin Wolfers, "Subjective Well-Being, Income, Economic Development and Growth," NBER Working Paper No. 16441 (NBER), October 2010.

Box 3: Why was Lirio not well functioning? What critical factors were missing?

Although an exception among the groups in this study, Lirio is not an exception among coffee cooperatives in Latin America. Many struggle to survive and reliably provide services to members.

In the case of Lirio, we believe that the main drivers of poor performance were (1) overreliance on donor subsidy and (2) insufficient attention to coffee collection and export. As the newest organization among the four, founded in 2010, Lirio had not yet learned to manage its coffee business, a problem made more complex by a dispersed membership and sizable local competition.

We believe that Lirio underperformed because it viewed itself primarily as a channel to distribute NGO services to its members, rather than to commercialize its members' coffee on export markets. Founded by Catholic leaders with significant donation, the organization has since its founding relied on programs delivered and funded by NGOs (including technical assistance, inputs, and food diversification) as the primary means of attracting members and reinforcing member relations.

While other cooperatives in Guatemala, notably Catalina and Idesa in this study, also serve as distribution channels for assistance delivered and funded by third parties, Lirio is different in that the group did not simultaneously focus on developing its business. For example, Lirio did not diversify beyond one buyer, so that when this contract was not renewed (following the study), Lirio lacked an alternative market. Since the cooperative did not have a contract with a buyer, Root Capital was, in turn, unable to renew its trade credit loan.

At the same time, the group has taken on significant debt for its facilities, without a clear plan for repayment. For example, Lirio did not take full advantage of its dry mill — a unique asset for a cooperative of its size, and the only dry mill among the four cooperatives we studied — failing to sell dry-milling services to other coffee cooperatives as a way of generating income.

On the business services side, Lirio was not well functioning insofar as it did not prioritize high-value services that the other groups provided, namely internal credit, technical assistance, and inputs, beyond the limited services offered by the partner NGOs.

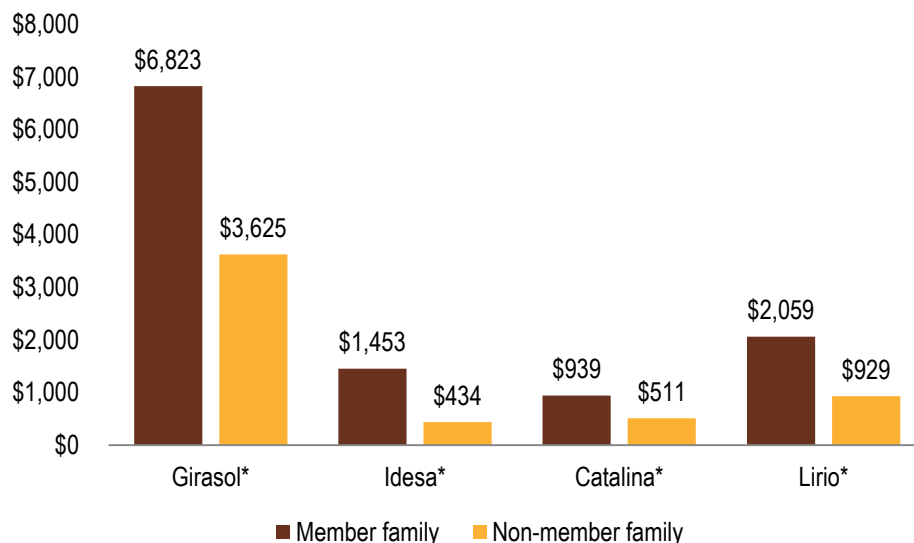
In the year of the study, Lirio faced an additional challenge: the fair trade certification it had secured was not recognized by its buyer in the target market. Lirio could not pay the promised premium to members, which significantly eroded member confidence.

How can those working with rural enterprises better support organizations like Lirio? Unfortunately, it is outside the scope of Root Capital's credit and financial training services to help a cooperative establish its core business and commercial relationships. Through partnerships with other NGOs, we are, however, exploring how to complement our services to meet diverse business needs outside of financing and financial management training.

Finding 2: Members' total income is higher, in part because coffee cooperatives pay higher prices

In the three well-functioning groups, members reported earning between \$428 and \$3,198 more revenue from coffee in 2013 than nonmembers. Members' coffee revenue on average was nearly double that of nonmembers.

Figure 10: Farmers' coffee revenues in 2013



In addition to earning more, members generally also reported less migration than independent farmers, particularly in Girasol, the group located closest to the border with Mexico. According to the 2006 landmark study in Central America by Keurig Green Mountain and the International Center for Tropical Agriculture (CIAT), a coffee farmer's ability to stay on his farm rather than migrate for work is one of the main indicators of his economic viability.²⁶ As one Girasol member explained:

Before, we traveled to the farms in Chiapas or to Cancun to earn cash, but now we have training, we have coffee, and we work for ourselves.

26 Sam Fujisaka et al., "Impacts and Indicators of Impact of Fair Trade, Fair Trade Organic, Specialty Coffee," Sustainable Food Laboratory, October 18, 2006, accessed March 26, 2014, <http://sustainablefood.org/images/stories/pdf/GMCR%20poverty%20indicators%20research%20report%20nov%202006.pdf>. The other key indicator for tracking coffee farmers' economic situation is the ability to make on-farm investment, including hiring laborers.

Figure 11: Migration of family members

Cooperative	Members with at least one family member away	Independents with at least one family member away
Girasol*	49%	75%
Idesa	11%	15%
Catalina	18%	21%
Lirio	7%	3%

Members of the well-functioning cooperatives earned more coffee revenue than independent farmers in part because the cooperatives pay a higher price per quintal (100 pounds of coffee). Premiums in 2013 ranged from 25 to 63 percent above the local market price.²⁷

Figure 12: Prices (dollars per quintal of parchment)

Cooperative	2013		
	Market	Coop	% premium
Girasol	\$104	\$169	63%
Idesa	\$104	\$130	25%
Catalina	\$104	\$132 (\$134 for women)	27% (29% for women)
Lirio	\$104	\$104 or lower ²⁸	0%

As one member explains, when one receives a sufficient price for coffee, \$130 according to him:

... the quality of life improves a lot, because I earn a bit more, whether I use it to pay for my brother's studies, or our food, or the coffee labors.

27 \$104 was the average price offered in the local market, as reported by members and management. This price varied slightly by region and at different times of the harvest, ranging from about \$90 to \$110. As we lack granular price information, we use the average price of \$104 as a proxy.

28 Lirio did not successfully match or exceed the market price, due to its failure to sell its coffee through a fair trade channel and receive the associated premium.

Box 4: Revenue or profit?

Profit is a more accurate metric than revenue for tracking coffee's contribution to income. However, estimating profit requires reliable data on the costs of production. In our experience and those of peers in the Sustainable Food Lab²⁹ performance measurement community, robust data for cash outlays is notoriously difficult to obtain because most smallholders do not keep written records. Among these four groups, 90 percent of members did not keep written records. Moreover, there is the question of whether and how to assign an opportunity cost to unpaid family labor, which farmers often omit from their cost estimates.

In this study, we strove to measure profit by incorporating COSA questions to estimate the costs of inputs and labor. However, because of the high variability of the results and the difficulty of administering this series of questions in the field, we are not confident enough in the producer-level results to report them here. In subsequent studies, we have begun to use participatory focus groups with farmers and technical staff to arrive at cost estimates and enable calculation of profits.

How much did selling to the cooperatives improve farmer incomes? We approximated the counterfactual in two ways. First, we estimated, had members sold all of their coffee into the local market (beyond the percentage they actually side-sold), members' coffee revenue would have been 16 to 24 percent lower than it actually was. This would have amounted to a reduction of between 3 and 16 percent in total household income.³⁰

Figure 13: Counterfactual of member selling into local market

Cooperative	Member family selling to cooperative	Member family selling into local market	% loss in coffee revenue	% loss in household income
Girasol	\$6,291	\$4,805	24%	16%
Idesa	\$1,454	\$1,166	20%	13%
Catalina	\$959	\$803	16%	3%

We also estimated how much more coffee revenue nonmembers would have received had they been members with access to the cooperatives' higher prices. In our calculation, we kept constant landholdings and productivity, and assumed that nonmembers sold to the groups according to the mean delivery rate for the group.

We found that nonmembers would have earned 19 to 43 percent more coffee revenue. In Girasol, for example, where the average nonmember earns household coffee revenue of \$3,625, cooperative

²⁹ The Sustainable Food Lab is a consortium of organizations focused on smallholder sustainability.

³⁰ The percent loss in household income was calculated by dividing the potential loss in coffee revenue by the total household income as reported in 2013.

membership would have earned the household an additional \$1,550, or 43 percent, in coffee revenue.³¹ This same household's income would have increased by 21 percent.

Figure 14: Counterfactual of nonmember selling to cooperative

Cooperative	Nonmember family selling into local market	Nonmember family selling to cooperative	% potential gain in coffee revenue	% potential gain in household income
Girasol	\$3,625	\$5,175	43%	21%
Idesa	\$434	\$539	24%	18%
Catalina	\$511	\$609	19%	3%

Both calculations point to the income benefit of membership. This additional income allows households to pay various household expenses, which generally include food (particularly important in the “lean months”), children’s school fees, medical costs, and on-farm investments for future production.

Despite the benefits of membership, we do not conclude that coffee revenues are presently bringing farmer households prosperity, because our data shows that farmer members experience food insecurity and gaps in education. (See Context for more details.) Based on this study and our accumulated field experience, we believe that farmer households’ incomes could rise under the following conditions: higher yields, higher per-pound prices paid by buyers and passed on to farmers, more coffee land, and/or establishment of additional income sources that help to smooth incomes throughout the year.

³¹ The potential gain in percent terms is more substantial for nonmembers than the potential loss for members, because the independent farmers surveyed had less total production and less total income.

Box 5: How do prices compare to the cost of production?

Incomes of coffee farmers are chronically low and unstable. Although coffee is one of the largest exports for Guatemala, little of the money that consumers in importing countries pay for their coffee ends up in the hands of Guatemala's approximately 90,000 coffee farmers. Farmers earn just 10 to 12 cents of every dollar of the end price paid by consumers,³² with the proportion lower for specialty coffee.³³

Organized farmers whose cooperatives sell into specialty markets tend to fare better. In Guatemala, a few dozen of these cooperatives secure premiums for certifications. Fair trade guarantees cooperatives a price floor of \$1.40, with a \$0.20 premium for community investment. Organic-certified groups earn \$0.30 extra to support organic production methods. Exporting cooperatives can also negotiate a premium for quality, based on the country of origin and the particular taste profile of the coffee.

In 2013, when the average local market price for coffee was \$104 per 100 pounds:

- Lirio paid farmers the local market price of \$104.
- Idesa, with fair trade and organic certifications, paid farmers \$130.
- Catalina paid farmers either \$132 or \$134, with women receiving \$2 extra per quintal through the Café Femenino label.
- Girasol paid farmers \$169, the highest among the groups, through negotiation of a price floor with its direct buyer, based on meeting high quality and basic social and environmental performance standards.

How did the prices paid by the groups and by the local market compare to the cost of production? According to Guatemala's national coffee association, Anacafé, the average cost of production for 100 pounds of conventional coffee is \$150. However, there is significant variance throughout Guatemala and among the groups in the study. Two of the cooperatives report much lower costs than \$150, potentially due in part to incomplete measurement of unpaid family labor.

- Girasol, in partnership with its direct buyer, conducted its own study in 2012, finding the average cost of production for its members to be \$162 per quintal.
- Idesa estimates, based on technical staff's records, that the average cost incurred by farmers is \$78 per quintal. According to the manager, this cost is lower than it should be for optimal production and reflects underinvestment in terms of inputs used.
- Catalina estimates the cost of production to be \$117 per quintal.
- Lirio has not estimated the cost of production.

With cooperative prices exceeding production costs per quintal, members of the three well-functioning groups appear to have earned a profit on coffee commercialized through the cooperatives. However, at least in the case of Girasol and Catalina, farmers generally lost money on coffee sold to intermediaries.

32 Pendergrast, Mark, *Uncommon Grounds: The History of Coffee and How It Transformed the World* (Basic Books, 2010).

33 While farmers of specialty coffee tend to receive a higher price per pound in absolute terms, they receive a smaller fraction of the final end price paid by the consumer, with roasters and retailers receiving a higher proportion.

Cooperative	Production type	Estimated Cost of production	2013 Market ³⁴	Cooperative Price Paid
Girasol	Conventional	\$162	\$104	\$169
Idesa	Organic	\$78	\$104	\$130
Catalina	Organic	\$117	\$104	\$132 (\$134 for women)
Lirio	Conventional	Unknown	\$104	\$104

Finding 3: Enterprises increase access to high-value services: credit, technical assistance, and inputs

3a. Credit

Smallholder farmers need access to credit because of irregular cash flows and limited savings. Expenditures increase prior to and during the harvest, yet coffee provides an income only during the three-month harvest, with a potential second payment several months later for members of exporting cooperatives. Although most coffee cooperatives were not designed to extend loans to their members, many, including the three well-functioning groups in this study, have developed this service in response to the financing needs of their members.

Among the three well-functioning groups, farmers ranked credit as one of the three most important benefits of cooperative membership. In all three enterprises, members received an advance or first payment from the cooperative upon delivery of their coffee. In Girasol and Catalina, this advance was effectively a loan, with interest charged. In addition, many farmers received loans from the groups at various times throughout the year, ranging from 40 percent of members in Idesa to 83 percent of members in Catalina and Girasol.³⁵

³⁴ This was the average price offered in the local market, as reported by members and management. This price varied slightly by region and at different times of the harvest, ranging from about \$90 to \$110. As we lack granular price information, we use the average price of \$104 as a proxy.

³⁵ During the presentation of results to Idesa's management and board, we learned that the 40 percent was likely an underestimation, as farmers in this context were uncomfortable sharing information about their level of indebtedness.

Box 6: Side-selling

Side-selling refers to the sale of coffee by cooperative members to intermediaries outside of the cooperative. The middlemen, often referred to pejoratively as “coyotes,” are typically hired by national and international coffee trading houses to buy coffee directly from producers. Although the middlemen pay at or below market rates, they offer an enticing proposition to producers: due to their ties with national coffee trading houses that provide cash, the intermediaries can pay farmers an advance *upon delivery* for their coffee.

This immediate payment is particularly important during the harvest, when farmers incur the majority of their on-farm costs to pay temporary laborers, and simultaneously have little savings remaining from the last coffee harvest for food and other household expenses. Unlike the intermediaries, a cooperative lacking external financing or self-capitalization is often hard-pressed to pay its members market rates upon delivery.

Side-selling has deleterious long-term effects for the producer and enterprise alike, with the potential to rupture the mutually beneficial cycle between the two. For the producer, selling to middlemen typically results in a lower price per unit in the long run. Although intermediaries may offer a higher up-front payment, the sum of payments by the cooperative is typically greater than the up-front payment by an intermediary. (In years when the coffee price spikes, the intermediaries’ total price might be comparable or even slightly larger, but cooperatives exporting into specialty markets generally pay more over the course of various cycles, which include years when the coffee price falls.)

Meanwhile, for the enterprise, if the volume delivered by the producer is lower than the quantity expected, the enterprise may fail to fulfill its contracts to buyers. Default on sales contracts threatens current and future contracts and thereby the cooperative’s ability to stay in business and benefit producers in the future.

The side-selling rate is contingent on the producer’s access to liquidity at key moments in the agricultural cycle. Other influencing factors include convenience, loyalty to the cooperative, and product quality.

Liquidity

The enterprise has three possible times in which it can pay producers for their coffee: before the harvest with credit, during the harvest with spot payments, and several months after the harvest, once the product has shipped, the quality-control specifications have been met, and the end buyer has paid the cooperative. In the first two instances, the enterprise is competing with intermediaries, who also offer pre-harvest credit and payments upon delivery.

Thus, to decrease the side-selling rate of its members, *the enterprise would ideally offer both pre-harvest credit and payment upon delivery*. The former allows the farmer to bypass an unfavorable loan, which he would pay back with coffee at a lower price, often compounded by a higher interest rate. Payment upon delivery also gives the farmer the needed liquidity to avoid selling coffee at lower spot prices to intermediaries during the harvest itself.

Convenience

Convenience plays a role in that a producer may sell to a middleman in order to avoid a lengthy trip to deliver coffee to the cooperative if it is located far away, or if transport costs are high.

Loyalty

The loyalty that exists between the producer and the cooperative likely influences the producer’s decision of whether to sell his coffee to the cooperative or to other buyers. Producers may feel loyal to the cooperative due to shared history, culture, or ethnicity. Present and past benefits of cooperative membership, such as

internal credit programs and technical assistance, may also strengthen the relationship with farmers and reinforce their motivations to sell to the enterprise on terms that may be less favorable in the short term.

Product Quality

Any coffee that does not meet the quality standards of the exporting cooperative — normally the coffee harvested at the beginning and end of the season, under 10 percent of the total — has to be sold in the local market. Selling this lower-quality coffee is not side-selling per se, because the cooperative would not accept it.

In addition, the quality of a higher proportion of the harvest can deteriorate — and thereby be sold in the local market — if the producer has not followed best production practices, due to a lack of resources or farming knowledge.

Given this context and the tradeoffs of delivering to the cooperative versus side-selling, we consider the delivery rate to be a rough proxy for the strength of the relationship between farmers and the enterprise. In this report, rates of side-selling and delivery to the enterprise add up to 100%, such that a 70 percent delivery rate implies a 30 percent side-selling rate, and vice versa.³⁶ Over multiple harvest cycles, a higher delivery rate, or inversely a lower side-selling rate, implies a relatively stronger relationship between farmers and the enterprise.

During the 2012–2013 harvest, the rate of delivery to the cooperatives examined ranged widely, with the three well-functioning groups achieving delivery rates of 68 percent or better, and the weaker group attaining a delivery rate of 35 percent.

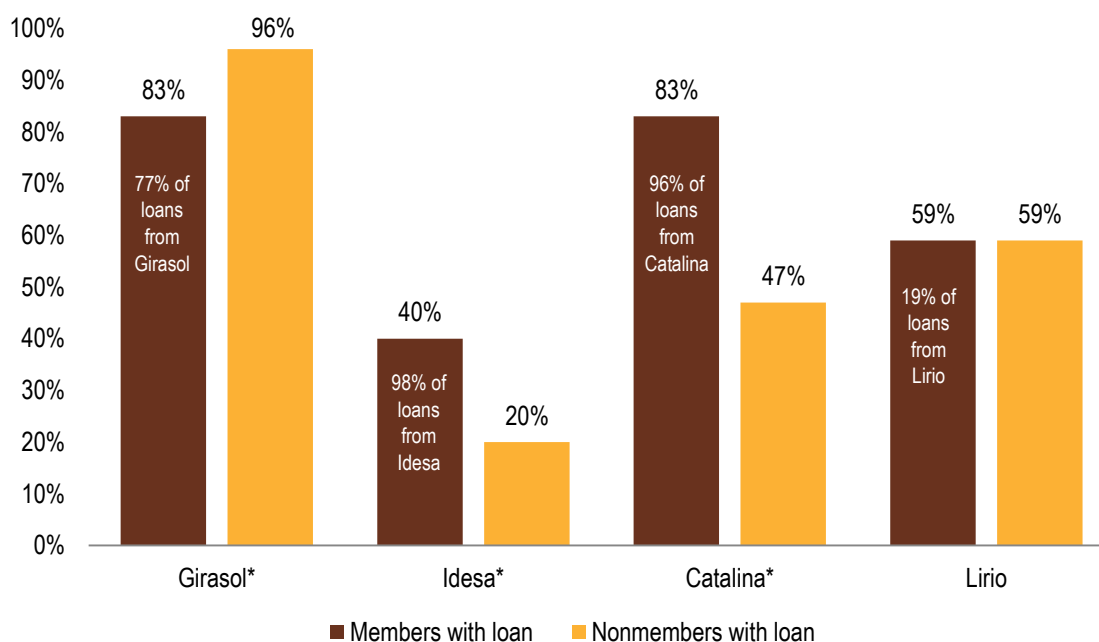
Cooperative	Delivery Rate
Girasol	68%
Idesa	97%
Catalina	69%
Lirio	35%

The overwhelming majority of members' loans came from the enterprises. These loans gave farmers the liquidity needed to invest in labor and inputs for production prior to the harvest and to purchase food and other household necessities.³⁷

³⁶ This equation is a slight oversimplification, as farmers would likely not sell 100% to the cooperative even if the cooperative were meeting their needs for liquidity and convenience, and farmers felt strong identification and loyalty. In addition to the aforementioned quality issue — that about 10 percent of the coffee is not export-quality and therefore not eligible for sale to the cooperative — many cooperatives negotiate to sell significantly less than 100% of their members' production, and thus would likely buy only up to that quantity for export.

³⁷ We did not investigate whether the timing of the credit were satisfactory, such that farmers could take out credit precisely when they needed to pay for inputs and labor. Past studies (e.g., Bennett et al, "Cocoa Farms in Ghana: An Evaluation of the Impact of UTZ Certification on the Sustainability of Smallholders Supported by the Solidaridad Cocoa Programme (2010-2012)", 27 November 2013, https://utzcertified.org/images/stories/site/pdf/downloads/impact/2013_cocoa_farms_in_ghana_an_evaluation_of_utz_certified_sustainable_smallholders_suported_by_the_solidaridad_cocoa_programme_2010-2012_cosa.pdf) have found that the timing of credit plays a role in determining whether farmers apply sufficient fertilizer.

Figure 15: Percentage of members and nonmembers using credit



In the case of Idesa and Catalina, larger proportions of members took out loans than nonmembers. Most coffee farmers, members and nonmembers alike, could not receive loans from microfinance institutions because they lacked formal titles to their land. In these two cooperatives, there was also widespread distrust of formal financial institutions. In these communities, as in Lirio, nonmembers instead tended to borrow from relatives and friends or receive larger loans from local coffee middlemen and loan sharks, generally at higher interest rates than those offered by the cooperatives.

As one cooperative member explained, the advantage of being a cooperative member was that he no longer had to seek loans from individuals charging high interest:

The cooperative benefit that we deem important is the credit they [in the cooperative] give us at low interest rates. Because, if you go with a lender, it's expensive, and far from helping us, [the loan] sinks us into true poverty.

The situation was different in Girasol, where independent farmers accessed loans in higher rates than members, likely because members had reached the point at which they were largely able to self-finance production. Many farmers in the comparison group were members of the credit cooperative (from which the coffee cooperative developed), though not members of the coffee cooperative; due to their lower incomes, nonmember farmers may have had greater economic necessity for credit.

In Lirio, members accessed credit in the same rate as nonmembers, with the majority of members' loans coming from outside the cooperative and from private lenders and loan sharks. Lirio did not help to address most members' credit needs.

3b. Technical assistance and inputs

As complementary services to credit, technical assistance and inputs provide the knowledge and tools, respectively, necessary to make production-enhancing investments. For three of the groups, technical

assistance was the second-most-cited benefit of cooperative membership. In Idesa, access to inputs and technical assistance were the third- and fourth-most-mentioned benefits. As one farmer explained:

When someone is a member of an organization [cooperative], he receives trainings, he applies [the lessons] to his crops. Someone who isn't a member doesn't do that and doesn't know what problems could affect his crop.

The trainings happen more frequently now, and I'm learning to become a better coffee producer. . . . When I wasn't in the cooperative, I grew coffee how I felt like doing it, inadequately . . . but now I've developed and know how to plant [new] coffee, manage shade, conserve the soil.

All four cooperatives led or facilitated agronomic assistance programs with third parties. Trainings focused on best management practices to boost productivity and quality in line with buyers' requirements, and, in the case of the fair trade and organic certified groups, to comply with certification requirements.

Common training topics included planting techniques, shade management, soil conservation, and waste management. The cooperatives also facilitated members' access to important agricultural inputs such as fertilizers and coffee tree seedlings, either by producing and distributing the inputs themselves or by subsidizing the purchase of inputs procured from a third party. (See Chapter 3 for more details.)

Farmer members were significantly more likely to receive agronomic training than nonmembers. Between 45 and 84 percent of cooperative members reported participating in agronomic training during the last production year, with participants reporting having received between six and 14 hours of training on average.

In comparison, between 0 and 22 percent of nonmembers reported receiving any training during the same period. Nonmembers accessed trainings through Anacafé, the national coffee association. In the cases of Catalina and Lirio, nonmembers could also participate in trainings offered by the cooperatives for the community at large.

Figure 16: Technical assistance access

Cooperative	% independent farmers receiving training	% members receiving training	Avg. hours in training among members
Girasol*	16	84	14
Idesa*	0	55	6
Catalina*	23	45	12
Lirio*	22	53	13

Finding 4: Enterprises with a stronger relationship with members experienced lower side-selling

Access to credit and other services is necessary but not sufficient to decrease side-selling. Other, less tangible factors, such as management, governance, and communication and transparency with producers, as well as preexisting contextual factors such as community cohesion and the organization's history, influence producers' commitment to the enterprise.

Measuring the strength of this relationship is difficult. Currently, the community of sustainable agriculture practitioners, including COSA and the Sustainable Food Lab, is actively working to define trade relationship indicators. These are the producer-level indicators we used:

- ☛ Years of membership, as a proxy for institutional stability and turnover levels
- ☛ Number of meetings attended, as a proxy for members' participation and for communication between the enterprise and its members
- ☛ Degree of comfort speaking in meetings, measured by members' self-assessments on a scale of 1 to 5
- ☛ Rating of members' participation and the degree to which their interests were reflected in enterprise-level decision-making.

We found that, together, these proxy indicators correlated with the strength of the relationship, as represented by the delivery rate to the cooperative. (In a regression with delivery rate as the dependent variable, regressed on membership years, comfort with speaking, meeting attendance, and a dummy variable for the cooperative, the three relationship variables were jointly significant at the 10 percent level.) Idesa scored highest in each of these proxies and sustained the highest delivery rate. Girasol and Catalina, with intermediate outcomes, had correspondingly lower delivery rates.

Figure 17: Strength of relationship proxies

	Girasol	Idesa	Catalina	Lirio
Delivery rate	68%	97%	69%	35%
Membership tenure	5 years	9 years	12 years	3 years
# meetings attended (out of 5)	2.8	4.0	3.2	1.7
% comfortable speaking	33%	94%	69%	34%
Participation rating³⁸	Members can participate, but interests of members not fully reflected in decisions	Members can participate and interests fully reflected in decisions	Members cannot fully participate and interests not fully reflected in decisions	No diagnostic performed

These proxies, of course, do not fully capture the factors contributing to the relationship between farmers and the enterprises. In the studies, we identified other salient factors, such as community cohesion and organizational history. For example, in the case of Idesa, the cooperative with the highest delivery rate, most members are from one town, which is also one of the sites that suffered most during

38 These ratings were assigned by Root Capital financial trainers in conjunction with the cooperatives, as part of a participatory diagnostic to assess organizational strengths and weaknesses and as a baseline for designing customized training plans.

the Guatemalan civil war. Outside of Idesa, where the members tended to be more dispersed, we observed less unity between the membership and the enterprise.

Finding 5: Root Capital services correlate with a stronger relationship between the enterprise and its members, and lower side-selling

As described above, many coffee cooperatives lack the working capital needed to pay farmers upon delivery. Root Capital's trade credit loans meet this need for working capital during the harvest. The chart below offers a summary of each group's loan history with Root Capital.

Figure 18: Loan history with Root Capital

Cooperative	Loan history
Girasol	\$390K in 2011, \$500K in 2013
Idesa	\$50K in 2005, steadily increasing loans to \$150K in 2013
Catalina	\$78K in 2008, steadily increasing loans to \$250K in 2013
Lirio	\$250K in 2013



At the enterprise level, Root Capital has the most impact when the loan offered is *additional*, to the extent that the businesses could not access a loan for the same purpose, with similar characteristics, from an alternative source. Among the Guatemalan study groups, Root Capital was the first lender to extend trade credit to three: Idesa, Catalina, and Lirio.

Our loans to these groups continue to be additional, given that the enterprises cannot secure loans from commercial banks at the scale necessary to meet their

needs due to lack of traditional collateral. Root Capital, on the other hand, accepts purchase-order contracts with select buyers in lieu of collateral. Without Root Capital's financing, Girasol would have to apply for loans with a local lender with a higher interest rate and less flexible collateral requirements.

Root Capital's loans have direct implications for the relationship between the enterprise and its producers. Root Capital's role, with reference to the Impact Framework, is to reinforce the credit and advances provided by the cooperatives.

In the case of the three well-functioning groups, Root Capital's loans enabled the cooperatives to shift from paying farmers at the end of the season to paying them a base price upon delivery. Below are the payment mechanisms that the three well-functioning cooperatives used before and after receiving Root Capital credit.

Figure 19: Payment mechanisms pre- and post-Root Capital

Cooperative	Payment schedule Pre-Root Capital		Payment schedule Post-Root Capital	
	1st payment	2nd payment	1st payment	2nd payment
Girasol	40%	60%	80%	20%
Idesa		2nd payment 100%	1st payment 90-100%	
Catalina	1st payment 30-40%	2nd payment 60-70%	1st payment 60-80%	2nd payment 20-40%

Cooperatives' ability to pay members upon delivery is integral to member relations because it helps to reduce the incentive for members to side-sell. Indeed, in the four groups, there is a positive correlation between the number of years of Root Capital-enabled advances upon delivery and the delivery rate to the enterprise. (Of course, other contextual factors, such as levels of social capital and community cohesion, influence member relations.)

Figure 20: Number of loans and delivery rates

Cooperative	# trade credit loans	Delivery rate
Girasol	2	68%
Idesa	10	97%
Catalina	5	69%
Lirio	1	35%

Beyond lending, Root Capital has also delivered a bundle of customized trainings on business financial fundamentals and internal credit systems to 24 producer organizations in Guatemala, Honduras, and Nicaragua, among them the three well-functioning groups.³⁹ These trainings have reinforced cooperatives' systems for offering credit and advances and higher prices, helping them to base decision-making on solid understandings of cash flows and financials.

Qualitative interviews with the managers of Idesa, Catalina, and Girasol reveal that these trainings have helped the cooperatives with many parts of their business, including:

- 🔗 Creation of an internal credit strategy and policy
- 🔗 Delineation of roles of different personnel and board positions
- 🔗 Financial planning and risk mitigation
- 🔗 Completion of necessary forms (e.g., cash flow statements) to apply for financing and grants

³⁹ These trainings are part of the Root Link program, supported by the Multilateral Investment Fund and Keurig Green Mountain.

In 2015, we will assess the impact of these training interventions, specifically the degree to which participating groups have applied the curricula to their business operations.

Finding 6: Enterprise services are associated with the adoption of conservation practices by members

In the surveys, we evaluated whether the cooperatives' agronomic extension services have influenced members' use of specific coffee management practices that are important for environmental health at the farm level, as well as for coffee productivity and quality. The 10 practices examined, detailed in Chapter 3, fall into three general categories: soil conservation, water-quality conservation, and on-farm biodiversity management. Throughout this report, we refer to these practices as "conservation practices."

Members of all four cooperatives reported higher usage of conservation practices than nonmembers, with the most significant differences in the areas of soil conservation and coffee wastewater treatment. In the three well-functioning groups, members reported statistically significantly higher use than nonmembers of five or more conservation practices. Members of Lirio reported statistically significantly higher use of two practices in the areas of soil conservation and water-quality conservation.

In focus groups, members of the three well-functioning groups attributed the adoption of these practices to cooperative services, namely agronomic training, input provision, and credit. As one cooperative member reported:

Before, there were no trainings or help on how to fertilize our coffee, no loans so that we could buy fertilizer or land. But now there are, and we are better than before.

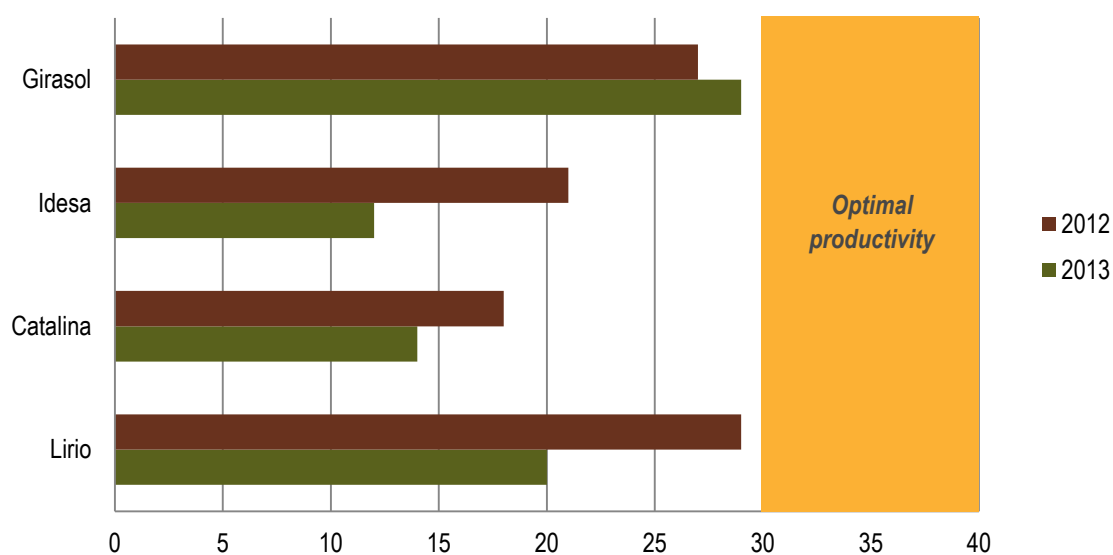
Despite these signs of improvement, however, current use of conservation practices by members remains limited across all four enterprises. We discuss these findings in greater depth, as well as ideas for ways in which cooperatives might improve their agronomic extension services, in Chapter 3: Agricultural Practices and Environmental Performance.

Finding 7: Evidence is mixed on whether enterprises have improved farmer yields and resilience to coffee rust

7a. Differences in yields between enterprises point to a productivity gap

In 2013, average self-reported yields for members of the four groups ranged from 12 to 29 quintales per hectare (1 quintal = 100 pounds). With coffee leaf rust reducing yields in certain regions during 2013, especially in Idesa and Lirio, we included productivity figures from 2012 for additional context.

Figure 21: Productivity 2013 and 2012 (quintales per hectare)



The differences between the four groups were statistically significant in both 2012 and 2013. Though not as stark, differences in yields were already present in 2012, before coffee leaf rust spread. While Girasol and Lirio farmers produced close to 30 quintales per hectare, those in Catalina and Idesa produced about 20 quintales. This is as compared to optimal yields of 30 to 40 quintales per hectare, according to local agronomists.

What could account for the differences in yields between groups? The data points to several factors that have been linked to the productivity gap,⁴⁰ but do not represent an exhaustive list:

- 🌱 **Fertilizer use:** Members of Catalina and Idesa, as organic-certified groups, rely on organic fertilizers, while members of Girasol and Lirio use both organic and chemical fertilizers. The literature indicates that organic and conventional production systems can reach similar levels of productivity, assuming similar levels of nutrient inputs and active plant maintenance.

40 CRS Coffeelands Blog, <http://coffeelands.crs.org/2013/04/346-coffee-rust-renovation/>.

Most small-scale organic coffee producers, however, do not achieve these levels of organic inputs, due to resource and knowledge constraints, and so generally realize lower yields than producers using concentrated, chemical fertilizers.⁴¹ As one farmer explained, “I wish there were money to . . . produce more, but because I don’t have enough, I don’t apply more fertilizer or fumigate.”

- ☛ **Density of trees:** Idesa and Catalina have significantly lower coffee tree densities than Girasol and Lirio, below the recommended density range for the tree varieties used (see Figure 22). The lower planting density limits the potential production per hectare.

Figure 22: Average planting density of cooperative members in 2012

Cooperative	Average planting density (trees/ha)
<i>Within recommended range*</i>	
Girasol	5,516
Lirio	5,309
<i>Below recommended range</i>	
Catalina	4,614
Idesa	3,874

*According to a local agronomist, the recommended range, given the varieties used by cooperative members, is between 4,700 and 5,700 trees per hectare.

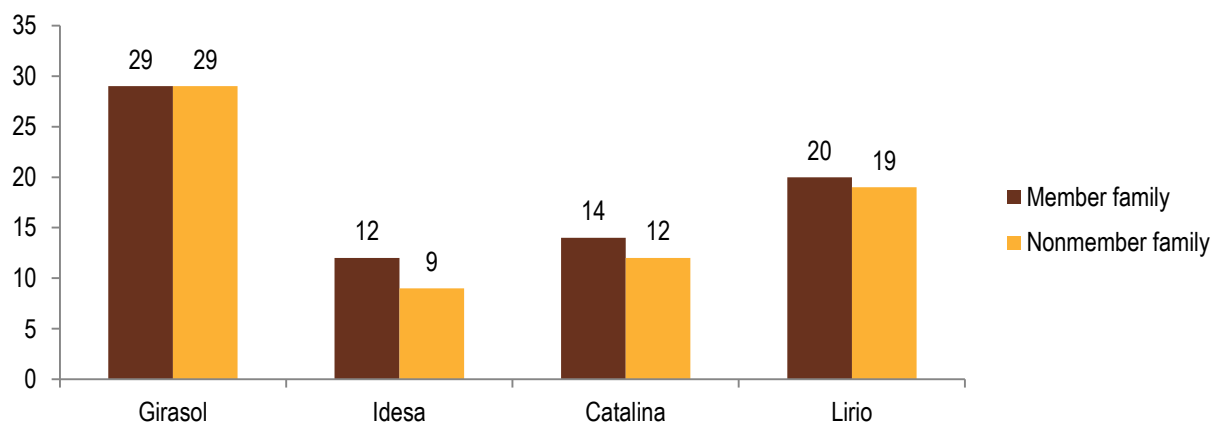
Productivity also depends on many additional factors, such as soil management, shade management, and pruning practices, and ultimately relies on individual producers’ effective and consistent application of best agronomic practices.

7b. Data on whether enterprises improved productivity is inconclusive

Within the groups, the evidence is mixed on whether cooperative membership correlates with higher yields. On the one hand, we found no statistically significant differences between members and nonmembers (see Figures 23 and 24).

41 J. Haggard et al., “Coffee Agroecosystem Performance Under Full Sun, Shade, Conventional and Organic Management Regimes in Central America,” *Agroforest Systems* 82 (2011): 285-301.

Figure 23: Productivity in 2013 by member and nonmember family (quintales per hectare)



On the other hand, members of the three well-functioning groups reported increased production since joining the cooperative (see Figure 24). Indeed, the majority of members in the three well-functioning groups reported that their production has improved somewhat or significantly since they joined the cooperative and prior to coffee rust taking hold.⁴² This was not the case in Lirio, where farmers predominantly reported production decreases, due primarily to coffee rust (referenced under the broader category of “pests” in Figure 25) rather than to any cooperative interventions.

Figure 24: Since joining the cooperative, how has your production QUANTITY changed, if at all?

Cooperative	Decreased significantly	Decreased	Same	Increased	Increased significantly
Girasol	4%	17%	10%	29%	40%
Idesa	2%	15%	6%	60%	17%
Catalina	1%	6%	26%	45%	22%
Lirio	26%	60%	4%	11%	—

In the three well-functioning groups, members attributed production increases to factors enabled by cooperative services (see Figure 25). Main factors included the replanting or denser planting of existing coffee farms, supported by cooperative loans or higher pricing; the purchase of new coffee land, again supported by income and credit from cooperatives; technical assistance; and increased fertilizer usage, tied to input provision programs and technical assistance.

⁴² Enumerators specified that we were asking about the overall trend, independent of the effects of coffee rust in the last two years.

Figure 25: To what do you attribute any change in production?

Cooperative	#1 most frequently mentioned	#2	#3	#4	Others mentioned
Girasol	Renovation coffee trees	Density of coffee trees	Fertilizer usage	New plots	Technical assistance, pruning, harvesting
Idesa	New plots	Coffee price	Technical assistance		
Catalina	Technical assistance	Renovation coffee trees	Fertilizer usage		
Lirio	Pests	Fertilizer usage	Input prices	Climate change	

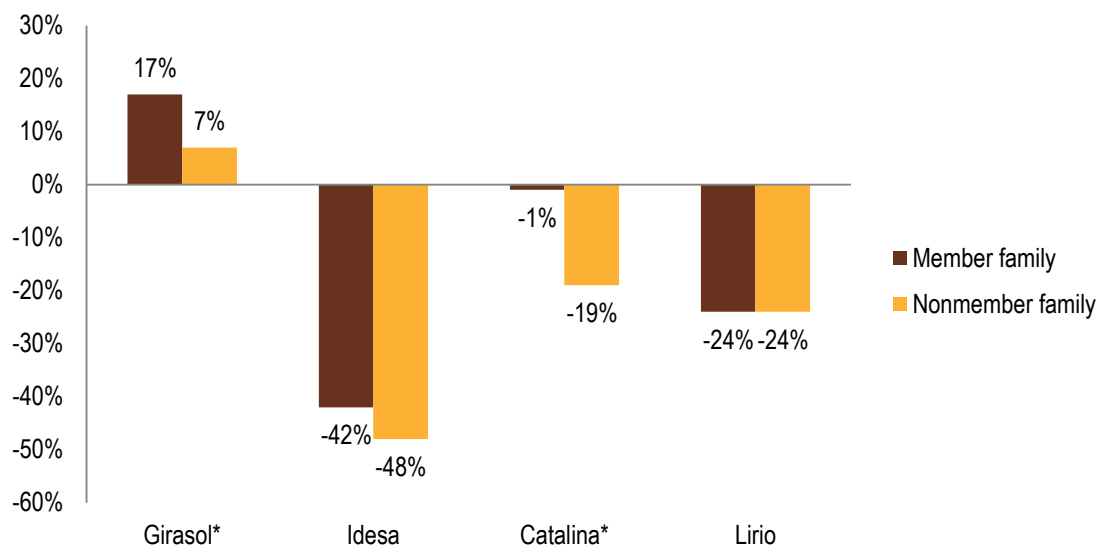
As one member said:

Those who are not organized [in a cooperative] have coffee trees that look like our fathers' coffee trees. I've seen that, when we [organized farmers] apply fertilizer and maintain our coffee, there is more product and, from that, we make more money.

7c. Membership in Girasol and Catalina correlates with higher resilience to coffee rust

Despite the inconclusive evidence on yields, it appears that membership in Girasol and Catalina correlated with members' higher resilience to coffee rust, protecting them from greater productivity losses. When asked about the effects of the disease on production in 2013, nonmembers corresponding to Girasol and Catalina reported significantly higher losses than did members of those cooperatives. (We did not see statistically significant differences in changes in production between 2012 and 2013 for Idesa and Lirio.)

Figure 26: Changes in production between 2012 and 2013



Although the data suggests links between the cooperatives' services and productivity, the cooperative's role is still inconclusive:

- ☛ It is possible that productivity gains have actually been nonexistent or modest. While farmers reported increased application of practices known to increase productivity, they may not have been applying these practices consistently. We learned in focus groups, for example, that farmers often limit or defer these practices, which require investments in inputs and labor, when resources are tight or the price of coffee is low.
- ☛ During the 2012–2013 season, coffee leaf rust significantly decreased production, likely eroding any productivity gains experienced in earlier years.
- ☛ Our sample size may have been too small. Given the large variation in productivity, and probably some memory errors by farmers, having a large sample size is all the more important for estimating a statistically significant effect with yields.

Finding 8: Enterprises have likely contributed to improving members' coffee quality

In the three well-functioning groups, cooperative members reported improvements in the quality of their coffee since joining the cooperatives. While farmers were not asked about a specific quality metric, farmers likely understood “quality” in terms of the criteria assessed by the cooperatives (e.g., number of defects, humidity level, cupping scores).

Members of Girasol and Catalina, and to a lesser extent Idesa, said that their coffee quality had improved. Indeed, managers of the three well-functioning groups corroborated decreases in the rejection rate over the past several years.

Figure 27: Since joining the cooperative, how has your production QUALITY changed, if at all?

Cooperative	Worsened greatly	Worsened	Same	Improved	Improved greatly
Girasol	—	1%	11%	64%	23%
Idesa	—	1%	57%	16%	26%
Catalina	—	2%	24%	40%	34%
Lirio	—	35%	51%	9%	5%

Quality improvements are important because they boost farmer incomes. A farmer who brings in high-quality coffee achieves a higher acceptance rate by the cooperative, selling a higher percentage of his coffee through the cooperative at the higher price for export-quality coffee. For the cooperative, consistently high quality among its members ensures compliance with specialty coffee buyer requirements and makes the cooperative competitive vis-à-vis buyers.

When we asked members to attribute these quality improvements, members cited cooperative interventions, primarily training; increased fertilizer use, which is tied to both training and facilitation of access to inputs; and compliance with certification standards, also tied to training.

Figure 28: To what do you attribute any change in quality?

Cooperative	#1 most frequently mentioned	#2	#3
Girasol	Harvesting practices	Fertilizer use	Pruning practices
Idesa	Technical assistance	Certification requirements	Price
Catalina	Technical assistance	Fertilizer use	Certification requirements
Lirio	Pests	Fertilizer use	Varietals

A minority (35 percent) of Lirio producers, on the other hand, said that their coffee quality had actually worsened since joining the cooperative; only 14 percent of members cited quality improvements.

Members of Lirio attributed quality declines primarily to the ongoing leaf rust crisis (subsumed under the broader category of “pests” in Figure 28) rather than interventions by the cooperative.

Finding 9: Enterprises' higher price and credit may have facilitated members' land acquisition

As described above, members earn an additional \$428 to \$3,198 in coffee revenues compared to nonmembers. While part of that differential owes to the higher price per unit paid by the cooperative, most of it comes from the difference in landholdings. Members in the three well-functioning groups tend to have substantially more land than nonmembers and thus produce proportionally more coffee (see figure 29).

In Catalina, although the medians⁴³ for members and nonmembers are equal, we find, by segmenting the Catalina control group into its constituent subgroups — independents, new members, and members of another cooperative — that independents and new members have smaller landholdings.

Figure 29: Coffee hectares (medians)

Cooperative	Member family	Nonmember family
Girasol*	1.2	0.7
Idesa*	0.8	0.4
Catalina	0.4	0.4 (0.2 among independents, 0.3 among new members)

Qualitative interviews suggest that membership in these well-functioning groups has contributed to producers' expanding their coffee plots. Differences in assets between members and nonmembers are *not* exclusively due to different starting asset bases, as members have also expanded their assets since joining the cooperatives. As one Girasol member explained:

Coffee always produces and always gives. It's what has permitted me to buy a bit more land. I cultivate corn, beans, tomato for my use, but coffee always gives [earnings] and I hope that this year there's a little left over to buy another cuerda⁴⁴ or two of land.

Another member described how credit from the cooperative has allowed him to purchase more coffee land.

I've taken out credit for several years and it's helped me. For example, last year, I bought this plot of several cuerdas, which was a little expensive, but I've committed to paying off my credit and continuing to improve [my farm].

Because land was not an original focus of the study, the producer-level survey did not ask members explicitly if they had acquired land.⁴⁵ When land emerged as a primary thread in the results, we sought to understand the role of the enterprise in land acquisition. Below is a summary of evidence that points to the cooperatives' promoting farmers' coffee land acquisition:

- Management interviews with two of the groups — Girasol and Idesa — suggest that acquisition of agricultural land is one of the primary uses of income and the chief way for farmers to make long-term investments. In the context of extremely small landholdings, of one hectare or less, members prefer to buy new land over investing in existing land, so as to ensure larger inheritances for children. There is also social status associated with larger landholdings. In Catalina, the perception is that investing in land already owned is risky, and that it is better to expand landholdings as an additional asset, to cultivate or to sell should necessity arise.

⁴³ We used medians because the distributions had long tails, that is, the means were swayed by small subsets of large landholders.

⁴⁴ A cuerda is a Guatemalan land unit that generally equals about 1/16 of a manzana and 1/25 of a hectare. The size of a cuerda may vary by region within Guatemala.

⁴⁵ Future studies will explicitly ask farmers if they have acquired land since joining the enterprise.

- ☛ The majority of members of the well-functioning groups reported that their coffee production had risen since they joined the enterprises. When members were asked to cite the reasons for the higher production, in Idesa the acquisition of new coffee plots was the most frequently mentioned response. In Girasol, new land was the fourth-most-mentioned response.
- ☛ Girasol has a credit line specifically for land purchases, which about 80 members (10 percent of savings and credit cooperative members) have utilized. According to management, most farmers use profit from coffee sales to purchase land, sometimes supplementing their funds with additional credit.
- ☛ The timing of the final coffee payment may facilitate land purchases as well. In Catalina, members said that the enterprise helped them to save by not paying them the full coffee price until the end of the season. There was no accrued interest, rather only a commitment device by way of a payment after the harvest — equaling 20 to 40 percent of the total coffee payment — which arrived in a lump sum and made possible a large, one-time on-farm investment.⁴⁶

Finding 10: Coffee farmers express both hope and apprehension about their future

During the surveys, we asked farmers a series of questions regarding their future aspirations:

1. What are the advantages and disadvantages of being a coffee farmer?
2. What future do you see for coffee farmers in your community?
3. What would you need for coffee production to be more viable?
4. What do you think you will be doing in five, 10, 20 years?
5. What future do you want for your children, and what do you think they will do when they grow up?

The main theme that emerged was that coffee is a primary income source and that most farmers expect and prefer to continue producing coffee. As one member explained:

We will continue farming coffee in the community. Coffee provides for us and gives sustenance to our families.

However, there is also widespread recognition of the challenges: fluctuating prices, leaf rust, and the need for renovation.

I think that coffee still has a future, provided that the prices don't fall.

Price instability is scary, especially for those who aren't organized [in cooperatives]. Those of us who are at least somehow organized, we have the minimum fair trade price, so we're less scared about the price falling.

The main disadvantage of producing coffee has been the diseases and plagues. Coffee leaf rust causes the leaves and fruit of the coffee to fall and the branches to dry. You lose your harvest.

⁴⁶ While land acquisition increases revenue, the data does not show if it increases profit. It is likely that land expansion boosts net cash profit (not accounting for opportunity costs) for the majority of farmers relying on unpaid family labor, who have time available for farming another small plot.

The main disadvantage in the long run is that coffee is harvested only once a year, and if you plant a new tree now, it will only produce in three years, maybe in two, but not in the quantity you hoped for.

Farmers' aspirations for their children are that they simultaneously carry on the coffee legacy and pursue higher education to diversify their sources of income. Farmers are also beginning to recognize the need for income diversification in the present.

Below is a sample of representative responses:

If God allows, the dream that I have for my children is that they won't be coffee farmers, because being in university and graduating from there, they now have other ideas. But the idea I have is that, even though they won't dedicate themselves to agriculture, they'll leave some percentage of their time to agriculture.

Some of my kids will work in coffee and others will apply their education. For example, among my daughters, one is a teacher and the other has another job. Now, they don't go to check if the coffee is good or not because they're busy with other work.

Our children will continue working in coffee. They should rise at dawn to work [in the fields] and then dedicate the afternoon to studying.

Conclusion

In this study, we found that cooperative membership was correlated with higher levels of self-reported well-being by producers, higher incomes, higher access to credit and training, and more widespread application of sustainable practices linked to soil health and water-quality conservation. Female members, a minority in three of the four groups, accessed cooperative services at the same rates but earned lower incomes relative to men because of land disparities.

Practitioners seeking to support smallholder coffee farmers should take away the following lessons from this research:

- ☛ Supporting well-functioning producer organizations, as well as actors that address enterprise needs such as financing, can improve rural livelihoods for smallholder farmers. The degree of benefit for farmers depends on their relationship with the enterprise.
- ☛ Understanding the nuances of this relationship — the services that are adequately being provided and those that are missing — can enable practitioners to better engage with and support the groups.
- ☛ Additional research is necessary.
 - What supporting services besides financing, and in what combination or sequence, help rural enterprises to be well functioning and to thrive? How can the sector support a group that is currently not well functioning, such as Lirio?
 - What will it take for enterprises' agronomic extension programs to translate to improvements in farmer productivity?
 - How can lenders, buyers, and NGOs working with smallholder farmers ensure that coffee livelihoods are sufficient for farmer households to avoid food insecurity?

CHAPTER 2: WOMEN IN AGRICULTURE: COMPARING IMPACTS FOR DIFFERENT HOUSEHOLD TYPES

In Latin America, coffee is traditionally a man's crop. Men predominate in roles throughout the value chain, starting with production. Women typically contribute in important, though less visible ways: preparing food for the male workers; carrying lunch several kilometers to the coffee plots; and cleaning, washing, and cooking at home. During the harvests, women also accompany the men to the fields and pick, depulp, and dry coffee beans.

Today, although women still represent a minority of coffee farmers and cooperative members, women's involvement in primary production tasks such as planting, fertilizing, and weeding is on the rise. A recent data review suggests that in the last decade the proportion of farms in southern Mexico and Guatemala operated by women has grown dramatically, due partially to male family members' emigration in pursuit of alternative income opportunities.⁴⁷

Many more women producers than a few decades ago have also joined coffee cooperatives — producer organizations that aggregate and commercialize coffee, often paying a price premium and providing other services such as technical training and credit.

The studies in Guatemala represent Root Capital's first extensive exploration of cooperatives' impacts on female members and the households they support.



⁴⁷ In Oaxaca, Mexico, between the mid-1990s and 2013, the proportion of women fair-trade organic farm owners grew from 9 to 42 percent. Lyon, Sarah, Bezaury, and Mutersbaugh. "Gender Equity in Fairtrade—Organic Coffee Producer Organizations: Cases from Mesoamerica in Geoforum," 2010.

Box 7: Women in Agriculture

Root Capital's Women in Agriculture Initiative (WAI)

In 2012, Root Capital launched our Women in Agriculture Initiative (WAI) to recognize and promote gender-equitable practices among our client enterprises. Through the WAI, we are continually increasing the number of clients that meet our gender-inclusive criteria,⁴⁸ with a particular focus on women-majority value chains such as shea and cashew, as well as certain agroprocessing clients. At the same time, through case studies, we seek to improve our understanding of the segments of our portfolio with low rates of women's participation and leadership, so as to inform the design of targeted services that we and/or our partners could offer to support gender equity.

Multilateral Investment Fund's Women's Empowerment Program

The Multilateral Investment Fund (the MIF) supports private-sector-led development to give businesses, farms, and households the tools to boost their incomes. The MIF aims to empower women in agriculture by using a gender lens in its projects to promote women's participation in value chains and to improve their access to productivity-enhancing services. The MIF does this by investing in agricultural value chains that have significant female participation, promoting women's participation and leadership in producer organizations, and supporting innovative private-sector-led approaches that improve women's access to agricultural technologies and agricultural finance.

In this study, our gender-related research goals were to understand:

- ☛ Women's roles as coffee farmers and members of coffee cooperatives
- ☛ The impacts of the cooperatives on female participants and their households
- ☛ How these impacts differed between households of male and female cooperative members

In particular, we sought to deepen our understanding of the barriers women face to joining cooperatives and to using and benefiting from cooperative services. Our methodology (see Appendix I) was to disaggregate impacts by household type using producer-level data and to triangulate this analysis with focus groups and interviews with cooperative management.

Brief Summary of Main Findings

We found that cooperatives are helping to level the playing field between households represented by female and male cooperative members by delivering high-value services such as credit and agronomic training in equal rates to women and men. Among the groups, we also found significant variety in women's participation and leadership. While the particular gender dynamics in each cooperative reflected the context and local gender norms, we also identified that the situation for women has evolved in response to changing economic and social conditions as well as interventions by the cooperatives and partners. The main findings are as follows:

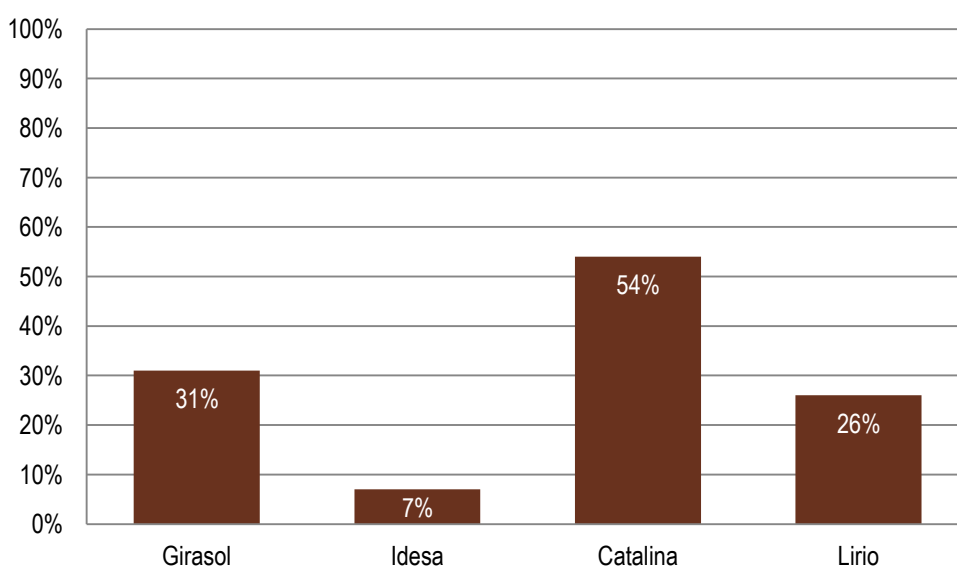
48 Given the disproportionate level of male participation in our primary sectors, we consider a business "gender-inclusive" if at least 30 percent of members are women OR if at least 20 percent of members are women and the business is majority woman-led (either in management or ownership).

- ☛ Women's participation in cooperatives is greatly hindered by social and cultural traditions and their limited access to land. However, we found no evidence of discriminatory membership policies or actions among the four cooperatives.
- ☛ When women join cooperatives, they and their households benefit because as cooperatives provide services such as training and production credit equally to members, regardless of the gender of the household representative to the cooperative.
- ☛ Women's membership correlates with moderate empowerment at the household level as measured by female members' reported involvement in intra-household decision-making.
- ☛ Women report a greater improvement than men in self-reported quality of life since joining the cooperative, potentially because households represented in cooperatives by females start from a lower baseline in earnings and farming knowledge.
- ☛ Despite having equal access to cooperative services and reporting significant improvements in quality of life, households represented by women benefit less in income terms than households represented by men, because they have smaller landholdings.
- ☛ Women participate significantly less than men in cooperative governance, leadership and decision-making.

Profile of Female Members

Among the four coffee cooperatives studied, women's participation varied. In 2013, women constituted 7 percent of members in Idesa, 26 percent in Lirio, 31 percent in Girasol, and 54 percent in Catalina.

Figure 30: Women as a percentage of members



The variety in women's participation stems from the distinct history of each community and cooperative.

- ☛ In Girasol, women tended to join when their husbands migrated to Mexico or the United States for work. The rate of migration was significantly higher for households represented by female members than those represented by male members. In Girasol, 69 percent of female members reported a household member away from home, compared to 41 percent for male members.
- ☛ In Idesa, a traditional Ixil community, women's membership has always been low and is currently only 7 percent. Among the eight women interviewed, five were widows, two participated in the cooperative on behalf of their husbands who did not enjoy participating, and one woman's husband was a teacher. The main finding for this cooperative is that high barriers to entry, particularly lack of land and traditional culture norms, preclude most women from joining.
- ☛ In Catalina, a substantial number of women joined after 2004 to take advantage of Café Femenino (see Box 12), a program started by the U.S. coffee importing company Organic Products Trading Company (OPTCO). The program provides an economic incentive for coffee produced on women's land and spurred the creation of a micro-credit fund specifically for women. Most of the female members live with their husbands, who generally work both their own coffee plots and those of their wives.
- ☛ In Lirio, women joined the cooperative to take advantage of subsidized savings and food security projects supported by an international NGO. Women were targeted as beneficiaries of this program.

Defining the Unit of Analysis

Our analysis compares impacts of cooperative membership for different households, with reference to the cooperative member who participates on behalf of the household.⁴⁹

The three household types the study profiled are:

- ☛ Households represented in the cooperative by male members
- ☛ Households represented in the cooperative by female heads of household ("female heads")
- ☛ Households represented in the cooperative by females, who were likely not heads of household ("female non-heads")

Most of the women interviewed were the only representatives of the cooperatives for their households, with no other household member registered with the cooperative.⁵⁰

49 In the few cases in which two or more household members were cooperative members, we randomly chose to interview only one of these household members, as most of the analysis used the household as the unit of analysis.

50 An oversight in the survey design was that we did not ask for the informant to name the household head or to clarify her marital status. Thus, in the analysis, to enrich understanding of the demographic profiles of different households, we used the household roster with names, genders, and corresponding ages to identify likely household heads. Women were deemed household heads if they were the oldest in their households and older than the next oldest male by at least 15 years. We realize that this exercise carries various assumptions, but decided it was better to segment, albeit imperfectly, in order to further an understanding of household sub groups.

Figure 31: Women interviewed, by household type

Cooperative	Total # women in cooperative	Total # women interviewed	Female is only household member in coop	Female head of household: single or widowed	Female likely not head of household
Girasol	88	32	88%	15 (47%)	17 (53%)
Idesa	12	8	100%	4 (50%)	4 (50%)
Catalina	68	59	80%	9 (15%)	50 (85%)
Lirio	61	20	90%	5 (25%)	15 (75%)

We interviewed very few women in Idesa because there were only 12 female cooperative members.

The small sample size limits the conclusions that can be drawn from comparisons of households represented by female versus male members.

Box 8: What does gender equality mean to Root Capital?

At Root Capital, we recognize that by supporting businesses that grow rural livelihoods, we are benefitting both men and women. We also know, however, that very often men and women experience these benefits differently, and sometimes unequally.

Root Capital's vision is for female smallholders to have equal opportunities as their male counterparts. We believe that equality of opportunity is fundamental to women's economic empowerment and necessary to strengthen the livelihoods of women and the households they support.

In the Latin American context, coffee cooperatives can promote equality by offering membership and its benefits — specifically training, credit, and participation at all levels of decision-making — on equitable terms to male and female members. In this study, we found that the cooperatives equitably provided services such as training and credit, but fell short on including women in decision-making.

Equality of opportunity also requires change that is outside of or not directly under the cooperative's control. Specifically, women need equal access to economic opportunities, such as land assets and education, which allow them to support themselves and their households and avoid dependency on male partners.

Socioeconomic profile of households

We found that households with female members were demographically similar to households with male members (e.g., ages, number of children), yet tended to be slightly poorer in terms of income and land.

Most salient was the difference in composition of income between sources.

- ☛ In Girasol, where migration to Mexico and the United States is significant, female-member households derived more of their household incomes from remittances and less from coffee.
- ☛ In Catalina and Lirio, female-member households earned a higher proportion of income from male household members' off-farm labor and less from coffee.

Figure 32: Composition of income

Cooperative	Total income (U.S. dollars)	Coffee income	Other farm sales	Employment	Other, e.g., remittances
Girasol					
Male HH	\$9,896	80%	4%	8%	7%
Female HH	\$8,584	61%	2%	11%	26%
Idesa					
Male HH	\$2,239	82%	6%	12%	0%
Female HH	\$1,595	86%	4%	10%	0%
Catalina					
Male HH	\$5,364	27%	21%	48%	4%
Female HH	\$4,148	19%	18%	58%	5%
Lirio					
Male HH	\$2,640	83%	6%	7%	4%
Female HH	\$1,729	68%	9%	18%	5%

Box 9: Women's roles in coffee production

Since the introduction of coffee in Guatemala in the nineteenth century, women have participated in the harvesting, sorting, and wet milling of coffee, including depulping, fermenting, washing, and drying, (and less so in primary production tasks such as fertilizing and weeding). Across the four cooperatives, we found that women perform these functions while also tending to housework, meal preparation, and childcare.⁵¹

Farmer interviews revealed that in recent years, a subset of women have been taking on tasks that were previously the purview of men. Although women who are not household heads generally subscribed to the gendered division of labor, single women have in many cases become protagonists in the coffee field, overseeing planting, weeding, and fertilization. The one exception for single women has been the practice of shade management, which, because it requires climbing trees, is often deemed too dangerous and inappropriate for women.

Like male members, female members frequently rely on household labor, particularly male children, to assist with production. Single women with larger plots who have sufficient capital or who take out credit generally also hire contract labor and then supervise — rather than completing the “male tasks” themselves — while retaining control over the processing. It is a commonly held belief in these coffee communities that women who are less directly involved in production are at a disadvantage because contract laborers often work too slowly or with insufficient attention to detail.

⁵¹ The Borderlands study in Colombia, conducted by Catholic Relief Services, assessed the gender breakdown of particular tasks in coffee, finding that men are the primary participants in all tasks, though women tend to be more involved in coffee milling and drying. For more details, please see: <http://coffeelands.crs.org/2014/09/422-womens-work-in-coffee/>

Main Findings

Finding 1: Most women are unable to join cooperatives and access the associated benefits due to traditional cultural norms and limited land ownership.

In three of the four cooperatives, women constitute a minority of cooperative members. This means that if their partners are not members, women and their households cannot access cooperative benefits. The main barriers to increased women's membership are traditional gender norms and nonexistent or limited land assets.

Cultural norms restrict women's participation in cooperatives

Women's membership in the cooperatives lags behind that of men's because of the patriarchal breakdown of household responsibilities and cultural norms against women's participation in the economic and public spheres. Among all coffee communities, *machismo* is prevalent, though in varying degrees, and many still consider a women's rightful place to be in the home. Even in Girasol, where the manager is a well-respected woman, the elected president of the cooperative board of directors told our research team that women fail in coffee production because "they're designed for the house."

In the communities where this belief is strongest — those corresponding to Idesa and several indigenous communities supplying to Girasol — husbands often forbid women from joining cooperatives. In Idesa too, as we learned from a women's focus group, a woman is unlikely to join because of the reputational damage she could suffer if others saw her as independent. As one woman member said, "The community criticizes women who participate and express their opinions a lot, so [most] try to avoid these problems."

A related reason for women's limited participation is lack of time. In focus groups, women explained that they have so many household responsibilities that making time for cooperative meetings is difficult. In Girasol, women pointed to their triple burden of supporting their partners in coffee production, taking care of children, and performing housework. In Catalina, many women indicated that in the few hours when they are not engaged in housework, they are occupied with weaving.⁵² There is too little free time to take on the responsibilities of being cooperative members as well.

Cooperative customs can reinforce social customs. For instance, although not stipulated by organizational bylaws, it is generally accepted practice to recognize one cooperative member per household, with exceptions in Catalina because of the Café Femenino program. While this "one member per household" practice theoretically gives the entire household access to livelihood benefits, in these cases the woman is typically uninvolved in cooperative-level decision-making and has little insight into the cash flows entering the household.

⁵² In Catalina, weaving is often women's primary income-generating occupation. Interviews suggest that weaving can earn women an average of \$26 per month, which is significant, but generally insufficient to sustain a family without supplementary income from agricultural activities.

Limited land assets preclude or discourage women's participation in cooperatives

A second and preeminent driver of women's low membership is women's limited access to land. In Guatemala, although women are legally entitled to own land, in practice women own only 6.5 percent of agricultural land overall and an even smaller percentage in indigenous communities.⁵³

In Idesa and in indigenous communities supplying to Girasol, very few women own any land at all, because virtually all land is passed on to sons. In interviews, members expressed that women who *do* inherit land receive less or worse parcels relative to their male siblings. In addition, when women who own land marry, they tend to transfer the land to their husbands informally, with the husband administering the land and making all land use and production decisions.

Should a woman's husband pass away, the widow inherits the deceased husband's land. Yet most women customarily do not keep all the land they inherit and either pass it on to their children or sell it out of short-term economic necessity; this explains widows' limited landholdings.

With little or no land, there is neither ability nor incentive to join a cooperative. Owning land on which to farm is a prerequisite for joining Girasol and Idesa. In addition, having more land creates a greater incentive to commercialize through high-value marketing channels such as those offered by cooperative membership.

Our study found that, while these barriers persist, there are early signs of improvement. In the case of Catalina, women who had previously transferred their land to their husbands have asserted their claims to this land to take advantage of the incentives offered through the partnership with Café Femenino (with the premium awarded for coffee produced by women). While no formal land transfer has taken place, this validation of women's property has the potential to begin chipping away at social norms.



⁵³ "Property Rights and Resource Governance Profile - Guatemala," accessed April 29, 2014, http://usaidlandtenure.net/sites/default/files/country-profiles/full-reports/USAID_Land_Tenure_Guatemala_Profile_0.pdf.

Box 10: What are alternative paths for women beyond coffee?

This study identified membership in cooperatives as a path toward stronger livelihoods for women and their households. In the process, however, we learned of alternative paths for women.

In the *mestizo* communities of Girasol, many households have prioritized education for girls and boys alike, to prepare the girls for off-farm jobs and for the boys to choose coffee production, off-farm jobs, or both. Indeed, we learned in interviews that the gap in educational attainment between women and men is narrowing in the youngest generation (i.e., among children of middle-aged cooperative members). This is consistent with our finding that women occupy nearly half of cooperative personnel positions, which generally require the completion of high school and/or a technical degree.

Although increased education is a promising trend that signals enhanced economic opportunities for some women, it is not a panacea for overcoming longstanding gender inequities, especially in the context of limited job opportunities. Often, skilled jobs are available only in cities, which means that women face the difficult choice between unemployment, an unskilled job locally, or a skilled job farther away.

In the villages, alternative opportunities exist but are not sufficient to sustain a household. In Idesa and Catalina, women weave, but earnings are limited (about \$26/month in Catalina). Some women heads of household also provide labor on others' farms.

In partnership with Root Capital, Idesa recently launched a project with smallholders to produce and export honey; although seven women signed up to participate (of 55 total), these women quickly withdrew. We learned from the Idesa management and board that the women cited the following reasons for opting out:

- The women had expected that honey production would be easier and less time-consuming
- Women's household burdens were not compatible with honey production
- Several husbands were uncomfortable with the women spending several hours each week away from the house in the company of other men
- The beekeeping suits could not readily be worn over the traditional dress for women in the area

We do not know how these reasons ranked in importance for the women.

Root Capital is currently pursuing several other income diversification pilots, including pea production and hen raising. While the pea project did not attract female participants, hen raising did, as the latter took place near the home rather than on farm plots farther away. In light of these pilots, the Guatemala project team identified that women were more likely to participate in income diversification activities close to their houses.

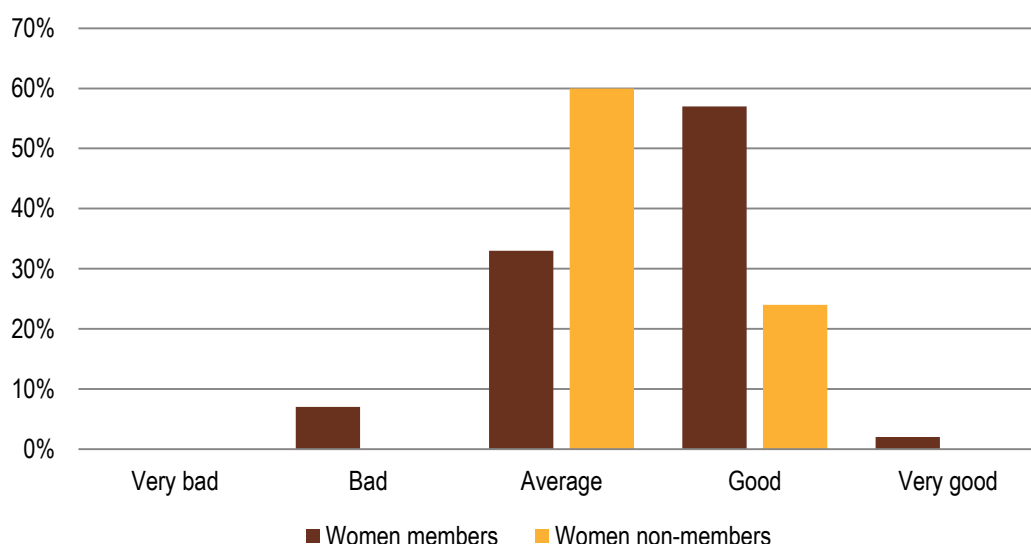
In Girasol and Idesa, the management recognizes the need to do more to boost women's participation, but have not determined the way forward, aside from a few first steps. In Girasol's case, the female manager has encouraged male members to bring their partners to trainings. In addition, a policy limiting how much each individual producer can deliver (up to 100 quintales) has inadvertently given several wives an incentive to join, to enable delivery of more coffee volume from the same household. In response to coffee leaf rust, Girasol planned to discontinue this policy to increase the cooperative's total volume.⁵⁴

54 Separately, in Idesa, where women do not own land, the management is exploring training opportunities for women to assume office and quality control positions, such as cupping, in response to encouragement from its buyer, potentially with a price premium attached.

Finding 2: When women do join cooperatives, they and their households benefit because cooperatives provide equal access to services such as training and production credit to all households, regardless of the gender of the household representative to the cooperative.

For women as for men, membership in the participating cooperatives correlates with better self-reported quality of life relative to female nonmembers. The chart below shows how member and nonmember women in the three well-functioning cooperatives viewed quality of life for their households in the last production year. On average, female members reported “good” quality of life, while nonmember females tended to cite “average” quality of life.

Figure 33: Self-reported quality of life for three well-functioning cooperatives



In surveys, we asked farmers about the services that benefited their households most. Women mentioned the same high-value services identified by men, including higher and more stable prices, access to credit, agronomic assistance, and inputs.

In the women’s words:

Without working capital, one can’t tend to the coffee. It was only when we received the credits [from the cooperative] that we could buy fertilizers, we renovated some of the coffee, and now we’re happy because of the improvements we’ve achieved.

— Female producer, Catalina

It’s really important to understand how to produce coffee. That’s why the trainings on production and fertilizers are so important and necessary.

— Female producer, Catalina

Figure 34: For your household, what have been the most important benefits of being a cooperative member? (Male and female households)

Cooperative	#1 mentioned	#2	#3	#4
Girasol	Credit	Technical assistance	Advances	Price
Idesa	Price	Credit	Inputs	Technical assistance
Catalina	Credit	Technical assistance	Price	Links to other orgs
Lirio	Links to other orgs	Technical assistance	Inputs	Price

Women receive equal services

The services that appeared most often — higher price, credit and advances, and agronomic assistance — are important because of their direct links to a higher, more stable income, whether through effects on revenue or yields. Based on extensive research linking income to self-reported well-being, we believe that it is relatively greater access to these income-boosting services that contributes to members, both women and men, reporting higher quality of life than nonmembers.

Box 11: A female producer on the advantages and disadvantages of coffee farming

The advantage of coffee is that it helps us. It's an income source for the family and the only crop that we trust. There aren't many other crops around here that put food on the table.

The disadvantage of coffee is that, in order to have a good product, you have to stump it, transport [new plants], wait for the [new trees] to mature . . . pay the laborers, wash the coffee, dry the coffee. The coffee process is difficult and the laborers charge a lot to harvest the cherries. And when the price of coffee drops, we don't make money.

When the rain comes and it's impossible to dry the coffee, the coffee gets dirty, and we have to wash it all over, depending on how many times it rains. Oftentimes, it rains for eight days straight. Well, in that case, we have to wash the coffee eight times. If you don't take care of the coffee, it gets damaged and is no good, and [buyers] don't want to pay a lot for the product.

— Female producer, Idesa

Across the four groups, we found that the cooperatives provided high-value services in equal rates to male and female members, with no indication of overt discrimination against women — a salient finding in a patriarchal cultural context.

In focus groups exclusively with women, participants reported that the treatment across genders is equal and that all cooperative members have the same rights, responsibilities, and benefits. Men and women were paid the same price for their coffee, with female members in Catalina receiving an additional \$2 premium per 100 pounds on behalf of the Café Femenino branch. Furthermore, there were no statistically significant differences between men and women in training participation and use

of cooperative credit (standardized for the amount of land). In focus groups in Catalina, women reported greater access to training and credit than men, likely due to Café Femenino.

Women similarly reported increases in production and quality⁵⁵ since joining the cooperatives, although informants did not specify magnitudes, so we do not know if technical assistance was correlated with similar impacts for female-member and male-member households. Like their male counterparts, female members attributed these improvements to services linked to cooperative interventions.

Cooperatives need to go beyond equality in service provision to maximize benefits for women

Despite similar access to benefits between men and women, the management of the well-functioning groups recognize that equality in service provision is likely not enough in the context of current gender inequities. Catalina, with the support of Café Femenino, has provided more extensive credit and training opportunities for women. In Girasol, the female manager acknowledged that the cooperative needs to place more emphasis on boosting women's participation and supporting them with training, but the cooperative currently lacks the expertise to devise an appropriate strategy.

Among all groups, agronomic training may need to be modified given the barriers specifically faced by women: lack of knowledge, limited literacy and education, limited time and ability to travel, and cultural norms against participation in public spaces. Technical assistance programs, to maximize impacts for women, need to take these barriers into account in the design of content and logistics:

- ☛ **Lack of knowledge:** In producer interviews, we found that women tended to be less knowledgeable about coffee production techniques and were often unfamiliar with the day-to-day management activities applied on their coffee plots. This is likely due to women's smaller base of experience producing coffee in the past. Women also reported lower implementation of all production practices we tracked, particularly practices to limit soil erosion and maintain soil fertility (see Chapter 3 for more details on environmental performance).⁵⁶
- ☛ **Limited literacy and education:** Women on average reported fewer years of schooling, and female illiteracy rates ranged from 38 to 61 percent among the groups (see Figure 35).⁵⁷ In the indigenous communities of Catalina and Idesa, where K'iche and Ixil are the primary languages, respectively, women were also less likely than men to speak Spanish.
- ☛ **Limited time and ability to travel:** In Girasol, women in focus groups reported it was difficult to attend off-site trainings and meetings due to their home responsibilities.
- ☛ **Cultural norms against participation in public spaces:** Women in focus groups in Idesa told us that they faced censure from their husbands and the community for participating in the cooperative and expressing their opinions. In all groups, women reported feeling less comfortable participating in cooperative meetings than men. Assuming that learning requires active participation and asking

55 While farmers were not asked about a specific quality metric, farmers likely understood "quality" in terms of the criteria assessed by the cooperatives (e.g., number of defects, humidity level, cupping scores).

56 However, it is unclear if these households actually applied fewer of these practices or, in the case of plots mainly worked by others, if women were unaware of the techniques used.

57 The producer surveys asked about women's literacy rates as part of the Progress Out of Poverty Index, but did not ask about men's literacy rates. We assume, based on the disparity in education years, that a similar disparity prevails in literacy rates.

questions to clarify concepts, cooperatives can consider the possibility of holding separate trainings for women to make them more comfortable for women, as Catalina has done.

Figure 35: Education levels

Cooperative	Men: average years of schooling	Women: average years of schooling	% women illiterate
Girasol	3.5	2.3	38
Idesa	4.7	2.0	61
Catalina	5.4	3.0	58
Lirio	3.5	2.9	45

Women’s membership is correlated with moderate empowerment at the household level

Women’s empowerment in household decision-making is fundamental to equity and, according to much secondary research, correlated with household welfare, as women are more likely to prioritize investment in food, health, and education.

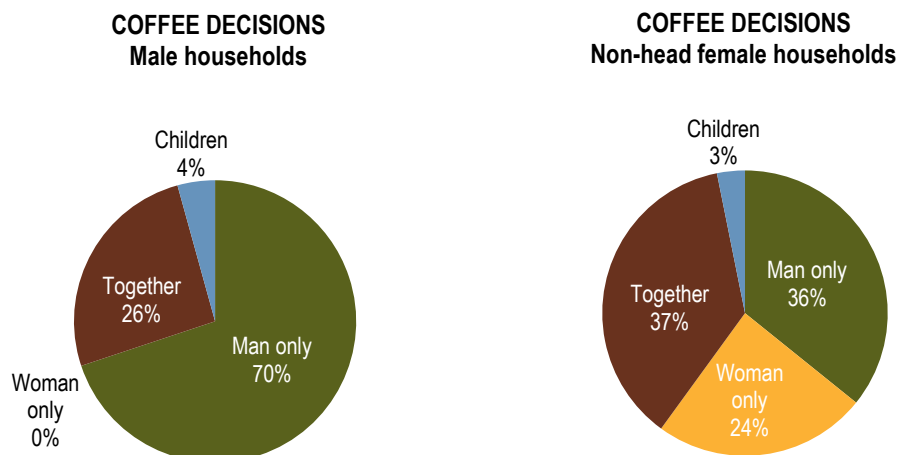
The producer-level survey assessed intra-household decision-making by asking, “Who normally makes the decisions related to . . .”

- ☛ . . . coffee production?
- ☛ . . . major household expenses?
- ☛ . . . minor household expenses?

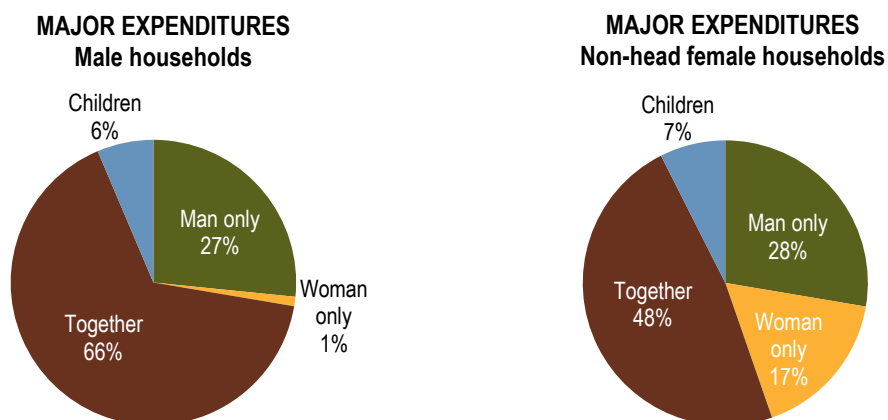
In most households, and particularly in male-member households, the data confirmed that production decisions were usually made exclusively by men, while women shared decision-making on major and minor household expenditures.

The main finding was that in households with female cooperative representatives, women had greater access to decision-making related to coffee production. Specifically, households with non-head female members reported that women were more involved in decision-making in coffee production than in male-member households. In non-head female households, the man was the sole decision-maker only in 36 percent of cases, compared to 70 percent in male-member households. Women were more involved, participating as sole or joint decision-makers. (The direction of causality between cooperative membership and household decision-making is unclear and requires further research.)

Figure 36: Decision-making by household type

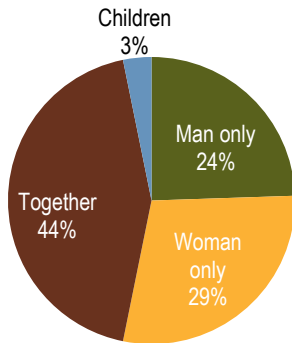


With major household expenditures (such as televisions or appliances), there was also a shift in the decision-making dynamic toward greater involvement by women. Whereas most decisions in households with male members were made “together,” in the case of non-head women households women would sometimes make major expenses decisions on their own. (However, decision-making by the man only was almost equal between the two groups.) Women’s greater participation in non-head female households possibly correlates with their higher involvement in production and/or from directly receiving payments from the cooperatives.

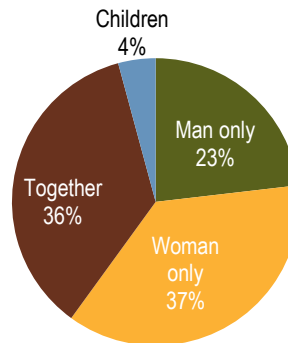


Decision-making on minor expenditures, such as food and daily household goods, showed similar results to major expenditures, with women taking more ownership of these decisions and consulting less with partners; this was reflected by more decisions made by the “woman only” and fewer decisions made “together.” Men made decisions on minor expenses in similar rates.

MINOR EXPENDITURES
Male households



MINOR EXPENDITURES
Non-head female households



Box 12: Café Femenino and Catalina — a catalyst for women's inclusion

In just a decade, the coffee cooperative Catalina transformed from being a male-dominated organization with a handful of female members to a gender-inclusive cooperative with women comprising 54 percent of membership and 33 percent of the governing board. What explains this transformation? The driving force appears to have been a partnership between Café Femenino, a foundation developed by the U.S.-based coffee importer Organic Products Trading Company (OPTCO), cooperative leadership, and several female members who stepped up as leaders.

Café Femenino is a buyer-driven incentive program, working with 32 cooperatives in nine countries, that seeks to impact female producers' daily lives and foster gender equality. The foundation selects as partners coffee cooperatives that are organic and fair trade certified, have a several-year track record of supplying high-quality coffee to OPTCO, and are open to making changes in their operations to promote women's participation in coffee production and cooperative decision-making. Each Café Femenino engagement is slightly different, with the requirements taking into consideration the local context.

Café Femenino initiated its partnership with Catalina in 2004. The foundation certified the coffee coming from women's property (confirmed with informal land titles), entitling women to a \$.02 premium per pound of coffee exported through OPTCO. In 2013, Catalina exported 20,000 pounds with the Café Femenino label, accounting for 18 percent of its total exports.

Under the terms of the collaboration, Café Femenino required the creation of a women's committee to oversee the Café Femenino programming at the cooperative level. This proved to be an important space for women to hone their public speaking and leadership skills, and then to make inroads into general cooperative management. Women now comprise 33 percent of the board.

Separately, Café Femenino provided Catalina funding for agronomic training and production microloans for female members, who, like the men, struggled to access formal loans because they did not possess formal land titles. In 2013, Catalina also launched a pilot program to train 19 female members in the replanting process, from seed to harvest, and provided them with their own seedlings and inputs.

Impacts of Café Femenino

The most visible effect was the increase in participation by women, not only in numbers but also in voice. In the last decade, women's participation in cooperative management and employment increased from 0 to 33 and 40 percent, respectively. Many of these women initially served in the women's committee before also becoming involved in the cooperative's general committee.

The director of Café Femenino described an early visit to the cooperative when women, originally absent from the meeting, joined when invited but were extremely timid. Ten years later, while women were still less comfortable than men (according to our surveys), our research team observed women speaking up in cooperative meetings. Their vocal participation stands in contrast to the silence of most female members in meetings observed at the other cooperatives.

At the household level, female members also have gained access to coffee incomes, as a result of the Café Femenino rules that women must physically receive payment for their coffee and the men cannot collect it in their place. Women now contribute to household income, and even though they often hand the money directly to their husbands, at the very least they have greater visibility into household inflows.

Challenges

Of course, Café Femenino is not a panacea. In addition to being an expensive program that requires identifying a market willing to pay the women's premium, Café Femenino does not necessarily address deeper cultural issues, specifically land inequity and women's limited roles in decision-making. Although Café Femenino has promoted formal acknowledgement of women's landholdings — a step in the right direction, in contrast to the practice of male household heads considering wives' land as their own — the program has not, as far as we know so far, caused a shift in unequal inheritances to sons and daughters.

In addition, men are still the primary decision-makers, as evidenced in the intra-household decision-making data in Catalina, more than in the other three cooperatives. Even in households with female members, in Catalina men are the sole decision-makers on coffee production in 41 percent of households, followed by joint decision-making in 31 percent, and women as sole decision makers in 22 percent. In the three other cooperatives, when a woman is a member, she is generally the primary decision-maker on coffee production.

Takeaways

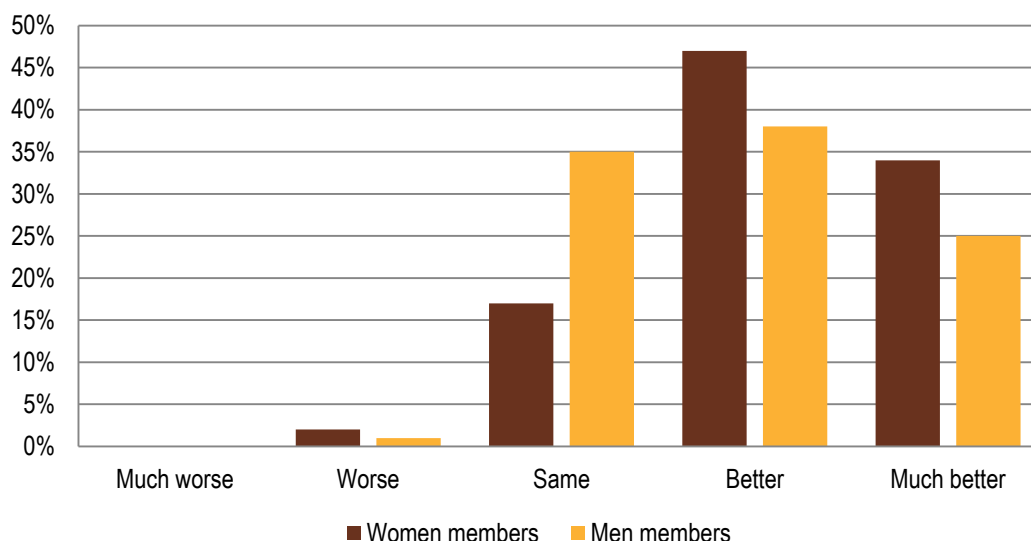
What can we take away from Catalina's experience? A buyer-led incentive program has high potential, in coordination with a gender champion like the manager of Catalina and women willing to step up and lead. In addition, creating a space for women's participation, like a focused committee, can be a stepping stone for women's leadership in the cooperative.

While Café Femenino is scaling steadily, there is scope for other buyers and development institutions to consider similarly structured incentive programs. For interested partners, a key lesson from Café Femenino's experience is to engage deeply and holistically with each group, and to check in often to make sure that the program is designed to fit the local context.

Finding 3: Women report a greater benefit than men in self-reported quality of life since joining the cooperative, potentially because households represented in cooperatives by females start from a lower baseline in earnings and farming knowledge.

Although the cooperatives are generally providing services equally to men and women, women reported experiencing *more* benefit than men from their membership. We found female members' satisfaction in 2013 was roughly even with men's (see Figure 37). However, on average, when asked about *changes* to their quality of life since joining the cooperatives, women reported improvement in *significantly higher rates* than men, pointing to the possibility that women may value the cooperative's benefits more than men do, or that the cooperative helped to improve their livelihoods from a lower baseline.

Figure 37: Quality of life now vs. pre-cooperative membership



We are uncertain regarding the source of the difference in perceived improvement between women and men. It could be that, while women’s households earned a lower total payment than men’s households in absolute terms, women valued the increase in income more because they entered the cooperative with a lower starting income.

Alternatively, it is possible that women perceived more incremental value in the cooperative’s services — in other words, they believed that they would have more difficulty than their male counterparts in accessing the same benefits, such as training or credit, outside of the cooperative. As one female Girasol member explained:

I feel that my life is better, my family’s life is better. Before, we didn’t have anywhere to go to get a loan to pay for coffee laborers. Now, thanks to our organization, we feel that life is better . . . also because they come to give us trainings. Maybe I don’t remember everything that’s covered, but the little I remember I apply to improve my work [in coffee].
— Female producer, Girasol

Training in particular may bring a disproportionately greater impact to women, who anecdotally have more difficulty accessing training outside of the cooperative. In Girasol, women explained that they often could not attend trainings organized by Guatemala’s national coffee association, Anacafé, because of their household responsibilities.

That cooperatives facilitate access to training (see Figure 38) is especially important given that women, as mentioned earlier, appear to have less knowledge than men in coffee production. In light of this disparity, cooperatives’ agronomic training has the potential to deliver greater impact for women than men.

Figure 38: Training participation in 2013

	Member women	Independent women
All*	59%	16%
Girasol*	88%	10%
Idesa	50%	0%
Catalina*	51%	21%
Lirio	40%	19%

Finding 4: Despite having equal access and reporting significant improvements in quality of life since joining the cooperatives, households represented in the cooperatives by women benefited less in absolute terms than households represented by males.

In all groups, households with male members earned the highest incomes, followed by households in which women were not heads. Female-headed households earned the least.

Figure 39: Average total income 2013

Cooperative	Male household	Female head of household	Female likely not head of household
Girasol	\$9,896	\$8,542	\$8,621
Idesa	\$2,239	\$1,003	\$2,385
Catalina	\$5,364	\$3,580	\$4,254
Lirio	\$2,640	\$1,478	\$1,818

The disparity in income owed largely to the family structure and composition of income. A second driver of this variance was coffee revenue, a function of land size and productivity.

Figure 40: Average total coffee revenues 2013

Cooperative	Male household	Female head of household	Female likely not head of household
Girasol	\$7,801	\$3,912	\$5,076
Idesa	\$1,492	\$974	\$1,238
Catalina	\$1,112	\$453	\$871
Lirio	\$2,301	\$1,114	\$1,299

In these communities, there was more variance in land size than productivity (see the productivity analysis below). Because households with female members had smaller plots, these households produced less and thereby generated less coffee revenue. Households led by women were particularly

disadvantaged, as these households had the smallest plots and the least family labor to dedicate to production.

Figure 41: Average coffee hectares 2013

Cooperative	Male household	Female head of household	Female likely not head of household
Girasol	1.8	1.1	1.3
Idesa	1.0	0.5	1.2
Catalina*	0.7	0.3	0.5
Lirio*	1.2	0.6	0.6

What accounts for the disparity in land size? The main cause is unequal inheritances. Female-headed households have only the land that the woman has inherited. In female non-head households, in which women pool land resources with their partners, we hypothesize that land plots are smaller than in male-member households due to a combination of the following factors, gleaned from qualitative interviews:

- ☛ The men in these households may have inherited less land to begin with.
- ☛ The men have potentially been more involved in off-farm labor, rather than investing in acquiring more land.
- ☛ In Girasol, it may be the case that the households of female non-heads have not prioritized acquiring land, as these households register a higher rate of out-migration, indicating a potential preference among these households to increase income through migration.

Productivity is a barrier for female-member households in Girasol — that is, productivity is statistically significantly lower — with the results inconclusive for the other groups

Much research points to women achieving lower yields than men in diverse contexts due to disparities in access to inputs, capital, and farming knowledge.⁵⁸ In this study, our research team similarly was told by women and men alike that women produce less. Yet our quantitative data does not corroborate these anecdotes, as we compare not women to men, but households with female cooperative members to households with male cooperative members.

Among the groups, the data did not consistently show lower yields among female-member households (including both female head and female non-head households) compared to male-headed households. Comparing members by gender in all four cooperatives, we found that women’s households produced an average of 18 quintales in 2013, compared to 19 quintales for men’s households. This result was not statistically significant, with the exception of Girasol. Regressing yields on gender, while controlling for land size, age, and whether another household member was a member of the cooperative, did not change the results; gender still was only a significant predictor of yields in Girasol.

58 For example, World Bank, Food and Agriculture Organization, International Fund for Agricultural Development. *Gender in Agriculture Sourcebook*, 2009.

Girasol was the only group in which the difference was pronounced and statistically significant, with female households producing 25 quintales per hectare while male households produced 29. The subset of female-headed households produced 22 quintales per hectare.

Figure 42: Productivity (quintales per hectare)

Cooperative	Male member family	Female member family
Girasol*	31	25
Idesa*	12	16
Catalina	13	13
Lirio	19	24

Even when we segmented by household type, there was no statistically significant difference, except in the case of Girasol.

Figure 43: Productivity (quintales per hectare)

Cooperative	Male household	Female head of household	Female likely not head of household
Girasol*	31	22	27
Idesa	12	15	17
Catalina	13	13	13
Lirio	19	29	23

Thus, our data is inconclusive, except in the case of Girasol. For the other groups, we refer to the qualitative data for possible explanations.

In Girasol, women had significantly lower yields, producing 25 quintales per hectare compared to 31 for men. Through triangulation from the surveys and qualitative interviews, we developed several potential explanations for this yield disparity:

- ☛ In Girasol, unlike in the other groups, female-member households utilize less fertilizer than male-member households, as reflected by lower total fertilizer costs reported by women. This is likely due to a combination of financial constraints in these households, which tend to be poorer, as well as knowledge gaps.
- ☛ Women have less labor capital to dedicate to production and yet need more labor because landholdings in Girasol tend to be twice as large as in other groups. With higher emigration rates in Girasol, many women lack a household member — typically the older male — who is dedicated to coffee as his primary activity. Indeed, single women report statistically significantly fewer household members. This shortage of household labor for production increases costs because the woman must hire additional labor. Anecdotal evidence suggests that contracting labor leads to

lower-quality production because hired agents who are not the farm owners are less invested in their work than family labor.

In Idesa and Lirio, women actually reported higher yields than men, though the results are not conclusive and the cooperatives did not have explanations for these results. We are uncertain if this result is generalizable because of the small sample size. Only seven women (of the 12 Idesa female members) were interviewed. In Lirio, qualitative interviews did not provide any explanation for women's higher yields; it is possible that the directional result, not statistically significant, is also not meaningful.

In Catalina, women and men's households had the same yields, potentially due to the consistency of the household division of labor across household types. Men tended to perform most of the production activities on the land corresponding to the household. Female heads of household were the only women taking charge of production on their plots. Land plots were small enough that female heads typically managed by using family labor without needing to contract additional labor.

Finding 5: Women participate significantly less than men in cooperative governance, leadership and decision-making.

Women hold fewer management positions

On the cooperative level, there is substantial room for improvement in women's participation in decision-making. With the exception of Catalina, women are virtually absent from cooperative boards, which represent the general assembly of members in decision-making.

Figure 44: Women's participation as leaders, employees, extension agents

Cooperative	Woman-led?	Women as % of board	Women as % of employees	Women as % of extension agents
Girasol	Yes	13%	45%	10%
Idesa	No	0%	50%	0%
Catalina	No	33%	40%	0%
Lirio	No	0%	14%	44%

In Catalina, women began to serve on the board in the last several years, once Café Femenino and the male manager — a strong gender champion — created space for women to participate. Currently, women comprise a third of committee members. Girasol too is beginning to make inroads, as the cooperative is run by a woman manager⁵⁹ and 13 percent of board members are women.

⁵⁹ In coffee cooperatives, an elected board represents the general assembly of the producer members, with the president and vice president presiding. Many coffee cooperatives, once they reach a certain size, also hire a paid manager to oversee cooperative business affairs, especially commercialization and negotiation of contracts with buyers. Although the cooperative general assembly is formally the ultimate decision-making authority, the manager often wields significant power to act and/or make recommendation. In general, the decision-making dynamic between cooperative boards and managers varies widely between groups.

Women’s participation as cooperative employees is on the rise

Unlike on the board, women comprise half or almost half of employees in three of the four cooperatives. These positions are in accounting, management of internal credit, and administration of sub-programs like Café Femenino; in the case of Catalina, a woman is responsible for the fertilizer laboratory, a technical position rarely held by a woman.

Having women in these positions, as “[hidden influencers](#),” is an important step forward, as these women can serve as a bridge between leadership and members, channeling information and contributing to decision-making.⁶⁰

In Lirio, which is the only cooperative with a dry mill, about 80 women were hired during the coffee season to sort and process the coffee.

Too few women serve as extension agents

A key area for improvement among all four cooperatives is in the number of female extension agents⁶¹ — farmer members who receive additional training and disseminate the cooperative’s technical advice to other members through on-site visits. In general, we have found that women are less likely to hold these field positions than men because of girls’ and boys’ unequal access to agronomic education and because the travel and physical work required is considered less suitable for women.

That women are absent from these positions is problematic because extension agents are highly influential to farmers’ agronomic practices and sales decisions, and many female farmers are more receptive to technical assistance from women. In focus groups, we learned that female heads of household in particular, because they are the primary overseers of farm production, are especially interested in technical assistance and would prefer receiving this assistance from female extension agents. In addition, past research and field experience suggests that increasing the number of female agronomists can lead to higher participation of women in trainings.

Female members’ participation in cooperative-level decision-making is still generally low

Female members, especially those who are not household heads, attend fewer meetings than men. This dearth of participation appears to have roots in traditional gender relations, as well as women’s household responsibilities, which consume much of women’s days and make them less willing to dedicate time to meetings and governance.⁶²

60 We define hidden influencers, a term originally coined by McKinsey & Company, as people who provide advice and services to others in their industry, and who therefore have a disproportionately strong influence on their peers because of the information they share and the respect they garner.

61 Lirio has higher participation by women extension agents through a project funded by an international NGO, rather than through cooperative-led technical assistance.

62 Lyon, Bezaury, and Mutersbaugh, “Gender Equity in Fairtrade–Organic Coffee Producer Organizations: Cases from Mesoamerica” in Geoforum, 2010.

Figure 45: Number of general meetings attended last production year

Cooperative	Male	Female head of household	Female likely not head of household
Girasol*	2.9	3.7	1.9
Idesa*	4.0	3.8	2.7
Catalina*	3.8	3.3	2.9
Lirio	1.8	1.0	1.5

Moreover, when women do attend cooperative meetings, they report feeling less comfortable contributing to discussions and decision-making. Between 6 and 29 percentage points fewer women than men report being “comfortable” or “somewhat comfortable” speaking in general assembly meetings. Participant observation confirmed that women rarely speak during these meetings. Catalina is again the exception, with women’s comfort with speaking almost on a par with men’s.

Figure 46: Comfort speaking at meetings: percent who are “comfortable” or “somewhat comfortable”

Cooperative	Male member	Female member
Girasol*	38%	23%
Idesa*	96%	67%
Catalina*	73%	67%
Lirio	38%	21%

Conclusion

Practitioners seeking to serve smallholder women coffee farmers and their households should take away the following conclusions from this research:

- ☛ Coffee cooperatives have the potential to positively impact women and their households. They can be a vehicle for reaching many female smallholders and linking them to premium markets and services such as credit, agronomic assistance, and inputs. Supporting these groups is one way to connect with an important subset of female farmers and promote economic livelihoods for them and their families.
- ☛ Yet women face systematic constraints in participating in cooperatives and benefiting from cooperative services. In light of these findings, we brainstormed ideas for how cooperatives, in conjunction with value chain and NGO partners, can address these challenges so as to economically benefit women and the households they support. We present these ideas below with

the dual caveats that we are not gender experts and that more data points are necessary before making generalizable recommendations:⁶³

- *Target agronomic training to female producers.* This study identified gaps in knowledge of best production practices among female coffee farmers. Training programs need to take into account this knowledge disparity, as well as women's relatively limited mobility, their limited literacy, and cultural norms against their participation in public spaces. It is also important for cooperatives, and those supporting them with technical assistance, to train female agronomists and extension agents, who may be more effective at communicating with female producers.
- *Support women's land acquisition.* This was the main barrier to cooperative membership and to the associated income premium for households with female cooperative members, and the most intractable. Root Capital previously piloted a loan product in Nicaragua that enabled a cooperative to on-lend to women farmers for land purchases.⁶⁴ This pilot, along with other potential solutions, such as incentives for land transfers and trainings for land acquisition, merit further testing by cooperatives and service providers.
- *Consider implementing an economic incentive.* The price premium and supporting programs offered by Café Femenino did not achieve full-scale gender equity within the participating cooperative, but they did catalyze greater participation and leadership by women in Catalina.
- *Encourage women's participation in decision-making and leadership.* In Catalina, the creation of a women's committee — a requirement of the Café Femenino program — gave women a space to practice public speaking and collaborative decision-making, skills they then applied in the cooperative's general board.
- *Encourage women to participate in middle-management positions.* The cooperatives in this study showed moderate success in attracting women to paid cooperative positions. Cooperatives and partners can explore new areas for women's participation and provide appropriate training, e.g., in seedling production, coffee roasting, milling, and cupping. Partners could offer incentives and financial resources for cooperatives to hire and train women for middle-management positions. Women's participation as personnel would contribute to gender equity while creating additional income-generating opportunities for women and their households.

- 📌 Future studies should continue to expand the knowledge base regarding potential interventions to address barriers to women's participation and leadership in cooperatives, and to explore additional

63 The ideas we offer are guided by our vision that female smallholders have equal opportunities as their male counterparts. We believe that equality of opportunity is essential for women's economic empowerment and necessary for strengthening livelihoods for women and the households they support. Furthermore, we believe, though did not investigate in this study, that these ideas are at least neutral and potentially positive for the enterprises themselves, as greater women's involvement can increase the quantity of product sold through the cooperative and reinforce relationships with buyers and partners who similarly prioritize gender equity (and in certain cases, as with Café Femenino are willing to pay a premium for coffee sourced from women).

64 Although the pilot was successful for this client — insofar as 20 women and 10 men acquired land and established coffee plants and the loan was repaid — the loan was also challenging to administer, with the client needing to dedicate significant resources to navigate the land purchases and guide the new farmers in establishing coffee plants.

livelihood opportunities for women in smallholder communities. In addition, we invite the sector to help us build knowledge in response to the following specific questions:

- How can cooperatives ensure that the services they provide, such as training and internal credit, meet women's particular needs?
- How can cooperatives and their partners support equitable land inheritances to men and women?
- What models have successfully boosted women's participation and leadership in cooperatives? Are there specific interventions in terms of education, training, job design, or other areas that could increase opportunities for women to take on managerial or leadership roles in cooperatives?
- What are other examples of applying incentives to improve gender equality beyond Café Femenino? What kinds of actors can offer these different incentives (e.g., buyers, lenders, government, NGOs)? What are the pros and cons of these economic-incentive programs, and what is the right way to set them up to mitigate negative consequences?
- More fundamentally, what is the way forward for women smallholders and the households they support: greater participation in coffee, in alternative income-generating opportunities at the household level, or in employment?

CHAPTER 3: AGRICULTURAL PRACTICES AND ENVIRONMENTAL PERFORMANCE

Agriculture is a leading driver of many of the world's most pressing environmental challenges, including ecosystem and biodiversity loss, land and soil degradation, depletion of freshwater, and climate change.⁶⁵ The threat is particularly urgent in the world's remaining biodiversity hotspots, including the Mesoamerican forest hotspot that stretches across Central America, given that almost half of the areas currently protected for biodiversity are in regions where agriculture is a major land use.⁶⁶

Smallholder farmers both contribute to and suffer from agriculture-driven environmental degradation. Smallholder farms currently account for much of the world's agricultural land: the Food and Agriculture Organization (FAO) estimates that small-scale farming families cultivate over 80 percent of agricultural land in Africa and 30 percent in Latin America.⁶⁷ Constrained by limited access to markets, inputs and equipment, technical assistance, and financial services, many smallholders resort to survival tactics such as slash-and-burn agriculture or illegal logging that harm the environment and create a vicious cycle of ecological and economic impoverishment.

Root Capital believes that agricultural small and growing businesses (SGBs) sourcing from smallholders, such as farmer cooperatives, can play a critical role in facilitating mutually beneficial outcomes for farmers and the environment. By providing technical assistance, credit, technology, and market linkages to their members, cooperatives can help otherwise disaggregated, marginalized farmers adopt more environmentally sustainable production practices.

Yet it is not a given that agricultural enterprises will serve as facilitators of environmental stewardship. We believe that businesses are more likely to play this role when they have sufficient resources, knowledge, and in some cases incentives (from certifications and/or other partners) to encourage the use of sustainable practices.

This study is Root Capital's first extensive study of our clients' role in promoting environmental stewardship among their suppliers.⁶⁸ Our research goals were to understand:

- ❧ Whether and to what degree cooperative members are currently using sustainable production practices; and
- ❧ The cooperatives' likely impacts on members' use of these practices.

65 J.A. Foley et al., "Solutions for a Cultivated Planet," *Nature* 478 (2011): 337-342.

66 Jeffrey A. McNeely and Sara J. Scherr, "Common Ground, Common Future: How Ecoagriculture Can Help Feed the World and Save Wild Biodiversity," May 2001. Available online at: http://www.ecoagriculture.org/documents/files/doc_10.pdf.

67 The Food and Agriculture Organization of the United Nations, *Good Practices in Building Innovative Rural Institutions to Increase Food Security*, 2012. Available online at: <http://www.fao.org/docrep/015/i2258e/i2258e00.pdf>.

68 The Guatemala Cluster Study builds on an earlier study with coffee cooperative Tziscaco in Mexico.

Methodology: Practices as Proxies Approach

In the study, we evaluated whether the agronomic extension services of the four cooperatives examined have influenced the “ecological footprint” — the effect, negative or positive, on the local environment — of members’ farms. We considered cooperatives’ likely environmental impacts to be changes in farmers’ ecological footprints since becoming cooperative members.

In assessing these environmental impacts, Root Capital considered the agronomic programs of the cooperatives (“inputs”), the agronomic practices reported by farmers (“outputs”), and how these practices link to environmental effects (“outcomes”). We took a “practices as proxy” approach, focusing our primary data collection on changes in farmers’ agricultural practices (i.e., at the level of outputs), while relying on the literature and expert opinion to estimate the direction, if not the magnitude, of the likely environmental outcomes associated with these changes. Our methodology did not measure environmental outcomes directly, given the difficulty of measuring many environmental health indicators, nor did it allow us to infer that cooperative programs caused these environmental outcomes.

We first examined the services offered by the cooperative that might affect farmers’ use of agricultural practices, such as training, fertilizer distribution or sale, or soil analysis programs.

Then, through producer surveys, we sought to evaluate the potential impacts of cooperative programs on farmers’ agricultural practices by making two comparisons: (1) between the practices of cooperative members and a comparison sample of nonmembers; and (2) between members’ current practices and their self-reported practices before joining the cooperative.⁶⁹ Triangulating the two comparisons gave us insight into which changes in practices were likely influenced by cooperative interventions and which were likely related to outside factors that affected both members and nonmembers. For example, we would consider practices that changed proportionately for both members and nonmembers to likely be responses to factors other than cooperative interventions.⁷⁰

In parallel, we reviewed the literature and interview experts in sustainable agriculture to understand whether, or in what contexts, specific changes in producers’ agricultural practices were likely beneficial or deleterious to specific aspects of environmental health. Although there remain significant gaps in the literature on the environmental impacts of many agricultural practices, including those included in certification standards, there is growing momentum to research these impacts to inform the work of sustainable agriculture practitioners like Root Capital.⁷¹

69 In the survey, we asked producers, “Before joining the cooperative, did you apply X practice?” For fertilization practices (use of chemical fertilizer, use of coffee pulp, and use of organic fertilizer), we also asked members whether the volumes they currently applied were smaller than, equal to, or greater than the volumes they applied before joining the cooperative. These questions, along with parallel questions on current usage, enabled identification of agronomic practices used prior to and during cooperative membership. We did not, however, specifically ask farmers to provide attribution for any changes in practices in the survey. Rather, we used focus groups to explore attribution with a subset of members from each cooperative.

70 In this scenario, another possibility is that there was spillover of practices promoted by the cooperatives to nonmember farmers. We took a conservative approach in analyzing data to prevent over-attribution of results to the enterprises.

71 Much of this momentum comes from within the certification community. A panel of certifiers, academic experts, and business leaders is advancing a research agenda around understanding the environmental and socioeconomic benefits of specific agronomic practices included in certification standards, to fill existing gaps in the scientific literature. Steering Committee of the State-of-Knowledge

Together, the information on services offered by the cooperatives, the data on changes in farmers' agricultural practices, and the literature review and expert opinion linking those practices to environmental outcomes gave us a sense of clients' *likely directional impacts* on environmental health, without directly measuring changes in scientific indicators such as soil fertility or water pH.

In this study, we evaluated the cooperatives' likely impacts on members' use of 10 agronomic practices, listed in Figure 47. The practices examined fall into three general categories: soil conservation, water-quality conservation, and on-farm biodiversity management. Throughout this section, we refer to these practices collectively as "conservation practices."

Box 13: Conservation practices surveyed

We selected these 10 conservation practices, in collaboration with experts at the Committee on Sustainability Assessment (COSA) and the International Center for Tropical Agriculture (CIAT), by identifying coffee management practices that (1) are commonly used by Guatemalan smallholders; (2) have been identified as important for farm-level environmental health in the literature and by the broader conservation community; and (3) are suited to assessment via farmer surveying by enumerators who are not agronomists.

In Figure 47 we summarize the general implications of each practice for environmental health and coffee productivity, as we understand it based on our literature review and consultations with experts in sustainable agriculture. (Please refer to Chapter 1 for a discussion of study findings related to coffee productivity and quality.)



Assessment of Standards and Certification, *Toward Sustainability: The Roles and Limitations of Certification*, (Washington, DC: RESOLVE, Inc., 2012): A-146-A-168.

Figure 47: Conservation practices surveyed

	IMPLICATIONS FOR ENVIRONMENTAL HEALTH (VERSUS ABSENCE OF EACH PRACTICE)	IMPLICATIONS FOR COFFEE PRODUCTIVITY (VERSUS ABSENCE OF EACH PRACTICE)
SOIL CONSERVATION		
Use of Fertilizer		
1. Coffee Pulp ⁷²	Increased soil fertility and improved soil structure ⁷³ ; if diverting organic waste streams, may also lead to reduced nutrient-loading of waterways ⁷⁴	Higher productivity ⁷⁵
2. Chemical	Increased soil fertility in the short term, yet reduced soil health in the long term, particularly if not supplemented with organic inputs; increased greenhouse gas emissions ⁷⁶	
3. Organic Compost	Increased soil fertility and improved soil structure	
Use of Erosion Prevention Measures		
4. Live Barriers ⁷⁷	Less erosion of productive topsoil ⁷⁸	Avoided losses in productivity that would have arisen from soil erosion
5. Soil Ridges ⁷⁹		
6. Terracing ⁸⁰		
WATER CONSERVATION		
Treatment of Wastewater		
7. Domestic	Reduced nutrient loading or contamination of waterways	Not applicable
8. Processing ⁸¹		
9. Safe Washing of Agrochemical Equipment ⁸²	Reduced contamination of waterways	Not applicable
BIODIVERSITY CONSERVATION		
10. Agroforestry Production (Degree of Shade Cover)	Compared to full-sun systems, increased on-farm biodiversity; increased soil fertility and improved soil structure; increased soil moisture; increased carbon sequestration ⁸³	Inconclusive ⁸⁴

⁷² Coffee pulp is the outer skin of the coffee cherry, removed during the initial processing stage. The nutrient-rich pulp can be applied to the

soil as a form of organic fertilizer.

- 73 Coffee pulp and other organic inputs can increase soil fertility by providing important nutrients, essential for plant growth and crop productivity, and can improve soil's physical properties by increasing its water infiltration and retention capacity, as well as its ability to make nutrients available to plants. Farmers must manage both soil fertility and structure to conserve long-term soil health.
- 74 Nutrient loading, or eutrophication, refers to the introduction of excessive quantities of artificial or synthetic nutrients into aquatic ecosystems. One common result of eutrophication is hypoxia, the depletion of oxygen in the water, which can kill aquatic organisms.
- 75 The literature indicates that organic and conventional coffee production systems can reach similar levels of productivity, assuming similar levels of nitrogen inputs in the form of fertilizers and active plant maintenance. Most small-scale organic coffee producers, however, do not achieve these levels of organic inputs due to income, resource, and knowledge constraints, and so generally realize lower yields than producers using concentrated, chemical fertilizers. J. Haggard et al., "Coffee Agroecosystem Performance Under Full Sun, Shade, Conventional and Organic Management Regimes in Central America," *Agroforest Systems* 82 (2011): 285-301.
- 76 A recent review of the scientific literature, conducted by the World Wildlife Foundation, Germany and the Heinrich Böll Foundation, concluded that chemical fertilizer, particularly synthetic nitrogen, has negative implications for environmental health in the long-term. Specifically, it "reduces the humus [passive organic matter] content and biodiversity in the soil, causes soil acidification and gives rise to emissions of nitrous oxide, a potent greenhouse gas causing climate change... The rise in soil acidity diminishes phosphate intake by crops, raising the concentration of toxic ions in the soil, and inhibits soil growth. The depletion of humus in the soil diminishes its ability to store nutrients." The authors recommend that mineral fertilizers be used sparingly as part of a comprehensive soil fertility strategy relying on organic fertilizer, agroforestry, green manure, and intensive fallowing.
- 77 Live, or vegetative, barriers are strips of trees, shrubs, or stiff grasses planted perpendicular to a dominant slope in order to reduce surface water runoff and soil erosion.
- 78 Topsoil is the uppermost layer of soil, usually ranging from two to eight inches in depth. Most of the soil's organic matter and microorganisms are found in the topsoil, making it the most important part of the soil for crop production.
- 79 Soil ridges are constructed around individual coffee plants to improve drainage and reduce erosion.
- 80 Terracing involves the construction of soil trenches or embankments planted perpendicular to a dominant slope to reduce sediment transport from surface runoff.
- 81 Refer to "Box 16: Wet Milling and its Impacts on Water Quality" for details on coffee processing wastewater management. The Specialty Coffee Association of America also provides a useful overview of the impacts of coffee processing on water resources: Lily Kubota, "Beyond the Quality of the Water in your Cup: Coffee and Water Resources at Origin," *The Specialty Coffee Chronicle*, 8 July 2013, <http://www.scaa.org/chronicle/2013/07/08/beyond-the-quality-of-the-water-in-your-cup-coffee-and-water-resources-at-origin/>.
- 82 This refers to the washing of agrochemical application equipment, such as sprayers, away from waterways to reduce pollution of aquatic ecosystems. We only report use of this practice by members of conventional cooperatives.
- 83 For a recent review of the literature on shade coffee's environmental benefits, see Shalene Jha et al., "Shade Coffee: Update on a Disappearing Refuge for Biodiversity," *BioScience* 64.5 (2014): 416-428.
- 84 Over the long term, coffee trees have been shown to have a longer productive lifespan under shade than in full-sun systems. In the short term, however, the literature on the effects of agroforestry systems on coffee productivity is inconclusive. There is consensus that production under very dense shade results in low yields, but research on how to use shade to optimize productivity is contradictory. Several studies have found that productivity is maximized under moderate shade coverage, while others have found that yields are highest under full-sun systems. One recent study of coffee production in Costa Rica and Nicaragua concluded that the impact of shade on yields is heavily dependent on context and on the management of shade trees to reduce competition with coffee trees. Jason Clay, *World*

Summary of Main Findings

A summary of the main findings is below. We next describe the agronomic extension services provided by the four cooperatives. We then discuss the findings' implications for specific areas of members' environmental performance; the factors likely contributing to variations in findings across the four cooperatives; and ideas for addressing challenges the cooperatives face in improving members' agronomic practices. (We discuss findings for individual cooperatives in Appendix V.)

Cooperative services are associated with the adoption of conservation practices by members.

Members of all four cooperatives reported higher usage of conservation practices than nonmembers, with the most significant differences in the areas of soil conservation and coffee wastewater treatment. In the three well-functioning groups (Girasol, Idesa, and Catalina), members reported statistically significantly higher use than nonmembers of five or more of the 10 conservation practices examined. Members of Lirio reported statistically higher usage of two practices in the areas of soil conservation and water quality conservation.

In focus groups, members of the three well-functioning groups generally attributed the adoption of these practices to cooperative services, namely agronomic training, input provision, and credit.

Despite these signs of improvement, use of conservation practices in absolute terms remains limited in all four enterprises.

Members of Girasol reported the best environmental performance of the cohort, with 50 percent or more of members reporting current use of six of the 10 practices examined. In Idesa, over half of members reported using five conservation practices; in Catalina, four practices; and in Lirio, one practice.

Even when conservation practices are used, focus group discussions suggest that members are not implementing them appropriately and/or consistently from year to year, likely due to financial constraints or limited agronomic knowledge.

Description of Cooperatives' Agronomic Extension Programs

All four cooperatives offered, or facilitated through third parties, agronomic extension to their members. Extension included training on best management practices to increase productivity and improve product quality and, in the case of the eco-certified groups, to ensure compliance with certification requirements. Extension also included facilitated access to important agricultural inputs such as fertilizers (see Figure 53 for details).

Agriculture and the Environment, (Washington, D.C.: World Wildlife Fund, 2004); J. Haggard et al., "Coffee Agroecosystem Performance under Full Sun, Shade, Conventional and Organic Management Regimes in Central America," *Agroforest Systems* 82:285-301, 2011.

Figure 48: Agronomic extension services offered by the cooperatives during the 2012–2013 coffee season

Cooperative	Training	Input services	Other activities
Girasol (Slow Food voluntary standard ⁸⁵ ; a direct trade standard)	Offered free, centralized workshops in each sourcing community, sometimes in coordination with local government institutions	Sold partially subsidized chemical fertilizers and other inputs Sold partially subsidized fumigation and fertilization services to members to combat coffee leaf rust	Facilitated free soil analysis for members, in partnerships with a laboratory of Anacafé, the national coffee association
Ilesa (organic, fair trade)	Offered free, annual centralized workshop	Sold partially subsidized fungicides, mostly to combat coffee leaf rust In small pilot, sold partially subsidized improved coffee seedlings	
Catalina (organic, fair trade)	Facilitated free, monthly centralized workshops from local government and nonprofit institutions	Created and/or sold partially subsidized inputs to producers, including several types of organic fertilizer (compost, foliar, bokashi) and an organic fungicide consisting of copper sulfate and lime In small pilot, supported members in replanting aged or diseased coffee plants by providing free seedlings	Organized community environmental education
Lirio (fair trade)	Facilitated free centralized workshops from an international NGO; in last season, limited to one sourcing region	Facilitated access to an international NGO's fertilizer donation program, designed to increase food crop yields	

In-house extension activities were conducted by part-time “promoters” and farm inspectors, themselves producer members. The cooperatives funded these activities through their coffee revenues and, in the case of the two certified groups, certification premiums.

For the centralized trainings, cooperatives often received financial and/or technical support from third parties, such as national government entities and non-profit development groups.

⁸⁵ The Slow Food Foundation for Biodiversity is a non-profit organization associated with Slow Food International, a global organization founded to prevent the disappearance of local food cultures and traditions. Girasol is a participant in the Foundation's Coffee Presidia program, which seeks to raise awareness of coffee issues among consumers. Slow Food Foundation, “Coffee Presidia,” <http://www.slowfoodfoundation.com/presidia/125/coffee-presidia>.

Main Findings

Cooperative membership correlates with greater use of conservation practices by farmers.

Members of all four cooperatives reported higher usage of conservation practices than nonmembers, with the most significant differences in the areas of soil conservation and coffee wastewater treatment.

Many members of the three well-functioning cooperatives linked their application of practices to cooperative extension services, primarily training, input provision, and credit.

Now I'm training to be a better coffee farmer . . . Now we know more about how to plant the coffee, manage shade, and conserve the soil — things I did not know before. Since I have joined the cooperative, I have received this training, and I am using it.

— Producer, Girasol

The technical assistance is very helpful, particularly concerning the good management of coffee. It has increased my production and helped with soil conservation, without relying on chemical fertilizers.

— Producer, Idesa

It's very important to know how to produce coffee. For that reason the [cooperative] training on production, compost, and inputs is important and necessary.

— Producer, Catalina

Figure 54 provides a summary of differences in the usage of conservation practices by cooperative members and nonmembers.

Figure 49: Dashboard of differences in usage of conservation practices between cooperative members and nonmembers

- Indicates statistically significantly higher usage of practice by members than nonmembers
- Indicates statistically significantly lower usage of practice by members than nonmembers
- Indicates no statistically significant difference in usage of practice by members compared to nonmembers

	Girasol	Idesa	Catalina	Lirio
SOIL CONSERVATION				
Use of Fertilizer				
1. Coffee Pulp	○	●	○	○
2. Chemical	○	N/A	N/A	● ⁸⁶
3. Organic	○	●	●	○
Use of Erosion Prevention Measures				
4. Live Barriers	●	○	○	○
5. Soil Ridges	●	●	●	●
6. Terracing	●	●	○	○
WATER CONSERVATION				
Treatment of Wastewater				
7. Domestic	●	○	●	○
8. Processing	●	●	●	○
9. Safe Washing of Agrochemical Equipment	●	N/A	N/A	●
BIODIVERSITY CONSERVATION				
10. Agroforestry Production (Degree of Shade Cover)	○	○	○	○

⁸⁶ For chemical fertilizer use, focus group discussions suggests that the more limited use of chemical fertilizer by Lirio members likely has negative implications for soil health on members' farms, as farmers are in many cases deferring fertilizer application due to financial constraints and thus not investing in rebuilding soil fertility.

Finding 1: Cooperative membership correlates with greater use of soil conservation practices.

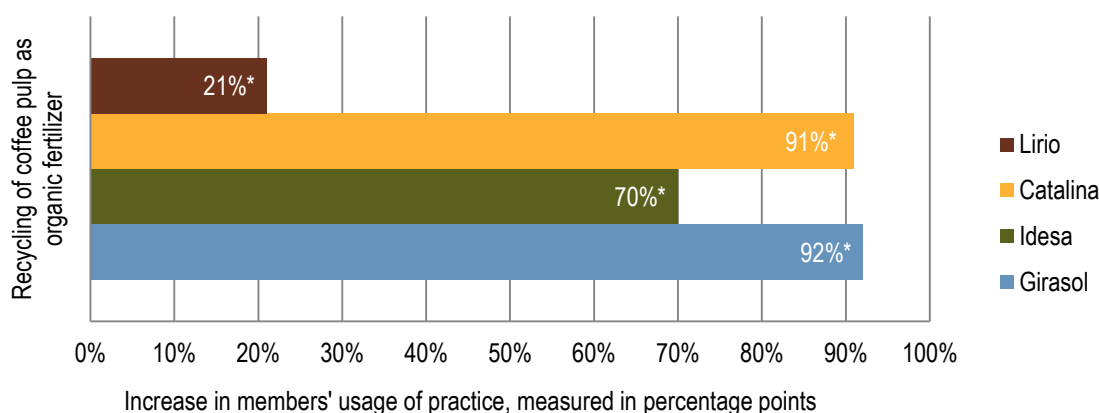
Soil is the foundation of a sustainable and productive farm ecosystem. Healthy soils are living systems that provide plants with essential nutrients, help control plant diseases and pests, and filter and store water. Farmers must manage soil fertility and structure to conserve soil health and ensure productivity over time.

Our data suggests that cooperative membership is correlated with producers' adoption of both soil fertility and soil erosion prevention measures, and with a gradual transition from low-input, likely "nutrient-mining"⁸⁷ production systems to ones that build soil health. The data also indicates, however, that the transition is far from complete, given members' continued low productivity and many members' ongoing concerns related to access to fertilizers.

1a. Soil fertility practices

We surveyed farmers on their use of two types of inputs related to improved soil fertility: **organic fertilizers**, such as coffee pulp and compost, and **chemical fertilizers**. We do not report on chemical fertilizer usage by members of the two organic-certified cooperatives, Idesa and Catalina.

Figure 50: Difference between members' current and pre-membership usage rates (%) of soil fertility practices



Box 14: Explanation of Figure 50

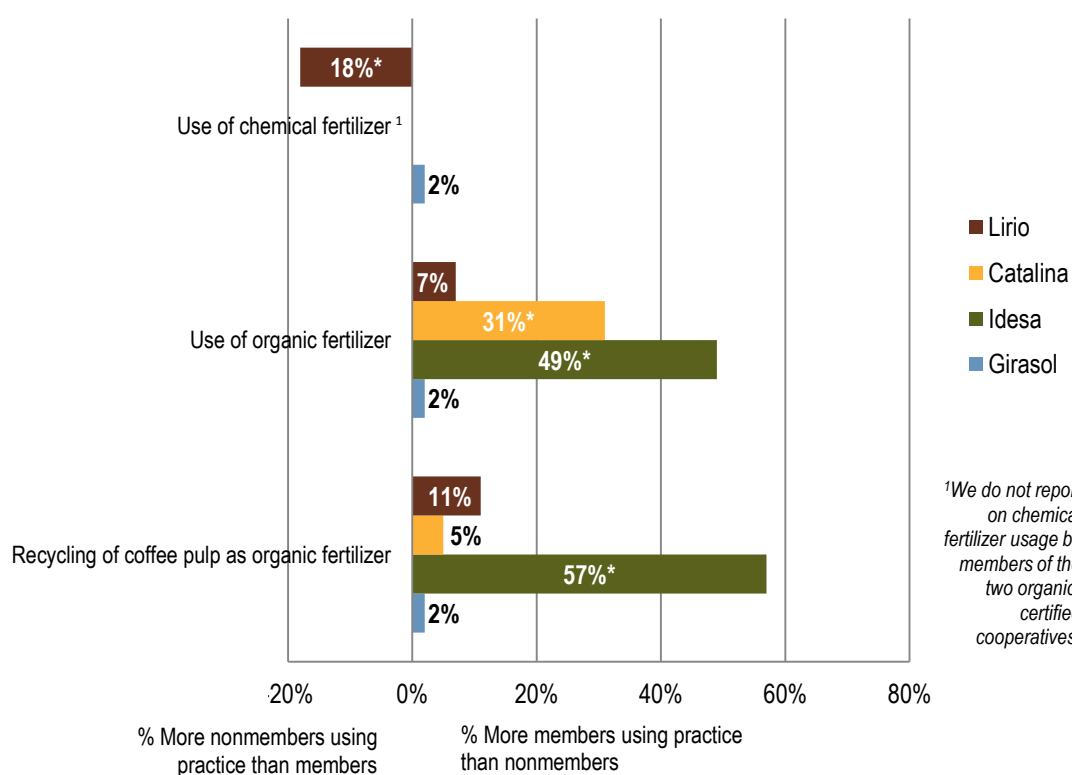
Note that this figure does not include data on pre-membership use of organic and chemical fertilizers. In an oversight, we did not ask all members if they had used these fertilizers before joining their cooperatives, but only members currently using those inputs, and therefore cannot report on overall fertilizer usage by farmers prior to cooperative membership.

⁸⁷ Nutrient mining –the removal by crops of soil nutrients without sufficient replenishment in the form of fertilizers, green manure, or other inputs – is a widespread problem among smallholder farmers in the developing world, resulting in depressed yields and, over time, complete soil exhaustion.

This and following figures show the difference, measured in percentage points, in the percentage of members reporting current use of a given conservation practice and the percentage reporting use prior to joining their cooperative.

For example, the data for the use of coffee pulp as an organic fertilizer by Lirio members indicates that the number of members reporting use of coffee pulp during the last production season was 21 percent higher than the number reporting use before joining the cooperative. In other words, the number of producers recycling coffee pulp as organic fertilizer rose by 21 percent, in this case from 1 percent to 22 percent.

Figure 51: Difference between members' and nonmembers' current usage rates (%) of soil fertility practices



Box 15: Explanation of Figure 51

This and following figures show the difference in the percentage of members and nonmembers reporting current use of a given conservation practice.

For example, the first set of data for the use of chemical fertilizer shows that 18 percent fewer Lirio members reported use of chemical fertilizers compared to associated nonmembers (in this case, 58 percent compared to 76 percent), while 2 percent more Girasol members reported use compared to nonmembers (100 percent compared to 98 percent).

For all groups, cooperative membership correlates with greater use of organic fertilizer by farmers.

Compared to pre-membership practices, producers from all cooperatives reported statistically significantly higher usage of coffee pulp, a byproduct of coffee processing, as an organic fertilizer during the last production season. The majority of Girasol and Idesa members currently using coffee pulp also reported increasing the amount they apply since joining their cooperatives.

Compared to nonmembers, members of the two organic-certified cooperatives, Idesa and Catalina, also reported statistically significantly higher usage of organic fertilizers.

Members of the conventional cooperatives, however, reported similar usage rates relative to nonmembers. Note, however, that organic fertilizer usage among members of the well-functioning cooperative Girasol was quite high, at 89 percent of members, as compared to only 25 percent of Lirio members.

For the well-functioning groups, focus group discussions suggest that changes in organic fertilizer application are a result of cooperative services, including guidance on best fertilization practices through training and, in the case of Girasol, a soil analysis program, input provision and internal credit programs. In the words of one farmer:

The trainings that we receive on how to prune, weed, and fertilize [are benefits of cooperative membership]. Before we did as we liked, while now there is a trainer that tells us how to maintain our coffee farms well.

— Producer, Girasol

The training and organic fertilizer provision services are mutually reinforcing, particularly as most producers struggle to create or buy enough fertilizer to fully treat their trees each year. As one member of Catalina reported:

What we need most to improve coffee production is working capital and training. Training alone is not enough. We need money alongside the training to enable production.

— Producer, Catalina

For the two conventional groups, Girasol and Lirio, cooperative membership correlates with reduced use of chemical fertilizer by farmers, particularly in terms of volumes applied.

Compared to pre-membership practices, producers from both conventional groups reported decreasing, often significantly, the amount of chemical fertilizers they apply to their farms.

Members of Lirio reported using chemical fertilizer at a statistically significantly lower rate than nonmembers, while members of Girasol reported similar usage rates to nonmembers. Note, however, that 100 percent of Girasol members reported using chemical fertilizer during the last production season.

For the two conventional groups, focus group discussions indicate that a combination of external factors and, in the case of Girasol, cooperative interventions likely led to the reduction in chemical fertilizer use by members. Members of both Lirio and Girasol cited the high price of chemical fertilizer as an ongoing challenge, with members of Girasol reporting a doubling of prices in their area during the last two years. The rising cost of inputs has been particularly problematic given the concurrent decline in coffee prices, and in the case of Lirio, the devastation of maize and bean harvests due to persistent drought. We believe these financial constraints are driving some producers, particularly in

Lirio's relatively poorer farmer communities, to limit or defer altogether their use of chemical fertilizer, with negative implications for soil fertility.

In the case of Girasol, conversations with members and management suggest that the decrease is also linked to members' greater knowledge of proper fertilizer application through the cooperative's soil analysis program. Through this program, the cooperative pays for the national coffee association, Anacafé, to conduct soil analysis for all members, allowing members to be more targeted in their application of both organic and chemical fertilizers. In this context, decreased use of chemical fertilizer likely has positive implications for soil fertility and environmental health, as chemical fertilizer can damage local ecosystem health if applied improperly, at the wrong time, or in excessive quantities.

1b. Soil erosion practices

We surveyed farmers on three practices related to the prevention of soil erosion:

1. **The use of live barriers**, or permanent lines of vegetation designed to prevent wind and water erosion
2. **The use of soil ridges** around individual coffee plants to improve drainage
3. **Terracing**, the construction of soil trenches or embankments on sloping land to reduce sediment transport

Figure 52: Difference between members' current and pre-membership usage rates (%) of soil erosion prevention practices

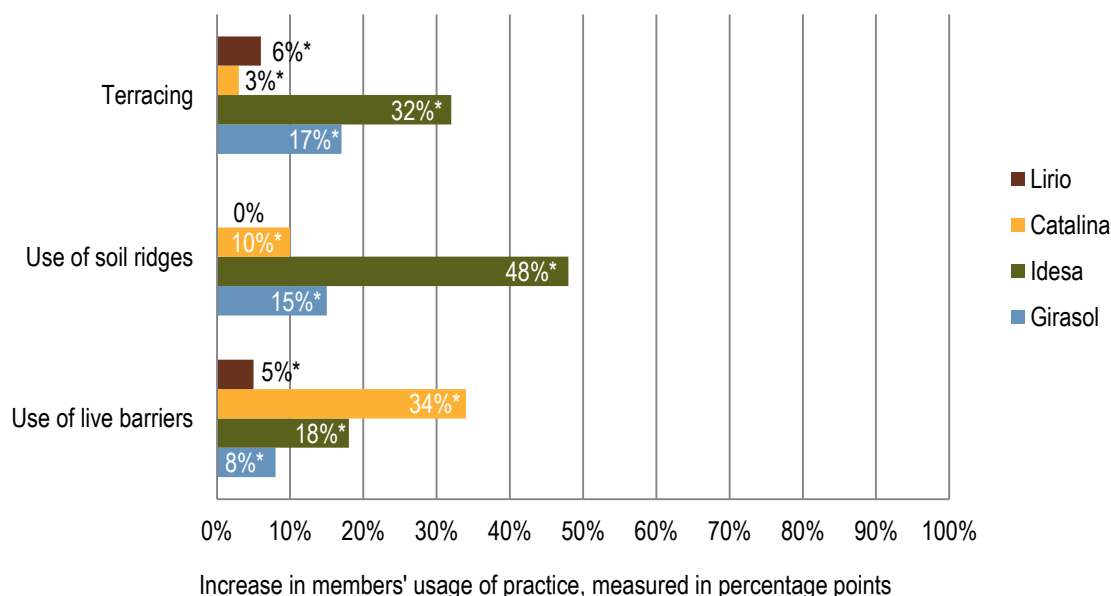
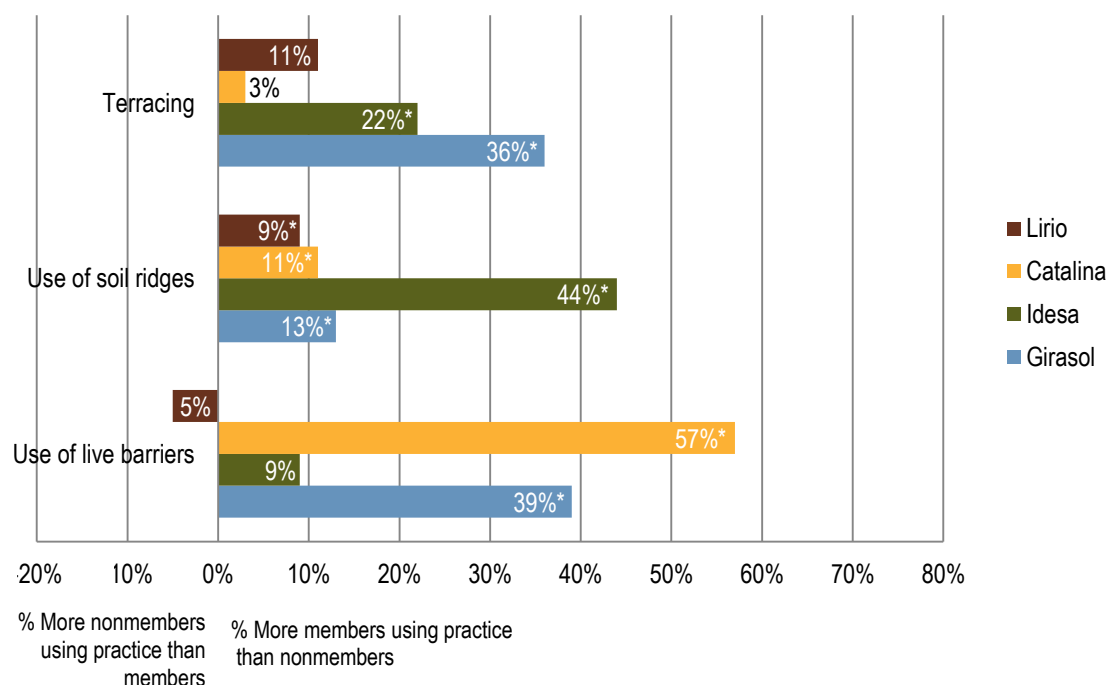


Figure 53: Difference between members' and nonmembers' current usage rates (%) of soil erosion prevention practices



For all groups, cooperative membership correlates with greater use of soil erosion prevention measures by farmers.

Compared to pre-membership practices, a statistically significantly higher number of members in all groups reported using live barriers and terracing during the last production season. A statistically significantly higher number of members of the three well-functioning enterprises also reported using soil ridges.

Compared to nonmembers, members of all four enterprises reported greater usage of some, but not all, soil erosion prevention measures. The degree of difference between members and nonmembers varied across the three erosion prevention measures:

- ☛ Members of Girasol and Catalina reported statistically significantly higher usage of **live barriers** than nonmembers. Members of Lirio and Idesa reported similar usage as nonmembers.
- ☛ Members of all four groups reported statistically significantly higher usage of **soil ridges** than nonmembers.
- ☛ Members of Girasol and Idesa reported statistically significantly higher usage of **terracing** than nonmembers. Members of Lirio and Catalina reported similar usage as nonmembers.

For the well-functioning cooperatives, focus group discussions suggest that members have adopted soil erosion prevention practices as a result of cooperative services, namely training. Members of Idesa, for example, said that the erosion prevention measures they use now, such as terracing, were introduced to them by cooperative trainers.

Overall, we see higher usage rates for soil erosion prevention practices in the two enterprises located in more mountainous regions, Girasol and Idesa. Together with members' reports of higher adoption rates for these practices relative to members of Catalina and Lirio, this suggests that Girasol and Idesa focused more on erosion control practices in their training programs, as steeper land is more prone to erosion.

1c. Further improvement is needed in soil conservation

Despite these indications of improvement, the data suggests that members are not fully and/or consistently implementing soil conservation practices, particularly related to soil fertility. We learned in focus groups, for example, that cooperative members often limit or defer fertilization, which requires investments in inputs and labor, when resources are tight or the price of coffee is low. As one farmer explained:

I wish there were money to “technify”⁸⁸ my plot and produce more, but because I don’t have enough, I don’t apply more fertilizer or fumigate.

— Producer, Girasol

Moreover, in response to an open question on services that the cooperative should provide in the future, members of three out of the four groups said they need better access to fertilizer. This suggests that cooperative members continue to struggle to make or purchase enough fertilizer to meet the needs of their farms.

Finding 2: Cooperative membership correlates with greater use of water quality conservation practices.



Coffee production is a major contributor to water contamination in Central America, threatening both human and environmental health. Most of the damage occurs during wet milling, the initial processing stage to remove the outer layer of the coffee cherry (or “coffee pulp”). Agrochemical use also threatens water quality, as herbicides, pesticides, and chemical fertilizers applied to coffee farms can contaminate local waterways through runoff.

88 We don't know exactly what the farmer meant by “technification,” as the term can refer to different practices in different contexts.

Historically, in Latin America the term includes the replacement of traditional coffee varieties with newer, often high-yielding varieties; an increase in tree planting density; the introduction and/or intensification of agrochemical use; and/or the reduction or elimination of shade trees. In this sense, technification can have negative environmental implications, if it results in excessive use of agrochemicals or significant deforestation. In our experience, however, coffee smallholders often use the word to refer to a general transition from low management systems to systems that include a moderate use of inputs and more active shade management. For a useful overview of coffee technification in Latin America, see “Transforming the Physical and Economic Landscape of Coffee” on the website of the Natural Resources Defense Council, available at: <http://www.nrdc.org/health/farming/ccf/chap3.asp#production>.

Box 16: Wet milling and its impacts on water quality

In Guatemala and throughout Central America, wet milling is mostly performed by producers at their households or farms, before they deliver their coffee to the cooperative. Producers first depulp the coffee cherries, often with a hand-operated mill, to remove the outer layers of the fruit and access the inner seed or bean. After depulping, the beans are still covered in mucilage, a sticky layer of sugars and alcohols. Producers remove the mucilage through fermentation or through a mechanical process.

After fermentation, producers wash the beans to remove any remaining traces of mucilage. This process requires a significant amount of water, up to 1,200 liters or more for each hundred-pound bag of coffee cherry.⁸⁹

Most producers use mills located on the margins of their coffee farms or near their homes, often next to streams to ensure a ready supply of water. (In this study, this is true of all groups except Catalina, which processes most of its members' coffee at a central wet milling facility.) Processing near waterways creates a risk of water contamination. If released untreated into streams or rivers, the nutrient-rich, highly acidic wastewater can create "oxygen dead zones," threatening aquatic life, and pollute the water for downstream communities.

To protect local waterways, coffee farmers can treat their wet milling wastewater using filtration or settlement pits that separate out the organic matter and prevent concentrated wastewater from entering natural water bodies.

We surveyed farmers on three practices related to water quality conservation:

1. **Treatment of coffee processing wastewater**
2. **Treatment of household wastewater**, such as kitchen wastewater
3. **Washing of agrochemical application equipment** away from waterways, for members of conventional cooperatives

The question of treatment of processing wastewater applies only to farmers performing their own post-harvest processing, and so is not relevant for most members of Catalina, which performs centralized processing.

89 Michael Sheridan, "293. Coffee and water resources at origin," 13 August 2012, Catholic Relief Services Coffeelands Blog, <http://coffeelands.crs.org/2012/08/293-coffee-and-water-resources-at-origin/>.

Figure 54: Difference between members' current and pre-membership usage rates (%) of water quality conservation practices

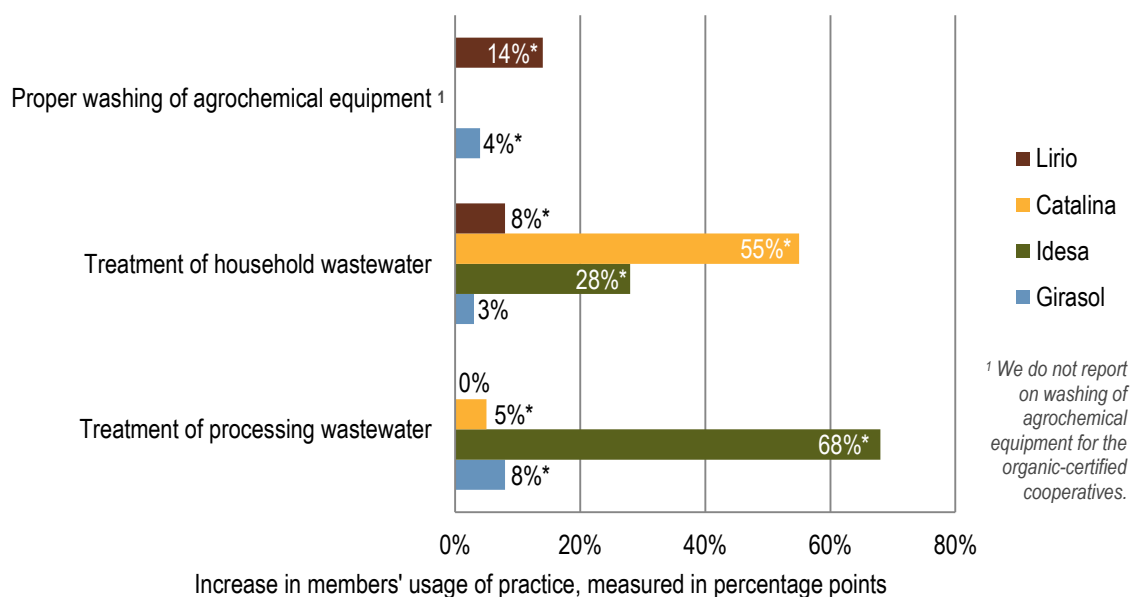
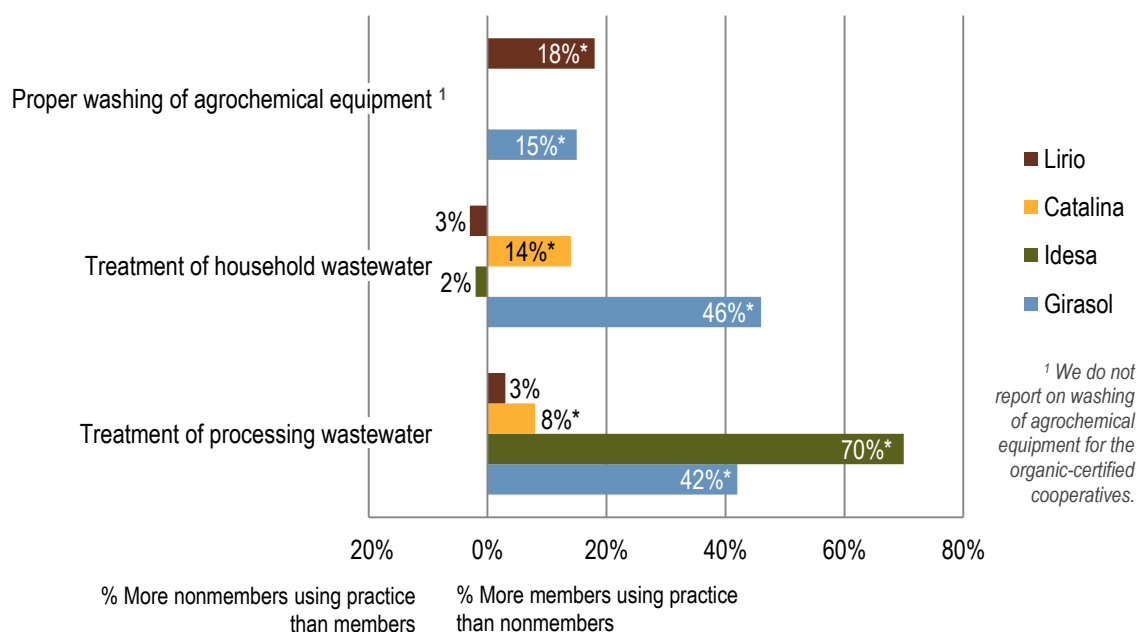


Figure 55: Difference between members' and nonmembers' current usage rates (%) of water quality conservation practices



For all groups, cooperative membership correlates with greater use of water quality conservation measures.

Compared to pre-membership practices, a statistically significantly higher number of members in all groups reported using water quality conservation practices during the last coffee season. The adoption rates for most practices, however, were low, generally under 15 percent.

Compared to nonmembers, members of all four enterprises reported statistically significantly higher usage of some, but not all, water quality conservation measures:

- ☛ Members of Girasol, Catalina, and Idesa reported statistically significantly higher rates of **processing wastewater treatment** than nonmembers.
- ☛ Members of Girasol and Catalina reported statistically significantly greater **treatment of household wastewater**.
- ☛ Members of both of the conventional groups, Girasol and Lirio, reported statistically significantly higher use of **appropriate washing practices for their agrochemical equipment** than nonmembers. (This practice was not relevant for organic-certified groups.)

In focus groups, members of Idesa attributed their adoption of water quality conservation practices to cooperative training. Members of the other three cooperatives did not mention adopting water quality conservation practices since joining their cooperatives, perhaps reflecting the low adoption rates overall.

2a. Further improvement is needed in water conservation

Use of water quality conservation practices among members remains low. In particular, treatment of coffee processing wastewater is limited among members of Lirio, with only 6 percent of members using this practice, and proper washing of agrochemical equipment is rare among members of Girasol, with a 16 percent usage rate. Meanwhile, independent farmers reported even lower usage rates for most water quality conservation practices.

This data highlights water quality conservation as an ongoing challenge for coffee-producing communities in Guatemala, one that is affecting local environmental health and producers' livelihoods.

As members of Girasol reported, rivers and streams in their communities are so contaminated with household and coffee processing waste that they sometimes cannot access enough clean water to process their coffee in a timely manner, resulting in loss of coffee and corresponding income.

Finding 3: Cooperative membership does not correlate with the degree of biodiversity found on members' farms

The level of biological diversity (biodiversity) within a farm is an important indicator of overall system sustainability. Biodiversity provides a number of environmental benefits, such as the conservation of genetic diversity, the provision of raw materials, and the mitigation of certain pests and diseases, including coffee pests.

Biodiversity tends to be higher on smallholder coffee farms than on other types of farms, as coffee is often cultivated in agroforestry systems that combine agriculture and forestry, mimicking coffee's native forest habitat. Agroforestry farms can range from more traditional, closed-canopy systems

resembling secondary-growth forests⁹⁰ to more intensive systems with one crop variety and one or two varieties of shade trees.

Box 17: Environmental benefits of agroforestry systems

A typical agroforestry coffee farm is a verdant, mixed-crop system including coffee, fruit trees, and/or deciduous shade trees. Agroforests provide important ecosystem services.⁹¹ The trees on agroforestry coffee farms, for example, enrich the soil through natural nutrient cycling⁹² and strengthen root systems, preventing soil degradation and erosion. Shade trees also capture and retain rainfall, lowering temperatures on heat-sensitive coffee farms while helping to regulate the local climate, and remove carbon from the atmosphere. In addition, coffee farms with high biodiversity can serve as important habitats or corridors for wildlife such as migratory birds.⁹³

To evaluate on-farm biodiversity, enumerators recorded the approximate amount of land on producers' farms dedicated to particular management types. Enumerators used a land management classification tool developed by COSA to ensure consistent interpretation across farms and cooperatives (see Figure 56). The tool depicts a variety of agricultural landscapes, ranging from cleared land or pasture (generally correlated with the lowest biodiversity) to natural forest (highest biodiversity). Levels 3 through 5 in the tool correspond to agroforestry management systems, with increasing degrees of shade and biodiversity.



Denser Agroforestry



Sparse Agroforestry

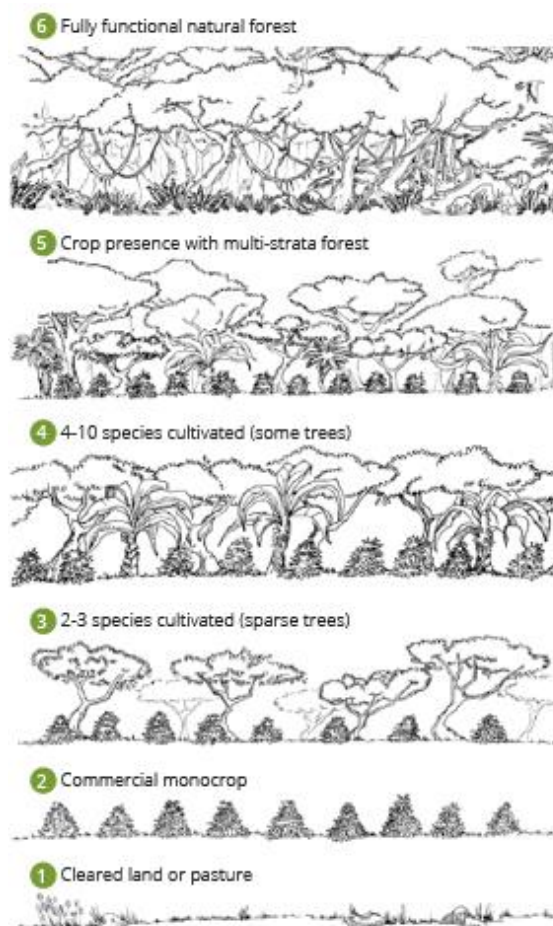
90 A secondary-growth or secondary forest is a forest or woodland area that has regrown after a major disturbance, such as a timber harvest or fire, to such an extent that the effects of the disturbance are no longer evident. It is distinguished from an old-growth or primary forest, which has not experienced such disruptions.

91 Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services. The International Finance Corporation, "Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources," 1 January 2012, www.ifc.org.

92 Nutrient cycling is the continuous exchange of organic and inorganic matter through an ecosystem, from the physical environmental (e.g., soil, air), through living organisms, and back to the physical environment.

93 Shalene Jha et al., "Shade Coffee: Update on a Disappearing Refuge for Biodiversity," *BioScience* 64.5 (2014): 416-428.

Figure 56: Farm landscape classification graphic (COSA)⁹⁴

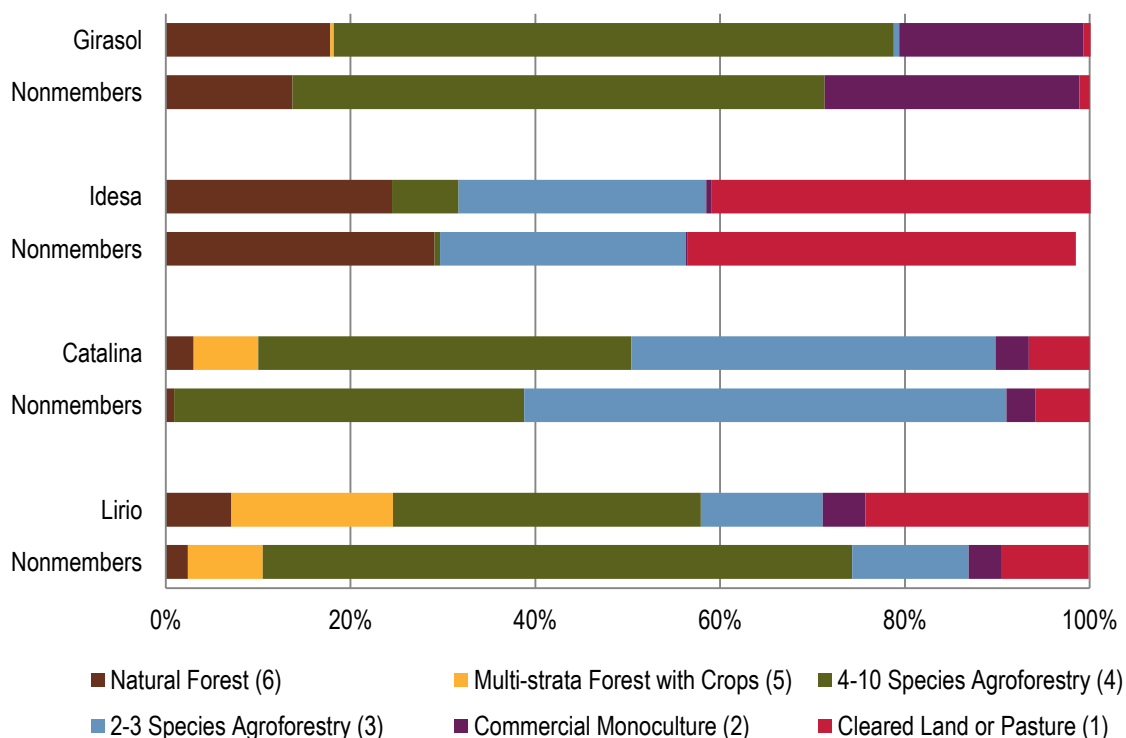


Our findings suggest that on-farm biodiversity is a function more of context than cooperative membership.

In all four groups, the farms of cooperative members and their comparison group counterparts had similar land management profiles, with the majority of both members' and nonmembers' land dedicated to the same landscape classification category (see Figure 57). This suggests that cooperative membership has not influenced members' land management decisions.

⁹⁴ The Committee on Sustainability Assessment, "Farm Landscape Classification Graphic for Consistent Interpretation."

Figure 57: Landscape management profiles of members' and nonmembers' farms (average % total land dedicated to each management type)



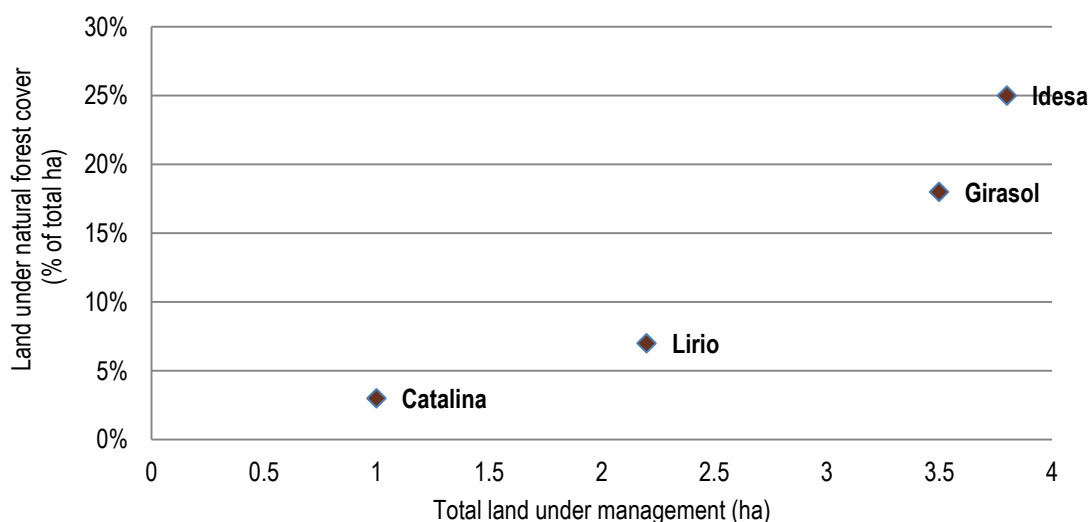
For three groups (Girasol, Catalina, and Lirio), both members and nonmembers kept most of their land under agroforestry management, with moderate shade density and biodiversity (Level 4 in Figure 3.8).

Idesa was the exception. Idesa members and associated nonmembers kept approximately 40 percent on average of their farm land as cleared or pasture land; this was significantly higher than in the other three pairings. We believe much of this land was used to grow food crops for household consumption. This data may help to explain why Idesa members and associated nonmembers reported experiencing fewer days of food insecurity than the other farmers surveyed, despite the fact that they also reported the lowest cash incomes. (Data suggests that members of Idesa also relied on a strong social network for mutual support during the lean months. For details, refer to Chapter 1.)

Moreover, the percentage of land under natural forest cover, associated with the highest degree of biodiversity, correlated with total land under management by farmers rather than with cooperative membership. Larger landholdings were associated with a greater degree of natural forest cover (see Figure 58). This suggests that the percentage of land under natural forest cover is a function of total land available to farmers rather than cooperative membership.⁹⁵

⁹⁵ This study did not explore farmers' motivations for conserving natural forest areas or for engaging in biodiversity conservation efforts more broadly. Given the environmental importance of agroforestry coffee landscapes, this will be an area of focus in our future studies.

Figure 58: On-farm biodiversity: Percentage of members' land under natural forest cover



Discussion of Variation in Outcomes across the Cooperatives

Across the four cooperatives, there is significant variation in the number and magnitude of differences between the agronomic practices of members and nonmembers, and between members' self-reported current and pre-membership practices. This suggests that some cooperatives provide more and/or more effective services promoting improved agronomic and environmental performance among their members than others.

First, while all four cooperatives offered or facilitated agronomic assistance to their members, these programs varied in scale. Not all members had received training within the last year, and participation rates ranged from a low of 45 percent in the case of Catalina to a high of 84 percent in the case of Girasol. Members who did receive training received between six and 14 hours on average.

Figure 59: Scale of cooperatives' agronomic training programs during 2012–2013, using staff count and members' participation in training as proxies

Cooperative	# of Staff Coordinating Training	% Cooperative Members Reporting Participation in Training	Avg. Hours of Training Received by Participating Members
Girasol	1 (part-time)	84%	14 hours
Idesa	2 (funded through NGO partner for food security program)	55%	6 hours
Catalina	1	45%	12 hours
Lirio	0 (trainings coordinated by staff of international NGO)	53%	13 hours

We hypothesize that greater and more regular participation in agronomic training, assuming a certain level of quality, correlates with greater adoption of improved practices. Our data, however, does not show a clear link between the percentage of members trained, or the number of hours of training received by members, during the last production season and the percentage of members using conservation practices. One reason for this may be that the study's time horizon was too brief. Producers may take several years to adopt new practices due to their limited resources and desire to limit real and perceived risk associated with the new practices.⁹⁶ We would need data on the scale and intensity of agronomic training activities over a longer period of time to understand these correlations.⁹⁷

Secondly, the extension programs varied in effectiveness. The data suggests that differences in a number of variables, at both the farmer and cooperative levels, are affecting whether and how members respond to the cooperatives' extension services.

Most fundamental, we believe, are the content and quality of the enterprise interventions themselves. In this study, we identified two enterprise-level variables that appeared to be associated with more effective extension programs:

- ❶ **Individualized training.** With the exception of Girasol, the cooperatives conducted their training exclusively through centralized workshops, meaning that the content was likely focused on the needs of the average cooperative member rather than on the specific needs of each member.

⁹⁶ A review of the literature on the adoption of agroforestry innovations in the tropics found that, more so than with non-agroforestry crops, "households tend to invest only incrementally in new agroforestry technologies... in response to high perceived risks associated with new agroforestry systems" and "the longer time periods required to reap the benefits from agroforestry investments." This suggests that a farmer may take many seasons to fully implement a package of practices recommended by his or her cooperative. D. E. Mercer, "Adoption of Agroforestry Innovations in the Tropics: A Review," *Agroforestry Systems* 204411 (2004): 311-328.

⁹⁷ We are starting to explore these questions through impact studies related to our Coffee Farmer Resilience Initiative in Latin America. These studies will include assessments of cooperatives' agronomic extension services, as well as baseline and endline assessments (pre- and post-Root Capital interventions) of the impacts of these services on farmers' agronomic practices.

Girasol complemented workshops with customized fertilization recommendations for each member, informed by its soil analysis program. In focus groups, Girasol members described this individualized support as very beneficial: *“If you need someone to come and look at your farm, to take a soil sample, they [from the cooperative] always come and help with this.”*

Members of all cooperatives, including Girasol, expressed a desire for more individualized training. As one Idesa member reported, *“The cooperative trainers do not visit our farms. They give [centralized] trainings, but no one visits us. There is no real technical support.”*

- 🍷 **Certification.** Producers affiliated with the two organic and fair trade-certified groups (Idesa and Catalina) reported the greatest improvement since joining their enterprises, with 25 percent or more of members reporting adopting two or more new practices.⁹⁸ We cannot be sure, however, of the direction of causality between the adoption of improved practices and certification.

In comparison, in Girasol, member adoption rates were under 25 percent for all but one practice. Girasol subscribes to two voluntary sustainability standards, one from Slow Food Foundation for Biodiversity⁹⁹ and one adopted by its buyer.

For Lirio, which became fair trade certified at the time of the study in 2013, member adoption rates were under 25 percent for all practice indicators.

We believe key farmer-level variables are also affecting how members respond to cooperative extension services, including:

- 🍷 **Farmers’ practices prior to joining the cooperatives.** Data suggests that members of the four groups had different production profiles prior to joining their respective enterprises (see Figure 60).

Members of Girasol reported the highest use, relative to members of the other three cooperatives, of inputs and conservation practices prior to joining the enterprise. Most of the conservation practices examined were used by between 40 and 60 percent of members surveyed. For Idesa, Catalina, and Lirio, on the other hand, most conservation practices were used by fewer than 20 percent of members before they joined the cooperatives.

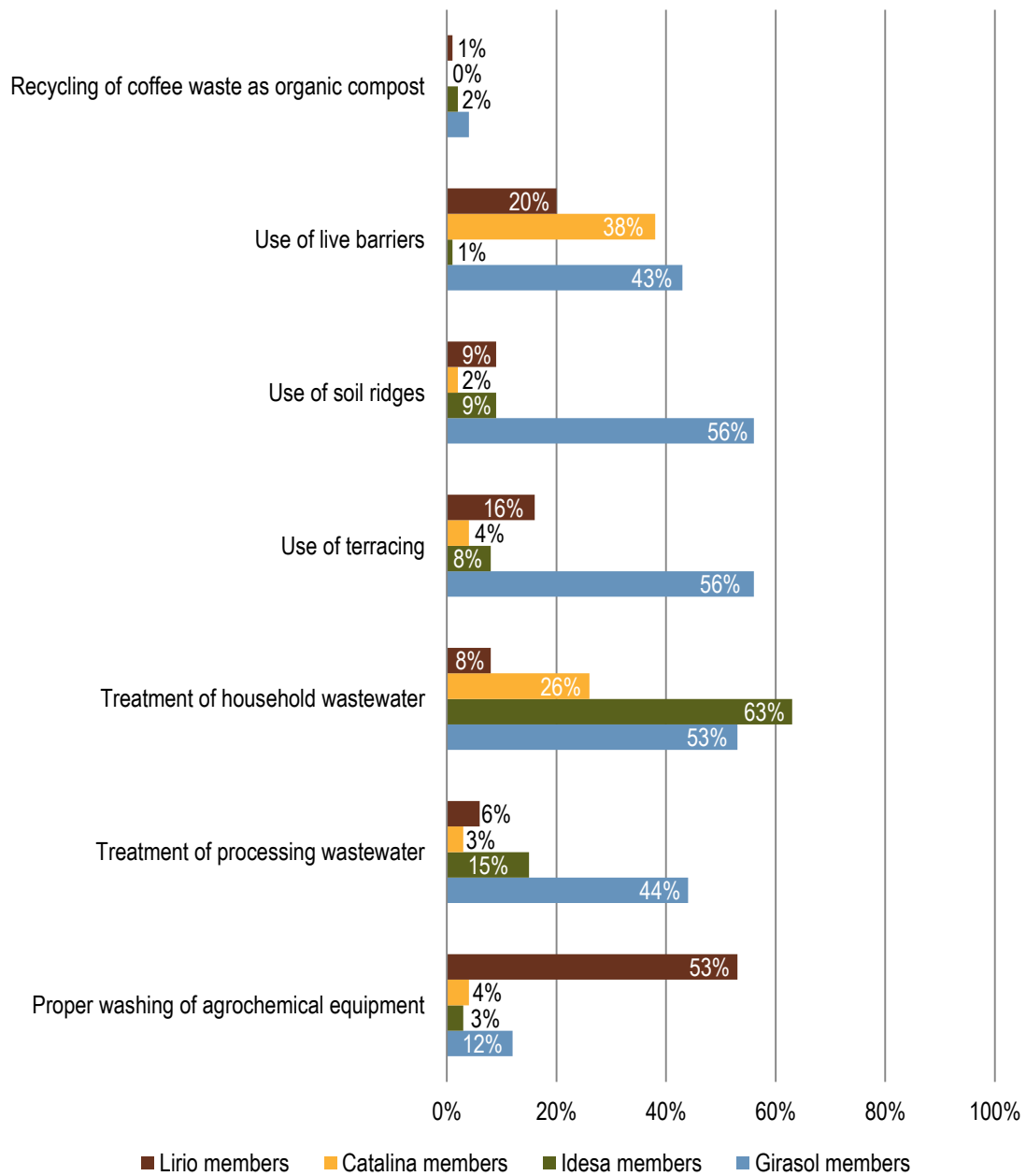
These differences in baseline performance indicate that members of some cooperatives had greater room for improvement, providing these cooperatives with greater opportunity for impact. Indeed, members of Idesa, with the lowest usage of conservation practices prior to joining the cooperative, reported the largest increases in practice use. Members of Girasol, with the best performance prior

⁹⁸ This is in keeping with the findings of a recent study by COSA on the impacts of sustainability initiatives, which concluded that “the environmental practices and conditions found on farms that participate in sustainability initiatives [including certification standards such as organic and fair trade] tend to be somewhat better than those on conventional [un-certified] farms. They are more likely to use soil and water conservation measures such as soil cover, contour planting, and terracing, drainage channels, and soil ridges around plants.” COSA, “The COSA Measuring Sustainability Report: Coffee and Cocoa in 12 Countries,” Philadelphia, 2013, p. 4.

⁹⁹ The Slow Food Foundation for Biodiversity is a non-profit organization associated with Slow Food International, a global organization founded to prevent the disappearance of local food cultures and traditions. Girasol is a participant in the foundation’s Coffee Presidia program, which seeks to raise awareness of coffee issues among consumers. Slow Food Foundation, “Coffee Presidia,” <http://www.slowfoodfoundation.com/presidia/125/coffee-presidia>.

to joining the cooperative, reported relatively lower rates of adoption for most practices, but demonstrated the highest overall use of conservation practices at the time of the study.

Figure 60: Members' usage rates for conservation practices prior to cooperative membership¹⁰⁰



¹⁰⁰ Data on farmers' fertilizer usage and degree of agroforestry production are not included in this chart. We did not survey farmers on the amount of land under agroforestry management on their farms prior to joining the cooperative, due to concerns about farmers' ability to recall this information. In an oversight, we also did not ask all members if they had used chemical or organic fertilizers before joining their

- ☛ **Farmers' length of time with the cooperative.** The four cooperatives were established at different times, and farmers' average length of membership varied across the four groups. Members of Catalina had been with the cooperative for the longest, just under 12 years on average; members of Idesa, an average of nine years; Girasol, an average of five years; and Lirio, the newest cooperative, an average of three years.

These differences indicate that members of the four groups had different levels of exposure to agronomic training and other high-value services offered by the cooperatives. This likely has implications for outcomes associated with these services, as it may take several years for producers to shift their production systems.

- ☛ **Farmers' comparative income.** Members of all four cooperatives are income-poor, but members of some cooperatives are poorer on average than others, with members of Lirio and Idesa being the poorest (see Chapter 1). Farmers with less cash on hand are likely less able to make ongoing investments in their farms, all else being equal.¹⁰¹

Some of members' cash constraints, however, may have been mitigated by access to credit from cooperative credit funds and other sources. In this study, the three well-functioning cooperatives managed internal credit funds; members primarily used credit to fund investments in agricultural inputs, labor, or other farm expenses. Lirio did not have an internal credit fund.

Conclusion

In this study, we found that cooperative membership correlated with greater use of sustainable production practices by farmers, particularly in the areas of soil health and water quality.

Practitioners seeking to support smallholder coffee farmers should take away the following lessons from this research:

- ☛ **Agricultural SGBs can empower farmers to act as stewards of their farm ecosystems** by providing them with access to agricultural inputs, agronomic training, and markets that offer incentives for sustainable practices. Supporting SGBs in the provision of these key services can be a way for stakeholders in the smallholder agricultural ecosystem to help “green” smallholder value chains.
- ☛ However, members' continued limited use of conservation practices and sub-optimal productivity suggest that, in all four cases, **cooperative extension services are not adequately meeting the agronomic needs of members.** We have seen similar gaps through our engagements with coffee cooperative clients elsewhere, suggesting that many cooperatives face resource and/or knowledge constraints that prevent them from providing effective extension. Cooperatives may benefit from more targeted support in this area from ecosystem actors.

cooperatives, but only members currently using those inputs, and therefore cannot report on overall fertilizer usage by farmers prior to cooperative membership.

101 The literature on the adoption of agricultural innovations indicates that households – like those of many cooperative members – with small land holdings, income and credit constraints, and limited access to labor are less likely to adopt new practices than those with greater access to these resources. D. E. Mercer, “Adoption of Agroforestry Innovations in the Tropics: A Review,” *Agroforestry Systems* 204411 (2004): 311-328.

Specifically, based on this and other engagements, we believe there are opportunities for coffee cooperatives in Latin America to expand the scope and improve the quality of their training activities in several key areas. The following ideas are meant for cooperative managers and boards collaborating with value chain, NGO, and government partners as appropriate.

☛ **Provide more support to farmers for creating and/or investing in fertilizers.** Across all four cooperatives, one of the farmers' greatest challenges was applying sufficient quantities of fertilizer, organic and/or chemical, due to labor, capital, and time constraints. Greater cooperative support in the form of centralized organic composting facilities, centralized sale of fertilizer, more training on creating and using organic fertilizer, input subsidies, and/or credit for inputs could help members in overcoming some of these barriers to caring for the health of their coffee trees and their land.

☛ **Customize training to the needs of individual members, including training in local languages and training specifically for women, ideally by women.** Members across all groups requested more individualized support in the form of on-farm training in their local languages, rather than in Spanish.

More individualized training would allow cooperatives to identify and respond to members' unique needs. It might also allow the cooperatives to help narrow the knowledge gap we found between male and female members, women being less familiar with coffee production techniques than men (see Chapter 2 for a full discussion).

☛ **Leverage data to inform training.** Prior to this study, the cooperatives lacked detailed data on the agronomic practices used by members, making it difficult to identify areas of strength and areas for improvement. Analysis of members' production profiles, using data collected through internal inspections or external studies such as this one, could help cooperatives develop or facilitate more targeted, and hence more effective, training curricula. (Root Capital shared the study findings with each of the groups to inform their operations. See Appendix II for details.)

With the exception of Girasol, the cooperatives also lacked quantitative data on the environmental health of their members' farms. Services like the soil analysis program offered by Girasol could allow cooperatives to help their members respond to environmental challenges such as soil degradation in a more efficient and effective manner.

Recognizing these common gaps in coffee cooperative extension programs, Root Capital is starting to explore drivers and barriers to agricultural SGBs' providing effective extension to their smallholder suppliers. We understand that, for many coffee cooperatives, these ideas likely require incremental resources, such as additional technical staff, perhaps with broader or deeper skills, investment in systems or data management tools, and funds to cover increased operating costs and/or new investments in infrastructure. Some cooperatives, due to financial or technical constraints, may not be able to implement these changes in the near term without external support, including support from financiers, capacity development providers, certification bodies, and buyers. By better understanding the specific constraints facing coffee cooperatives in our portfolio, we hope we might better support them in improving the environmental footprint of their smallholder members.

APPENDIX I: METHODOLOGY

Primary data collection for the Guatemala Cluster Study took place between June and October 2013.

In this study, we sought to balance rigor and practicality, meeting our burden of proof and that of our stakeholders while recognizing field realities (e.g., the difficulties of corroborating self-reported information, recruiting farmers into the comparison group).

This study marked a number of methodological firsts for Root Capital:

1. We introduced a comparison sample of unaffiliated farmers to better isolate the impacts of our client enterprises on farmer members from contextual factors that affected all of the farmers in the region.
2. We improved the generalizability of the results by conducting simultaneous studies from which we could extract common results applicable to our other clients.
3. We incorporated standard questions used in the smallholder agricultural sector for measuring sustainability and indices to assess poverty, food security, and farmer attitudes.

Enterprise	Total # members in coffee cooperative	Total # member surveys (# women)	Total # control group surveys (# women)	Enterprise-level surveys	Focus groups
Girasol	270	108 (32 women)	81 (39 women)	✓	✓
Idesa	176	101 (8 women)	40 (3 women)	✓	✓
Catalina	127	102 (59 women)	75 (36 women)	✓	✓
Lirio	204	96 (22 women)	37 (26 women ¹⁰²)	✓	✓
TOTAL	777	407 (121 women)	233 (104 women)		

To build the comparison sample, we worked in tandem with participating cooperatives to identify potential respondents unaffiliated with the enterprise. The comparison sample was a combination of incoming cooperative members for the subsequent harvest (strongest comparability), members of neighboring coffee cooperatives that were not Root Capital clients (moderate comparability), and producers who decided not to affiliate but were from the same communities as members (moderate to weak comparability).

Incorporating these comparison samples, however imperfect, allowed us to partially simulate the “counterfactual” of farmers’ likely outcomes had they not joined the cooperative. This enabled us to better attribute observable differences to cooperative interventions. In presenting the data, the symbol *

¹⁰² Women comprised a higher percent of the control group in Lirio relative to the members because they were recruited from local savings groups, in which women's participation was higher.

indicates that impacts are statistically significantly different for the two groups being compared, such as members and nonmembers.¹⁰³

Finally, we designed questions that would verify and elaborate on our hypothesized enterprise and producer-level impacts. These are the hypotheses we set out to examine:

- ☛ **Well-being:** The enterprise's services improve farmers' self-reported well-being.
- ☛ **Higher incomes:** The enterprise raises farmers' incomes by paying higher prices than the local market.
- ☛ **More stable incomes:** The enterprise stabilizes farmers' incomes *during* each harvest cycle by providing greater access to credit.
- ☛ **Sustainable production practices:** The enterprise facilitates adoption of farm-level practices that are linked to environmental conservation and/or to higher productivity and quality, which in turn contribute to higher incomes.
- ☛ **Impacts by gender:** Impacts on men and women are not the same. We expected to find lower participation among women as participants and decision-makers, but for their impacts relative to nonparticipant women to be greater.

In partnership with the Committee on Sustainability Assessment (COSA), an independent research organization promoting universal metrics to measure social, environmental, and economic sustainability in smallholder value chains, we co-developed a detailed survey to examine impacts,¹⁰⁴ while also furthering our understanding of farmers' socioeconomic situations, on-farm production practices, challenges, and aspirations for the future.

Our research team orally translated the survey from Spanish into several different local languages, including K'iche, Ixil, and Mam.

Below is a subset of the questions that we used in the producer-level survey to understand context and the enterprise's impact on the household.

- | | |
|----------------------|---|
| Context | <ul style="list-style-type: none">☛ Household demographics: gender, age, occupation, education and literacy levels☛ Land area, separated by uses☛ Progress Out of Poverty Index (PPI®)☛ Months of Adequate Household Food Provisioning (MAHFP) |
| Higher income | <ul style="list-style-type: none">☛ Price paid by cooperatives (enterprise level)☛ Proportion of coffee sold to cooperatives (producer level) |

103 In the analysis, we used a P-value of .1 as the cutoff for statistical significance in comparing means (e.g., of members vs. nonmembers). This means that, in the case of a statistically significant result, the probability of obtaining that result by chance was under 10 percent.

104 For ease of reading, in this report, "impacts" refer to what are typically considered outputs and outcomes according to academic evaluation terminology.

	<ul style="list-style-type: none"> Gross income earned by producer from coffee and other crops and sources Migration incidence
Stable income	<ul style="list-style-type: none"> If credit used in last year Source of credit Purpose credit was used for
Farm practices	<ul style="list-style-type: none"> Participation in trainings Practices used (e.g., use of fertilizers, terracing, ridges, live barriers, renovation) Total production; production per hectare Effects of coffee leaf rust Self-reported change in quantity of production and explanation of cause Self-reported change in quality of production and explanation of cause
Attitudes	<ul style="list-style-type: none"> Perception of quality of life Most Significant Change (most significant benefit of cooperative membership) Perception of any change in life quality since joining cooperative Perceived future as coffee farmers (e.g., understanding what would make coffee more viable, exploring aspirations for their children)
Impacts by gender	<i>In analysis, segmented impacts by gender</i> <ul style="list-style-type: none"> Intra-household decision-making (production, large expenses, small expenses)

To investigate the enterprise’s impacts on local ecosystems, the study piloted a new “practices as proxies” environmental module. In the survey, we asked producers to report production practices they were applying to their coffee plots. Then, using the best available scientific evidence from an extensive literature review and consultation with outside experts, we sought to link these reported practices to likely environmental outcomes at the farm level.

Alongside detailed producer-level surveys at farmers’ homes or coffee plots, we conducted enterprise-level interviews and focus groups to examine differential impacts of cooperative membership on men and women and, separately, on production practices linked in the literature to environmental sustainability and to productivity and product quality.

Producer-level surveys were applied at farmers’ homes and/or coffee plots, using the Committee on Sustainability Assessment’s COSATouch surveying platform, to a random representative sample of farmers and to a comparison group of farmers corresponding to each cooperative. These surveys assessed household demographics, changes due to cooperative membership, and coffee production

practices. Comparison groups varied depending on each cooperative's context and were selected accordingly by group:

- ☛ **Girasol:** The majority were incoming cooperative members, with a small subset consisting of members of a neighboring credit cooperative not offering a higher price or technical assistance.
- ☛ **Idesa:** The sample included farmers in the main community who did not belong to any coffee cooperative.
- ☛ **Catalina:** The sample comprised incoming members, members of a neighboring organic cooperative offering limited services, and independent farmers.
- ☛ **Lirio:** The sample included coffee farmers participating in saving groups alongside Lirio farmers but not selling through the cooperative.

The **enterprise-level surveys** were completed by interviewing each group's management, governing boards, technical staff and agronomic promoters, and founding members. This survey was meant to complement and contextualize the producer-level surveys, and to help us understand each group's history, objectives, services provided, and policies or programs geared toward women, as well as Root Capital's impacts at the enterprise level. The number of individuals interviewed ranged from five to 30, depending on the complexity of the group structure and functions, and on individuals' availability.

Focus groups on women's roles were conducted with each client to further explore women's reality as producers and cooperative members and to identify differences between men's and women's experiences. We conducted two focus groups per enterprise, with four to 10 women participants from Girasol, Catalina, and Lirio. In Idesa, where only 12 women producers are registered as members, we conducted one focus group with three participants.

Focus groups on coffee production were also conducted to improve our understanding of farmers' production practices and how these have changed due to client interventions, as well as to gauge farmers' environmental knowledge and perceptions. With all groups, we conducted two focus groups with mixed participation by male and female farmers (separate from the gender focus groups), with group sizes ranging from four to 10 participants.

APPENDIX II: CLIENT PRESENTATIONS

In June 2014, our research team visited the four cooperatives to present study results to management and board representatives. We explained the results, benchmarked against the performance of the other groups, and used them as a springboard for the groups to reflect on potential areas of improvement. We asked each cooperative whether the results were useful and how they intended to use them. Groups identified three primary uses for the study data:

1. **Baseline for decision-making**, particularly useful to see areas in which the cooperative is weak and needs reinforcement
2. **Snapshot of performance and member demographics**, which may or may not inspire action
3. **Marketing collateral** for groups to share with buyers and partners

Below, we share clients' specific intended uses of the data, as well as the presentation lessons that we plan to apply in future studies and that we hope are useful to other practitioners looking to benefit clients through research.

How groups reported they would use data

Girasol:

- ☛ The group has already acted on the data. The research team presented initial results in September 2013 and helped Girasol to identify future services, such as credit for productive infrastructure and additional emphasis on individualized technical assistance. (The group has begun to provide individualized technical assistance and is exploring diversifying its credit offerings to cover productive infrastructure.)
- ☛ The value of the recent presentation was to validate and justify service offerings that Girasol incorporated last year.
- ☛ Girasol will potentially use the recent presentation as a baseline to consider necessary and unaddressed improvements in (1) environmental practices and (2) women's participation.

Idesa:

- ☛ Idesa convened a meeting with two technical staff to review the productivity and technical assistance data from the study (e.g., low productivity, low participation by members), and to begin thinking through training needs in different areas.
- ☛ During the presentation, Root Capital suggested that Idesa conduct a short diagnostic with farmers to assess their barriers to higher productivity and training needs.
- ☛ Idesa will also consider potential activities to boost women's participation, particularly in personnel positions.

Catalina:

- ☛ Catalina intends to share the data with members to show the cooperative's performance and advances, particularly in women's participation.
- ☛ Catalina management also said they would share the data with buyers to demonstrate their strengths and to provide supporting materials for new proposals.
- ☛ Catalina will consider improving the content and methodology of agronomic trainings in light of data showing low participation by members.

Lirio:

- ☛ The data provided Lirio with a snapshot of its current status, compared to other groups and to nonmembers, and affirmed significant need for improvement.
- ☛ Lirio learned that the main service valued by their members — the group's serving as a bridge to other social service providers — was distinct from main services valued in other organizations (price, credit, technical assistance), suggesting potential need for reprioritization of services.

Methodology lessons from presentations

1. Groups were highly interested in service assessment

- ☛ Groups were particularly interested in responses related to member satisfaction with existing services and demand for future services.
- ☛ In the future, we may incorporate additional questions to gauge satisfaction with specific services, especially those related to technical assistance, which appears to be the greatest area of uncertainty for groups.

2. Groups appreciated having their performance benchmarked to other groups

- ☛ Benchmarking (e.g., in service delivery, yields) affirmed successes in high-performing areas, and provided motivation for improvement in low-performing areas.
- ☛ In the future, depending on the availability of data, we will endeavor to supplement data with regional averages.

3. PowerPoint worked well, but the format could be simplified further

- ☛ Participants found presentations in PowerPoint clear and the visuals telling; we also explained the visuals qualitatively because not everyone had sufficient schooling to understand the graphs. We arranged for translation in Idesa and Catalina, where most people speak Ixil and K'iche, respectively.
- ☛ During the Idesa presentation, our advisory trainer created a simpler summary format using a stoplight, with green signifying "good as is," yellow signifying "needs improvement," and red signifying "needs significant improvement" (included below). Idesa and Girasol said that this format was understandable and actionable.

4. Data presentations should ideally happen within three months of completing data collection to be useful. Presentations to clients need to take precedence above other knowledge products

- ☛ Presenting results one year later, after the current harvest, was too late, particularly for groups that are actively strategically planning, such as Girasol.

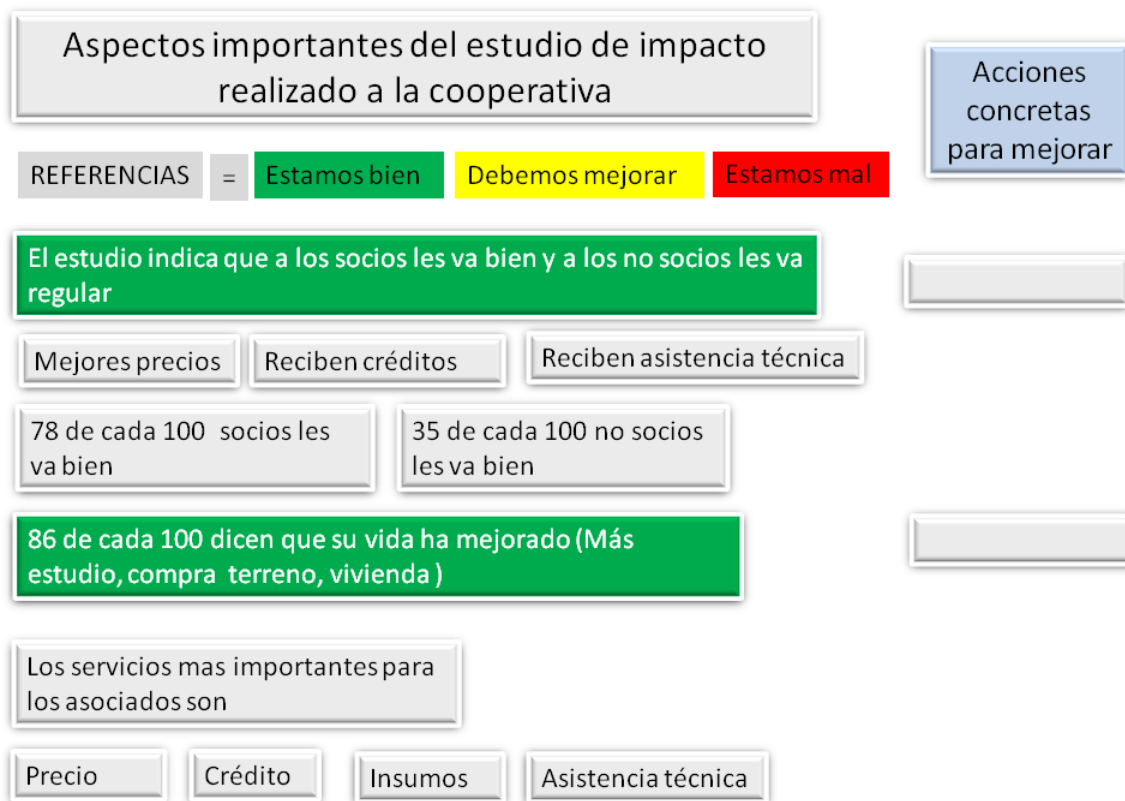
5. It is helpful to partner with local technical assistance staff for groups to develop action plans based on findings

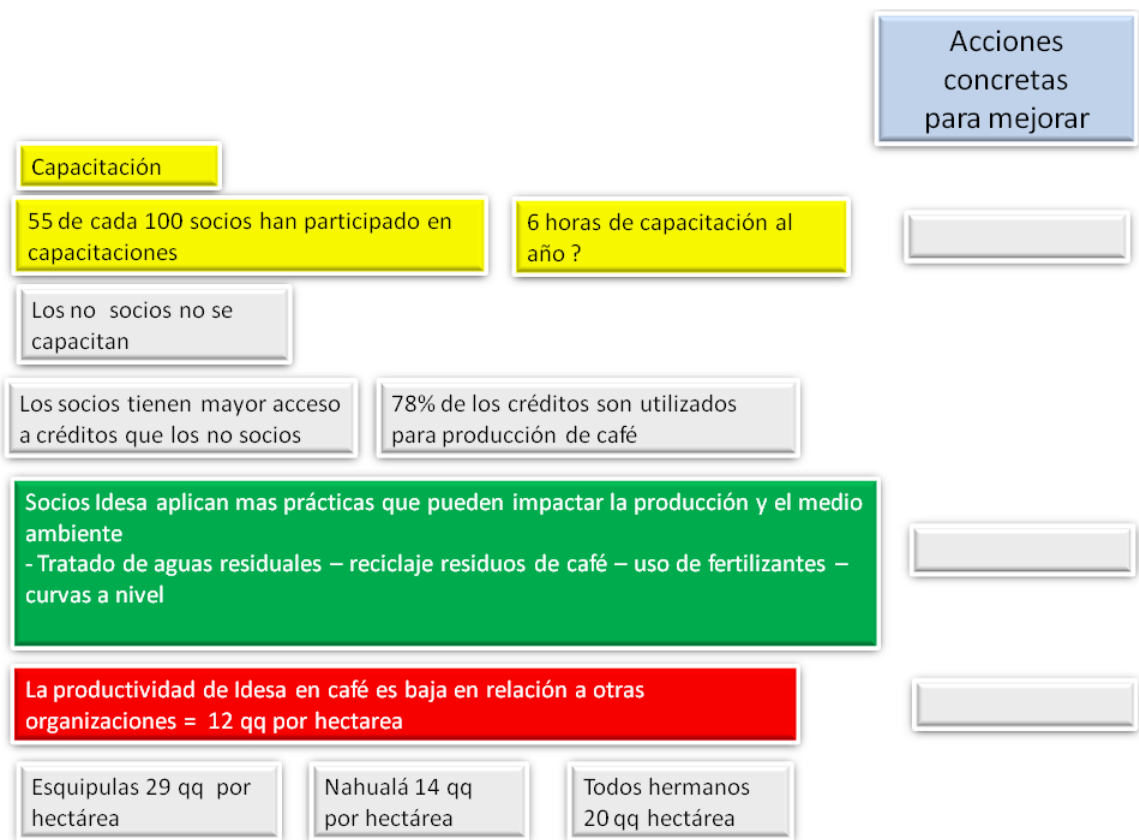
- ☛ We found that our local financial advisory staff, who accompanied the presentations, had the knowledge, experience, and authority to make recommendations based on the results and to help groups think through how they could act on the results in their strategic planning.

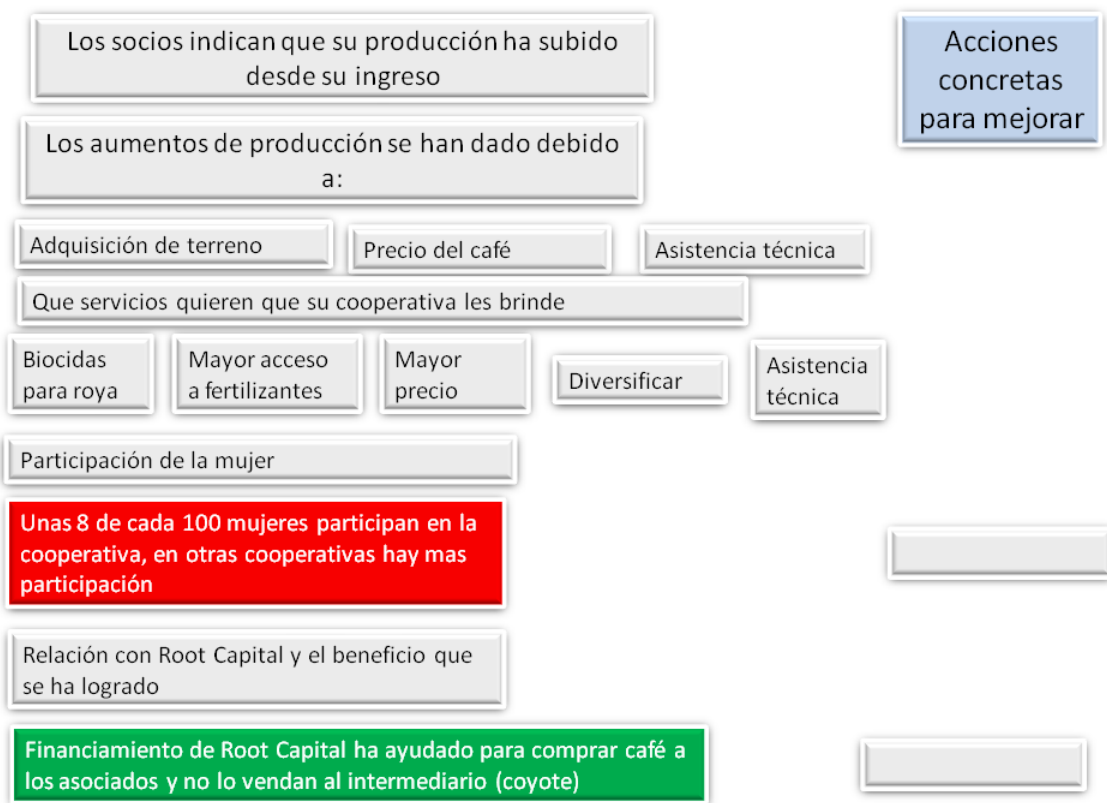
6. The presenter should suggest or facilitate discussion of actions for the organization, Root Capital, and other entities as appropriate

- ☛ The universal barrier for groups was how to act on the results: after seeing data on weaknesses, groups did not necessarily know how to address them.
- ☛ We found it important to facilitate conversations for the groups to consider how to address areas of weakness, while also considering the role of our own organization and that of others.
- ☛ In the future, we would like to explore how we could more knowledgeably guide the discussions for improvements in social and environmental performance.
- ☛ Separately from these presentations, we are learning the importance of sharing results with the broader community in smallholder agriculture to catalyze other organizations' actions, as appropriate.

Example of “Stoplight” for Idesa

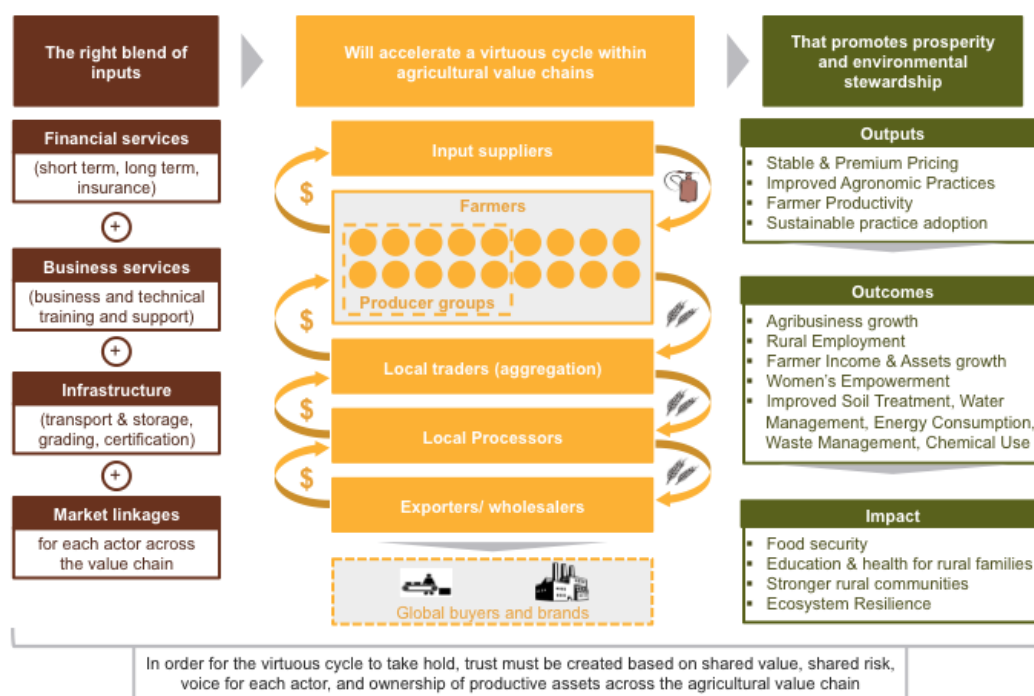






APPENDIX III: UNIVERSAL SMALLHOLDER THEORY OF CHANGE

Developed by the Initiative for Smallholder Finance



This universal theory of change represents an emerging consensus on a common theory of change across the smallholder finance community. The Initiative for Smallholder Finance developed the theory of change based on consultation with leading smallholder agricultural investors, technical assistance experts, certification bodies, commercial agricultural brands, and many of the foundations supporting smallholders. With many actors in the smallholder support community working at different levels of the agricultural value chain, this theory of change helps to create a shared vision for how these efforts combine to promote smallholders' prosperity and environmental stewardship.

— Council on Smallholder Agricultural Finance, <http://www.csaf.net/impact/theory-of-change/>

Root Capital participated in the development of the universal theory of change and is committed, through our impact studies, to continuing to contribute to the learning agenda of the smallholder agriculture community.

APPENDIX IV: PROGRESS OUT OF POVERTY INDEX®

To assess the poverty levels of cooperative members' households, we administered the Guatemala Progress out of Poverty Index® (PPI®) survey with a sample of members at their homes. The PPI, developed by the Grameen Foundation, is a standardized survey tool that estimates the likelihood that a household lives below a particular poverty line, based on 10 questions about their assets, household composition, and other factors statistically linked to poverty.

Cooperative	<\$1.25/day	<\$2.50/day	<\$3.75/day	Estimated income/day (from our survey)
Girasol	1.2%	17.5%	38.5%	\$5.52
Idesa	6.9%	52.8%	80.1%	\$.98
Catalina	2.9%	30.8%	60.8%	\$2.81
Lirio	4.3%	37.7%	66.3%	\$1.55

Responses to the PPI survey indicate that cooperative members live in moderate poverty, with most members likely living on between \$1.25 and \$3.75 a day. The exception is Girasol, whose members have a 61 percent likelihood of earning more than \$3.75 a day. Member responses to separate questions related to annual income generally support these findings. Both sets of data show that farmers in Idesa are the poorest, followed by Lirio, Catalina, and then Girasol.

Although the PPI can assess the likelihood that an individual lives in poverty, the index alone may be too blunt a tool to evaluate differences in the degree of poverty experienced by individuals. For example, among these four cooperatives, the PPI score did not correlate cleanly with food security data.

APPENDIX V: IMPACTS ON AGRICULTURAL PRACTICES AND ENVIRONMENTAL PERFORMANCE: COOPERATIVE-LEVEL FINDINGS

I. Girasol

Agronomic Extension Services

During the 2013 coffee season, Girasol offered three forms of agronomic assistance to its members. The cooperative's extension services were managed by one part-time staff member and funded through the cooperative's coffee revenues.

Figure 61: Agronomic extension services offered by Girasol during the 2012–2013 coffee season

Cooperative	Training	Input Services	Other Extension Activities
Girasol (Slow Food voluntary standard ¹⁰⁵ , a direct trade standard)	<ul style="list-style-type: none"> Offered free, centralized workshops in each sourcing community, sometimes in coordination with local government institutions 	<ul style="list-style-type: none"> Sold partially subsidized chemical fertilizers and other inputs Sold partially subsidized fumigation and fertilization services to members to combat coffee leaf rust 	<ul style="list-style-type: none"> Facilitated free soil analysis for members, in partnerships with a laboratory of Anacafé, the national coffee association

Eighty-six percent of Girasol members participated in training during the last coffee season. Participating members received an average of 14 hours of training. Access to training was significantly higher for members than nonmembers, only 16 percent of whom received any technical assistance during the same period.

Members of Girasol valued the cooperative's agronomic extension program, which was the second most-cited benefit of membership in the Most Significant Change question.

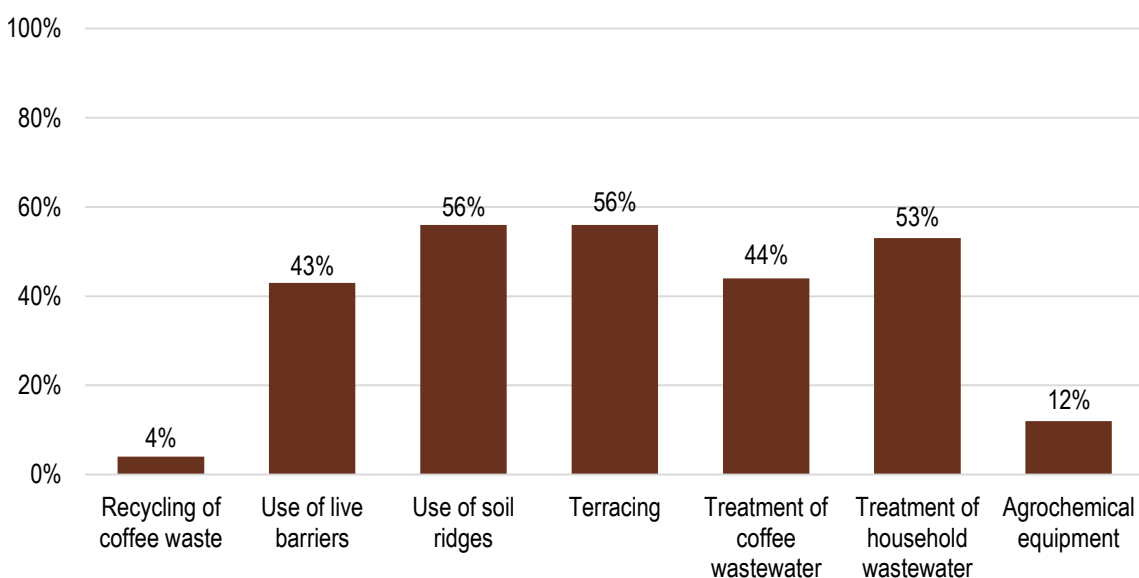
¹⁰⁵The Slow Food Foundation for Biodiversity is a non-profit organization associated with Slow Food International, a global organization founded to prevent the disappearance of local food cultures and traditions. Girasol is a participant in the Foundation's Coffee Presidia program, which seeks to raise awareness of coffee issues among consumers. Slow Food Foundation, "Coffee Presidia," <http://www.slowfoodfoundation.com/presidia/125/coffee-presidia>.

Cooperative Impacts on Members' Agricultural Practices

Main finding: Cooperative membership correlates with greater use of conservation practices among Girasol farmers.

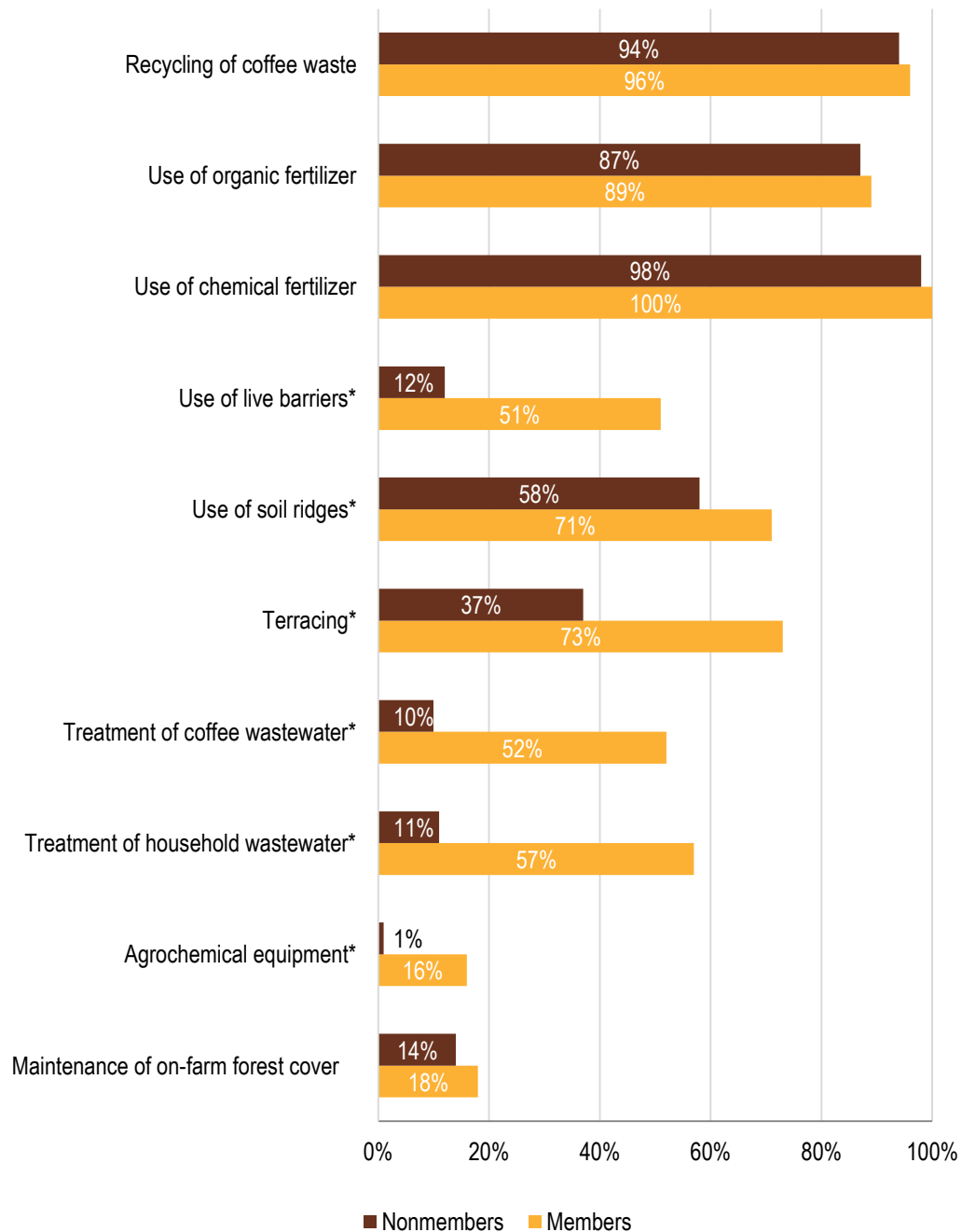
Members' production systems were fairly technified before joining Girasol, particularly compared to the members of other cooperatives examined. Farmers reported using conventional coffee practices prior to joining Girasol; most of the conservation practices examined were used by between 40 and 60 percent of members surveyed.

Figure 62: Use of conservation practices by Girasol members prior to membership



Responses to the producer-level survey reveal that Girasol members have changed their agronomic practices since joining the cooperative in line with the practices being promoted through the cooperative's agronomic extension program. Compared to pre-membership practices, members reported greater usage rates for all practices.

Compared to nonmembers, cooperative members reported statistically significantly higher use of six of the 10 conservation practices examined (indicated by an asterisk in Figure A2).



In focus groups, Girasol members attributed the use of many conservation practices to cooperative services, namely agronomic training and soil analysis. In particular, members reported adjusting their fertilization practices using data from the cooperative's soil analysis service, as well as improving shade management practices based on techniques they learned in training delivered by the cooperative.

Several members also noted, however, that they used soil erosion prevention practices, namely terracing, prior to cooperative membership.

Finding 1: Cooperative membership correlates with greater use of soil conservation practices

1a. Responses indicate that members have improved their fertilization practices since joining Girasol, increasing the volumes of organic fertilizers and reducing the volumes of chemical fertilizers applied

Compared to pre-membership practices, the vast majority (92 percent) of Girasol members reported adopting the use of coffee pulp as an organic fertilizer since joining the cooperative. The majority (70 percent) of members currently using coffee pulp also reported increasing the amount they apply. On the other hand, the majority (87 percent) of Girasol members currently using chemical fertilizer reported decreasing the amount they apply since joining the cooperative.

Compared to nonmembers, members reported similar usage rates for both types of fertilizer. Usage rates were over 87 percent for both members and nonmembers. It is unclear whether factors other than cooperative services have influenced fertilizer usage rates for both groups — unusually high, within the local context — or whether there has been a spillover effect of Girasol’s extension activities within the broader community.

Focus group discussions suggest that the changes in fertilizer use are driven primarily by a better understanding of proper, targeted fertilizer application through the cooperative’s training and soil analysis programs. In the case of chemical fertilizers, the reduction is likely also caused by the rising cost of these inputs.

These changes in fertilizer use likely have positive implications for the health of members’ soil, given that chemical inputs, if applied incorrectly or in excessive quantities, can damage soil structure, whereas organic inputs enhance soil fertility and structure.

1b. Cooperative membership correlates with greater usage of erosion prevention measures

Compared to pre-membership practices, Girasol members reported an increased use of all three measures examined (terracing, soil ridges, and live barriers). Girasol members also reported statistically significantly higher use of these measures than nonmembers. In general, these practices help retain productive topsoil and are particularly important in the mountainous regions in which Girasol members farm.

Finding 2: Cooperative membership correlates with greater usage of water quality conservation practices

A statistically significantly higher number of Girasol members reported using all three measures during the last production season than before joining the cooperative. Girasol members also reported statistically significantly higher use of these measures than nonmembers.

Use of some of these practices by members, however, remains low. Roughly half (52 percent) of Girasol members surveyed reported treating their coffee processing wastewater. Only 16 percent reported taking precautions when cleaning their agrochemical application equipment to prevent contamination of local waterways. Moreover, in focus groups several members reported disposing of their coffee wastewater directly into local streams or rivers.

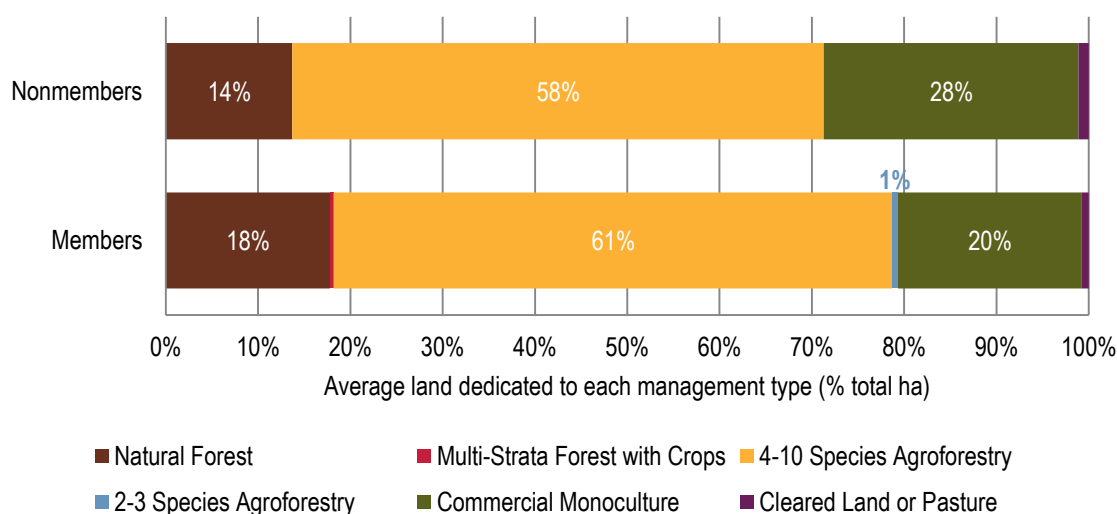
The limited use of water quality conservation practices is a concern, especially given members’ descriptions of heavily polluted waterways in their communities, contaminated by domestic

wastewater, agrochemical runoff, and coffee wastewater. This pollution threatens both human and environmental health.

Finding 3: On-farm biodiversity is a function more of context than of cooperative membership

We did not see any significant differences in the degree of on-farm biodiversity between Girasol members and nonmembers. Both groups held most of their land under dense agroforestry systems with between four and 10 cultivated species.

Figure 64: Landscape management profiles of Girasol members' and nonmembers' farms



II. Idesa

Agronomic Extension Services

During the 2013 coffee season, Idesa offered two forms of agronomic assistance to its members. The cooperative's extension services were managed by two technical staff and funded through international NGO partners.

Figure 65: Agronomic extension services offered by Idesa during the 2012–2013 coffee season

Cooperative	Training	Input Services
Idesa (organic, fair trade)	<ul style="list-style-type: none"> Offered one free, annual centralized workshop 	<ul style="list-style-type: none"> Provided partially subsidized fungicides, mostly to combat coffee leaf rust In a small pilot, sold partially subsidized improved coffee seedlings

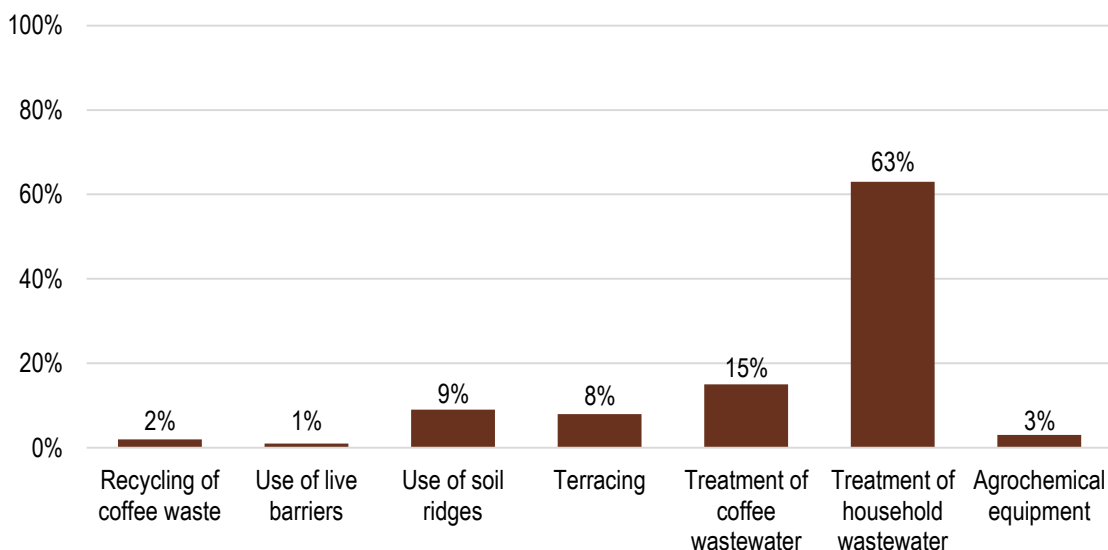
Just over half (55 percent) of Idesa members participated in training during the last coffee season. Participating members received an average of six hours of training, the least of any of the groups examined. Participation in training was significantly higher for members than nonmembers, none of whom received any technical assistance during the same period. Members of Idesa valued the cooperative’s agronomic extension program, with access to inputs and training the third and fourth most-cited benefits of membership, respectively, in the Most Significant Change question.

Cooperative Impacts on Members’ Agricultural Practices

Main finding: Cooperative membership correlates with greater use of conservation practices among Idesa farmers.

Prior to joining Idesa, members reported practicing organic, low-management coffee production, employing few of the conservation practices examined. Anecdotal evidence indicated that a limited number of farmers used chemical inputs, namely fertilizers. This suggests that members’ production systems were largely “natural” or “organic by default”: due to financial constraints and limited agronomic knowledge, most producers did not use any inputs, synthetic or organic, to maintain soil fertility, and so were likely degrading the health and productivity of their farms over time.

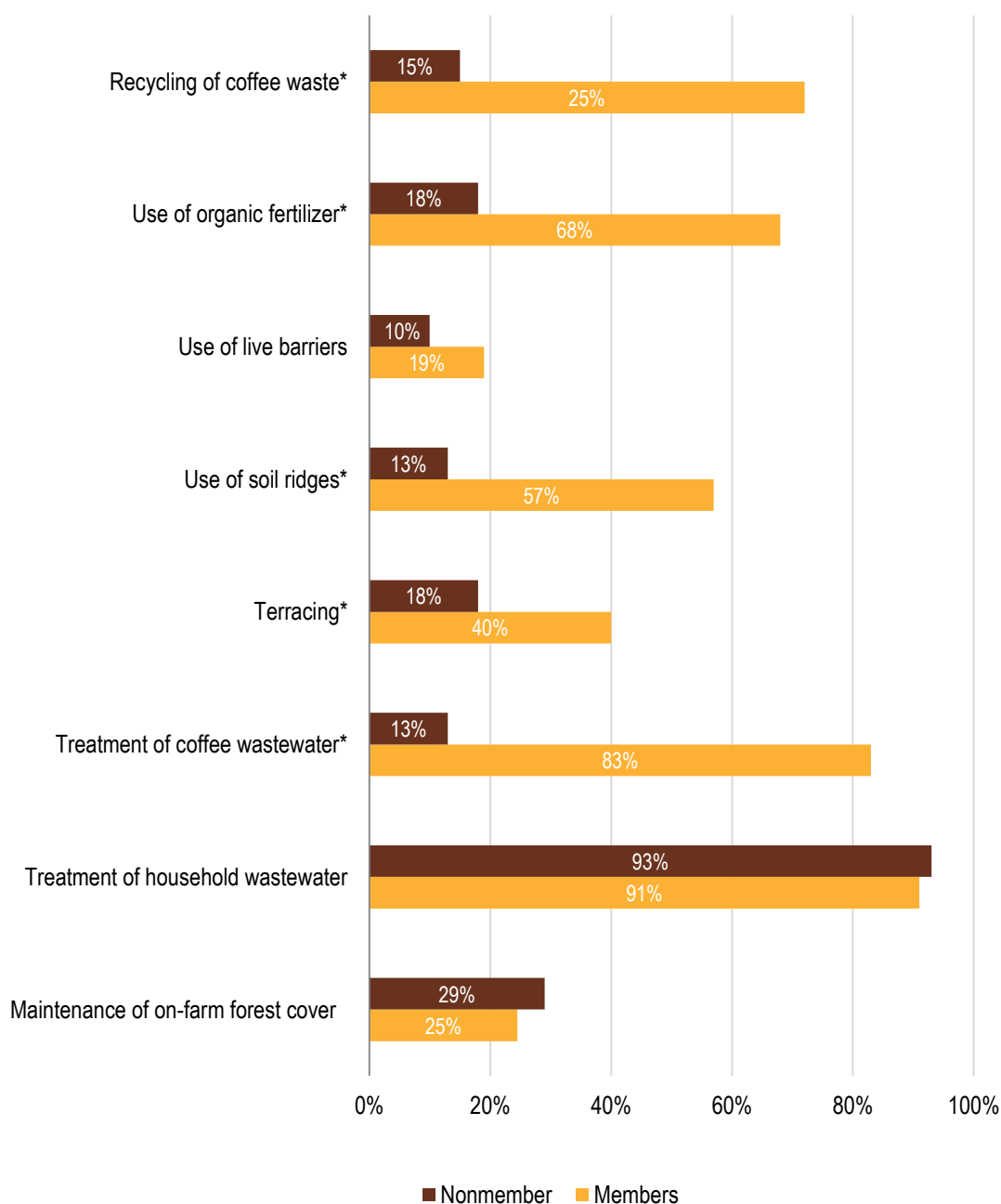
Figure 66: Use of conservation practices by Idesa members prior to membership



Responses to the producer-level survey reveal that Idesa members have changed their agronomic practices since joining the cooperative in line with the practices being promoted through the cooperative's agronomic extension program. Compared to pre-membership practices, members reported greater, often significantly greater, usage rates for all practices. Compared to nonmembers, cooperative members reported statistically significantly higher use of five of the eight¹⁰⁶ conservation practices examined.

¹⁰⁶ For Idesa and the other organic-certified cooperative, Catalina, we do not report on two conservation practices tied to the use of chemical inputs: the use of chemical fertilizer or the washing of agrochemical equipment. The use of chemical inputs is prohibited by the organic certification standard.

Figure 67: Use of conservation practices by Idesa members and nonmembers



In focus groups, Idesa members attributed these changes to cooperative services, namely agronomic training. Members reported adopting terracing, the use of soil ridges, composting, and proper shade management practices, among others, due to cooperative training. Several members noted that they did not use any conservation practices before joining the cooperative and that, upon joining, they received guidance on these practices from cooperative trainers.

Finding 1: Cooperative membership correlates with greater use of soil conservation practices

1a. Cooperative membership correlates with greater usage of organic fertilizers

The majority (70 percent) reported adopting the use of coffee pulp as fertilizer since joining Idesa. Members also reported statistically significantly higher usage of organic fertilizers than nonmembers.

1b. Cooperative membership correlates with greater usage of erosion prevention measures

Compared to pre-membership practices, Idesa members reported an increased use of all three measures examined (terracing, soil ridges, and live barriers). Idesa members also reported statistically significantly higher use of two of these measures (soil ridges and terracing) than nonmembers. In general, these practices help retain topsoil, important both for productivity and long-term soil health.

Focus group discussions suggest that the changes in soil conservation practices are driven by the cooperative's training program.

Finding 2: Cooperative membership correlates with greater treatment of coffee processing wastewater

Compared to pre-membership practices, a statistically significant higher number of Idesa members reported treating both coffee processing and domestic wastewater since joining the cooperative. Compared to nonmembers, however, we only saw statistically significantly higher treatment of processing wastewater, with a 70 percent difference between the two groups.

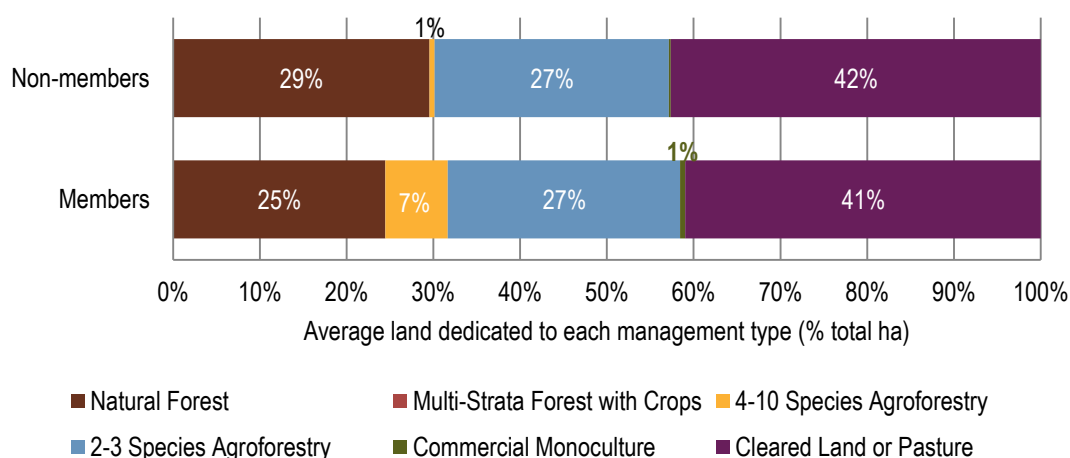
In focus groups, members of Idesa attributed their adoption of coffee wastewater treatment practices to cooperative training. They did not, however, attribute the adoption of household wastewater treatment practices to cooperative services. As nonmembers reported similar treatment rates for household wastewater, this suggests that external factors, such as improvements in local infrastructure, are driving increased treatment of household wastewater rather than cooperative interventions.

Overall, Idesa members reported greater use of these water conservation practices than members of the other three cooperatives. The reason for this is unclear and merits further investigation.

Finding 3: On-farm biodiversity is a function more of context than of cooperative membership

We did not see any significant differences in the degree of on-farm biodiversity between Idesa members and nonmembers. For both groups, about 40 percent of land under management was cleared or pasture land. This was significantly higher than in the other three pairings.

Figure 68: Landscape management profiles of Idesa members' and nonmembers' farms



We believe much of cleared or pasture land is devoted to food crops, as both members and nonmembers reported devoting a high percentage of their land, on average, to cultivating crops other than coffee. This helps contextualize the findings that both members and nonmembers suffered from fewer days of food insecurity in the past year than the other farmers surveyed, despite the fact that they reported the lowest incomes. (Data also suggests that members of Idesa also rely on a strong social network for mutual support during the lean months.)

III. Catalina

Agronomic Extension Services

During the 2013 coffee season, Catalina offered three forms of agronomic assistance to its members. The cooperative's extension services were managed by two part-time technical staff, one devoted to training activities and one to the organic fertilizer program, and funded through the cooperative's certification premiums and coffee revenues.

Figure 69: Agronomic extension services offered by Catalina during the 2012–2013 coffee season

Cooperative	Training	Input Services	Other Extension Activities
Catalina	<ul style="list-style-type: none"> Facilitated free, monthly centralized workshops from local government and nonprofit institutions 	<ul style="list-style-type: none"> Created and/or sold partially subsidized inputs to producers, including several types of organic fertilizer (compost, foliar, bokashi) and an organic fungicide consisting of copper sulfate and lime In a small pilot, supported members in replanting aged or diseased coffee plants by providing seedlings 	<ul style="list-style-type: none"> Organized community environmental education

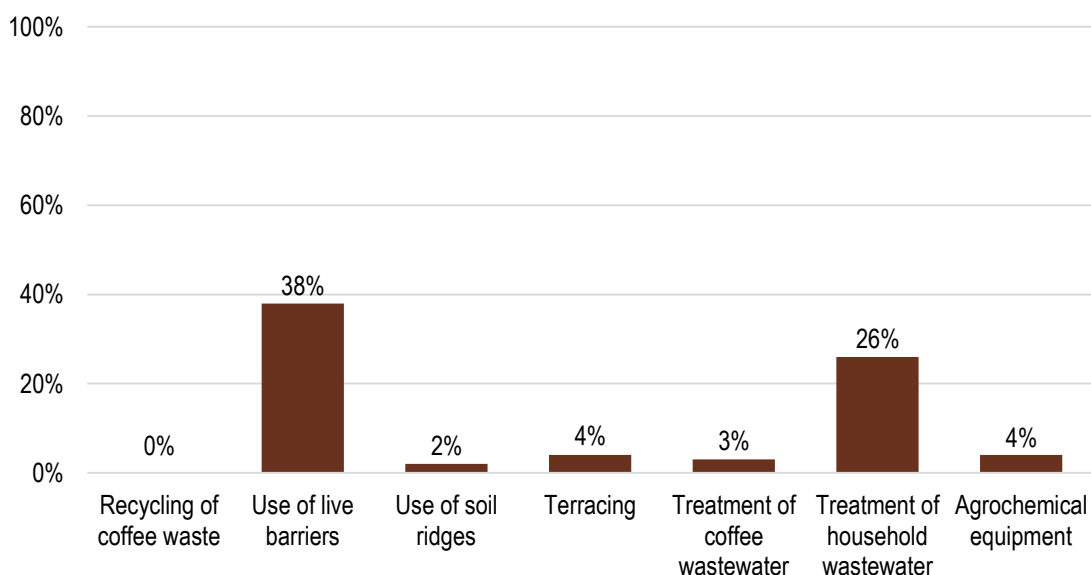
Just under half (45 percent) of Catalina members participated in training during the last coffee season. Participating members received an average of 12 hours of training. Participation in training was significantly higher for members than nonmembers, only 23 percent of whom received any technical assistance during the same period. Members of Catalina valued the cooperative’s agronomic assistance services, which ranked as the second most-cited benefit of cooperative membership in the Most Significant Change question.

Cooperative Impacts on Members’ Agricultural Practices

Main finding: Cooperative membership correlates with greater use of conservation practices among Catalina farmers.

Prior to joining Catalina, members reported practicing conventional, low-management coffee production systems, employing few of the conservation practices examined. Notably, no members reported using coffee pulp as an organic fertilizer before joining Catalina. Together, this suggests that farmers, due to financial constraints and/or limited agronomic knowledge, used few conservation practices before joining Catalina and were likely degrading the health and productivity of their farms over time.

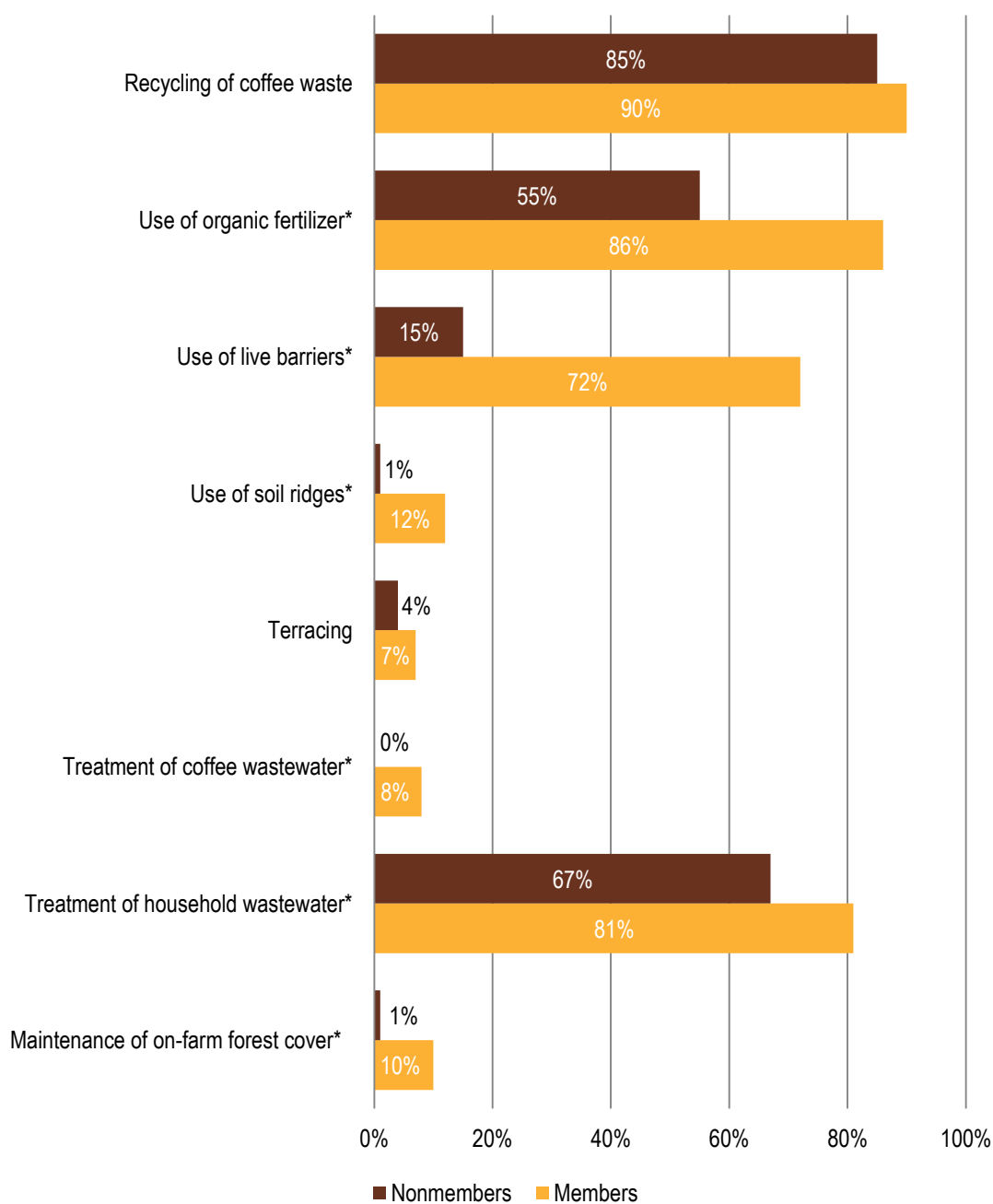
Figure 70: Use of conservation practices by Catalina members prior to membership



Responses to the producer-level survey show that Catalina members have changed their agronomic practices since joining the cooperative in line with the practices being promoted through the cooperative's agronomic extension program. Compared to pre-membership practices, members reported greater usage rates for all practices. Compared to nonmembers, cooperative members reported statistically significantly higher use of six of the eight¹⁰⁷ conservation practices examined.

¹⁰⁷ For Catalina and the other organic-certified cooperative, Idesa, we do not report on two conservation practices tied to the use of chemical inputs: the use of chemical fertilizer or the washing of agrochemical equipment. The use of chemical inputs is prohibited by the organic certification standard.

Figure 71: Use of conservation practices by Catalina members and nonmembers



In focus groups, Catalina members attributed these changes to cooperative services, namely agronomic training and credit. Specifically, members reported adopting terracing, live barriers, shade management, composting, buffer zones, and pruning due to cooperative training.

Finding 1: Cooperative membership correlates with greater use of soil conservation practices

1a. Responses indicate that cooperative membership correlates with greater use of organic fertilizers

The vast majority (90 percent) reported adopting the use of coffee pulp as fertilizer since joining Catalina. Members also reported statistically significantly higher usage of organic fertilizers than nonmembers, with a 30 percent difference between the two groups.

Focus group discussions also indicate that many members have stopped using chemical fertilizers since joining Catalina, per the requirements of the cooperative's organic certification. Several members mentioned, however, the difficulty making the transition from conventional to organic practices, due to the associated capital and labor costs and, in some cases, a lack of clarity on best application practices. They requested additional assistance from the cooperative on the creation and use of organic fertilizers.

1b. Cooperative membership correlates with greater use of erosion prevention measures

Compared to pre-membership practices, a statistically significantly higher number of Catalina members reported using all three measures examined (terracing, soil ridges, and live barriers) during the last production season. Catalina members also reported statistically significantly higher use of two of these measures (soil ridges and terracing) than nonmembers. In general, these practices help retain topsoil, important both for productivity and long-term soil health.

In focus group discussions, members attribute the adoption of soil conservation measures to cooperative training.

Finding 2: Cooperative membership correlates with greater treatment of household and coffee processing wastewater

Compared to pre-membership practices, a statistically significantly higher number of Catalina members reported treating both coffee processing and domestic wastewater during the last production season. Compared to nonmembers, members also reported statistically significantly greater use of both water conservation practices.

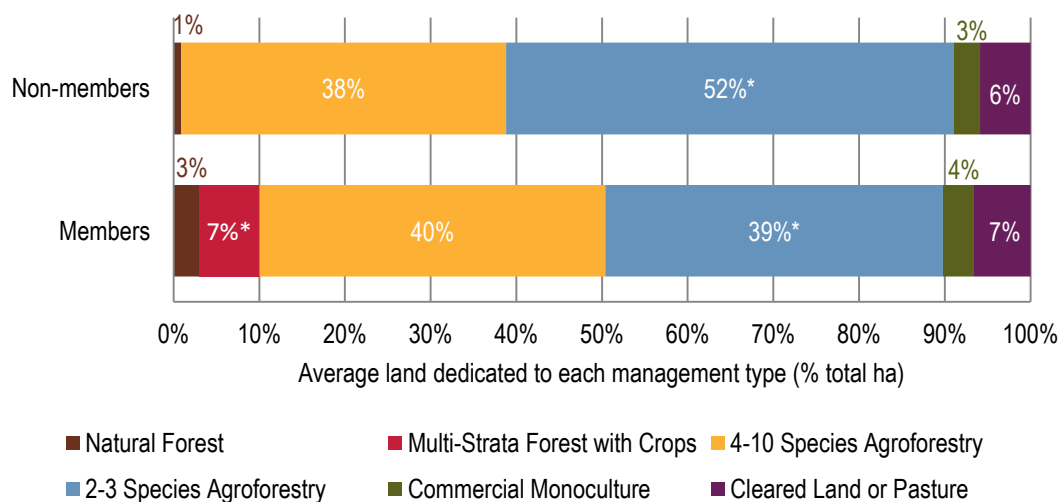
The rate of coffee processing wastewater treatment, however, remained low among Catalina members, at only 8 percent. We believe this is due to the fact that most members do not process their own coffee, because Catalina encourages members to have their coffee processed at the cooperative's wet milling facility to ensure quality control.

Finding 3: Cooperative influence on on-farm biodiversity management is unclear

Catalina members managed statistically significantly more of their coffee farms under complex agroforestry systems than nonmembers.

While members and nonmembers had essentially the same amount of coffee land under agroforestry management (both around 90 percent on average), cooperative members had statistically significantly more (7 percent) land under multi-strata agroforests, which have a denser and more diverse canopy of shade trees and are generally associated with higher on-farm biodiversity. By comparison, nonmembers had 13 percent more coffee land on average under simple agroforestry systems, with sparser shade coverage and fewer shade-tree species.

Figure 72: Landscape management profiles of Catalina members' and nonmembers' farms



Because this study did not explore farmers' understandings of or motivations for on-farm biodiversity management, it is unclear whether this difference is due to cooperative interventions or external factors.

IV. Lirio

Agronomic Extension Services

Lirio, the youngest cooperative of the group, did not manage its own agronomic extension program, but rather facilitated member access to services provided by the national coffee association Anacafé and an international NGO. During the 2013 coffee season, Lirio facilitated access to two forms of agronomic assistance.

Figure 73: Agronomic extension services facilitated by Lirio during the 2012–2013 coffee season

Cooperative	Training	Input Services
Lirio (fair trade)	<ul style="list-style-type: none"> Facilitated free centralized workshops from an international NGO; in last season, limited to one sourcing region 	<ul style="list-style-type: none"> Facilitated access to an international NGO's fertilizer donation program, designed to increase food crop yields

Just over half (53 percent) of Lirio members participated in training during the last coffee season. Participating members received an average of 13 hours of training. Participation in training was significantly higher for members than nonmembers, only 22 percent of whom received any technical assistance during the same period.

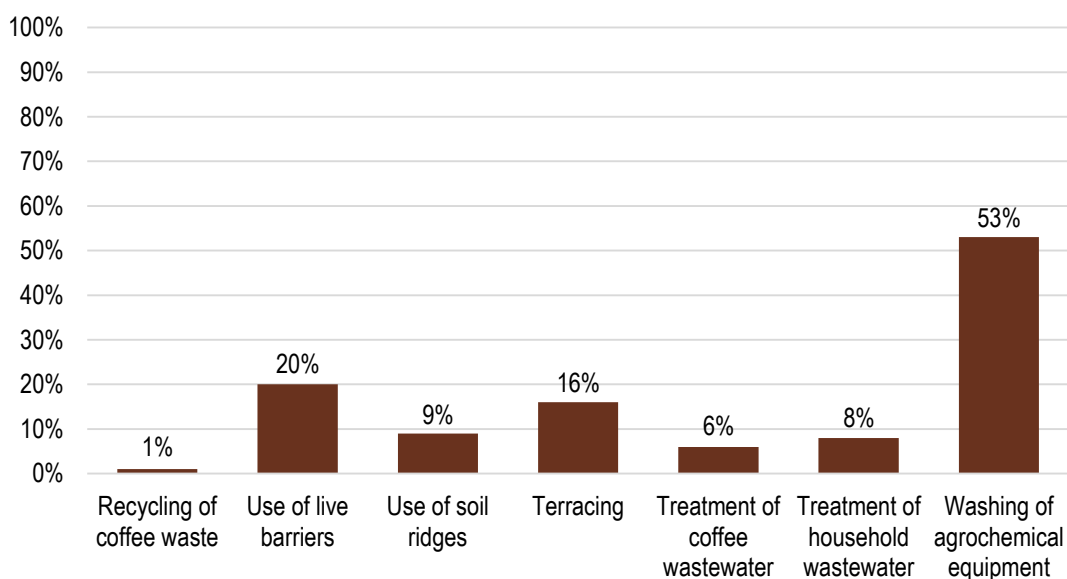
Members of Lirio valued the cooperative's agronomic extension program, which ranked as the second most-cited benefit of cooperative membership in the Most Significant Change question, behind linking members to other organizations, presumably including the NGO partner providing members with training and inputs.

Cooperative Impacts on Members' Agronomic Practices

Main finding: Cooperative membership correlates with greater use of some conservation practices among some Lirio members, but the changes are not widespread.

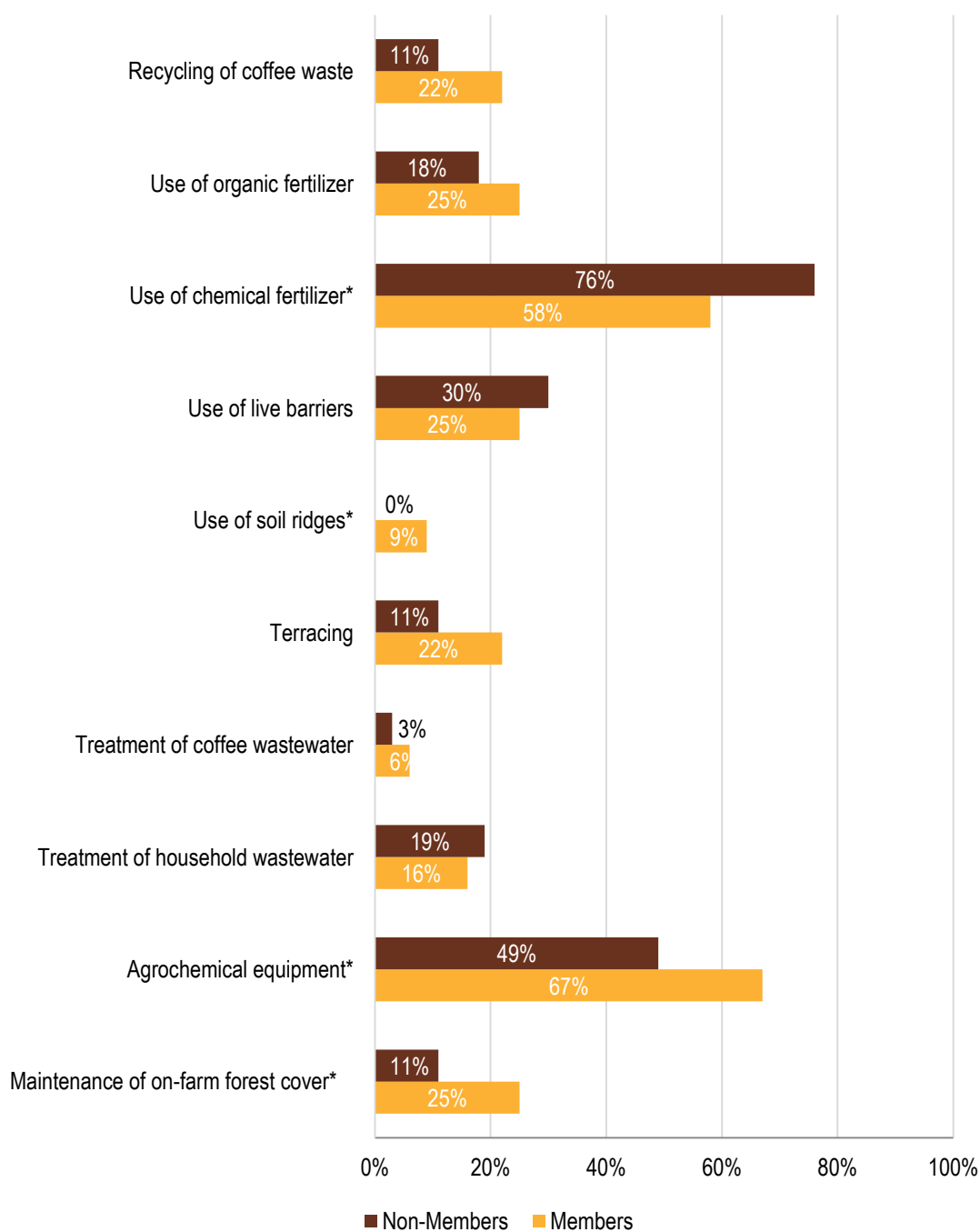
Prior to joining Lirio, members reported practicing conventional, low-management coffee production systems, employing few of the conservation practices examined. Notably, only 1 percent of members reported using coffee pulp as an organic fertilizer before joining Lirio; fewer than 20 percent reported using any of the erosion prevention measures. Together, this suggests that farmers, due to financial constraints and/or limited agronomic knowledge, used few best management practices prior to joining the cooperative and were likely degrading the health and productivity of their farms over time.

Figure 74: Use of conservation practices by Lirio members prior to membership



Responses to the producer-level survey show that a minority of Lirio members have changed their agronomic practices in line with the practices being promoted through the cooperative's agronomic extension program. For each of the practices examined, 20 percent or fewer of members reported adopting the practice since joining the enterprise. Compared to nonmembers, cooperative members reported statistically significantly higher use of only three of the 10 practice indicators.

Figure 75: Use of conservation practices by Lirio members and nonmembers



In focus groups, members attributed the limited adoption of conservation practices since joining Lirio to inadequate technical assistance and the cooperative's failure to deliver on promises to provide higher pricing for fair trade-certified coffee.¹⁰⁸ The lack of premiums eroded members' confidence in the organization and, likely, their willingness to invest time and money in adopting new practices.

Finding 1: Cooperative membership correlates with slightly higher use of soil conservation practices

1a. Responses suggest that most members have not changed their use of organic fertilizers since joining Lirio, but have reduced their use of chemical fertilizers

Compared to pre-membership practices, a statistically significantly higher number of Lirio members reported using coffee pulp as an organic fertilizer during the last production season. However, the current rate of organic fertilizer use was low, at 25 percent of members; this was not statistically significantly different from the rate for nonmembers. Anecdotal evidence suggests that members struggle to create organic fertilizer for their farms, given limited organic inputs, particularly coffee pulp, and limited labor.

Members of Lirio reported statistically significantly lower usage of chemical fertilizer than nonmembers. Only 58 percent of members reported using chemical fertilizers during the last production season, as compared to 76 percent of nonmembers. By comparison, 100 percent of members from the well-functioning conventional cooperative Girasol reported using chemical fertilizers.

Moreover, about 40 percent of Lirio members currently using chemical fertilizers reported reducing the amount applied since joining the cooperative. In focus group discussions, members mention the high and rising costs of chemical inputs, suggesting that many farmers are deferring or limiting chemical fertilizer application due to financial constraints, with negative implications for soil health and productivity on their farms.

1b. Cooperative membership correlates with slightly higher usage of erosion prevention measures

Compared to pre-membership practices, statistically significantly higher numbers of Lirio members reported using live barriers and terracing during the last production season. Compared to nonmembers, however, members only reported statistically significantly higher use of one practice, soil ridges.

In focus group discussions, some members attributed their adoption of terracing and other soil erosion prevention practices to cooperative training. Overall, however, the use of these practices remains limited. This may be a reflection in part of Lirio members' local landscape, which is less mountainous than other parts of Guatemala, including the highlands in which Girasol and Idesa members farm, and therefore less prone to erosion.

Finding 2: Cooperative membership correlates with greater use of some water quality conservation practices

Compared to pre-membership practices, a statistically significantly higher number of Lirio members reported treating their household wastewater and using safe agrochemical equipment washing methods

¹⁰⁸ Lirio achieved fair trade certification in 2013, yet the certification was not recognized by its existing buyer. As a result, Lirio could not pay its members the promised premium during the 2012-2013 coffee season. (For details on Lirio's situation, refer to Chapter 1.)

during the last production season. Only a limited number of members reported adopting the treatment of coffee processing wastewater.

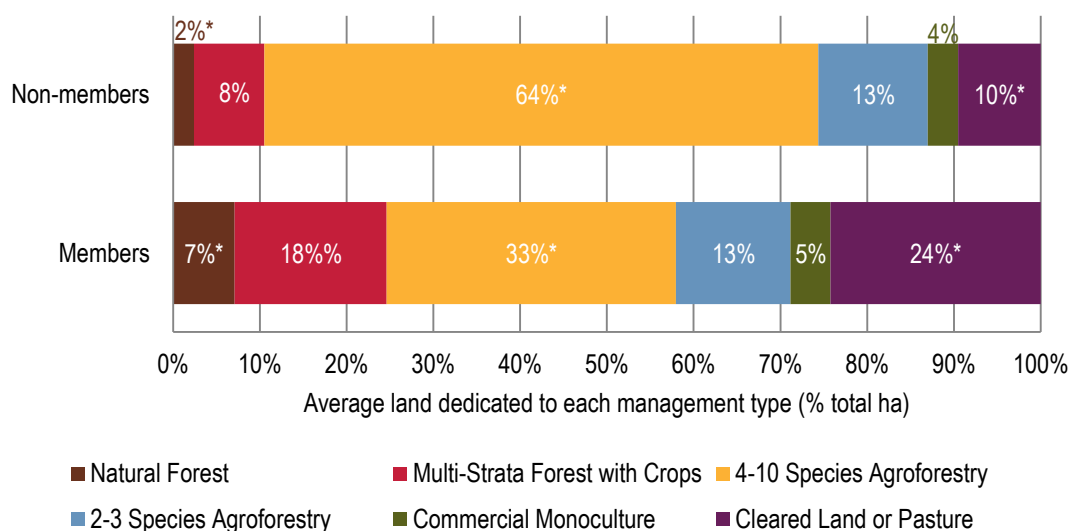
Compared to nonmembers, members reported statistically significantly higher usage of safe agrochemical equipment washing methods. We did not see statistically significant differences in the treatment of domestic or coffee processing wastewater.

Finding 3: Cooperative influence on on-farm biodiversity management is unclear

Lirio members and nonmembers reported statistically significantly different land management patterns. Causality for these differences, however, is unclear.

Compared to nonmembers, Lirio members managed statistically significantly more of their coffee farms, on average, under natural forest or multi-strata agroforestry systems, both of which are associated with relatively greater biodiversity. Members also reported, however, having statistically significantly more cleared or pasture land than nonmembers. Both members and nonmembers kept the highest percentage of their land under agroforestry systems with between four and 10 species under cultivation.

Figure 76: Landscape management profiles of Lirio members' and nonmembers' farms



It is unclear whether these differences are due to cooperative interventions or external factors. Looking across the four cooperatives, we found a positive correlation between total land under management and percentage of land under complex agroforestry or natural forest management. In the case of Lirio, members had roughly twice as much land, on average, than nonmembers (about 2 hectares compared to about 1 hectare). This may have allowed members to keep more of their land under multi-strata agroforestry and natural forests, but does not explain why members also had more cleared land on average than nonmembers.



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